Tracking online learning behaviour in a cross-platform web application for vocabulary learning courses

Kazumichi Enokida[1], Kunihiro Kusanagi[2], Shusaku Kida[3], Mitsuhiro Morita[4], and Tatsuya Sakaue[5]

Abstract. The present study aims to reveal English as a Foreign Language (EFL) learners' online learning behaviour in a cross-platform web application for EFL vocabulary learning courses at a national university in Japan. Students were divided into two groups: those who were provided with the new, cross-platform application for vocabulary learning, and those with the older, PC-based Web-Based Training (WBT) system. The learning contents, learning processes, and the course evaluation systems were almost identical between these two groups. The log data of approximately 850 students over a year was extracted, and the online learning behaviour was statistically compared between the two groups. The comparison results can be summarised as (1) the total learning duration, the outcome, and learning efficiency are almost equivalent across the groups, and (2) the students with the new application exhibited a relatively significant tendency of frequent, steady, and periodical logins than those with the old one. The analyses suggested that the cross-platform, mobile-optimised web application elicited the students' ability to regulate their everyday self-accessed online learning.

Keywords: WBT, vocabulary learning, learning behaviour.

1. Hiroshima University, Higashihiroshima, Japan; kenokida@hiroshima-u.ac.jp
2. Hiroshima University, Higashihiroshima, Japan; kusanagi@hiroshima-u.ac.jp
3. Hiroshima University, Higashihiroshima, Japan; skida@hiroshima-u.ac.jp
4. Hiroshima University, Higashihiroshima, Japan; mmorita@hiroshima-u.ac.jp
5. Hiroshima University, Higashihiroshima, Japan; tsakaue@hiroshima-u.ac.jp

How to cite this article: Enokida, K., Kusanagi, K., Kida, S., Morita, M., & Sakaue, T. (2018). Tracking online learning behaviour in a cross-platform web application for vocabulary learning courses. In P. Taalas, J. Jalkanen, L. Bradley & S. Thouësny (Eds), *Future-proof CALL: language learning as exploration and encounters – short papers from EUROCALL 2018* (pp. 47-53). Research-publishing.net. https://doi.org/10.14705/rpnet.2018.26.811

1. Introduction

Enokida et al. (2017) reported on the development of the web application to be utilised for EFL vocabulary learning courses at a national university in Japan. The older version of the WBT system, based on Adobe Flash, has long been used since these courses were first implemented in 2011, targeting 1,000 first-year students at the university. In the academic year 2017, the Flash-based system was partially replaced by a new, HTML5-based one: a group of students were provided with the new system, while the rest of them did their coursework on the old one.

This division has provided two data sets with which the online learning behaviour of the two groups can be compared. Although there has been a steady stream of studies that have reported the impacts of two different CALL materials on students' usability feedback (e.g. a questionnaire survey) and learning outcomes (e.g. pre- and post-test scores), relatively few studies have examined students' online learning behaviour itself. Considering the positive effects of mobile English vocabulary learning on the learning performances and interests of learners (Chen & Chung, 2008), it is expected that providing a cross-platform application will positively affect their online learning behaviour as well. The present study extracted online learning log data of approximately 850 students over one year, and statistically compared the students' online learning behaviour between the two groups. The purpose of the present study is to answer the following research question:

- How can users of the new, cross-platform application be compared with those of the older, PC-based WBT system in terms of their learning behaviour, as measured by (1) the frequency (number) of logins, (2) the periodicity (cycle) of logins, (3) the outcome, and (4) the learning efficiency?

2. Method

2.1. Participants and instruments

There were 841 participants in this study who took the semester-based online courses, 'Communication Basic I/II' in academic year 2017, which are compulsory courses for first-year students at Hiroshima University. They were required to learn 3,000 words per semester (15 weeks) and 6,000 per year on a self-study basis through the WBT system, the *HiroTan App*. The materials are based on an essential

vocabulary list called *The Hirodai Standard 6000 Vocabulary List*, which was specially developed for the courses.

2.1.1. The Hirodai Standard 6000 Vocabulary List

The Hirodai Standard 6000 Vocabulary List consists of two levels (basic and advanced) of words that are used in daily communication as well as in academic and business contexts. The basic list consists of 2,000 words and the advanced 1,000 words – all to be learned within one university semester. Each word comes with its Japanese translation and a sample sentence with its Japanese translation. The students were provided with a printed textbook and downloadable audio podcasts with which they could listen to the pronunciation and sample sentence of each word, as well as the WBT materials.

2.1.2. The HiroTan App (WBT system)

An original WBT system is used for these courses to enable the students to learn the forms, meanings, and pronunciations of the large number of words in small steps (10 words per unit) and review them repeatedly (Enokida et al., 2017). Detailed log data is stored in the server, so that it can be analysed to assess the students' online performance. The latest cross-platform version of the WBT system is called HiroTan (see Figure 1).

Figure 1. The HiroTan App: learning ten words in a unit

2.2. Data collection

The participants engaged in a self-access vocabulary list learning for one academic semester, but reflecting the above-mentioned transition from the old to the new system, they were divided into the two groups based on the accessibility conditions: (1) a Flash-based application via PC and PC web browsers, and (2) a newly developed HTML5-based application that is optimised to mobile devices such as smartphones and tablets. The learning contents, learning processes, and the course evaluation systems were almost identical between these two groups.

2.3. Data analysis

The log data of the students' 120-day-long learning behaviour that was automatically recorded by the implemented function in the two accessibility conditions were then extracted, in order to compare (1) the frequency of logins in a day, (2) the periodicity of logins, and (3) the number of the contents completed during the semester. Since the size of the log data is too big to perform statistical testing, the present study visualised the data and fitted some statistical distributions using the maximum likelihood estimation as appropriate.

3. Results and discussion

The present study at first compared the frequencies of logins in a day, which are visualised in Figure 2. The number of students in each data set was standardised as density. The figure clearly shows that the new version (left) promoted more frequent logins than the older (right), meeting our expectations. To support this statistically, the present study fitted the exponential distribution using the maximum likelihood estimation, and compared the parameter λ for each group, since the data are, at a glance, extremely skewed. The estimated parameter values are λ=0.039 for the new HTML5-based application, and λ=0.059 for the old Flash-based application, and the expected values were calculated by the parameters. The values were 25.64 logins in a day for the new version, and 16.90 for the old version.

Secondly, the present study inspected the periodicity of logins. Figure 3 represents the time series of the cumulative total number of logins in a day for both the conditions. There are higher numbers of daily logins to the new version throughout the 120 days of the online course, which means that the new version has a strong tendency of shorter cycles of logins than the older. This tendency becomes clearer when we break down the data into days of week. As Figure 4 shows, the new

version has a statistically steady half-week cycle of logins (Day 1/7 and Day 4) while the older does not exhibit the tendency.

The total numbers of the contents completed during the semester were almost equivalent between the two groups. That makes sense considering that the minimum requirements of the materials to be learned to pass the online course were the same in both groups. Also, against the two previous findings that suggest the new versions' advantages, no striking differences were found in the outcome of the courses, which were measured by the vocabulary tests, and the total learning duration, which can be operationalised by the logout – login time difference. That might imply that the outcome and the learning efficiency themselves were not facilitated by the replacement of the systems.

Figure 2. Histograms representing the cumulative total number of students' login to the web apps in a day

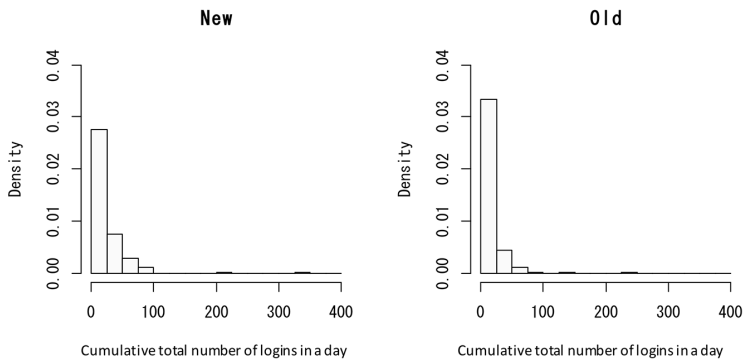


Figure 3. Time series plots representing the total number of logins in a day

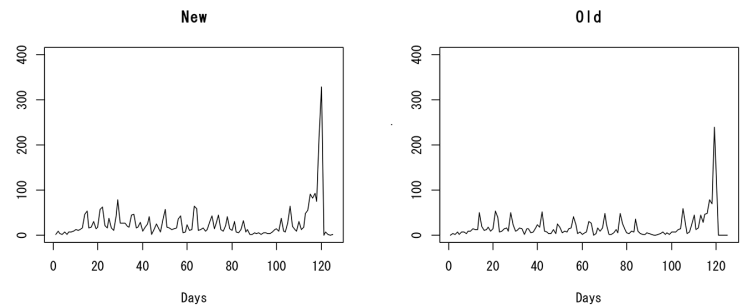
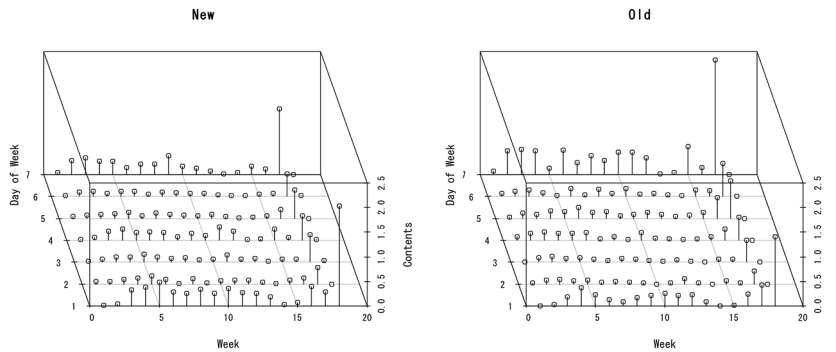


Figure 4. Plots representing the total numbers of logins in a day, showing the differences of logins by the day of week; Day 1 represents Sunday and Day 7 is Saturday



4. Conclusions

The analyses of the online learning behaviour can be summarised as (1) the total learning durations, the outcome, and learning efficiency are almost equivalent across the groups, and (2) the students with the new, cross-platform application exhibited a relatively significant tendency of frequent, steady and periodical logins than those with the old, PC-only one. The analyses suggested that the cross-platform, mobile-optimised web application elicited the students' ability to regulate their everyday self-accessed online learning.

Since only the new application is currently used in the Communication Basic courses, our future directions will include: (1) comparing the online learning behaviour of successful vocabulary learners with that of unsuccessful learners, and (2) addressing the questions regarding the effectiveness of WBT-based list learning, as given in Enokida et al. (2017).

References

Chen, C. M., & Chung, C. J. (2008). Personalized mobile English vocabulary learning system based on item response theory and learning memory cycle. *Computers & Education*, *51*(2), 624-645. https://doi.org/10.1016/j.compedu.2007.06.011

Enokida, K., Sakaue, T., Morita, M., Kida, S., & Ohnishi, A. (2017). Developing a cross-platform web application for online EFL vocabulary learning courses. In K. Borthwick, L. Bradley & S. Thouësny (Eds), *CALL in a climate of change: adapting to turbulent global conditions – short papers from EUROCALL2017* (pp. 99-104). Research-publishing.net. https://doi.org/10.14705/rpnet.2017.eurocall2017.696

Published by Research-publishing.net, a not-for-profit association
Contact: info@research-publishing.net

Future-proof CALL: language learning as exploration and encounters – short papers from EUROCALL 2018
Edited by Peppi Taalas, Juha Jalkanen, Linda Bradley, and Sylvie Thouësny

Publication date: 2018/12/08

Typeset by Research-publishing.net
Cover theme by © 2018 Antti Myöhänen (antti.myohanen@gmail.com)
Cover layout by © 2018 Raphaël Savina (raphael@savina.net)
Drawings by © 2018 Linda Saukko-Rauta (linda@redanredan.fi)

ISBN13: 978-2-490057-22-1 (Ebook, PDF, colour)
ISBN13: 978-2-490057-23-8 (Ebook, EPUB, colour)
ISBN13: 978-2-490057-21-4 (Paperback - Print on demand, black and white)
Print on demand technology is a high-quality, innovative and ecological printing method; with which the book is never 'out of stock' or 'out of print'.

British Library Cataloguing-in-Publication Data.
A cataloguing record for this book is available from the British Library.

Legal deposit, UK: British Library.
Legal deposit, France: Bibliothèque Nationale de France - Dépôt légal: Décembre 2018.