Original Article

Proposal for LMS-like environment by utilizing Google Apps to promote English reading activities

Toshihiko Shimauchi (Advanced Course, Komatsu College, shimauchi@komatsu-c.ac.jp)
Hidetaka Nambo (Graduate School of Natural Science & Technology, Kanazawa University, nambo@blitz.ec.t.kanazawa-u.ac.jp)
Haruhiko Kimura (Faculty of Production Systems Engineering and Sciences, Komatsu University, haruhiko.kimura@komatsu-u.ac.jp)

Abstract

Out-of-class study hours of Japanese university students are significantly shorter than those of American university students. Assignments are practical method to encourage students to study. However, professors have many responsibilities and giving feedback to each student is difficult. Effectively utilizing learning management system (LMS) can encourage students to study in out-of-class hours and to lessen professors' burden of scoring. However, the system is not fully introduced nor utilized in every university in Japan. In this paper, an LMS-like environment was built by using Google Apps in order to solve these problems in a university without LMS. The proposed environment was implemented in an English course for one semester. The result showed that the environment enabled efficient scoring of assignments and effective recording of the students' learning activities: when given a reading assignment from past EIKEN P1 grade reading sections composed of three question sets totaling 10 questions with 2,041 words, average study hour of the students was 70 minutes. Time required to construct the environment was long but the time required for operation was short, suggesting professors could increase their research activities.

Key words

LMS, Google Apps, ICT in education, reading skills, self-study activities

1. Introduction

It is widely reported that the study hours of university students in Japan are significantly shorter compared to other countries. According to a survey conducted by National Institute of Educational Policy Research, undergraduate students from 1st year to 3rd year spent approximately 5 hours per week for their out-of-class studying (National Institute of Educational Policy Research, 2016).

In order to encourage students to study out of class with their own initiatives, professors need to arrange several educational designs. Typical designs include a quiz and a report assignment which are given to students in regular basis. The NIEPR survey showed that 88.8 % of the students responded that they had a quiz and/or a report for the registered classes. On the other hand, only 36.7 % of the students responded that they received a feedback from their professors (NIEPR, 2016). Several studies have shown that providing appropriate feedback for the assignment is effective to maintain and to promote students' motivation for learning (Nishiyama et al., 2015; Mizokami, 1996).

However, university professors in Japan have already devoted significant amount of time to education by reducing hours for research activities (Kanda and Tomizawa, 2015). Between 2002 and 2013, while a proportion of time spent on research activities over total activities have decreased from 46.5 % to 35 %, that of educational activities have increased from 23.7 % to 28.4 %. It is important to improve educational quality without adversely affecting professors' research activities. Utilizing ICT is a promising way to address this challenge.

LMS (Learning Management System) is a comprehensive system which manage every aspect of learning activities and histories for individual student. The system allows teaching staff to give assignments and feedbacks to students. However, LMS has not been fully utilized in universities. Also, there are several universities without LMS.

This paper aims to address these problems in universities without LMS. Specifically, in order to encourage students to study out of class and to reduce professors' time for scoring and feedback, an LMS-like environment was built by utilizing Google Apps, including Google Site, Google Forms, G-mail, and Google Drive. Combining these apps allows an LMS-like environment which automatically scored the assignments and provided feedback to students via e-mail. Also, the environment recorded students study hours.

2. Background

2.1 Credit Substantiation

The ministry of education of Japan (MEXT) stipulates that one credit is composed of 45 hours of study combining in-class and out-of-class hours. Table 1 shows necessary study hours for a typical university student to graduate.

However, out-of-class study hours per week is shorter than hours required per day as listed in Table 1. Several researches and reports have been pointing out repeatedly the short study hours by university students in Japan compared to those in the United States (Noda and Shibui, 2016).

Many universities have implemented so-called CAP system, which limits the number of course enrollment per semester, in order to promote out-of-class studying and learning.

Table 1: Out-of-class study hours necessary for graduation

Credits required for graduation: 124 credits
Credits per semester 124 ÷ (4 years x 2 semesters) ≒ 16 credits
1 units= 45 hours = (class 1 hour + out-of-class 2 hours) x 15 weeks
Out-of-class study hours per semester 16 credits x 30 hours = 480 hours
Out-of-class study hours per week 480 hours ÷ 15 weeks = 32 hours
Out-of-class study hours per day (based on one week = 5 days) 32 hours ÷ 5 days ≒ 6 hours

Standards for Establishment of Universities, which set necessary requirement for establishing a university and a new department, were revised in 1999 to introduce a new clause under which every university has duty to strive to implement the CAP system. Under the system, university students are expected to use out-of-class hours for their preparation and review for the enrolled classes. The percentage of universities with the system has increased from 68 % in 2007 to 89.0 % in 2014 (Ministry of Education, 2010; 2016). However, surveys conducted during the same period have shown no significant changes in self-driven study hours by students (Noda and Shibui, 2016). CAP system does not guarantee per se the changes in students learning activities.

2.2 LMS

2.2.1 Percentage of universities with LMS

LMS first appeared in the U.S. in 1990s and was introduced to Japan in 2000s. Figure 1 shows the time series changes of percentage of universities with LMS (Academic Exchange for Information Environment and Strategy, 2016). In terms of classes, national universities use LMS in 14.6 % of total classes; for public universities, 14.8 % and for private universities, 26.0 %. The universities in the U.S. uses LMS in 69.4 % of classes in 2015, significantly higher compared to Japanese universities (Green, 2015).

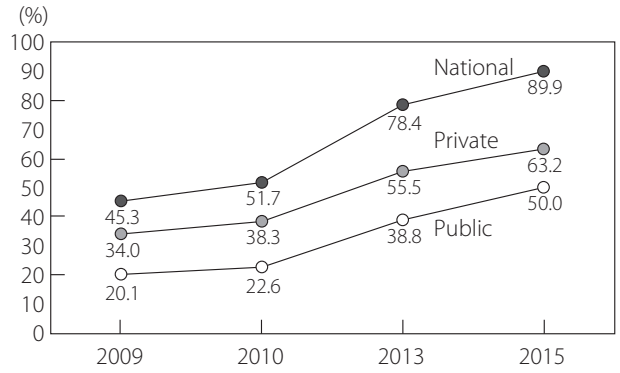

Figure 1: Percentage of universities with LMS (Academic Exchange for Information Environment and Strategy, 2016)

In sum, over the past decade, more Japanese universities have introduced LMS, but there still remain issues to be resolved. One is the fact that public universities have lower percentage in LMS introduction rate. The other is the lower utilization of LMS in terms of class numbers.

2.2.2 Reasons for underutilization and non-introduction of LMS

Possible reasons for the underutilization of LMS are two folds: cost and staff.

First is the cost. There are many types of LMS, with and without fee. More than 30 % of the Japanese universities with LMS use Moodle, an open source system (Academic Exchange for Information Environment and Strategy, 2016). Moodle itself is free, but cost of server to store the system and of staff to maintain the system are necessary.

Second is lack of supporting staff. Professors who intend to use LMS as a teaching tool are required to have certain amount of ICT skills and support staff. Lack of supporting staff and professors' skills may be contributing factors for the underutilization.

Possible reasons for the low-introduction of LMS to public universities are two folds: the small size and staff rotation.

As shown in Table 2, percentage of small universities are higher in public universities compared to national and private universities (Ministry of Education, 2015). Smaller size leads to less income and less investment in ICT including LMS.

Table 2: Students size according to institutional category

Category	Number	< 1,000	1,000 ≦
Total	779	32.9 %	67.1 %
National	86	5.8 %	94.2 %
Public	89	39.3 %	60.7 %
Private	604	35.8 %	64.2 %

Source: Ministry of Education (2015).

Many staff in public universities are dispatched from municipal government. The average length of work for senior and administrative staff are approximately 3 years in public universities (Yamamoto, 2014). Because of this frequent job rotation, necessary skills required for university administration may not be accumulated institutionally (JAPU, n.d.). Frequent rotation lead to shorter perspective which may overlook the necessity of LMS.

3. Existing studies and practices

3.1 CAP system and study hours

Katase (2017) analyzes the impact of CAP system on students' registration behaviors, but no references are made for the impact on study hours. Goda et al. (2003) reports that study hours show a slight increase after the introduction of CAP system. However, they interpret this increase as a result of the effort by professors. Nishigaki and Yabe (2009) reports,

based on questionnaire survey in Japanese universities, only 21 % universities in the survey reported the increase of self-study hours after the introduction of CAP system and/or grade point average; 60.7 % reported no changes in the study hours. As for the universities reporting the increase, the specific increase hours cannot be validated from the survey.

3.2 Utilizing Google Apps to build LMS like environment

There are many existing studies and reports on English teaching activities utilizing LMS (Imura and Kamiya, 2006; Fujii et al., 2013; Obari et al., 2013; Hanazaki, 2013). However, there are few reports regarding educational activities using Google Apps. Tanaka et al. (2013) reported their activities in several universities by using Google Apps and concluded that using Google Apps enables to implement minimum function similar to LMS. Their report does not include analysis on study hours. Suzuki (2016) report his experiences of using Google Apps. However, there are no mention on how study hours are changed due to his activities. Nagaoka (2014) reports that although Google Apps have better user interface, because of its limited functions, it can be utilized mainly in smaller universities without LMS. Fukui et al. (2016) compares Google Apps and Moodle and reports that the former lacks several functions such as scheduling the contents display timing.

To summarize, the existing studies have not sufficiently analyzed the effect of the CAP system on the students' study hours. The existing practice reports have not provided sufficient information about how to effectively utilize Google Apps for LMS-like operations.

4. Proposed environment

The LMS-like environment proposed in this paper utilizes Google Apps and analyzes students' study hours. Table 3 summarize the application used and their functions.

Table 3: Specification of proposed environment

Apps	Function	Figure
Google Sites	Course page	Figures 2 & 3
Google Forms	Answer registration	Figures 4 & 5
	Scoring and analysis	Figure 7
G-mail	Send link to feedback page	Figure 6

4.1 Environment building process

A Google account is necessary to use a service provided by Google. After creating the account and logging the Google, one of the authors used Google Sites to build a web site for the course taught in a university. The top page of the site contains several information such as site structure, instruction about assignment and other necessary information (Figure 2). Under this top page, a page for each week is added which include links to the assignment, the page for registering the answers, and the comment page (Figure 3).

Figure 2: Course top page

Figure 3: Page for each assignment

4.2 Process of assignment

3-page assignments were distributed and processed according to Table 4.

Table 4: Process of assignment

Phase	Who/When/How
Distribution	Professor to students/At the end of the class/3-page hand-out
Answering	Student/Out of class hours/Off-line.
Registering	Student/Prior to due date/Google Apps
Feedback	Automatic/After answer registering/Google Apps
Scoring & analysis	Automatic/after answer registering/Google Apps

Figures 4 and 5 show the registering page on the internet. The page is built by using Google Forms and designed to be shown on smart phone with small display. Pull-down format is used for students to answer. Since the assignments have similar structure, the answer page contains minimum information, and students input the answer by referring to the hand-out assignment distributed in the classroom.

The students were instructed to access this page to register their mail address, student number, names, study hours for each question set, and answers.

After registering the answers, a message notifying the completion is sent to the registered e-mail address. The mes-

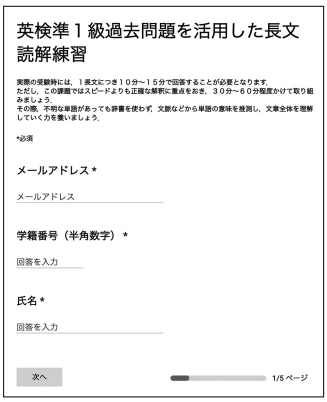

Figure 4: Answer Form 1

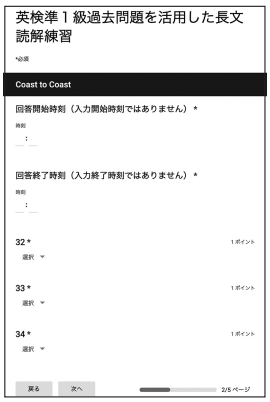

Figure 5: Answer Form 2

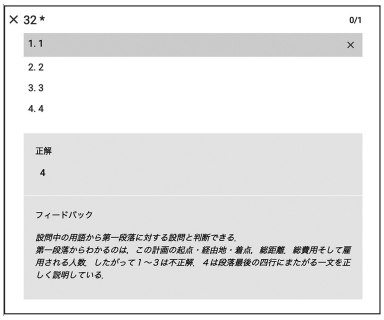

Figure 6: Feedback page (partial)

sage contains the link to a page with score information and commentary. Figure 6 partially shows the commentary page.

Google Forms automatically process all the data registered by the students, including making a scatter diagram, extracting questions with low accuracy rate, and storing all the data in Google spreadsheet format into Google drive with time stamp data (Figure 7).

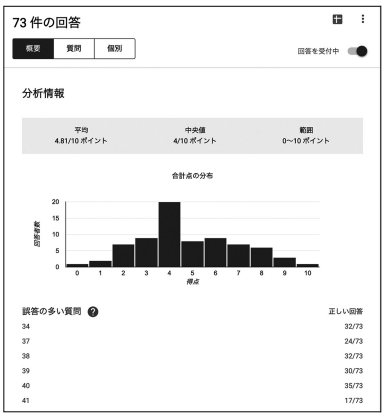

Figure 7: Auto response-analyzing page

5. Experiment

5.1 Participants

First year students (n = 82) in the Faculty of Intercultural Communication of Komatsu University participated in this project. In fall semester of 2018, they were required to take

Table 5: Course name, days and students registered

Class	Date	Male	Female	Total
English IIIa	Tuesday 13:00-	3	20	23
English IIIb	Wednesday 13:00-	12	12	24
English IIIc	Friday 13:00-	2	33	35
Total		17	65	82

"English III" course. The aim of this course was to help students improve reading skills in English. The course was divided into three classes held in Tuesday, Wednesday and Friday. The students were free to decide which class to take (Table 5).

5.2 Material for the assignment

Written tests of EIKEN grade P1 level conducted and published by Eiken Foundation were used. A written test is composed of multiple-choice section (41 questions) and composition section (1 question). Out of 41 questions, 10 questions in reading sub-section were printed and distributed to the students. The sub-section is divided into three question sets, as shown in Table 6.

Table 6: Words size of each question set

	QS1	QS2	QS3	Total
Number of questions	3	3	4	10
Words in texts	312	412	494	1,218
Words in questions	241	239	343	823
Words in total	553	651	837	2,041

Note: QS; question set.

The assignment was selected based on following two factors. First, one of the achievement goals for the course is for the student to acquire high fluency in advanced reading. For the second reason, the rest of written test is cloze test format, which does not necessarily stimulate logical mind-set required for knowledge-based society.

According to Eiken Foundation's evaluation criteria, the intended examinees of the Grade P1 are second to third year university students. Successful examinees are expected to fully understand and use English required in actual social life situations. The level of P1 test is slightly difficult for the participating first-year students. The test was adopted for the following two reasons: (1) the students in this faculty are expected to have strong incentive to learn English, and (2) there are certain number of students who have already successfully passed the Grade 2 test, which is one level lower than P1.

For the copyrights of the past test, section1, article 35 of the copy rights law is applied for this project so that the tests can be reproduced without a permission from the copyright holder.

5.3 Results

Table 7 shows the descriptive statistics for the assignments (n = 78). The average number of submissions was 10.6 out of 13. The average score was 5.1 over 10 points. Average study hours were 72 minutes (SD = 28 minutes). 4 students did not submit single assignment at all.

Table 7: Statistics for the assignments (n =78)

	Submission	Score	Study hours
M	10.65	5.09	1:12:19
SD	2.98	1.75	0:28:41
Min	2.00	1.67	0:30:00
Max	13.00	8.58	2:40:00

Table 8 shows starting times and submission time for each question set. More than 50 % of students started answering the questions between 6 a.m. and 6 p.m.

Table 8: Starting times for each question set

Time Zone	QS1	QS2	QS3
00:00-05:59	4.7 %	4.5 %	4.6 %
06:00-11:59	26.1 %	22.6 %	20.2 %
12:00-17:59	39.5 %	39.6 %	34.2 %
18:00-23:59	29.7 %	33.3 %	41.0 %

Note: For 13 assignments.

Table 9 shows the time spent on developing and operating the proposed environment. Initial designing phases required significant amount of time. During operation phase, making weekly commentary for each assignment and manual feedback sheet per 3 to 5 weeks took 40 minutes.

Table 9: Time required to build and operate the system

Category	Contents	Time	Frequency
Initial design	Brain storming, research & actual designing	10 hours	once
Operation	Building pages for session & answer	5 minutes	weekly
	Commentary	2 hours	weekly
	Scoring &analysis	10 minutes	weekly
	Feedback	40 minutes	twice

6. Discussion

6.1 Average study hours

The average out-of-class study hours of the students who submitted the assignments exceeded 70 minutes. The course has two credits, which on regulatory basis requires the enrolled students to study 240 minutes per week. Compared with this requirement, 70 minutes study for the assignment was not sufficient. But it should be noted that the students could have studied for the course in addition to the assignments.

Compared to the average study hours of the university students in Japan (5 hours per week), 70 minutes study for the assignment of one course can be positively evaluated. The participating students in this paper were in the first year and they had many registered courses in the second semester. Specifically, every student took two-class-per-week Chinese course, which required long preparations for the class and frequent tests.

6.2 Study hour zones

Based on starting times for the assignments, between 55 % to 60 % of the students used time zone from 6 a.m. to 6 p.m., as shown in Table 8. The university which the students are enrolled in has the CAP system described in chapter 2. The result can be interpreted that this system is functioning as originally planned.

The average total scores of the students who started the assignment between 6 a.m. and 12 p.m. is 4.84. This score is lower than the total average of 5.30. The reason for this difference will be investigated in our future study.

7. Conclusion and future direction

In order to promote out-of-class study hours for Japanese students, solely introducing CAP system is not sufficient. Assignments and quizzes should be prepared by professors. LMS is an effective tool to give assignments and feedbacks and to record students learning history. For universities without LMS, they can use Google Apps to build an LMS-like environment.

The merits and effects of the proposed LMS-like environment are as follows:

- Professors at small-size university without LMS can build an environment similar to LMS
- Automatic scoring and analysis allow professors to concentrate on research and class preparation.
- Real-time feedback encourages students to review their comprehension level.

On the other hand, there are several limitations for the proposed environment.

- Designing phase and periodical feedback require certain amount of time.
- Compared to LMS, the environment does not provide prescheduling function and professors are required to make relevant page open to the students manually.
- Unlike LMS, the environment requires combining several applications. This leads to a longer preparation for design

phase.

One of the merits of LMS or LMS-like environment is to efficiently provide feedback to students. The students survey was conducted at the end of the course. Analyzing the feedback effect on students' learning motivation is a next step to verify the effectiveness of the proposed environment.

References

Academic Exchange for Information Environment and Strategy (2016). *Survey on ICT utilization in higher education institutions in 2015*.

Copyright Division, Agency for Cultural Affairs (Government of Japan) (n.d.). *Educational activities in schools and copyright*. (accessed on 2019/01/17)

Fujii, T., Hayase, H., Koga, T., Kawamichi, T., and Hoyashita, S. (2013). The practical use of LMS in English education at Saga University. *Journal of the Organization for General Education Saga University*, Vol. 1, 3-12.

Fukui, K., Ukawa, Y., and Kamiyama, Y. (2016). A Proposal for course using Google classroom. *COMMUE*, No. 23, 57-62.

Goda, M., Maruyama, T., and Hasegawa, T. (2003). A prospect for developing lectures, suggested from the response of the students to "a questionnaire on the state and effects of the lecture". *Proceedings of 51st Conference of Japanese Society for Engineering Education*, Vol. 2003, 129-132.

Green, K. C. (2015). *2015 campus computing: The 26th national survey of computing and information technology in American higher education*.

Hanazaki, K. (2013). English education using LMS plug-ins. *Shinshu University Annual Report of the Language Education Center*, No. 1, 49-54.

Imura, M. and Kamiya, K. (2006). Introduction of learning management system to English classes. *Memoirs of the Osaka Institute of Technology. Series B, Liberal Arts*, Vol. 51, No. 2, 47–52.

Kanda, Y. and Tomizawa, H. (2015). Changes in the ratio of time spent on work activities by university & college faculty members: A comparison of results of the "survey of full-time equivalency data at universities and colleges" of 2002, 2008, and 2013, *Research Material No. 236*, Research Unit for Science and Technology Analysis and Indicators, NISTEP, MEXT.

Katase, K. (2017). How CAP-system changed students' registration for study: "Unintended Consequence" of Cap-system in the case of Faculty of Liberal Arts of Tohoku-Gakuin. *Tohoku Gakuin University Institute of Education Report*, Vol. 17, 17-40.

Ministry of Education (2010). Current status of educational reforms in the universities as of FY2008. (accessed on 2019/01/17)

Ministry of Education (MEXT) (2015). *FY2015 School Basic Survey*.

Ministry of Education (MEXT) (2016). Current status of educational reforms in the universities as of FY2014. (accessed on 2019/01/17)

Mizokami, S. (1996). Learning motivations of university students. *Kyoto University Researches in Higher Education*, Vol. 2, 184-197.

Nagaoka, C. (2014). A review on Google classroom. *Luncheon seminar No. 209*, Institute for e-learning Development Kumamoto University. (accessed on 2019/01/17)

National Institute of Educational Policy Research (2016). *Survey on study hours by university students* (summary). http://www.nier.go.jp/05_kenkyu_seika/pdf06/gakusei_chousa_gaiyou.pdf. (accessed on 2019/01/20)

Nishigaki, J. and Yabe, M. (2009). The current situation of the measures to make an effective credit system in Japanese universities and their effects on students' learning: A report of the questionnaire survey to four-year colleges in Japan. *OCU Journal of Higher Education Studies*, Vol. 7, No. 1, 25-30.

Nishiyama, M., Haze, Y., and Terasawa, T. (2015). Effects of feedback regarding learning outcome on learning motivation: Learning support using micro step measurement. *Proceedings of 57th Conference of Japanese Association of Educational Psychology*, 463.

Noda, A. and Shibui, S. (2016). Substantialization of the credit hour system and certified evaluation and accreditation. *Research on Academic Degrees and University Evaluation*, No. 17, 20-33.

Obari, H., Lambacher, S. G., and Pagel, J. W. (2013). A study on English education integrating LMS and mobile technologies in Cloud computing environments: From electronic textbooks to Social learning using the on-line lectures iUniv. *Aoyama Information Science*, Vol. 41, No. 1, 46-55.

Suzuki, H. (2016). Introduction to some benefits and usages of Google classroom. *The Bulletin of Hachinohe Institute of Technology*, Vol. 35, 107-120.

Tanaka, K., Suzuki, R., and Yamazaki, H. (2013). Using Google Apps as LMS. *Proceedings of Information Education Symposium of 2013*, Vol. 2013, No. 2, 209-215.

The Japan Association of Public Universities, Challenges regarding human resource development in public universities. http://www.kodaikyo.org/wp/wp-content/uploads/2015/06/291b49066698d28000d0acfe50446578.pdf. (accessed on 2019/01/22)

Yamamoto, S. (2014). An analysis on the role of non-academic staff working for universities: Overcoming difference of mind among executives, academics and non-academic staff. *Journal of Higher Education Administration*, Vol. 4, 1-9.

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