Castledown

Engagement in PC-based, smartphone-based, and paper-based materials: Learning vocabulary through Chinese Stories

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Abstract

Various studies have discussed learners' attitudes and achievement in CALL and MALL (Kiernan & Aizawa, 2004; Lu, 2008; Huang & Lin, 2011, but there has been little research into a combination of these with paper-based materials to date in terms of their attitudes and the factors leading to decisions about which to use. Research has suggested that learners show generally positive attitudes towards using technology for learning, but this is not necessarily reflected in actual usage (e.g., Stockwell, 2010), and there have been few studies that have looked at all three of these methods within a single study. Thus, this study investigated 70 Japanese learners of Chinese to examine their task engagement and attitudes toward PC-based, smartphone-based, and paper-based materials designed to supplement their learning outside the classroom, as well as to identify the potential reasons behind their choice of method. All of the materials were largely the same, but the materials on the website and mobile application included several interactive activities that were not possible to replicate with the paper-based materials. The study was carried out over an eight-week period in three classes, and the learners could choose which materials to use at any point throughout the period. Data collection included weekly, pre- and post- surveys, along with interviews to determine how they framed the activities as a supplement of their courses. The results revealed that learners made informed decisions about what materials they used, with which technological difficulties, learning strategies and conditions had varying effects on engagement and attitude.

Keywords: task engagement, attitude, vocabulary learning, Chinese as a Foreign Language

Introduction

There is mounting evidence to suggest that technologies can have a positive impact on second language learning, providing learners with opportunities for output, interaction, and feedback, as well as enhancing affect, motivation, and metalinguistic knowledge (Golonka, Bowles, Frank, Richardson, & Freynik, 2014). The effects on language education are deep reaching, resulting in large shifts in the

way that language is taught, learned, used, and even perceived. As Stockwell and Tanaka-Ellis point out, language teaching and learning environments have "evolved dramatically as a direct result of advances in technology, and it is likely that technologies will continue to develop, producing even more diversity in environments" (2012, p. 89). This diversity is often a cause of confusion for teachers due to the wide range of options that are available to them, who are unsure about what technologies are suitable to their own individual contexts. Numerous studies have generally yielded positive outcomes in terms of effectiveness and learner attitudes regarding technologies, whether mobile or otherwise (e.g., Smith, 2004; Chen, 2013), which can lead to assumptions that technology is universally not only superior to but also preferred by learners over paper-based alternatives.

While relatively sparse, there have been a small number of studies that look at learning outcomes of both computer- and mobile-assisted language learning tools, as well as paper-based materials in the literature (e.g., Fuente, 2003; Lu, 2008; Kim, Rueckert, Kim, & Seo, 2013). Outcomes of these studies have been biased towards mobile learning—at least with regards to potential affordances—typically concluding that mobile devices are ideal to help students increase exposure to the L2 even when they are outside of the classroom due to their portability and flexibility (e.g., Chen, 2013). However, considering studies that have pointed out less-than-expected usage of mobile devices for engaging in learning activities outside of class when other alternatives are available (e.g., Stockwell, 2010; Kim et al., 2013), is it valid to assume L2 learner task engagement and attitude in mobile-based activities will be more positive compared to the others? There have been very few studies to date which have focused on actual student task engagement and attitudes across these three methods to explore what shapes in their decisions in selecting computer-based, mobile-based, or paper-based materials to carry out language learning activities, and as such, this was the primary question that guided the current study. Knowing how learners choose to use to engage in outside of class and having some understanding of the reasons behind their choices can play a role in helping teachers to design materials that are more suited to learners' uses, which will, it is hoped, lead to more sustained engagement in the activities outside of class.

Task Engagement out of Class

Given the time restrictions that many teachers face in teaching languages in formal learning contexts, requiring learners to carry out language learning activities and use resources that supplement what has been done in class is a very common practice. Encouraging learners to engage in these activities outside of class, however, can be a struggle unless learners have some degree of autonomy, that is, they are sufficiently motivated and possess the necessary study skills to do so (Stockwell, 2012). As Gardner (1985, p. 10) argues, success in language learning depends on a "combination of effort plus desire to achieve the goal of learning the language plus favorable attitudes toward learning the language." Favorable attitudes towards learning a language can serve as motivation to engage in learning above and beyond regular classes to some degree, but motivation is prone to changes over time with learners' learning experiences and goals (Dörnyei & Ushioda, 2013). Thus, while it is evident that autonomy is dependent upon motivation, it is also related to several other factors within a complex social environment (Oxford, 2003; Little, 2007; Murray, 2014). Autonomy has been described as a pre-existing capacity for behavior that learners already possess but requires teacher intervention to link to language learning (Little, Dam, & Legenhausen, 2017), and as a "developmental process" (Benson, 2011, p. 69) that develops over time rather than being formally taught or learned. From this, autonomy in a broader sense is a characteristic that learners are already equipped with to some degree, although dependent on the specific tasks that learners perform (Schwienhorst, 2008). The primary problem that remains for teachers, however, is how to make the most of this autonomy to encourage learners to take the time to use the resources that teachers provide for them to assist them in their learning outside of class. Obviously, engagement goes beyond simply the amount of time spend on tasks and also includes

the degree to which the learners are involved in them (see Philp & Duchesne, 2016), and may include cognitive, behavioral, emotional, and social elements. In the context of the current study, the term engagement is used in a broader sense to indicate that the learners spent quality time engaging in the activities with the purpose of improving their language skills.

Discussions of the characteristics of optional tasks that lead to learners to engage in them has long been a regular topic in educational research, and various theories have been developed to account for learners' (lack of) engagement in these tasks. One such model that has attempted to achieve this is the Expectancy-Value Theory, that has as its central tenet that the amount of time and effort that learners are willing to put into a task will depend on the value that they see in doing the task compared with the amount of effort required to complete it. According to Wigfield and Eccles (2000, p. 68), "individuals' choice, persistence, and performance can be explained by their beliefs about how well they will do on the activity and the extent to which they value the activity." Dörnyei and Ushioda (2013) suggest that the expectancy value can affect motivation as well, stressing that "the greater the perceived likelihood of goal-attainment and the greater the incentive value of the goal, the higher the degree of the individual's positive motivation" (p. 13). The implications for this are that learners need to believe that they can use resources in a manner that justifies the amount of time spent on them.

Attitudes Toward Learning with Technology

Technology has been widely cited as a means of providing tasks and activities that learners are willing to engage in of their own volition (e.g., Sanprasert, 2009; Lai & Gu, 2011), dependent on various factors such as cultural values (Lai, Wang, Li, & Hu, 2016), teacher influence (Lai, 2015), training (Stockwell & Hubbard, 2014; Lai, Shum, & Tian, 2016), and a sense of community (Chik, 2014). What remains to be seen, however, is whether technology is viewed by learners as a viable option to learners when other alternatives are available. There is evidence that choices are made within available technological options. Stockwell (2007, 2009, 2010) found that learners were more likely to select computers as the method for completing vocabulary and listening activities outside of class than mobile phones, with the primary reasons for this being associated with finding a suitable location to study and technological affordances such as the small size of screen, lower storage, and inconvenient inputting methods of mobile devices (cf., Lu, 2008; Kim & Kim, 2012; Stockwell & Liu, 2015). Studies that compare technology with paper have often shown a preference for technology, largely attributable to the enhanced interactivity and access to multimedia that technology affords (Uther & Banks, 2016). In contrast, however, there have also been research that suggests that learners will select paper-based materials when they see it as more appropriate to the particular task. Huang and Lin (2011) found that Taiwanese learners of English were more likely to choose mobile phones for reading shorter passages, but then selected paper-based materials for longer passages simply because they were easier to read on paper.

Assumptions that younger learners will automatically prefer technology to alternative methods on the grounds of their being so-called "digital natives" (Prensky, 2001) have come to be challenged over the years (Helsper & Eynon, 2010). Younger learners may be more experienced with using technology, but this is not a good predictor of their ability to use these technologies without training and support (Teo, 2016). This leads us to the question of how to get some insights into whether learners are willing and able to use technology, and how is this willingness translated into actual usage. Hopefully, this study could give some indication of users' attitudes towards using technology, which may provide insights into learners' decisions for choosing between a technology and other alternatives.

While the study was largely exploratory in nature, there were two main guiding research questions posed:

1. How do learners engage in PC-, smartphone-, and paper- based materials for undertaking vocabulary tasks outside of class?
2. What are the reasons that students choose specific methods and what are the reasons behind their choices?

Methodology

Research design

A sample of 70 Japanese university students enrolled in elementary Chinese classes participated in the study. The participants could choose and switch among the three methods—computer-based, mobile-based, and paper-based materials—as they liked during the study. Each method offered the same materials with varied functions, which were provided by "Chinese Stories," an online Chinese learning system that the system developers allowed the researchers to use for the study. The study was carried out in four phases. The first phase consisted of technological training that was conducted in the first week, where participants were introduced to the functions of the online system, to understand how to utilize the functions of the system. After this training session, a pre-survey was distributed to understand students' experience and expectations regarding using technology for learning Chinese.

In the second phase, the participants were asked to finish eight lessons outside of class over an eight-week period, consisting of a total of eight story. The students were provided with a paper-based version of the materials, but they were also free to use either the PC website or mobile app if they preferred. They were also able to use any combination of materials that they saw fit. After each lesson, the participants were required to fill out a learning journal to record their learning methods, location, time spent, and any comments about their experience.

In the third phase, at the end of the 15-week semester, the participants were required to fill out a post-questionnaire, which sought to identify learners' attitudes toward the involved learning methods. Since the survey questions were closed-ended, the neutral option was removed to force the participants to choose their responses (i.e., participants had to choose from an even number of options meaning that their responses would have to indicate—even marginally—whether they felt positively or negatively about the questions being asked. In the final phase, nine students voluntarily engaged in group-interviews to collect additional data from their learning journals and questionnaires.

Participants

All students who entered the degree program were required to take two different foreign languages as a requirement of their degree. Almost all students chose English as their first foreign language, and for their second foreign language they had a choice of French, German, Spanish, Chinese, and Russian. The 70 students in the study were in three intact Chinese classes, and at the time the study was conducted were in their second semester and still at an elementary level of Chinese. The age of the participants ranged from 18 to 20 years old and included 31 female students and 39 male students. While the level was comparable, each of the three classes had a different class teacher who taught different content based on teachers' own preferences.

Materials: The Chinese Stories system

All three methods included identical content from the Chinese Stories system, but the nature of each medium meant that there were necessarily some different functions and interfaces (see Table 1). Chinese Stories consisted primarily of reading materials based on both ancient and contemporary

stories showcasing Chinese society and culture and were intended to encourage learners to read about Chinese speaking countries in Chinese. The stories were not directly related to the content of the classes but were selected as they were thought to be interesting to learners of Chinese regardless of field of study. Activities included reading passages, vocabulary activities based on the passages with definitions in Japanese, and sample sentences in Chinese. The computer and mobile versions also contained audio recordings of the reading passages. Links to Wikipedia enabled learners to get more information about topics that arose, and actual place names were linked to Google map to get more information about them.

Table 1 Identities and differences from three platforms of Chinese Stories

Descriptions*			Website	Mobile application	Printout
Functions	Chinese text	i	✓	✓	✓
	Chinese text with Japanese translation	i	✓	✓	✓
	Chinese text with Pinyin	i	✓	✓	✓
	Grammar list	i	✓	✓	✓
	Vocabulary list	i	✓	✓	✓
	Word bank		✓	✓	-
	Progress report		✓	✓	-
	Quiz	o	✓ (vocabulary and grammar practices)	✓	△ (only grammar practices)
	Extensive reading (links to Wikipedia and Google map)	i	✓	✓	-
	Live voice recording MP3	i	✓	✓	-
	Note	o	✓	✓	✓
	Comments/ questions (interactive feedback)	a	✓	✓	-
Interface	Colored fonts		✓	✓	-
	Adjustable font size		✓	✓	-
	Screen size		Large	Small	-
	Screen orientation		Horizontal	Vertical	Horizontal
	Access		Mouse click	Touch screen	Manual operation

*i=input; o=output; a=interaction

Data collection methods

This study applied mixed methods with quantitative and qualitative approaches under the framework of grounded theory (Glaser & Strauss, 1967), in order to explore the complex factoring phenomena in CALL environment (see Stickler & Hampel, 2015). The data was collected and interpreted by the following instruments.

Learning Journal

Students' learning journals were analyzed to examine how they engaged in the tasks, for example, which method or methods they used, the locations where they engaged in activities, and the time spent working on them. In addition, a comment column in the learning journal was included as an optional open question where students were free to make any comments about the system or tasks, or to give

reasons why they did not complete the task if they so desired. The participants were asked to fill out the learning journal before the class in the following week. They could choose to complete it online (a link was inserted in the website and the mobile app), or on a printed copy which was supplied to them at the beginning of the study. The information in the learning journals was not shared with the class teachers, and this was made clear to the participants at the outset to avoid giving inflated responses in the hope of giving a better impression.

Surveys & Interviews

Pre-treatment and post-treatment surveys were carried out to find learners' basic demographical information and their attitudes towards the technology both before and after the treatment. The pre-treatment survey consisted of two parts. Part 1 asked for learners' background information including sex, age, device ownership, period of learning Chinese, Chinese proficiency, reason for choosing Chinese as a subject, experience in learning Chinese with a computer and/or smartphone. In Part 2 section, a 4-poins Likert scale based on the Technology Acceptance Model (TAM) (Davis, 1993) was designed to quantify learners' experience and attitudes toward the three methods. Additionally, a post-questionnaire was conducted to collect information about learners' attitudes towards learning with a PC, smartphone, and paper-based materials. Group interviews with students from each of the three classes were arranged to collect more detailed information and to clarify responses in their learning journals and questionnaires.

## Results

Pre-treatment surveys

The purpose of the pre-treatment survey was to investigate various devices owned by the participants, as well as their experiences and willingness of learning Chinese via technology. Firstly, as shown in Figure 2, the ownership of desktop (20%) and tablet (17%) was comparatively low, 89% of the 70 learners owned a laptop and all of them owned a smartphone (100%).
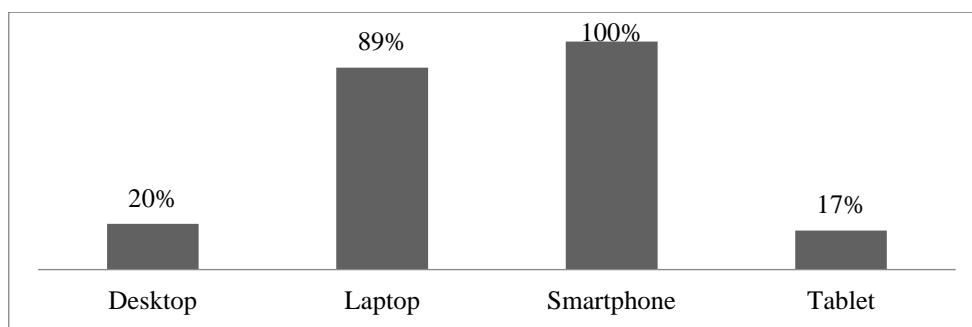
Figure 2 Different devices owned by students (n=70)

Secondly, learners were asked if they had any Chinese learning experience in using different devices, specifically with PCs (desktop and laptop computers are collectively classified) and smartphones, along with the language skills and language knowledge they had practiced. Most of the students responded they had never used a PC (87%) or a smartphone (81%) to learn Chinese. Merely six (9%) of the students had experience in using a PC, and three of the students (4%) gave unclear answers. Of the six learners who had used a PC, four had used it for improving listening skills, and one each for vocabulary, grammar, and writing learning. On the other hand, the percentage of the learners who had learning experiences with the use of a smartphone was slightly higher. Of the 13 students (19%) who had used their smartphone as a Chinese learning tool, eleven had used it for vocabulary learning, five for listening, and four for grammar learning.

While students responded that they did not have any Chinese learning experience with PCs or smartphones, they were asked further about their willingness of trying the two new methods. As shown in Figure 3, 57% (35) of the students who did not have experience of using PC as a Chinese learning tool were willing to try; 67% (38) of the students who had not used smartphone to learn Chinese were willing to try. This suggests that the students had more positive willingness to try smartphone as a CFL tool compared with PC.
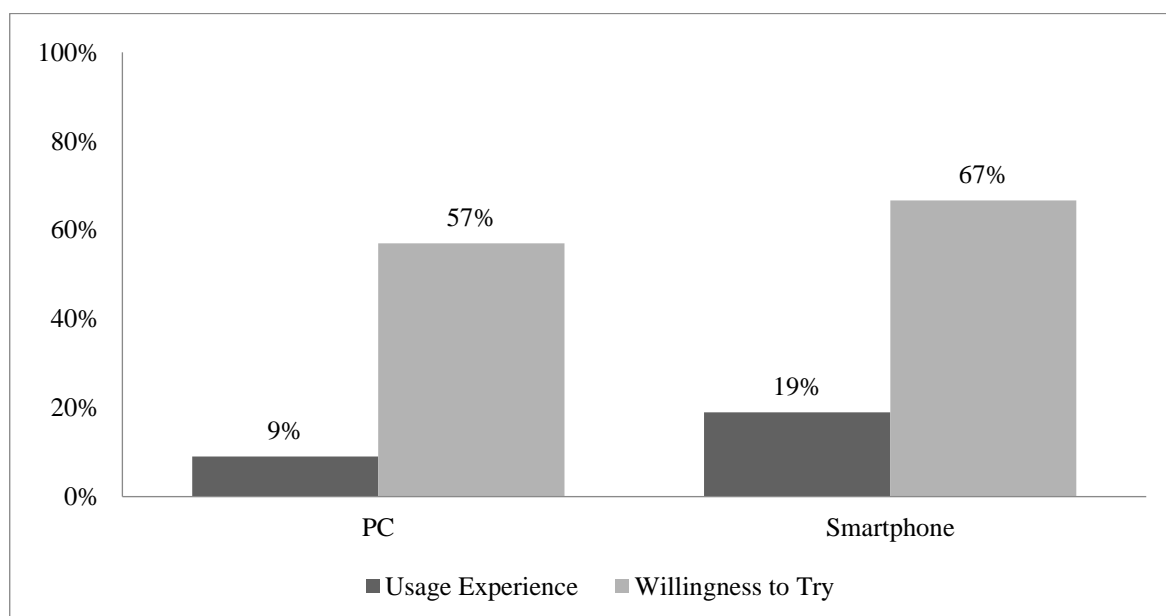
Figure 3 Usage experience and willingness to try PC and smartphone for learning Chinese
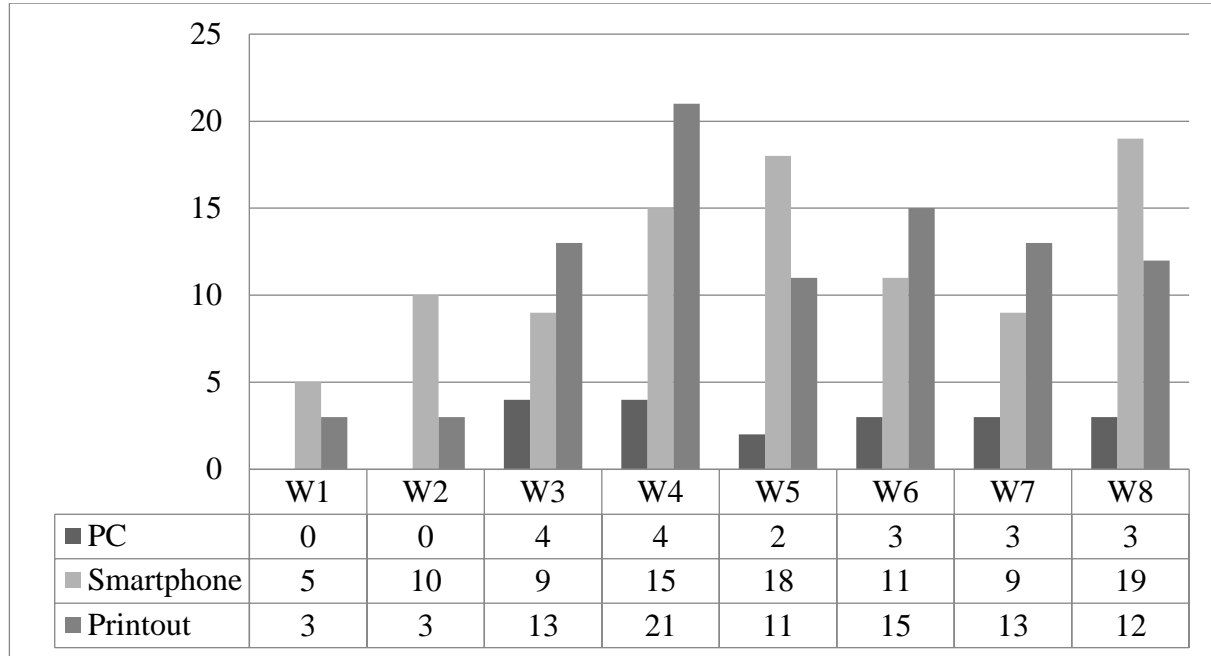
Learning journals

The data from the learning journals reveals which method the students used, along with the location and time spent on different tasks. Table 2 lists the numbers of different tasks completed through the different methods throughout over the eight-week period. As can be seen, most of the tasks were completed on smartphones (57.4%), followed by paper-based materials (30.5%), PCs (11.4%), and lastly tablet (0.7%). The number of the vocabulary tasks (21.9%) and grammar tasks (21.6%) were completed higher than reading tasks (18.8%), quizzes (14%), listening tasks (12.9%), and the other tasks (10.7%).

Table 2 *The numbers of different tasks completed on different platforms throughout the eight lessons*

Task	PC	Smartphone	Tablet	Printout	Total
Vocabulary	19	96	2	91	208
Grammar	19	114	1	71	205
Reading	17	97	1	64	179
Listening	19	81	1	22*	123
Quiz	17	92	1	23	133
Others	17	65	1	19	102
Total	108	545	7	290	

***Note**: The listening tasks were not available on printout, but it might be a possibility that students used two methods together. For instance, students who answered that they used paper-based materials to complete the tasks may have been other devices at the same time to play the listening, and the interviews failed to provide further information about this.

Furthermore, Figure 4 shows the number of vocabulary tasks engaged in through each method over the eight weeks. Smartphone and paper-based material usage fluctuated over the eight weeks. In the first two weeks, vocabulary task engagement on smartphones was the highest, but paper-based materials caught up from the third week and reached a peak (21 tasks) in Week 4, but this decreased gradually. In the final week, vocabulary task engagement on smartphones rose dramatically (19 tasks) compared to the previous two weeks. PC usage was consistently low throughout the eight-week period.

	W1	W2	W3	W4	W5	W6	W7	W8
■ PC	0	0	4	4	2	3	3	3
■ Smartphone	5	10	9	15	18	11	9	19
■ Printout	3	3	13	21	11	15	13	12

Figure 4 Vocabulary tasks completed through the three different methods each week

The students were asked to take note of the locations where they completed the tasks in their learning journals. As Table 3 demonstrates, most of the tasks were completed at home (394 tasks; 41.1%), and following at school (30.5%) and when commuting (24.3%), besides, 2.5% of the tasks were finished in "other" places where the students did not identify clearly. Lastly , a small number of the tasks (1.57%) were completed at part-time job locations, but one student stated that he "did not feel free to study there (in his working place)".

Furthermore, Table 4 indicates where and what the methods the learners used to engaged in their vocabulary tasks. Accordingly, most of the vocabulary tasks were completed through smartphones while commuting and at home, and the students tended to use printout at home and at school, which shows the students had their preferred learning methods in different learning conditions.

Table 3 The numbers of different tasks completed in different locations

Task	Commuting	At home	At school	Part-time job site	Others*
Vocabulary	50	84	66	4	4
Grammar	53	79	65	4	4
Reading	43	72	58	3	4
Listening	26	59	37	1	4
Quiz	35	53	37	2	4
Others	26	47	29	1	4
Total	233	394	292	15	24

*Note: Students did not specify where "others" was.

Table 4 *The numbers of vocabulary tasks completed with different devices in different locations*

	PC	Smartphone	Tablet	Printout
Commuting	1	33	0	16
At home	14	34	2	34
At school	4	28	0	34
Part-time job	0	1	0	3
Others	0	0	0	4
Total	19	96	2	91

Post-treatment surveys

The data from the post-treatment survey were analyzed to give some insights into how learners viewed using the PC-based, smartphone-based, and paper-based materials for engaging in the activities. From Part 1 in the post-questionnaire, students were asked whether they had engaged in any of the tasks on their smartphone and PC. If they answered "No," further open questions were provided to find the reasons why they never tried. According to Question 4 (Did you engage in any of the tasks with your smartphone?), 37 (54%) students responded "Yes" and 32 (46%) answered "No". On the other hand, according to Question 5 (Did you ever engage in any of the tasks with your PC?), 21 (30%) students answered "Yes" and 48 (70%) answered "No". The reasons why the students never tried reading on smartphone and PC were summarized in Table 5.

Table 5 Reasons for not use smartphones and PCs for engaging in tasks

Did not ever engage in any of the tasks with a smartphone (n=32)		Did not ever engage in any of the tasks with a PC (n=48)	
Reason	Number	Reason	Number
Used to reading paper-based materials	4	Paper-based materials are sufficient	6
Paper-based materials are sufficient	4	Already using smartphone and paper-based materials	1
PC is sufficient	1	Smartphone is sufficient	15
Problem with downloading	3	Problem with logging in	2
Problem with logging in	3	Not familiar with using it	1
Forgot App Store password	1	Lack of access to Wi-Fi	1
Lack of skills with technology	1	Nuisance to boot up a PC	3
Not familiar with using it	1	No time to try	2
No time to try	3	Losing motivation	2
Losing motivation	1	Other	16
Other	10		

Some of the reasons why they chose the particular method and the reasons without the choices were found in the students' responses in the post-treatment surveys. First, the students chose smartphones because of potential features of the device, such as portability, including the smaller size, less setup time, and so on. Accordingly, the students who did the tasks on their smartphones gave positive comments such as: "It is easy to carry around," "When I am taking the subway, I can use my smartphone to read easily," and "I prefer using my smartphone when I am commuting, because unlike printouts and laptops, it is compact and doesn't take up space which may bother other passengers." Task completion time is also taken into consideration as well, as one learner indicated "It took me about ten minutes to complete all the tasks in each lesson, so I can use it in my free time in a convenient way." In addition, one of the students who preferred to use smartphone-based materials suggested that "I want to do more types of quizzes.", which implies that doing quizzed might be a trigger of more engagement.

In contrast, the reasons for not choosing the smartphone as a learning method were briefly shown in Table 5, such as, a lack of familiarity in studying with smartphones, a view of smartphones as a tool to play games and to use SNS, and distractions from other applications. These factors indicate that the students might not be ready for using smartphone as a learning tool, because of a lack of previous experience of using smartphone for pedagogical purpose. Also, some students claimed they intended to study with their smartphone but could not download or use the application successfully, parts of the responses are presented as follows:

> "I did not remember my password on App Store, so I could not download any applications."
> "I am not used to learn with a smartphone, so I couldn't help but start playing other applications in my smartphone."
> "It is too much hassle to download the application and to log in the system."
> "I have limited network connection speed."

These suggests that previous learning habits and technological barriers can result in low engagement with smartphones. Since using paper-based materials could avoid technological problems, the students chose printout as a learning method when they encountered difficulties with the technologies. Also, learning habits from previous experience also appeared to be a crucial factor to affect their usage patterns, likely due to the fact that the students were used to studying with paper-based materials in high school. The learners who chose printout to complete tasks provided reasons such as:

> "Compared with the others (electronic methods), printouts are easier to use."
> "I am used to using printouts."
> "It is easier to read, because the screen size of my iPhone is too small."
> "Printouts are handy."
> "It is annoying to use PC, because it takes time to set up. Printouts are easier to read."
> "I was unable to log in with my smartphone, so I used the printout."

PC usage for completing the Chinese Stories tasks was generally quite low. The main reasons why the learners did not choose a PC were "it is too big to carry around" and "it takes time to boot up." It is interesting to note, one student who switched from their smartphones to PC explained that "I could not download the application to my smartphone, so I changed to use my laptop." However, once they could access the app on their smartphone, they chose smartphone over PC. Thus, it seems that PC was the least preferred option because of its affordance, and the learners thought smartphone was sufficient.

It is worth noting that one student used a combination of her smartphone and the printouts. The possibility of using multiple methods was not explicitly introduced in the orientation, but the student settled into this usage by herself from the fourth week. She pointed out as below:

> "I found combining smartphone and printouts together makes my study easier. It is a good idea to combine them!"

Students who did not finish any of the tasks and never tried any of the methods cited they were too busy with their schoolwork, university festival, club activities, or their part-time job. However, some of the students only completed vocabulary tasks and grammar tasks selectively, choosing those that they considered helpful for them, often rather sporadically.

In Part 2 of the post-treatment survey, learners' attitudes towards the three methods were investigated on a 4-point Likert scale (1— strongly disagree, 2— disagree, 3— agree, 4— strongly agree) and the results are calculated in Table 6. These findings reveal a difference between learners' perceptions of

the methods before and after actual use that were presented in previous post-treatment section. Table 6 show the students had more positive attitudes towards learning vocabulary through the paper-based materials, as the results shown above, learners previous learning strategy and the lack of experience of learning through technology may indicate the preferences of paper-based materials. On the other hand, the learners saw smartphone-based materials nearly as beneficial as paper-based materials (smartphone with 3.46 points and printout with 3.47 points), but perceived learning via smartphones to be more useful regarding the features of mobile devices. PC was perceived as the less positive method among the three methods generally, with which a small number of tasks were completed. However, PC was thought to be a more comfortable way than smartphone with regard to the larger size and the distractions gain by smartphone. These demonstrate an understanding of how the learners' attitudes changed along with their actual usage pattern.

Table 6 Mean scores of the three different methods

Statement	Mean score		
	PC	**Smart-phone**	**Printout**
I find learning words by using _____ beneficial. (n=68)	3.15	3.46	3.47
I find learning words by using _____ flexible. (n=68)	2.16	3.82	2.79
Using _____ gives me greater control of my study. (n=68)	2.97	3.43	3.24
Using _____ enables me to memorize words more effectively. (n=68)	2.66	3.21	3.34
I feel comfortable when using_____. (n=68)	2.94	2.69	3.71
I find learning words by using _____ "pleasant." (n=67)	2.82	3.19	2.88
I don't take a lot of effort to become skillful at using _____ to learn words. (n=67)	2.75	3.00	3.60
I think that using _____ to learn words is a positive idea. (n=68)	2.91	3.49	3.60
Over all, I like the idea of using _____ system. (n=68)	2.85	3.38	3.57
I will continue learning words via _____. (n=67)	2.25	2.27	3.12

Interviews

Further responses according to the learning journals were collected in three semi-structured group interviews, which were designed to understand more specifically on learners' actual use. The participants were asked how they engaged the tasks with different methods, and why their selections of the methods changed overtime.

Nine students volunteered to participate were divided into three groups according to their classes (Class A, Class B, Class C), and they were categorized into five types of user according to their usage pattern reported on learning journals: heavy user, late heavy user, balanced user, sporadic user, and non-user (see Table 7), in order to explain their task engagement and motivation outside of class.

Table 7 *The brief description of the students participated in the group interviews*

Student	Type of user
A1	Sporadic user: mainly used printout to engage the tasks at home
A2	Late heavy user: started the lesson lately (from the fourth week), mainly used smartphone to engage the tasks when commuting or at school
A3	Balanced user: only used smartphone when commuting or at school
B1	Balanced user: used printout at home and smartphone at school
B2	Balanced user: used smartphone when commuting or at school
B3	Balanced user: mainly used printout at home, but used smartphone at school for the last lesson
C1	Heavy user: studied every lesson; used smartphone for the first two weeks and changed to use printouts for the last lesson; mainly studied when commuting
C2	Sporadic user: only engaged in vocabulary and grammar tasks; mainly used printouts at home
C3	Non-user: did not engage in any tasks

Except for student C3, who did not engage in any tasks, eight of the students had tried using the different methods. Learners responses to their methods selections and the reasons motivated them were summarized as follows:

Heavy user

Student C1 who finished all the lessons every week said that he always carried his smartphone around, so he could start a lesson by a simple click on the application whenever he wanted. The reason why he never tried PC is that it took longer setup time, for instance, typing the website address and logging in. Besides, he found the vocabulary list compiled with a level scale of HSK (a Chinese language proficiency examination called Hanyu Shuiping Kaoshi) useful, because he could check where his lexical knowledge had achieved.

Late heavy user

Student A2 who started her lessons late but engaged actively then intended to use smartphone-based materials in the beginning, but she switched to paper-based materials when she could not access to the application. She also found herself more concentrated to learn vocabulary with paper materials, which she was familiar with. After accessing to the app successfully, she found the MP3 audio files on smartphones were helpful, so she suggested using a combination of smartphone and printout. Additionally, she suggested that "I spent a lot of time commuting, so I used the time to learn via smartphone in subway."

Balanced user

The students in this group maintain their lessons evenly, which means they engaged half of the lessons within the period. They had tried various methods according to their learning conditions and affordances, eventually, they found their preferred ways.

Student A3 claimed that she was unable to use the application with her smartphone in the beginning, but once she was able to access to smartphone-based materials, she still thought learning with paper-based materials made her more relaxed, in which she "could write down the words to help to memorize", and this was her learning strategy to study English before. However, she found it difficult to take out the printout in a crowded train.

Student B1 noted that she found no differences between using PC and smartphone in terms of actually engaging in the tasks, but smartphones are lighter and easier to open up the system. However, meanwhile, she indicated that she "got distracted easily while using smartphone"; she would press the home button immediately although she intended to study.

Student B2 said he usually used the materials when commuting, but there was no space to open up a laptop in the train, so he studied with his smartphone. He thought MP3 audios in smartphone-based materials were convenient, since most of the existing textbooks provide CD but it is inconvenient to insert the audios into a smartphone. However, he found it was time-consuming to download and update the application on to the smartphone.

Student B3 implied that "it was easy to lose the printouts", and PCs need to be charged regularly, so he thought installing learning material on his smartphone was a good idea.

Sporadic user

Two students who engaged the lessons sporadically, that is, they engaged frequently from the beginning to the end of the lessons but did not complete the tasks in the middle of the period, claimed that they had mid-term examination and university festival during the time. Coincidently, they both found learning vocabulary through stories interesting, which motivated them to keep up with the lessons later on.

Student A1 had tried all of the methods and his method usage changed with time. At first, he intended to use smartphone-based materials, as he suggested "there are lots of language learning applications recently. I've been using some of them, so I am familiar with the learning methods." However, when he had technological problems, he changed to use the printouts and PC. But he still preferred using smartphones, because "Unlike PC that took time to setup, I always took my smartphone around, so I can open it up in a second and use it in my fragmentary time." Besides, he pointed out that he was curious about the stories, but he got distracted when he encountered new words he did not know.

Student C2 also found learning vocabulary through stories meaningful as she enjoyed reading stories. However, she claimed that she was "terrible with technology" and had limited network access. She also thought the process of downloading and login was a nuisance, so she preferred printouts, which allowed her to take handwritten notes and that was her learning strategy since she was learning English in high school.

Non-user

Student C3 did not engage in any lessons at all, and she never tried any of the methods. The possible reasons might be the lack of motivation, which could explain the low engagement in this study as well. Student C3 thought "the formal class was enough" and did not see the value of learning outside the classroom. Also, the she claimed the content was too difficult for her and as such did not have any motivation.

Furthermore, the participants were asked if they knew how to use the system on the website and application, even though the researchers only gave brief technical training with a manual at the beginning of the study, they figured out how to use it without reading the manual by trying the various functions one by one.

Discussion & Conclusion

Motivation and engagement outside of class

The current study focused on vocabulary learning, but the system included various tasks designed to develop different language skills as well, nevertheless, most of the participants regarded vocabulary and grammar tasks more important and engaged in these two kinds of tasks more frequently than the other tasks. It reveals learners' achievement values could reflect on their engagement (Wigfield & Eccles, 2000; Dörnyei & Ushioda, 2013). Also, the learners who found reading the stories enjoyable gained intrinsic value (IM), and learners who thought the quiz tasks useful gained extrinsic value (EM), which contribute to their engagement. Besides, the cost (time spent and effort) determined learners' engagement as well. The learners who claimed they did not have time to complete the task might not have the motivation to learn Chinese outside of class, regardless of the methods, which shows that although the average time spent on a lesson was within 30 minutes, low-motivated students did not try to engage in the activities through any of the methods (Philp & Duchesne, 2016).

As the current study indicated, though the percentage of PC ownership was nearly high as smartphone ownership, most of the learners did not opt to use their PCs to engage in vocabulary tasks; they preferred to use smartphones and printouts for their lexical learning rather than PCs Also, though most of the learners did not have experience in using electronic devices for learning purposes before, they were more willing to try using new methods to learn. However, the results show that students' intention did not actually relate to their attitude during and after use. Although the three methods' design features were different, and the learners were able to choose their preferred methods, as shown in Table 6, learners' cognitive responses varied. They perceived learning vocabulary via smartphones more useful (beneficial, flexible, and gave them better control of learning), but regarded paper-based materials easier to use (more comfortable and effortless to utilize). Eventually, learners had a more positive attitude toward printouts toward using and stated they will continue engaging with it. In other words, learners' willingness before usage and perceptions after usage varied and did not reflected on their actual engagements, which reveals a gap between learners' attitude and engagement.

Selecting learning methods

The current study revealed that learners did indeed have some awareness of the affordances of each of the learning methods and chose what they thought was most appropriate to the needs of the moment. This trend was particularly evident in one learner who developed learning strategies with a combination of the different methods. While some learners swapped methods because of technical difficulties, others made conscious decisions when and where to learn with a combination of multi-methods. This could be indicative of a shift in awareness towards mobile devices, where it is becoming the electronic tool of choice, even when other alternatives are available.

The findings have shown learners' usage patterns with PC-based, smartphone-based and paper-based materials changed over time. The factors causing this switch might be the obstacles of each method, learners' learning habits, study condition (time and location), as well as motivation. Firstly, although the learners opted to complete the tasks with a certain method, when encountering some barriers, they would change to another method or give up the whole lesson. For instance, the learners intended to utilize smartphones at first, but having technological problems (such as failing to login), they changed to use printouts to avoid the problems. The following table (Table 8) briefly indicates the barriers of the three methods that the learners met with.

Table 8 *The barriers of each platform according to students' responses*

Method	Barriers
PC	Problems with login and typing the website address Limited network access Longer setup time Heavier weight Larger size
Smartphone	Problems with downloading and logging in Time-consuming to download new lessons Limited network access Limited storage Smaller screen size Psychological barriers (be distracted easier, not used to study with)
Printout	Larger size Easier to lose

Secondly, learners' previous studying habits might affect their method choice as well. Some of the learners pointed out that they were used to memorizing vocabulary and writing it down on paper simultaneously. It shows that learners Vocabulary Learning Strategies (VLS) have an impact on their method usage. Also, since most of the learners did not have experience in using PCs and smartphones to study before, and they mainly used smartphone as a SNS tool or for private use rather than a learning tool (Stockwell, 2007, 2008), it took time for the learners to get familiar with learning through them.

Thirdly, study conditions might have an impact on learners' method usage. In other words, students tended to use the method according to the learning environment and time. Thus, the devices they had at hand might be one of the considerations. An environment without Wi-Fi would not allow students to access to online resources, and a crowded train would not allow students to open up a large sized laptop or an A4 printout. Although there are lots of potential benefits for learning vocabulary through smartphones, we could not ignore the barriers at the same time. Despite some researchers suggest that MALL methods enable learners to study anytime and anywhere, our results agree with Kim et al. (2013) that a suitable learning place and time will also likely impact the method chosen by learners. Another interesting outcome did, to a certain degree, contradict with Wang and Higgins (2005), who claimed "although m-learning happens when people are away from their offices or classrooms, when they get home, if they want to learn, mobile devices are not likely to be their main choice." In the current study, the results suggest a shift towards mobile devices usage where the students tended to use PCs and smartphones at home and opted for non-electronic means at school (see Table 4). Primary reasons for this were seen in the post-treatment survey as following: "I used the mobile app before sleeping.", "I can use it (printout) to study during break time and during class (where smartphones are banned)."

Finally, the reason for learners not engaging in any of the activities at all appeared related to low motivation regarding studying Chinese. As the results revealed above, when high-motivated students encountered technological barriers, they would change to another method or asked for help, but low-motivated students largely just gave up on engaging in the activities altogether.

Limitations of the Study

It should be acknowledged that there were some limitations in the current study. Firstly, there was a lack of accurate tracking of learners' usage patterns. Although the login time could be tracked on the website, there was no way to track learners' time spent on the printouts or on the smartphone

application, which was downloaded completely on to their devices. It should be noted, however that as the study was not related to students' grades in formal classes, they did not have any reasons to misrepresent their engagement in their learning journals (which were not shared with the class teachers as well). Secondly, because the learning contents in this study were not directly related to students' in-class study, the students might not have strong motivation to complete all of the lessons which were an optional supplement to their learning, possibly contributing to the overall low task engagement. Lastly, as the researchers did not teach in any classes, they had limited time to give detailed technological instruction, and although the teachers of the classes were supportive of the study, they were only able to spare five to ten minutes of class time to the researchers at the beginning of each class to collect the journals and to ask if the students had encountered any difficulties.

Implications

Even when learners were aware of the differences in affordances between the different platforms, particularly with regards to the extra functions that were available through the electronic means that were not on paper. In other words, even though the learners were able to carry out activities on PCs or mobile devices that were considered as beneficial, they still often chose to use paper-based materials as well. There are several possible reasons for this. Firstly, it could simply be that the learners did not see the value of the functions such as links to Wikipedia or Google Maps, and that these functions were just seen as add-ons that were not of particular interest or relevance to learners. Other functions that were surprisingly underused were the word bank and progress report functions, which were considered as having a motivational effect on the learners in that they could see what they had achieved and what they still needed to know. Thus, part of making the most of digital materials would depend on learners understanding the functions and seeing how they are relevant to them, which is related to training (see Hubbard & Romeo, 2012).

Secondly, it was also interesting to note that very few learners engaged in the comments or questions that were particular to the digital versions. The comments and questions meant that the students could write the responses to the open questions posed by the system either in Japanese and Chinese and these would be checked by the researcher, but learners may have opted to not engage in these because they did not understand that they would receive "live" feedback, or alternatively it is possible that they felt pressure to write their responses and that if they started to do so that they would need to do this on an ongoing basis.

Conclusion

The current study aimed to investigate learners' attitudes towards learning with PCs, mobile phones, and paper-based methods, as well as their task engagement through these methods outside of class, in order to determine the reasons behind their choice of method. From the total numbers of the various tasks completed, we can see that learners appeared to engage more in vocabulary tasks and grammar tasks than other types of tasks, which likely reflects underlying views of language learning that they perceived more value to complete. As shown in previous results, even though a majority of the students did not have experience in CFL learning through PCs and smartphones, a high percentage of them were willing to try. In spite of this, learners' willingness was not reflected in their actual task engagement, in which they engaged in smartphone-based and paper-based materials for vocabulary learning more frequently than PC, and generally had more positive attitude toward paper-based materials eventually.

The post-treatment survey and interviews suggested that the factors of methods choice were: (1) barriers of the methods, such as the larger size of PCs, login problems with smartphones, and easier to

lost the printouts; (2) previous learning habits, which they were familiar with before, for instance, the methods of learning English; (3) study conditions, when and where learners would like to use the particular method; and (4) motivation, which determined whether learners would engage in the activities or not, also the determination to solve or avoid technical problems.

Although various studies have shown positive results towards using PCs and mobile devices, the necessity and the role of technologies are still unclear in some regards. As the results suggested, the students were not well prepared for using computers and smartphones as out-of-class learning tools. This adds further weight to the argument that university students will be competent users of technology just because they are "digital natives" (see also Stockwell, 2019). Although they might be open-minded to try using mobile devices as a learning tool, they still require sufficient training. Most important, they need to be instructed in how to apply technologies to their learning. As has been pointed out above, although the students intended to use smartphones at the beginning, once they faced technological problems, many abandoned their study using them. A positive attitude may be indicative of intention to learn, but it does not equate with active engagement. This prompts us to suggest that educators should reconsider the necessity of utilizing technologies for language learning and teaching. If paper-based materials are sufficient for students, what are the practical benefits of technology? Providing learners with insights into how technologies can be used to engage in learning and showing the specific affordances of the tools is likely to play a role in persuading learners to use them in a more sustained and engaged manner. This also leads us to question the "one tool fits all" attitude that may in fact be detrimental in achieving this. Allowing learners sufficient freedom to make choices from the tools that are available to them can also enable them to think deeper about when, how, and why they can use these tools, and develop their own strategies that is the best fit to their own individual learning needs and environment.

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