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Facilitating Collaborative Learning for Japanese Language Learners using Sketchpad

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Abstract: This paper describes the development and evaluation of a collaborative learning tool called Sketchpad. The importance of collaborative learning in foreign language learning has been pointed out for a long time. Besides, one of the trends in a pedagogical field is the shift from teacher-centered to student-centered learning. Recent advancement of IT technology has accelerat-ed its trend. With the spreads of educational application, it has enabled us to share information and knowledge in real time. In order to promote student-centered learning, it is necessary to facilitate interaction among students. For these purposes, Sketchpad was introduced in a language and culture class at university in Japan. The objectives of our research study is to examine whether Sketchpad contributes (i) to the facilitation of Japanese language learning as well as (ii) to the facilitation of interaction among students. Its effectiveness was compared with that of Blogger comment function. The result of the post-tests and the questionnaire conducted after evaluation showed that its more contribution to both (i) and (ii) than Blogger service. However, some user-unfriendliness was reported, and some editing function did nor work properly. It will be dealt with in our future work.

Keywords: Collaborative learning, Japanese language learning, Sketchpad, language and culture class, student-centered learning

1. Introduction

Social interaction is very important when it comes to learning (Vygotsky & Cole 1978). One of the theoretical bases which support its importance is a concept called the zone of proximal development originally proposed by the psychologist Lev Vygotsky. Another base is "social constructivist" philosophical base, where learning is regarded as construction of knowledge within a social context (Oxford 1997). In fact it is one of the trends in a pedagogical field that there goes the shift from teacher-centered to student-centered learning in any level of education (Morimoto 2008). It is reported that student-centered and small-scale course programmes resulted in more academic success than lecture-based course programme (Severiens et al. 2015). It is reported that a student-centered collaborative learning is one of the most effective ways of learning in language class (Chen 2003). In fact, most stud-ies investigating the link between the extent to which course programmes are student-centered on the one hand and promote academic success on the other hand, find positive relationships between the two (Severiens et al. 2015). Recent prevalence of high-performance mobile devices has enhanced the potential of students' active interaction via mobile-based communication tools. We have seen a good deal of research on communications applications such as educational application (Munoz & Towner 2009; Hung & Yuen 2010; Kim & Kim 2013; Kwak, Choi, & Lee 2014. Our collaborative learning project, Sketchpad system, is among them. In this study Sketchpad was introduced for the purpose of facilitating interaction among students in the domain of Japanese language learning.

2. Japanese Language Learning in Japan

According to the survey conducted by Cultural Affairs Agency in Japan, there are 2,230,000 foreign residents and about 190,000 international students are studying Japanese in Japan [10]. In addition Japan is in the process of moving ahead on a "Plan for 300,000 Exchange Students" as a policy measure to create a Japan that is Open to the World in 2008 [11]. EF English Proficiency Index (2017) [12] indicates that Japanese people have low English proficiency. In fact, many international students report the inability of Japanese local people to communicate in English as one of their biggest culture shocks [13] (Uosaki et al. in press). Therefore, in order to live in Japan, Japanese language ability is necessary. However, learning Japanese language is a big challenge for international students. In particular, in Japanese language there is no space between words, which makes them more difficult and complicated to understand the grammatical structure of the language and its meaning. How can we support their understanding of Japanese language in terms of how to segment them properly? Our objective in this study is to examine whether our developed system, Sketchpad contributes to (i) the facilitation of Japanese language learning as well as (ii) the facilitation of interaction among students.

3. Sketchpad

3.1 System Design

Sketchpad System is a client-server application. It has been implemented using HTML5 and the Coupled Object technology. Details are described in (Frez, Baloian & Zurita, 2012; Baloian, Gutierrez & Zurita 2013). So it can be run using web browsers Chrome, Mozilla, or Safari regardless from the operative system of the computational device. It is created to support collaborative class by providing content distribution in real-time. Its functionality consists mainly in the distribution of slides that can be drawn and edited on using predefined tools and which contents remain synchronized at all times with every student participating in class. If a learner draws a new stroke in the slide, that content gets distributed to every learner allowing everybody to see the new stroke in their own devices at the same time.

Its main interface, shown in Figure 1, consists of a workspace, which can be private or shared, where the user create sketches by freehand drawing and text typewriting, including basic edition functionalities like deleting, copy and paste, undo, redo, changing colors, zooming in and out, etc.

Students can make their contributions through brainsketching to several individual and/or shared pages but they can work on one only at a time. Icons with a small view of the page content are shown at the left-hand side of the interface. The page that is currently edited is highlighted with a blue frame (see Fig. 1). In order to share a private page, the user has simply to drag and drop its icon from the private to the public area. A copy of the page will appear in the public area, keeping the original in the private one. After this, all users participating in the session will see this page as a new icon in the public area. They can start working collaboratively by selecting it, clicking on the icon. The third slide highlighted in a light blue frame indicating that its user is currently working on it, thus it is shown in the main workspace at the center of the interface.

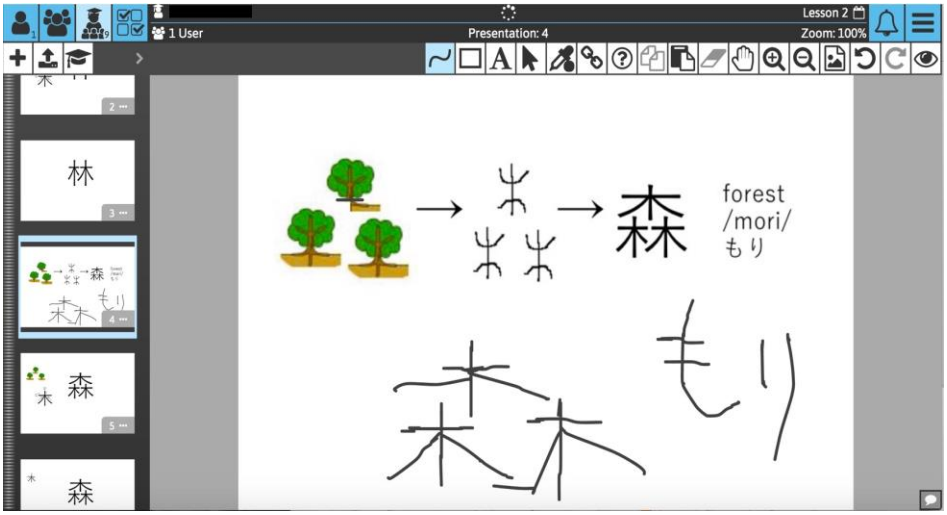

Figure 1. Sketchpad Interface.

4. Pilot Evaluation

4.1 The target class

The target class was held on a once-a-week-basis in a CALL (computer assisted language learning) room during the fall semester, 2017. Each student had a PC in class. The class was one of "international exchange subjects" which was targeted mainly for international exchange students. Japanese students who are interested in interacting with international students could also join it. The objectives of the target class were (1) to improve the skills of their target languages, which are Japanese for international students or English for Japanese students and (2) to enhance cross-cultural understanding. An evaluation was conducted in one of the authors' class at university in the western part of Japan. Fourteen students participated in the evaluation (4 Japanese, 2 Germans, 2 Chinese, 1Finnish, 1 French, 1 Korean, 1 Macau, 1 Taiwanese, 1 Vietnamese).

4.2 Procedures

Figure 2 shows the learning scenario.

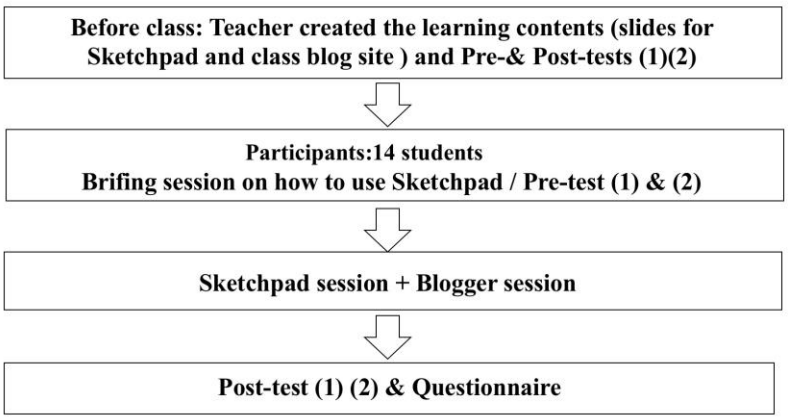

Figure 2. Sketchpad Interface.

The teacher created 5 slides which showed 5 sentences which were pretty difficult to be segmented even for native speakers of Japanese such as "うらにはにはにわにはにはにわにわとりがいる"(uraniwaniwaniwaniwaniwaniwaniwatorigairu/There are two chicks in the backyard and

so are in the yard). The objective of the contents was to learn how to segment Japanese sentences. Before Sketchpad was introduced, the participants whose target language was Japanese took the pre-test to examine whether they know the meanings of the target sentences. The system was introduced in the class of the 2017 fall semester held in January 23rd, 2018. The students were divided into three groups. The groups were made in the way that at least one Japanese native speaker was in each group so that they could play the role of an instructor to lead them to segment the sentences for understanding the meaning.

At the beginning of the class, they had a briefing about how to use the system since it was their first time to use it. The slides created by the teacher were shared by the system. They were instructed to brainstorm ideas about how it should be segmented and what it meant with the shared slides. They were informed that their active participation would reflect their grades. After the evaluation, the post-test was taken by the Japanese language learners and the questionnaire was conducted in the whole class.

In order to examine the effectiveness of Sketchpad system, the comparison was made between Sketchpad and Blogger's comment function. A class blog was created by the teacher using Google Blogger service at the beginning of the semester and used as a communication tool for the whole semester. Therefore the students were all familiar with using this function by then. The teacher created a new page in Blogger site to let them think about the meaning of the Japanese sentences given in the pre-test.

In order to give an equal opportunity of education using the cutting-edge technology and due to the late introduction of the system (The pilot evaluation was conduction during the last class of the semester.), there was no control group created. Therefore the whole class experienced the system and the blogger site at the same time.

4.3 The Results

Table 1 shows the result of the Pre- and Post-test(1) and (2). Pre- and Post-test(1) were identical to ask them the meaning of 3 Japanese sentences which were difficult to be segmented to be learned through Sketchpad. Three points were given for each question, thus the full mark was 9 points. Pre- and Post-test(2) were identical to ask them the meaning of 2 Japanese sentences which were difficult to be segmented to be learned through Blogger site. Three points were given for each question, thus the full mark was 6 points. The teacher did not give them the correct answers. So only the student-centered collaborative learning reflected the results. The mean scores of the Pre-test(1) and (2) taken by the Japanese language learners in class were 0.38 and 0.23 with the standard deviation(SD) of 0.77 and 0.69. It means almost no one knew the meaning of them. After the evaluation, the mean scores of Post-test(1) jumped into 3.75(41.7%) with the standard deviation of 2.49, while that of Post-test(2) was 0.75(12.5%) with the standard deviation of 1.30. The results show that the students learned more with Sketchpad than Blogger site.

Table 1

The result of the pre- and post-test

	Pre-test(1) (full mark 9)	Post-test(1) after **Sketchpad** use (full mark 9)
Mean	0.38 (4.2%)	3.75(41.7%)
SD	0.77	2.49
	Pre-test(2) (full mark 6)	Post-test(2) after **Blogger** use (full mark 6)
Mean	0.23(3.8%)	0.75(12.5%)
SD	0.69	1.30

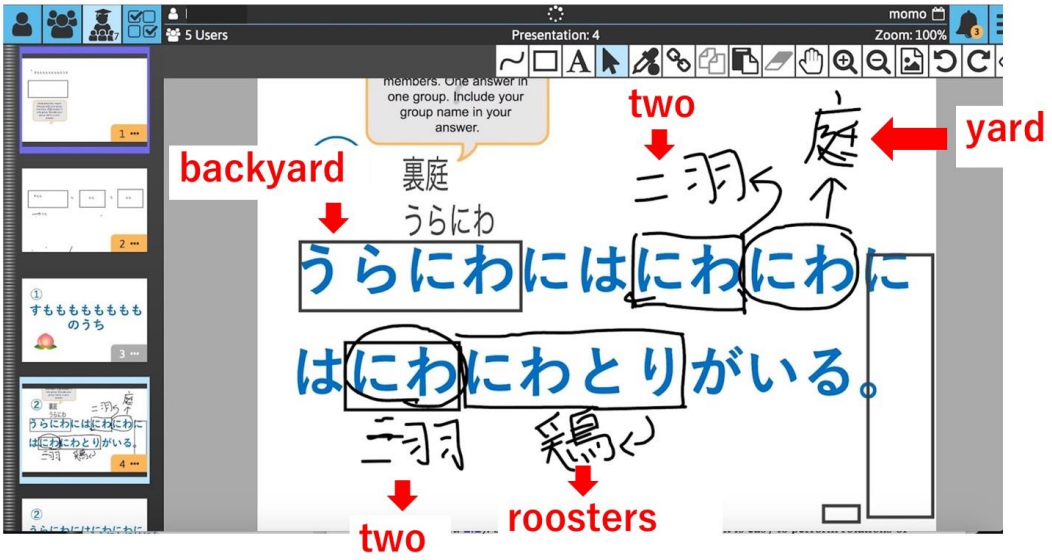

Figure 3. Collaborative brainstorming using Sketchpad:"うらにはにはにわにはにはにわにわとりがいる"(uraniwaniwaniwaniwaniwaniwatorigairu).

Figure 3 shows that the students in a group sharing the slides and showing their ideas how the sentence could be segmented properly so that it makes sense. As expected, the students with higher proficiency level of Japanese language (native speakers) in a group lead the whole process. On the other hand, no interaction among students took place when using Blogger comment function even though they were already familiar with its function. In fact one of the student commented ".... there it is more complicated to write comments (in the blog)" when asked which was the easier to handle, Sketchpad or Blogger site. Therefore Blogger comment function did not play the role as a communication tool, which endorsed the result of the evaluation conducted in (Uosaki, Yonekawa, & Yin 2017).

At the end of the phase, they were asked to answer the five-point-scale-questionnaire as shown in Table 2. Q1 and Q3 were created based on the technology acceptance model proposed by (Davis 1989). Q2 was created to examine the fun factor of our system.

Table 2

The results of the 5-point-scale questionnaire

	Questions	Mean	SD
Q.1	Was it easy for you to use Sketchpad?	3.8	0.84
Q.2	Was it fun for you to use the system?	3.8	1.1
Q.3	Was it helpful to share knowledge with your classmates?	3.8	1.30
Q.4	Was it helpful as a means of collaborative work with your classmates?	3.6	1.34
Q.5	Was Sketchpad helpful for understanding Japanese language ?	4.0	0.71
Q.6	Please rate its interface	3.2	0.84
Q.7	Please rate the whole system.	3.0	1.41

The highest score, 4.0 was given when they were asked whether it was helpful for understanding Japanese language (Q.5). Since the main objective of this evaluation was to examine whether the system contributed to the improvement of the Japanese language understanding with collaborative work, it can safely be said that our system worked effectively enough in helping them learning Japanese. The lowest score, 3.2 was given when they were asked to rate its interface (Q.6). As it was their first encounter of the system and they were not given enough time to practice the system before the evaluation started because the semester end was approaching, some students felt it was too complicated (Table 3

Comments # 4), which seemed to lead to the low score of the interface rating of Sketchpad. Therefore, it is necessary to give them enough time to practice before the evaluation, which will be considered in our future evaluation.

At the end of the phase, they were asked to answer the five-point-scale-questionnaire as shown in Table 2. Q1 and Q3 were created based on the technology acceptance model proposed by (Davis 1989). Q2 was created to examine the fun factor of our system.

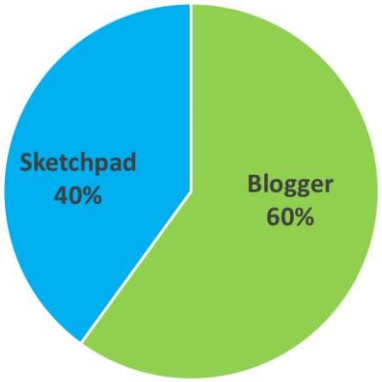

Figure 4. Which was the easier to handle, Sketchpad or Blogger site?

Figure 4 shows the result of the question: which was the easier to handle, Sketchpad or Blogger site? Even though the blogger comment function was not used actively by the students, 60% of them still felt it was easier to handle. One of the students said "I prefer the interface of the Blogger site, although there it is more complicated to write comments." It implicates two things:1) Blogger site was more complicated to write comments than Sketchpad. 2) The interface of Blogger site was more user-friendly than Sketchpad. As mentioned, the late introduction of Sketchpad in the semester did not allow them to have enough time to practice the new system, which affected the whole evaluation. Since the lesson learned, we will consider this point in our next evaluation.

Table 3 shows the participants' free comments on Sketchpad, which will be dealt with in the next section, 4.4 Discussions.

Table 3

The students' impression of Sketchpad

#1	It was fun to write on the screen and be able to share the idea with other people.
#2	Did not work properly. I could not do any markings to help problem solving
#3	The idea behind Sketchpad is interesting, but it is quite similar to Google Slides (which functions without any bugs).
#4	In my opinion it was too complicated.
#5	Still needs some improvement. Management of editing rights is not very straightforward (should be possible to give global editing rights or for multiple slides instead of selecting it for every student on every slide, unless we missed that functionality). Even though I had editing rights once, it would not allow me to draw lines, so there seem to be some minor technical hiccups. Aside from that, all the necessary editing functionality is there and straightforward to use.

4.4 Discussions

Our research question was to examine whether our system contributes (i) to the facilitation of Japanese language learning as well as (ii) to the facilitation of interaction among students. As for (i), our system contributed to the improvement of the understanding of Japanese language with the following reasons: 1) When they used Sketchpad, the improvement between the pre- and post-test results was much larger than when they used Blogger site. 2) When five-point-scale questionnaire conducted, the highest score, 4.0 was given when they were asked if Sketchpad was helpful for understanding Japanese language. As for (ii), interaction among the students took place more

actively compared with the Blogger site. As the comment #1 in Table 3 says, the system gave them some fun in sharing the ideas with other people. Therefore, it can be safely be said that Sketchpad contributed to the facilitation of Japanese language learning as well as (ii) to the facilitation of interaction among students. However, it turned out that our system had some weakness, especially in the user-friendliness as the comments # 4 in Table 3 says that it was too complicated. Besides, as the comments #2 & 3 pointed out, some editing function did not work properly. This issue will be considered in our future work.

5. Conclusion and Future Works

In this study, we described the development and evaluation of a collaborative learning tool called Sketchpad. When Sketchpad was introduced in the university class targeted for international students who were keen in learning Japanese, the improvement from pre-test to the post-test was dramatical. The highest points of the questionnaire results when asked whether Sketchpad was helpful for understanding Japanese language showed that the participants were satisfied with its contribution to the facilitation of Japanese language learning. Our hypotheses (our research questions)(i) and (ii) were proved to be correct. However it was found out that the editing function of our system did not work properly. Since it is one of the key functions for the collaborative learning, it is necessary to solve the problem. It is among our future works to find out the solution. In our next evaluation, we plan to give them enough time to get used to the system and to divide the class into two groups and conduct an evaluation for a longer period so that the both groups could experience both with and without the system.

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