

Japanese Tertiary Students' Access to Smartphones and their Feelings Regarding their Use in the EFL Classroom

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When institutional stakeholders contemplate the introduction of a new technology into the classroom, they often are concerned with the uses and functions of the tech and sometimes overlook a very basic aspect: students' access and level of comfort using the technology required. This study was conducted to assess the level of access students at a small private engineering university had to smartphones, a technology that stakeholders believe will be used to access and complete assignments on a new asynchronous learning site the university is rolling out in the upcoming academic year. While the results showed that nearly 100% of students surveyed ($N=225$) *did* have access to the requisite tech, only 23.56% of respondents ($n=53$) indicated that they were excited about using them for coursework. The reasons students gave for their willingness or hesitation are presented, and the implications of the introduction of the portal site are discussed in terms of English education and general motivation. Some suggestions are also given of how to most effectively address students' concerns.

Key Words : Technology in the Classroom^{*1}, Access to Technology, Smartphones, Handwriting, Asynchronous Learning

1. Introduction

Technology has generally been defined as being anything that extends human capacity (Lawson, 2010)⁽¹⁾. By this definition, we can see that while most people would envision items such as the personal computer or robotics when thinking of examples of technology, a simple piece of chalk also qualifies. By using chalk, people are able to make their thoughts visible, either by drawing pictures or writing letters, hence extending their ability to communicate with others. By that token, the chalkboard on which things are written, the eraser which allows the same space to infinitely be used anew, and the notebooks in which students take notes are all examples of various technologies being utilized in the classroom. In modern day developed countries, it is easy to lose sight of the fact that while we now take these technologies for granted, each one was once a revolutionary invention which changed the face of education; some of which faced stiff resistance initially. For illustration, while almost incomprehensible today, teachers in the late eighteenth century were strongly against the incorporation of pencils with attached erasers (Baron, 2009)⁽²⁾, as this directly contradicted the mantra of “think before you write” that had been prevalent for decades.

Nevertheless, the march of technology continues ever forward, and with each new technological discovery comes some sort of social change. However, it is important to remember that access to technology is not universal. Unfortunately, this fact is often overlooked by educators and program administrators, who tend to focus on the functionality of new innovations, rather than the availability of them among the students. This is a particularly important consideration in public schools, which draw students from various economic and social backgrounds, or in classes involving minors, who are not yet financially independent. Older learners as well, may possess the financial means, but lack the technological literacy to be able to effectively utilize the technological requirements of their educational institutions. The purpose of this study is not to debate the disadvantages or merits of a particular technology, but to evaluate the practicality of incorporating its use into the pedagogy of a current group of learners at a particular Japanese university, which has recently made the decision to roll out a

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new online-based learning system to supplement the students' existing weekly synchronous sessions. This new service, while of course accessible by computer (electronic learning or e-learning) also has the feature which allows students to access the site with a mobile device (m-learning). While e-learning and m-learning systems have existed for decades, this university's smaller size (approx. 2,000 enrolled undergraduates) and location in a rural prefecture have contributed to asynchronous learning being low on the list of priorities for this institution to this point. This study will investigate whether the current student body has sufficient access to the technology required to make effective use of the new system, and also illicit whether the students are receptive to the integration of new technology into the classroom or not. It is hoped that the results of this study will provide insight into the study body of this university, which will then support informed decision-making regarding future changes to the curriculum. As such, the study set out to answer the following research questions:

- ① What is the degree of access to smartphone technology among students of this university?
- ② Is there interest among these students for using smartphones for class assignments?
- ③ How do students feel their work will change, if at all, depending on input method?

2. Review of the Literature

The first issue that comes into play in this study is the matter of access to information technology, which unfortunately, is not universally equivalent. In fact, the term 'digital divide' was first coined in the late 1990s to describe the apparent correlations between race, gender, education, and access to computers in the workplace and at home (Novak & Hoffman, 1998)⁽³⁾. Obviously, newer technologies can usually first be found among populations of higher income and education (Coley, Cradler, & Engel, 1997)⁽⁴⁾, but researchers have also warned of gender gaps (Broadband Commission for Sustainable Development, 2018)⁽⁵⁾ and race gaps (Abrams, 1997)⁽⁶⁾ in Internet use. Therefore, we can see that access to technology is not always a matter of economic means, a fact supported by an Australian study in which respondents without a home computer cited cost as the primary reason only 31% of time, while 50% said it was due to other reasons such as lack of interest or the inadequacy of the requisite infrastructure (Australian Bureau of Statistics, 1999)⁽⁷⁾.

Particularly salient to this study, Japan has been in a state of economic decline since the mid-1990s, with the number of households requiring government assistance and those without savings showing significant increase (Abe, 2006)⁽⁸⁾. While Japan still has relatively few cases of "absolute poverty" (defined to mean a household with an income below which human survival is impossible, i.e., death by starvation), cases of "relative poverty" (households making 50% or less than the country's mean disposable income value) are on the rise (Tachibanaki & Urakawa, 2008)⁽⁹⁾. One study from 2005 put the percentage of relative poverty in Japan at 17.1%, second only to the United States among developed countries (Förster & d'Ercole, 2005)⁽¹⁰⁾. Single-parent households are particularly vulnerable, as Japan still has a large wage gap whereby a woman earns about 65.7% that of a man, and part-timers earn about 51.5% that of a full-time employee. Single mothers were found to be employed full-time only 24.4% of the time, resulting in an annual income of about one third that of a two-parent, one-child household (Ujihisa, 2006, as cited in Sekine, 2008)⁽¹¹⁾. Among this backdrop, it was estimated in 2018 that 52% of Japan's population owned at least one Internet-capable mobile device (Statistica, 2019a)⁽¹²⁾, but of those, only 56.9% were smartphones (Statistica, 2019b)⁽¹³⁾.

The other issue addressed by this study deals with students' feelings towards using smartphone technology instead of traditional pen-and-paper to complete class assignments. Several researchers have investigated whether students are receptive towards using their smartphones for learning, with most reporting that students have positive perceptions towards their use (e.g., Almaiah & Jalil, 2014; Haag, 2011, Yaman, Şenel, & Yeşilel, 2015)⁽¹⁴⁾⁽¹⁵⁾⁽¹⁶⁾. However, it should be noted that these studies investigated smartphone use in a very general way, such as web or video browsing, or using interactive learning apps such as Quizlet and Kahoot with vibrant colors, sound effects, and games (Hulse, 2018)⁽¹⁷⁾. This study asked students to think reflect on smartphone use for the purposes of English composition writing, something that has so far not been investigated. While there has been some research done comparing handwriting and typing (i.e., on a computer), an exhaustive search through the literature failed to produce any previous empirical studies that specifically looked at the differences between

handwriting and smartphone input, especially in the case of doing so in a foreign language. Lee (2019, this issue)⁽¹⁸⁾ is the first to empirically analyze differences in ELT student performance when composing on paper versus by smartphone, to which it was found that students writing on paper produced much more to a statistically significant degree.

3. Study Design

3.1 Participants

This study was conducted at a small private university in Japan, which largely specializes in industrial science courses. This university requires all undergraduate students to take general English courses for all four years of their education, although there is no English major program at present. While there are some exceptional English speakers among the student body, the university overall has a TOEIC average score of 346 (Nyugaku, Koyama, Lee, & Thomson, 2017)⁽¹⁹⁾, which would classify them as being of elementary proficiency. The participants for this study were recruited during a one-week period during each student's English course, with each class being asked if they would like to voluntarily participate in an anonymous capacity, resulting in $N=225$ valid responses. Among the respondents were first-year ($n=65$), second-year ($n=86$), and third-year students ($n=74$), representing a total of eight different course majors. Both male and female students agreed to participate in the study, however due to the anonymous nature of the data collection, the exact numbers of each gender are not available. The university is overwhelmingly comprised of traditional students, who enter at age 18 or 19. The exception to this are foreign students, who typically study Japanese language domestically for two years before matriculation at age 20 – 21, however these students make up less than 5% of the student body and none were involved in the current study. All participants can therefore be thought of representing the 18 – 21-year-old demographic of Japanese students who study at a technical university.

3.2 Materials and Methodology

An original survey was created for the purposes of this study on Google Docs, the link to which was converted into a QR code that would be easily shown to potential participants. Several copies of the survey were also printed out and prepared, in case some students wanted to participate but did not have access to the Internet for some reason. In total, ($n=222$) participants responded via the online survey, while ($n=3$) responded by paper. (It should be noted that all three paper respondents reported that they did own smartphones. One student did not have his phone at the time of the survey because he had forgotten it at home that morning, while another had his phone but was concerned about battery life, so he preferred to respond on paper. The third student had a phone that was amply charged, but he claimed to not be able to open the survey online, possibly because he was over his monthly data limit on his account. While none of these issues posed any problem for the implementation of this study, they should be remembered as possible complicating factors to consider when implementing a new educational system that requires students to have smartphones.) The survey questions were written in Japanese, the L1 of the participants, for ease of comprehension and to lower the affective filter of the respondents, who might have been discouraged from participating if the questionnaire had been composed in English. The survey consisted of binary response, multiple-choice, and open response items, which asked the students to express their preferences regarding using paper or smartphones for their classwork/homework in their English courses (see Appendix). Students were also allowed to answer the open response item in Japanese, for the same reasons stated previously. No time limit was set for the completion of the survey, and students were informed that they could even think about their responses and submit the form later from their homes if they would like to do so.

The items on the survey were decided upon based on the results of a pilot study conducted with a different participant pool than that of the actual study. During this piloting phase, participants ($N=52$) were asked verbally whether they preferred handwriting or smartphone input regarding classwork completion and asked to give reasons for their responses. The responses gathered during this phase formed the basis of the multiple-choice items used on the final survey, with the additional option of "other", allowing for the participants to write in a response that was not one of the choices provided.

4. Results

The following tables show the frequency of responses to the three primary interview questions and the percentages of the population they represent.

Table 1

Responses to Q1: Do you typically carry an Internet-capable device (smartphone, tablet, etc.) to English class?

	<u>Frequency</u>	<u>Relative Frequency</u>
Yes	224	99.56%
No	1	0.44%

Table 2

Responses to Q2: If it were possible to submit English classwork via smartphone, would you choose to do so?

	<u>Frequency</u>	<u>Relative Frequency</u>
Yes	53	23.56%
No	55	24.44%
No Preference	117	52%

Table 3

Responses to Q3: Which method of entry (smartphone vs. handwriting) do you think you would write more in?

	<u>Frequency</u>	<u>Relative Frequency</u>
Handwriting	78	34.67%
Smartphone	57	25.33%
I don't think it matters	90	40%

As the data in Table 1 shows, an overwhelming majority of the participants brought an Internet-enabled device with them to school on a daily basis. It should be noted that the single respondent who answered “no” reported afterwards that he *did* own a tablet, but was not in the habit of bringing it to school as it is of limited use in class at the moment, meaning that 100% of the sample population *did* have access to smartphone/tablet technology. So, while the answer to RQ1 (*What is the degree of access to smartphone technology among students of this university?*) appears to be virtually 100% penetration, the matter of attitude towards their use in an academic setting is not so clear.

To answer RQ2 (*Is there interest among these students for using smartphones for class assignments?*), Table 2 above shows that participants' responses were evenly split between those in favor of smartphone use (23.56%, $n=53$) and those opposed (24.44%, $n=55$). Over half of the respondents (52%, $n=117$) reported having no preference between handwriting and smartphone input. While this result indicates that there is general support among students for introducing smartphone-based classwork into the general curriculum as only 24.44% of students are actively opposed to it, it is necessary to investigate the reasons given which influenced the participants' responses, as some concerns may be found to be easily addressed. It must be remembered that students at this university have never used m-learning nor composed English paragraphs on their smartphones before, so are basing their responses on merely the idea of doing so. Items 4 – 6 on the survey asked the students to give some reasons for their reported preference of either handwriting or smartphone input. These results are reported below, in Tables 4 – 6.

Table 4

Responses to Q4: If you selected "Handwriting" on Item 3, please explain your rationale. (multiple choices accepted)

<u>Response</u>	<u>Frequency</u>	<u>Relative Frequency</u>
I'm not good at typing, so handwriting would be faster for me	33	42.3%
I use my smartphone for researching and for looking up words while I write an assignment, so it would difficult to do that and compose on the same device	33	42.3%
I like the feeling of writing on paper, and it heightens my emotional state	20	25.64%
The movement of my hands and eyes while writing aids my concentration	20	25.64%
I feel limited when composing on a smartphone due to the small screen size	10	12.82%
Other (go to Item 6)	7	8.97%

Multiple responses were accepted, causing relative frequencies to total > 100%.

Table 5

Responses to Q5: If you selected "Smartphone" on Item 3, please explain your rationale. (multiple choices accepted)

<u>Response</u>	<u>Frequency</u>	<u>Relative Frequency</u>
The spellcheck on my phone make composition easier	41	71.93%
The predictive function makes composition faster	23	40.35%
I'm not used to writing compositions by hand in English	10	17.54%
It's fun and feels like a game, rather than work, when I'm composing on my smartphone	9	15.79%
Other (go to Item 6)	5	8.77%

Multiple responses were accepted, causing relative frequencies to total > 100%.

Table 6

Responses to Q6: Free response

<u>Response</u>	<u>Frequency</u>
I would be able to handle either style.	5
I feel I remember more when I write something out by hand.	2
I always have my smartphone on me, so being able to do classwork on it would be convenient for me.	2
I don't think input style affects length, but I do think it's easier to learn spelling through physically writing words.	1
I think smartphone input is easier, but I don't think it's possible to memorize words unless you physically write them out.	1
I'm worried about battery life if I had to use my smartphone for class.	1
The copy & paste function to a translation app on a smartphone makes composition easy.	1
If the assignment was multiple choice, a smartphone would be more practical, but for actual composition	1
I think it would end up taking more time than handwriting.	1
Smartphone are good because they are convenient, but I don't think it would be good to do all classwork on the phone.	1
I think bad students would use translation apps instead of composing by themselves.	1

I have literally never written anything in English on my phone before, so I cannot even speculate if it would be easier or more difficult.	1
Would the use of translation apps be allowed if classwork were done on smartphone?	1
I think it would be so easy to make corrections to compositions on smartphone.	1
It would be easy to make corrections, and also look up words at the same time.	1
I use my smartphone as a dictionary in class.	1
I like to make several notes while composing something in English, and only begin writing when the story is complete in my mind.	1
I think writing something out by hand is faster.	1
Smartphones are so easy to use.	1
I think it would take longer to write something out in English on smartphone.	1
Not a smartphone, but I think a PC would be much easier to use for classwork.	1
Basically, I think paper for writing, smartphones for looking words up.	1
As more and more people are using smartphones, there have become some Japanese people who can't remember how to write out certain Kanji. I think it would be same case in English, if we were to transition from paper to smartphone for assignments.	1
I personally think PC would be the fastest, but in class probably paper is best for assignments.	1
I think my handwriting is pretty hard to read.	1
I like the feel of writing with my hands on paper.	1
I personally prefer writing on paper, but in terms of filling out a form, or sticking to a word limit, digital entry is quite convenient.	1

5. Discussion

While almost no new change in system or curriculum ever enjoys 100% backing, the results of this study could be seen as generally supportive of implementing an online-based system for students to complete and submit class assignments at this university. At the very least, access to the requisite technology for m-learning at this university has been confirmed by the virtual complete ownership of smartphones/tablets by the sample population. In addition, while only 23.56% of students indicated that they preferred to do classwork by smartphone, the 52% of respondents who indicated that they had no preference could also be considered to support the measure, as they are not actively against the idea (Table 2). Unfortunately, that still leaves 24.44% of respondents who reported that they would rather use the traditional methods of pen & paper when completing their class assignments. As the implementation of the asynchronous m-learning system is still in the beginning stages, it would be prudent for the university to address these students' concerns as directly and expediently as possible to assuage their fears before they can negatively impact their studies, or the general motivation of students on the whole.

Looking at the responses the students gave in Tables 4 and 6, it becomes clear that some concerns are more easily addressed than others. Students who are concerned about their battery life or the small screen size could easily mitigate these factors by bringing a charger to class or upgrading their devices to a larger size (as is usually the trend with smartphones). However, other concerns are much more difficult to address, as they concern the students' personal preferences and study beliefs. The cognitive effects of digital input versus handwriting have not been adequately studied to date, although the general trend has been supportive of the students' stated beliefs that handwriting forms a more salient and lasting impression than typing does (Longcamp, Zerbato-Poudou, & Velay, 2005; James & Engelhardt, 2012)⁽²⁰⁾⁽²¹⁾, particularly Smoker, Murphy, and Rockwell (2009)⁽²²⁾ which empirically found an advantage in recall and recognition for words when they have been written rather than typed. Lee (2019, this issue)⁽¹⁸⁾ presents the strongest argument for taking care when using m-learning, as it has been suggested empirically that students generally produce more on English writing tasks when allowed

to submit by pen-and-paper, in support of what many of the students innately believed. However, Lee's study did show a trend for smartphone input becoming gradually longer and more complex, suggesting that there is a learning curve while students acclimate to a new system. It has yet to be demonstrated if smartphone input on an English writing task can ever match the length and complexity of paper input, which is a good direction for further study.

Perhaps one way to mediate the concerns of students who prefer handwriting would be to allow them to compose their assignments on paper. These pages could then be photographed or scanned using, and then be uploaded to the m-learning portal as an attachment. While it would be easy enough for professors to view and write comments on the attachments, more advanced users might even use optical character recognition (OCR) software to convert the scanned files into editable Word or pdf documents. Another option may be for teachers to set the deadline for submissions to coincide with the students' class time. That way, students who wish to submit via paper would be able to do so with the same deadline electronic submitters. Finally, bridging the gap between handwriting and digital input is a high-end device with a high-end stylus, such as the Apple iPad Pro 2018 and the Apple Pencil. While not able to recreate the exact feeling of writing with a pen on paper, with each generation of technological advancements these electronic writing instruments are increasing their accuracy, speed, and precision, making them a potential tool for students and educators to be aware of.

6. Limitations and Further Research

This study was very directed, aimed at a specific private university and its student body. As such, the results may not be entirely generalizable to the populations of other universities across Japan, let alone overseas. In addition, the majority of majors at the university are involved in the sciences and engineering, most likely drawing a particular subset of the general population who are interested in studying such disciplines. It is highly likely that engineering-oriented students would most likely be interested in technology as well, i.e., smartphones. However, as has been mentioned previously, the national penetration rates of smartphones in Japan are extremely high, thus reducing the impact of this particular limitation on the generalizability of the study. The largest potential limiting factor is the fact that this university does not have an English major, and so all participants in the course were studying other subjects, resulting in a wide range of English proficiencies and degrees of interest. This means that most students were not used to English writing tasks, which was the main focus of the survey. While this was the key area of investigation for this study, it would be informative to repeat the study in the context of using smartphones to complete coursework *other* than English, i.e., completing reports and papers in Japanese language via smartphone vs. handwriting. Likewise, it would be informative to have data from another institution that has English major students, as these students would ostensibly have more experience in English writing in general, perhaps allowing them to transition to a different medium more easily than the students at this university.

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Appendix

(Translated version of the survey used in the study)

Paper vs. Smartphone

Please enter your student ID #.

Question 1: Normally, do you bring an internet-capable device (smartphone, tablet, etc.) to English class?

- Yes
- No

Question 2: If it were possible to submit your English writing assignments via smartphone, would you choose to do so?

- Yes, I would submit by smartphone.
- No, I prefer to submit a paper version.
- Either would be OK for me.

Question 3: Which medium do you think you would write more in?

- I think I would write more via handwriting.
- I think I would write more on my smartphone.
- I don't think the medium would affect the volume of my writing.

Question 4: If you answered "I think I would write more via handwriting" in Question 3, please say why you believe so.

- I'm not good at typing, so it would be faster for me to write by hand.
- Handwriting is more palpable, allowing me to emotionally connect to my writing more.
- It's easier for me to concentrate when writing on paper because I have to move my hands and eyes.
- I feel constricted when using a smartphone because the screen is so small.
- I use my smartphone as a Japanese-English dictionary, so it's easier to write my actual assignment on paper.
- Other (please fill in your response in the blank space in Question 6).

Question 5: If you answered "I think I would write more on my smartphone" in Question 3, please say why you believe so.

- It's easier to compose on the phone because I don't have to worry about spelling.
- The predictive function makes it faster to write in English.
- I'm not used to writing in English, so it's easier for me to use my phone to write.
- It's fun for me to use my smartphone, so even doing assignments feels like a game.
- Other (please fill in your response in the blank space in Question 6).

Question 6: Please write any thoughts you have on the topic, paper vs. smartphone.

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