Internet-Based Spaced Repetition Learning In and Out of the Classroom: Increasing Independent Student Use

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Abstract

This article presents the results from the second semester of a two-semester project exploring the incorporation a spaced-repetition system (SRS), flashcard computer program, Anki, and its website, into an English as a Foreign Language (EFL) classroom. The overall goal of the project was to teach Japanese university students to be independent users of mobile technology in order to effectively and efficiently learn English. In the first semester, students were introduced to Anki and shown how to use it. At the end of the semester, results showed that student usage of Anki was very low. From an analysis of the first semester of the project (Bailey & Davey, 2011), two possible problem areas were identified: 1) students did not know how to use Anki and therefore could not use it independently; and 2) students did not understand how Anki could help them learn because they had not experienced correct use of the program. For the second semester, solutions were proposed and implemented. Results show that students were able to use Anki independently and correctly, and comparison of usage data from first and second semester showed an overall increase in student usage. Additionally, some results showed a dramatic increase in Anki use , indicating students were using the program outside of the classroom.

Keywords: smartphones, learning, flashcards, spaced repetition

Introduction

In the first semester of this project, two classes of Japanese university EFL students were introduced to an Internet-based, spaced-repetition (SRS), flashcard system called Anki (Bailey & Davey, 2011). Using teacher-created accounts and initial decks of flashcards created from class content, students were shown how to access Anki and study their decks of flashcards. Then, the process for creating flashcards was demonstrated. Finally, students were asked to study Anki outside of class on their smartphones and were encouraged to do so throughout the semester. Not surprisingly, the results were quite poor, with many students using Anki very little, and in some cases, none at all.

From analyzing the first semester results, two possible reasons for low independent student use were identified: 1) students did not how to use Anki independently; and 2) students did not understand how Anki could help them learn. This paper examines the implementation of changes proposed to address these problems and the effect the changes had on the goal of creating more independent student use of Anki.

Literature Review

Mobile Technology

Smartphones, and other mobile technology, such as tablets, are becoming an unavoidable reality in teachers' and students' lives (Sharples, 2010; Looi et al., 2010). Unfortunately, they can easily be a distraction in and out of the classroom, with text messages, social media, and games competing for our students' limited attention (Sharples, 2002). However, these smartphones are small, portable and powerful computers that connect to the Internet, and if carefully and thoughtfully incorporated into the educational environment, can offer great possibilities. With this mobile

technology, students can access information and study anywhere and anytime. As educators, it is important to better understand the potential of smartphones and their role in and out of the classroom.

Space-repetition system, flashcard programs

There are many possible uses for smartphones in education, with thousands of educational applications and websites available. In the first semester of this project, I chose to focus on an SRS, flashcard program called Anki due to my personal success with using it to study Japanese and subsequent familiarity with the system. An SRS flash card system uses an algorithm and user self-evaluation to calculate the time interval between reviews of a card for optimal learning and retention (Altiner, 2011). These SRS systems can be an excellent way for students to learn the necessary vocabulary and language needed for communication, and there are many options for teachers and students (Unterrainer & Welte, 2008; Godwin-Jones, 2010).

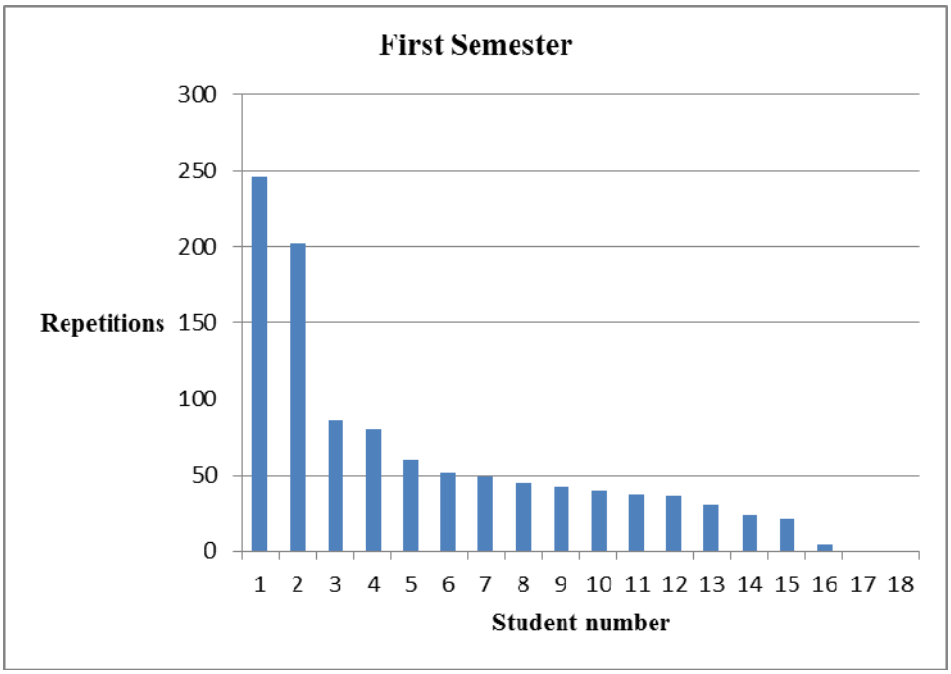
Previous work

In the first semester of this project (Bailey & Davey, 2011), students were introduced to Anki and shown how to use it. Then they were asked, but not required to, to study with Anki outside of the classroom and encouraged to do so throughout the semester. Students were not required to study with Anki outside of the classroom. The concern was that students would use Anki incorrectly in order to quickly completed the required amount of studying. This can significantly undermine the effectiveness of an SRS program because the calculation of time intervals between reviews of cards is based on correct and honest feedback from the user. I had hoped that the students would see the benefit of studying with Anki and use it because they

wanted to, not because they had to. This was, in retrospect, quite an idealistic and naive hope.

In examining the usage data from the first semester, it is obvious that the students studied very little. The chart below shows the students' Anki usage.

Table 1



The horizontal axis represents students, and the vertical axis represents the number of times a student studied a card, a "repetition." The average number of repetitions per student was 61. Two completed more than 200, and three completed zero repetitions. Since this Anki use occurred outside of the classroom, it was not possible to determine where and how the students studied or whether they studied correctly or not.

Obviously, the amount the students studied was quite low, and overall, I do not think this attempt to get students to study with Anki should be

considered successful. From analyzing the first semester, two probable causes for low student use were identified.

First, students did not have the ability or the confidence to use Anki on their own. It is theorized that because the students were not in charge of the process and were not explicitly taught how to make their own flashcards, they could not or did not use Anki independently. They also would not have any ownership or investment in the process. It was only another unknown and difficult thing the teacher wanted students to do.

Second, students did not see how Anki could help them learn. Students are constantly told by teachers how to effectively learn. However, many of them never have the opportunity to experience that effective learning. And therefore, few develop the desire or motivation to attempt it on their own. Here, it is theorized that without experiencing correct Anki use and seeing how it could actually help them learn, the majority of students simply did not want to use it.

To address the above problems, three solutions were proposed for the second semester.

Independent Anki use. First, I would teach the students how to create their own Anki user accounts and flashcards from class materials. Second, I would teach them how to access their Anki accounts and study their flashcards. Third, I would teach them how to add new flashcards to their existing deck of flashcards.

Correct Anki use modeling. As a group, I would regularly and consistently show them how to study with Anki by teacher-modeled use in class, focusing on accurate self-evaluation of answer and providing correct feedback.

Student-pair Anki use. To increase exposure and use of Anki, students would have regular and consistent opportunities to use Anki correctly with a student partner to study their flashcards.

Method

Participants

Due to class scheduling, only one of the three original classes was available for continued participation in the second semester of the project. The 18 participants were Japanese university, first-year, students in an EFL course. This required class met four times a week for 45 minutes per class.

Materials

As part of the class content, a new dialog was introduced each week. Each dialog was approximately six to eight lines long with five additional scenarios to practice the dialog structure. From the dialogs, students created flashcards that had a full sentence or question in Japanese on the front and the English translation on the back. From the accompanying scenarios, additional flashcards with key vocabulary were created in the same format. This resulted in approximately 11 to 18 flashcards per week.

Procedures

In this section, procedures to implement the three proposed changes will be discussed.

Independent Anki use. To create more independent users of Ankident users of Anki, the class met in a computer lab once a week. On the first computer lab day, students learned how to access the Anki website on a desktop computer and how to make their own Anki user accounts. In the second week, students learned how to create a new deck and new flashcards from the previous week's dialog activity. Also, in the second week, during regular class, students learned how to access their Anki website accounts and

study their cards on smartphones. In the third week, students learned how to add new cards to their decks. Throughout the rest of the semester, students added new cards on a weekly basis. Students who finished early on those days were encouraged to study their decks. This created an opportunity for additional practice and instruction of correct Anki use.

Correct Anki use modeling. To increase students' understanding of correct Anki use, correct use was modeled approximately once a week during the semester. The Anki desktop program with a deck of flashcards made from the class materials was displayed on a widescreen television in class. With full class attention, a flashcard with the Japanese language prompt was shown on the screen. A random student was chosen to produce the English equivalent. The student's answer was written on the board. Other students were called upon to rate the first student's answer, based on the four options for feedback. The original student was asked for a self-rating. Finally, I gave a rating and explained the rationale behind that rating. This process was repeated for approximately five to ten minutes

Student-pair Anki use. To increase exposure to correct use of Anki, students participated in pair work once or twice a week. Students logged into their Anki website accounts on a smartphone and passed the device to their partner. This allowed all students to participate, even if they did not own a smartphone. The partner quizzed the first student on their Anki deck by reading the Japanese language prompt. If the first student's response was correct, the partner pushed the appropriate feedback button. This reduced the problem of students incorrectly rating their own answers. If the response was incorrect, the partner said the correct answer and the first student repeated it. Then, the partner showed the first student the answer on the smartphone and pushed the "again" (incorrect answer) feedback button.

After about five or ten minutes, students switched roles and repeated the activity. I circled around the class, listening and providing assistance and feedback when necessary.

Results

Independent Anki Use

By observing students in class, I determined that by the end of the second semester, all students were able to access their Anki website accounts. By checking students' flashcard decks against a master list, I determined that all students made consistent and correct flashcards.

Correct Anki use modeling

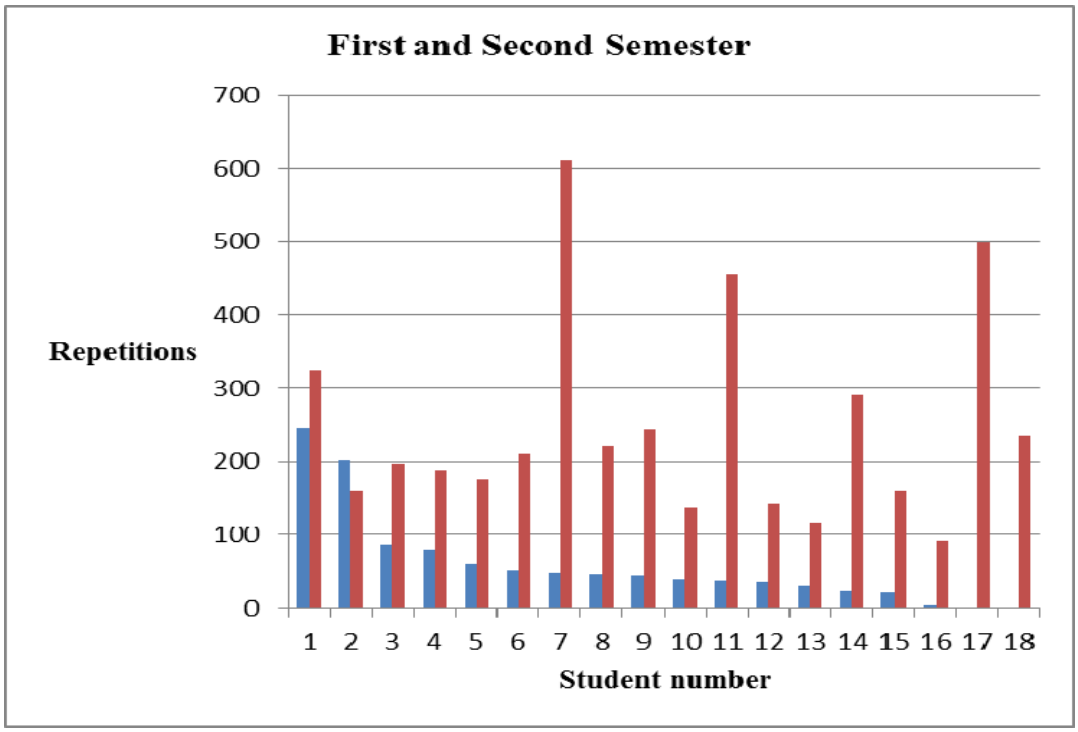
Based on my observations and interactions in class, all students demonstrated to me that they understood how to consistently use Anki correctly.

Student-pair Anki use

In terms of Anki usage, data from first and second semesters were available for comparison. In the first semester, as I created the master Anki account, I could access students' individual decks, and with their permission, I did so. In the second semester, the students gave me their usernames, passwords, and permission to access their accounts. Through both of these methods, it was possible to collect information on students’ Anki usage for comparison.

The following chart shows both the first (blue columns) and second semester (red colums) Anki usage data of the students.

Table 2



As in the earlier chart, the horizontal axis represents students in the same order, and the vertical axis represents the number of times a student studied a card, a "repetition." From the chart, it is obvious that the usage in the second semester was greater. With a highest usage of 611 repetitions, and a lowest of 92, the average number of repetitions per student was 246 compared to 61 from the first semester, an increase of over 400 percent.

Discussion

Obviously, in addressing the first probable cause of low student use of Anki, students not being independent users of Anki, the first proposed solution to create more independent users of Anki was easily implemented by committing the class time required for the students to learn how to create accounts and cards and how to access the Anki website from smartphones. While troublesome at times to manage a room full of students with different levels of technological ability, eventually all students were able to function

independently. It was also helpful to identify students who quickly understood the process and recruit them to help other students who were struggling with the logistics of logging into their accounts and creating new cards.

In regard to the second probable cause of low student use, students not understanding how Anki could help them succeed, the second proposed solution of correct Anki use modeling was also easily implemented. Some class time was needed to model correct Anki use in order to effectively demonstrate to the students how to correctly evaluate answers to flashcards and provide the appropriate feedback. While the students were not assessed directly on their assessment of other students' or their own answers, based on interaction with and feedback from the class during this modeling, and in the student-pair work, it appeared that they developed a better and more mature understanding of how to use Anki correctly.

The implementation of the third proposed solution of student-pair work was the most difficult of the three, but perhaps, in the end, the most effective. With nine pairs of students using a variety of smartphones to log in to the Anki website and study their flashcards, the first few weeks were often chaotic. Between forgotten usernames and passwords, technological mishaps, and slow cell phone or Internet service, it often took time to get all the students studying together. Also, as I did not want to constantly interfere with the students' attempts to use Anki in this structured way, I could not always monitor the accuracy of the partner evaluation or even if the students were actually studying. However, as the goal was to create independent learners, this freer and less controlled opportunity to use Anki gave students the chance to experience it on their own.

A word of caution, though, is in order. Students often overrated the partner's answers. One very effective technique to improve correct evaluation was to tell the partner with the smartphone to play the role of *kibishi sensei*, or strict teacher, and to evaluate quite critically.

Data from First and Second Semesters

In looking at the data in the chart comparing the first and second semesters, it is
obvious that the changes in the second semester were successful; the average student Anki use increased by over 400 percent. This greatly increased the opportunity for students to experience Anki in a positive, learning way.

It is also interesting to note from the chart that the increase in student use appears to be independent of students' performance in the first semester. Students who were the highest users in the second semester were not the highest users in the first semester. The three top students of first semester showed improvement in the second semester, but nowhere near as dramatically as the top three students of the second semester. This implies that the changes implemented in the second semester were effective in increasing usage for every student, regardless of students' motivation or other intangible factors.

However, the most interesting and hopeful aspect of the data are the three students whose
Anki usage was significantly higher than the rest of the class. As the students all studied approximately the same amount in class throughout the semester, the data for the other 15 students is assumed to represent the average amount of studying that occurred in the classroom. In that case, ranging from 92 to 325, the average amount of in-class studying is 193 repetitions. In comparison, the top three students, at 456, 499, and 611, studied an average

of 522 repetitions, 270 percent more than the other students. The assumption is that in order to have achieved such high numbers, these three top students studied independently outside of the classroom.

Conclusion

Overall, the second semester of this project can be viewed as a limited success. The goal

of the project was to teach Japanese university students to be independent users of mobile technology to effectively and efficiently learn. For the second semester of this project, it was theorized that teaching students how to use Anki independently and exposing them to correct use would produce an increase in their independent use of Anki.

By the end of the second semester, students were able to use Anki independently, and student exposure and correct Anki use increased significantly. Unfortunately, these changes did not necessarily translate into independent use outside of the classroom, with only a few students out of 18 appearing to use Anki significantly more than the others. However, the results achieved by the three top students indicate that with the right students in the right context, mobile technology can offer great potential for learning.

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