Seamless Flipped Classroom Using SCROLL in CALL Class

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Abstract: In this paper we have explored flipped classroom. How we can encourage students to learn outside-class is a key issue in flipped classroom. In our previous study it was found that our system called SCROLL (System for Capturing and Reminding Of Learning Log) contributed to the students' increased involvement in outside-class learning. SCROLL is expected to play an important role in its effective implementation of flipped classroom. A pilot evaluation was conducted to examine the effectiveness of our proposed learning scenario using SCROLL and SNS(Social Networking System). The result showed that it enhanced the students' outside-class learning, though more examination is necessary to conclude its contribution since there are other factors which contributed to boosting up outside learning time. Timing of posting outside-class task was also examined and the period of two weeks was found to be appropriate.

Keywords: flipped classroom, mobile assisted language learning, second language learning

1. Introduction

Growth of the Internet has enabled us to go beyond the interaction between individual learners and the system, and it realized collaborative learning that can occur simultaneously with group of learners connected to each other. Besides, New telecommunications technology such as Wi-Fi (wireless fidelity), Bluetooth, 3G and 4G (third and fourth generation), has enabled various kinds of portables devices (e.g. laptop or netbook computers, palmtop computers or PDA, mobile phones, smart phones, GPS devices, MP3 players, handheld electronic game devices). These technologies allow learners to learn anytime, anywhere, and provide them with multiple ways of learning throughout the day.

The progress of these technologies and realization of one device or more per learner have offered us a new learning environment called "flipped classroom". In flipped classroom, how we can encourage students to learn outside-class is a key issue. In our previous study, SCROLL contributed to the students' increased involvement in outside-class learning (Uosaki et al. 2013). Therefore we expected our system could play an important role in effective implementation of flipped classroom.

The rest of the paper consists of 4 sections: Theoretical backgrounds of our study were overviewed in Section 2. In Section 3, our developed system SCROLL is described. Section 4 includes the pilot evaluation experiments we have conducted to investigate how our system could contribute to the effective implementation of flipped classroom. Finally Section 5 concludes the study mentioning our future works.

2. Theoretical Backgrounds

2.1 Flipped classroom

Flipped classroom is a newly risen learning strategy and has gathered a lot of attention from researchers and educators of various fields in the recent years (Bergmann & Sams, 2012; Kiat & Kwong, 2014; Vaughan, 2014; Schmidt & Ralph, 2014). It is a kind of blended learning, where learning contents moved outside the classroom. According to Flipped Learning Network, 'flipped classroom' is defined as "a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter." More simply it is often defined as "school work at home and home work at school". Theoretically it might be possible to conduct flipped classroom without technology. One possibility is to deliver paper-based learning contents to the students for reading before class. But when the term, "flipped classroom" or "flipped learning" emerged, it was already a generalized idea to deliver video contents. Therefore flipped classroom can be realized with the help from technology.

As one of the advantages of flipped classroom, Bergmann et al. (2011) has listed that flipped classroom is "a means to INCREASE interaction and personalized contact time between students and teachers." It is also expected that it can be a means to increase interaction not only between students and teachers but among students. Thus it enables us to realize a student-centered collaborative learning, which is reported as one of the most effective way of learning in second language learning class (Chen, 2003). It is a growing research area attracting the attention of scholars of learning technology all over the world. Since it is an emerging research area, a lot of issues are to be explored in order to prove its effectiveness and its efficacy.

2.2 Mobile Learning

Mobile learning has generally been defined as learning with the use of mobile and wireless technologies. The concept for mobile learning was foreseen as early as 1970s with the Xerox Dynabook project which proposed a "self-contained knowledge manipulator in a portable package the size and shape of an ordinary notebook" (Sharples et al, 2009). It has been recognized as one of the natural directions toward which CALL (Computer-Assisted Language Learning) is heading (Chinnery, 2006; Stockwell, 2007). Thornton and Houser (2005) reported that the learners preferred mobile platform rather than PCs. Especially, mobile technologies have been expected to foster shifting from classroom-based learning to the one that is free from time and space boundaries. Since mobile technology is a fast-evolving, constantly advancing field, its infinite potential is inevitably expected to contribute to implementation of flipped classroom.

2.3 Motivations

One of the motivations for introducing flipped classroom is to make use of class time for collaborative activities. In Uosaki and Ogata (2009), the survey result shows that the participants, university sophomores, felt it was the most useful to conduct an interview with international students among various activities in their communicative English class. In fact, it is regarded as one of the most effective ways of learning languages to mingle with those who speak that language. Since one of the authors' L2 learning class consisted of international and Japanese students, it was an ideal situation for language learners. In order to make most use of class time with group discussion, group presentation or any kind of collaborative activities, flipped classroom was introduced.

The other motivation is that learning time of the second language at school is far from sufficient in Japan and there is a strong necessity to boost up outside-class learning time (Uosaki et al., 2013). In order to solve this problem, flipped classroom is expected to be one of the key contributors. Taking the above mentioned elements into account, we have designed a class where students can mingle with peers during class with lecture part at home such as introduction of new terms.

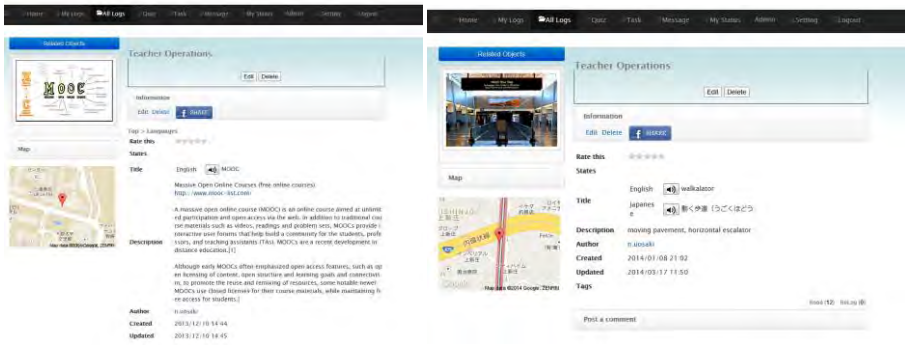
3. SCROLL

3.1 System Design

We have developed a system called SCROLL (System for Capturing and Reminding of Learning Log) that allows learners to log their learning experiences with photos, audios, videos, location, QR - code (Quick Response code), RFID (Radio - frequency identification) tag, and sensor data and so on , and share and reuse them with others (Ogata, et al., 2010). SCROLL is a client-server application. The server side runs on Linux OS. It runs on different platforms such as Android mobile phones, PCs, and other smart phones and tablets. Users register what they have learned, which we call "ubiquitous learning logs (ULLs)", to the system and view ULLs uploaded by themselves and others. Then the system automatically generates quizzes to help learners to recall their past ULLs.

ULL recorders facilitate learners' recording of their ULLs to the server whenever and wherever they learn new objects. As shown in Figure 1, in order to add a ULL, they take its photo, attach different kinds of meta-data such as its meanings in different languages, comments, tags and location information. They can share their new ULLs with others and view ULLs uploaded by themselves and others. They can keep their ULLs private if they wish.

Figure 1. Add ULL on Android



(1) "MOOC" for previewing before class (2) "walkalator" for reviewing after class

Figure 2. SCROLL Interface on the Web

It is expected that the sharing function that we can share ULLs with other learners instantly gives a great deal of support for implementation of flipped classroom. In this study, SCROLL was used for an instructor's uploading terms to be learned for viewing before class (eg. "MOOC" in Figure 2(1)) and also terms which they learned during class for reviewing after class (eg. "walkaltor" in Figure 2(2)). It was also encouraged learners to upload their own learning experiences, which is the system's original purpose.

4. Evaluation

4.1 Subjects

Eleven university students in an international exchange class which was held weekly and conducted in English language at Osaka University participated in the evaluation. They were 5 international students (two from Netherland, two from Brazil, and one from Germany) and 6 Japanese students. They all reported they had Internet-connected PCs at home and were mobile phone owners.

4.2 Flipped classroom Design

The objectives of the subject class were 1) to improve their target language abilities and 2) to enhance mutual understanding of the culture of their mother countries and Japan. In order to make much of class time for discussion and other collaborative activities, as for lecture part such as learning new terminology, or briefings on how to use SCROLL, they were assigned to view contents on SCROLL before class, which are, in most traditional classes, supposed to be done during class. In addition, in order to encourage students' outside-learning, they created their own Blogger site and were given home assignments of composing essays using their target language. Furthermore, in order to promote their

interaction outside-class, a Facebook group was created. The learning procedures are described in Figure 3.

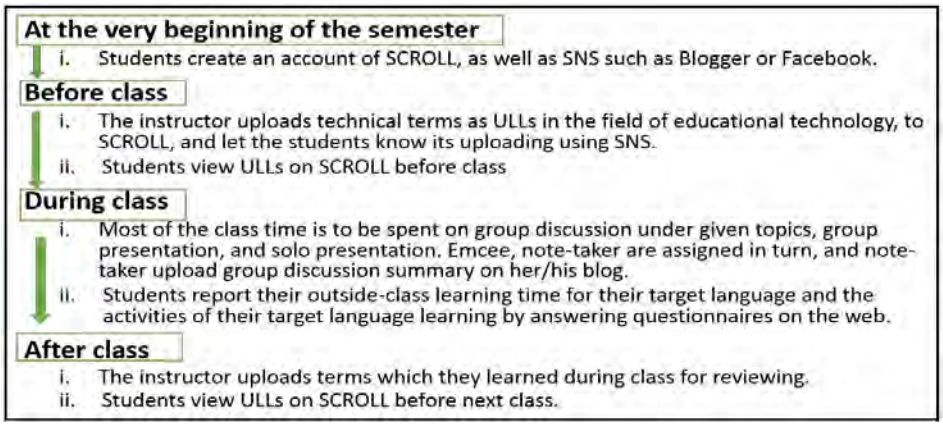


Figure 3. Learning Procedures

4.3 Results and Discussion

4.3.1 The average outside-class learning time for the target language learning

As mentioned, since it is a key issue how we can encourage students to get involved in learning outside-class in flipped classroom, the participants were asked to report their outside-class learning time and what kind of activities were included on the questionnaire site created by Google Drive.

The average outside-class learning time for each student was shown in Table 1. The whole class average was 53.9 minutes per day.

Table 1: Average outside-class learning time for the target language learning (per day)

Student #1	116.9
Student #2	75
Student #3	70.1
Student #4	65.8
Student #5	55.3
Student #6	51.8
Student #7	51.5
Student #8	47.3
Student #9	22.1
Student #10	21.6
Student #11	15.7
Mean (SD)	53.9 (27.6)

In our previous study, we had conducted an evaluation with university freshmen with/without SCROLL (Evaluation I) in order to find the answer to our hypothetical question: Does SCROLL contribute to the solution of lack of learning time? (Uosaki et al., 2013). Table 2 shows the average outside-class learning time for both groups: SCROLL group, 10.07 minute per day, without-SCROLL group, 6.6 minute per day. This indicates that the SCROLL group more committed to outside-class learning than without-SCROLL group, though the t-value (1.28) did now show its statistical significance.

Table 2: Average outside-class learning time in Evaluation I (per day) from (Uosaki et al., 2013)

	Outside-class Learning Time (min)Mean (SD)	*t*	Effect Size (d)
With SCROLL	10.07 (151)	1.28*	0.37 (Small)
Without SCROLL	6.6 (115)		

*$p = 0.11$

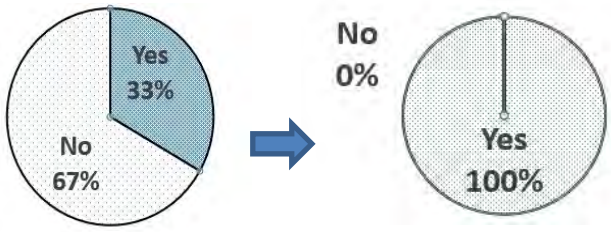
Compared with our previous study, outside-class learning time dramatically increased in this pilot study. Since one of the motivations for introducing flipped classroom was to boost up their outside-class learning time, the question was "How long did you study your target language outside class from date *X* – date *Y*?", the same question asked in the previous one. There should be considered

various factors which contributed to boosting up outside learning time. The interview session was conducted for the hardest worker whose average outside-learning time for her target language was 116.8 per day. She said "I studied hard because I intended to take IELTS (International English Language Testing System). In her case, it seemed to be IELT test that boosted up her outside-class learning time. Therefore it is too early to say flipped classroom was one of the contributors.

4.3.2 Appropriate timing of posting an outside-class task

1) One week Vs. two weeks

The students were assigned to view ULLs before class. Figures 4 shows the questionnaire results on whether they learned a new term, 'flipped classroom'. The first questionnaire result shows only 33% answered 'yes' to the question whether they knew it. In fact the exact the same 33% said 'yes' to the question whether they viewed it. Next class, the instructor encouraged them to view it and the second questionnaire conducted one week later shows 100% of the students answered 'yes'. It seemed it was unlikely for them to do their outside-class task during the first week. Their performance was highly improved after the teacher pushed them to view it. Therefore it is recommendable to give them at least two weeks to view ULLs as an outside-class task.



(1) 1st time (2) 2nd time (one week later)

Figure 4. Do you know what 'flipped learning' means?

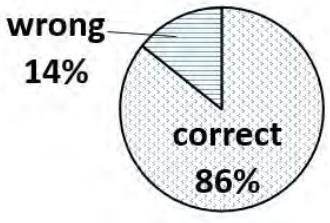
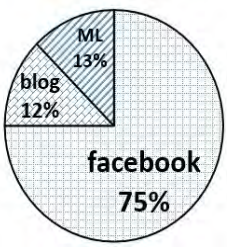


Figure 5. What does 'MOOC' stand for?

The students were assigned to view 'MOOC' uploaded to SCROLL as an assignment. The instructor gave them a reminder the next class and a multiple-choice quiz was conducted two weeks later. Figure. 5 shows its result. 86% gave a correct answer. The result also endorsed it was adequate to give them two weeks view an assignment content.

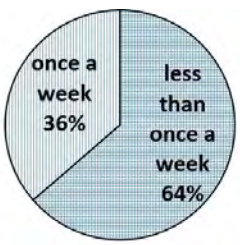
4.3.3 *SNS contribution to outside-class learning*

Since SNS function of SCROLL is yet to be ready, all the students created their own blog including the teacher and became readers each other and a Facebook group and a mailing list were also created in order to encourage outside-class interaction. According to the survey, 75% of the students used Facebook as a means of getting messages from the teacher (Figure. 6(1)). 55% of the students viewed Facebook posts every day, while 64% of the students viewed blog posts less than once a week (Figure.6(2)(3)). Therefore blog sites did not work as a means of communication outside-class, while Facebook group functioned as a group forum and they interacted each other using their target language outside-class, which, we believe, one of the contributors to boosting up their outside-class learning time of their target language.



(1) Means of getting messages

(2) FB viewing frequency



(3) Blog viewing frequency

Figure 6. SNS contributions

5. Conclusion and Future Works

In this study, we explored flipped classroom and conducted a pilot evaluation. It was found that outside class learning time increased in our proposed learning scenario, but still more examination was necessary to conclude its contribution. Timing of posting outside-class task was examined and found out that the period of two weeks is appropriate as far as this pilot is concerned. Full evaluation is scheduled to be conducted in the near future to examine whether these findings are replicated.

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