Supporting an English Course Using Handhelds in a Seamless Learning Environment

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Abstract: In this paper, we propose mobile-assisted seamless vocabulary learning and present learning scenarios seeking smooth and seamless transitions between learning in-class and out-class, incorporating students' self-directed learning into classroom activities so that learning both in-class and out-class interacts with each other, which is ultimately expected to result in effective and fruitful vocabulary learning. Two experiments using mobile devices are proposed to find out some answers to the following questions: (1) Does the use of mobile devices support seamless English vocabulary learning? (2) Can the additional contents recommended by the system help linking in-class and out-class vocabulary learning?

Keywords: MALL (Mobile Assisted Language Learning), Seamleass Learning, Vocabulary Learning, ESL

Introduction

English has become the lingua franca of the world due to globalization and internationalization in recent decades [1]. Therefore ESL (English as a Second Language) education is inevitable for non-English speaking countries including Japan. It has been long pointed out that Japanese ESL learners are lacking in vocabulary though it is an essential component in language skills. It is evident that with more unknown words, learners face more difficulty in understanding English [2]. Therefore it is very important to build up vocabulary to improve one's English skill. But it is also true that vocabulary teaching/learning methods are often considered boring [3]. Then the following question occurs: 1) What if technology can support effective and enjoyable vocabulary learning for ESL learners? If such a system were successfully implemented, its contribution to vocabulary learning or furthermore, language education in general, would be immeasurable.

1. Theoretical Background

Seamless Learning

Recent progress of mobile and wireless technologies offers us the potential for a new learning environment, namely "seamless learning". It has been gaining quite a few researchers' attention as a new learning environment [4] [5] [6] [7] [8] [9] [10]. "Seamless learning" is used to describe the situations where students can learn whenever they want to in a variety of scenarios and that they can switch from one scenario to another easily and quickly using one device or more per student ("one-to-one") as a mediator [4]. It allows learners to learn any time, anywhere, and provides them with multiple ways of learning throughout the day. The term, seamless learning is also used to describe lifelong learning in various environments across time and location seamlessly through the use of the technology

as a mediating tool [5]. In this paper, however, we use this term in the narrower sense, that is, by seamless learning, we mean learning which occurs with smooth and seamless transitions between in-class and out-class learning, between handheld use out-class and desktop use inside-class. Seamless learning can be depicted in a two-dimensional way 1) in-class and out-class learning and 2) planned and unplanned learning. Thus there are four types of learning accordingly: in-class planned learning, in-class unplanned learning, out-class planned learning and out-class unplanned learning [8]. And if the technology could help these four types of learning interact with one another and help them to be incorporated into one continuous learning beyond time and space, learning could be very successful (Figure 1).
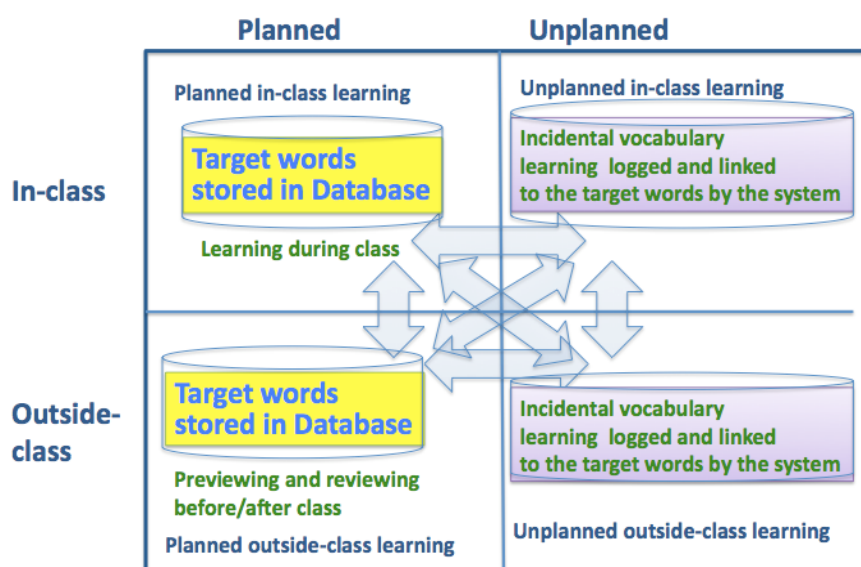

Figure 1. Incorporation of Four Types of Vocabulary Learning with the help of technology
(adapted from So et al, 2008 [8])

In addition, we need to consider that we usually have only one instructor per class, small or large. What the teacher can do through these four types of learning is limited. So peer-to-peer (P2P) collaboration is necessary for successful seamless learning. How we can adopt P2P collaboration effectively in a seamless learning is the key issue. We aim to create a knowledge-aware virtual learning community to promote P2P interaction in our seamless learning environment.

Cyclic Model of Learning

One premise of our seamless learning idea is that there are four processes of learning: preview, in-class lesson, review, and expanded study and that these four processes should be connected with each other to make smooth continuous learning. This concept is depicted by the term, 'cyclic model of learning'. Takeuchi (2007) proposed 'cyclic model of learning' [11] (Figure 2), by which he means 'class', in a broad sense, means not only learning in-class but also learning out-class and it allows teachers to incorporate students' self-directed learning into classroom activities [12]. Though it is called 'cyclic', the image is more like 'spiral', since the learners are improving their skills, expanding their knowledge, where learning occurs seamlessly from one in-class learning to another with out-class learning in between (Figure 3).
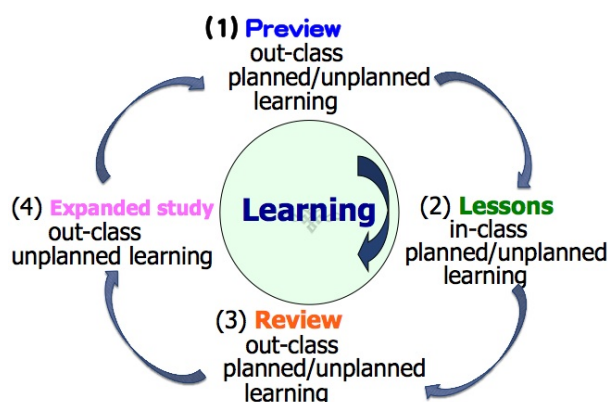
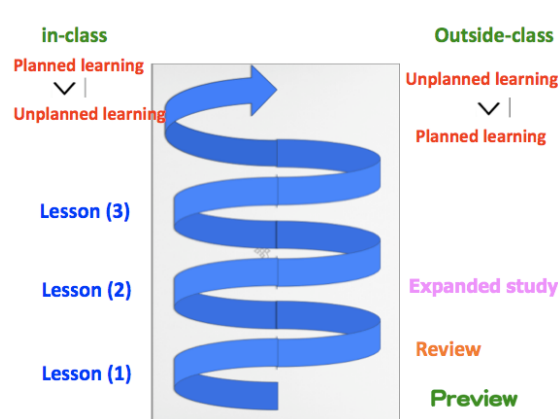Figure 2. Cyclic Model of Learning (adapted from Takeuchi, 2007)

Figure 3. Seamless Learning based on Cyclic Model of Learning

Seamless learning and cyclic model of learning, these two concepts share the same idea that learning can occur wherever they are, and that every learning experience both in-class and out-class interacts with each other, which should result in effective and fruitful learning experiences. This concept is critical for English education in Japan since it has been pointed out that learning time of English at school is not sufficient: 630 – 650 hrs during 6 years of junior and senior high school education [11], plus 112.5 hrs, for instance, during college years at our university (based on the University of Tokushima enrollment guideline 2009). Shortage is apparent when we consider the fact that 1200 hrs is necessary to achieve basic level of French language in Canada [13]. In fact, Ministry of Education, Culture, Sports, Science and Technology have decided to introduce once-a-week English class (45 minutes for one class and 35 classes a year) for elementary school 5th and 6th graders from 2011. But it will only add 52.5 hours to total learning hours. It is far from satisfactory to solve the lack of learning time. Then how should we cope with this shortage problem? If in-class learning time is limited, there is no other way but to learn out-class. Thus we strongly suggest mobile-assisted seamless vocabulary learning which motivates students to learn out-class and encourages their self-directed learning. According to the survey we have conducted in October 2010 over 164 university freshmen and sophomores (age: 18 - 20) majoring in literature, law, economics, and commerce, 162 (98.8%) reported owning mobile phones. 182 students were invited to respond and 164 responded to the survey. So it endorses the widespread use of mobile phones among college students in Japan.

2. System Design

Based upon the above ideas, we design the following Seamless Mobile-Assisted Language Learning Support System (hereafter we call it SMALL System) (Figure 4). In our system, (1), (3), in Figure 2 are mobile-based out-class planned learning, (2) is a PC-based in-class planned/unplanned learning and (4) is a mobile-based out-class unplanned learning.

Word Data in Figure 4 consists of target words to be learned through one semester. Data is imported to the system from an electric or OCR scanned textbook.

Quiz Logs consist of all the quizzes done by the students. All the students' activities and quiz results are analyzed and evaluated. This newly gained data reflect review quizzes and difficulty level adjustment and facilitate their learning processes.

Learner Info contains the students' English levels and their fields of interests for the distribution of the customized contents.

Related Contents are obtained through RSS feed and delivered to the students' mobile devices according to their English levels and their interests for the expanded study.

Learning Log System or SCROLL is a system developed by our team. It supports learners' capturing and recalling their learning logs (http://ll.is.tokushima-u.ac.jp/learninglog/signin) [14]. The students register their newly acquired words through their expanded study and the system gives them quizzes from new words.
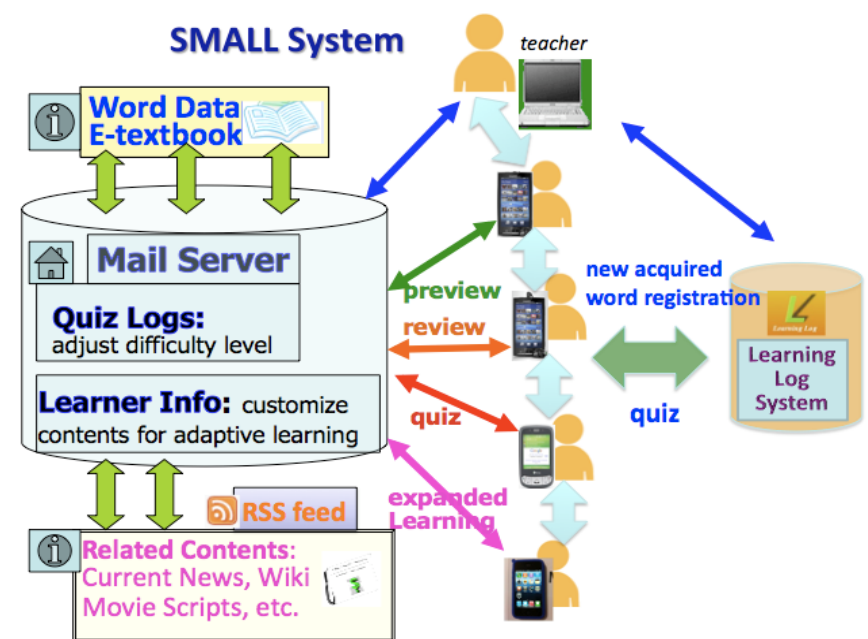

Figure 4. SMALL System (Seamless Mobile-Assisted Language Learning Support System)

The scenarios based on Figure 2 are as follows. Students will be beforehand given English vocabulary-level tests to establish their level of English and also questionnaires will be given to identify their fields of interests. They are assigned to write about their current interests on the designated website (blog, twitter, foursquare etc.) on a regular basis so that the system can identify them which reflect the contents to be delivered for extended study.

They are informed that these assigned writings will be evaluated and reflected on their school reports.

(1) **Preview (mobile-based out-class planned/unplanned learning):** Students receive messages which show the URLs to read the text for preview and take target word quizzes (Figure 5 & 6). Students can choose either web-based texts and quizzes or mail-based texts and quizzes. They answer multiple-choice quizzes until they make correct answers. They can read texts and answer quizzes at any time and at any location using mobile devices, whether it is a smart phone or a conventional type.
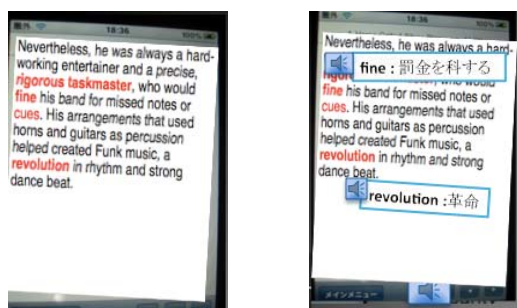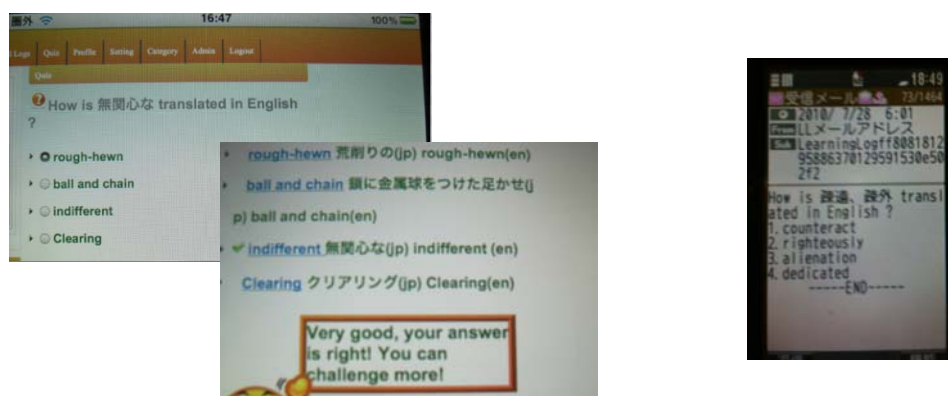
Figure 5. Preview text interface

Figure 6. Quiz interface 〔 web-based (left & middle) & mail-based (right) 〕

(2) **Lessons (PC-based in-class planned/unplanned learning)** :In the electronic/scanned textbook, target words are hyperlinked and when the teacher clicks them, new windows will be opened and they show names of the students who made wrong answers so he can pay attention to them during class (Figure 7). They are given web-based quizzes to make sure if they learn the target words during lesson.

(3) **Review (mobile-based out-class planned/unplanned learning)**: Students receive messages which show the URLs to read the text for review and take target word quizzes. The system reports the review test results with most frequently mistaken word ranking lists and the teacher will review these words in the next class. So the learning occurs continuously.

(4) **Expanded Study (mobile-based out-class unplanned learning)**: Students receive messages which show the URLs for expanded study. The SMALL System recommends the contents of each student's interests which include target words learned in class. The target

words for the week are highlighted in the expanded study texts for recalling so that in-class learning is reinforced through out-class learning.
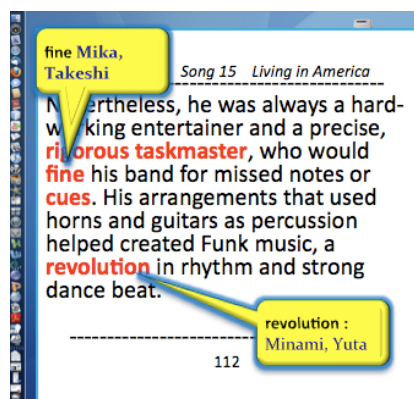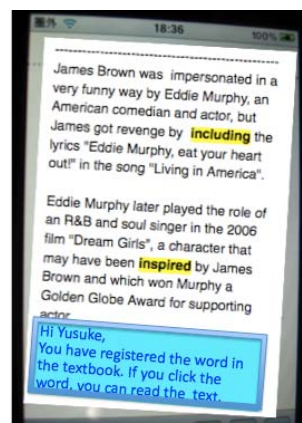

Figure 7. Textbook with Hyperlinks

Figure 8. Mobile user interface while reading contents provided by the system
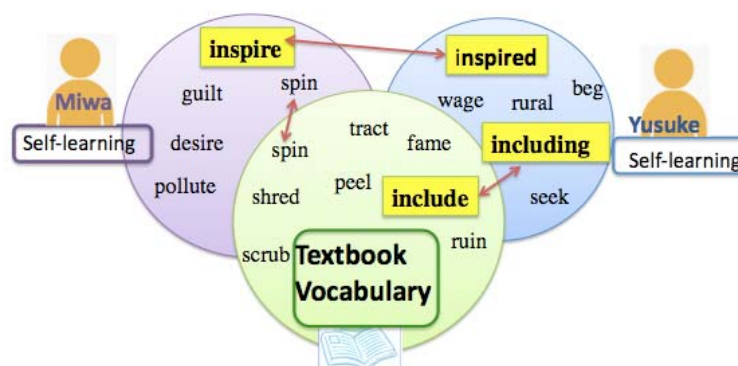

Figure 9. Link between in-class learning and outside learning

Figure 8 and 9 show how in-class vocabulary learning and out-class vocabulary learning are linked. When a student, Yusuke, resisters new word, "including", which he already learned in the textbook, then it is hyperlinked. If he clicks it, it jumps to the textbook page where it appears. If Yusuke and Miwa registered the same new word, "inspire", then it is hyperlinked and by clicking, it jumps to the other part's text. We learn words from the context [15]. The system provides the contexts to let them learn how the word is used, which is expected to lead to the effective vocabulary learning. If some students have read the same contents, the system will send a message to encourage them to start a chat or discussion. It will be expected to add some fun factor to likely-to-be boring vocabulary learning. With the help from the system, students can be aware of what they have learned before, and what other students are learning. In addition, each student is supposed to present in-class in turn what he/she has learned through his/her expanded study so that the teacher can incorporate students' unplanned self-learning into classroom activities. Students are encouraged to collaborate with other students who have the same interests.

In order to help the students retain their vocabulary, the system gives them quizzes containing the newly acquired words through out-class unplanned learning. They are provided with quizzes of the words they already have answered correctly after a certain interval to make sure if they are retaining their newly acquired vocabulary. That way it is

expected that their short-term memory will be transferred into long-term memory. In order to motivate them to learn more, the System shows each student his degree of advancement by counting his correct answers out of total number of target words.

3. Methods

The System is scheduled for completion next year. Upon its completion, the following experiment will be conducted. The numbers of the subjects are subject to change according to the size of the target classes.

3.1 Experiment

Eighty university students will be divided into two groups with the equal English proficiency according to the pre-test result. The test consists of target words to be learned in the textbook. Each group will engage in learning vocabulary, where Group A will use SMALL System, while Group B will learn vocabulary in a conventional way, e.g., using a paper dictionary without technology. Evaluation will be carried out over a period of six weeks. At the end of the phase, the subjects will undergo two kinds of post-tests: the same vocabulary test as the pre-test (Post-test 1) and a vocabulary test containing self-learned words gained through unplanned learning (Post-test 2). As for Group A, Post-test 2 will be created by the System which identifies what they have learned through self-learning. As for Group B, the students are asked to write down their newly gained words through unplanned self-learning on the template sheets. They will submit their sheets when the phase is over. Then personalized Post-test 2 will be created in the following procedure. Submitted sheets will be folded in the way that only English word section will appear to use them as test sheets. Another possibility is that submitted sheets will be scanned and modified so that only English word section may appear. Both post-tests will be designed to tap partial knowledge of word meanings. The students will be given individual interview and questionnaires which will help us examine advantages and disadvantages of SMALL System. Further data will be collected from the subjects of Group A by means of the log data contained in the server.

4. Early Insight and Future Works

As our preliminary survey showed 98.8% of the students owned mobile phones. Widespread use of mobile phones endorses practicability of SMALL System. Since the System is still under development, we have not acquired any data to be analyzed, but possible advantages of SMALL System might be: 1) In-class and out-class vocabulary learning are closely linked so that what they learn in-class will be reinforces in out-class learning and vice versa. 2) Since we learn words from contexts, its linking context function can lead effective vocabulary learning. 3) It encourages out-class self-learning, which is expected to compensate the lack of learning time in class. 3) Linking between the students who registered the same word or who read the same contents can trigger peer-to-peer interactive learning, which is expected to add some fun factor to vocabulary learning which is likely to be monotonous. 4) Customized contents can help students enhance their motivation to learn more. The disadvantage of this system is that it may be unfair for the students who do not own mobile phones.
As our further future work, improvement of the system's capability of identifying related words or derived lexical items will be needed so that when the students resister related words, it will be able to successfully make links. That way one's unplanned self-learning will be entwined with that of other students more deeply.

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