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AUTHOR(S):

Majumdar, Rwitajit; Kuromiya, Hiroyuki; Komura,
Kiriko; Flanagan, Brendan; Ogata, Hiroaki

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LA Platform in Junior High School: Trends of Usage and Student Performance

Rwitajit Majumdar, Hiroyuki Kuromiya, Kiriko Komura, Brendan Flanagan, & Hiroaki Ogata
Kyoto University
dr.rwito@gmail.com

ABSTRACT: This study reports the initial trends found in the pilot phase of a Learning analytics (LA) platform adoption at a Junior high school in Japan. The LA platform includes a Learning Management System (LMS), e-Book reader, and analytics dashboard that is accessible to both teachers and students. The interaction logs of those learning tools and mid-term test score for the third-year junior high school mathematics class with 120 students were analyzed. The result highlighted that a group of students who voluntarily explored the dashboard performed significantly better than the group of students who did not check the dashboards. However, both the groups' e-Book interaction counts were not significantly different. This initial result was encouraging as the evidence was extracted from the data collected without any specific interventions. The findings also motivated further investigation in the usage pattern of the LA platform and design of interventions.

Keywords: Evidence-based Education, TEEL Platform, LAViEW, BookRoll

1 BACKGROUND

Previous works in LAK considering learning analytics in schools, focused on personalization of intelligent tutoring system for middle school mathematics class (Fancsali & Ritter, 2014), predicting failures early in course (Jiménez-Gómez et al., 2015), or at-risk students with respect to graduating high school (Aguar et al., 2015). However, studying trends and collecting evidences from the wild in any face-to-face teaching-learning context at school level is rarely discussed. In this paper we report the initial trends of usage of an implemented Learning Analytics (LA) platform during its pilot phase. Additionally, the study reports relationship between students performance and learning activities.

1.1 Technology Context – Learning Evidence Analytics Platform

The LA platform includes Moodle as LMS, BookRoll, an eBook reader, and LAViEW, as LA dashboard (Majumdar et al., 2019). Both teachers and students can access the learning tools. This integrated LA system was introduced at a junior high school level. Teachers were guided to use the eBook reader features to design learning activities, and then orchestrate them in their class. LAViEW visualized the reading interaction logs. Teachers could review their students learning behaviors. Their students (Learners) could also reflect on their own learning data.

The authors highlight three features of LAViEW that helps teachers in school and LA researchers at universities to collaborate. The first feature is a function to upload offline test scores. As many of the formative assessments in Japanese school were traditionally paper based. The function allowed teachers to upload the tabulated test scores and stored it directly in the Learning Record Store (LRS). Like other learning logs, these records too were linked only to the system generated pseudonymized

ID of the learner. The performance data is then accessible to the researchers for developing learner models along with the other learning logs in the LRS. The second feature was an implementation of xAPI statement-based logging of LA dashboard interactions. It logged which visualized indicators (graphs) the user checked LAViEW. To our knowledge, such standardized logging of dashboard action is not available in previous literature. It would assist tracking monitoring and reflection behaviors of users. The third feature is an evidence portal which assists evidence extraction from the collected data stored in the LRS. Extracting such as learning logs, test scores, and dashboard access logs. The portal's objective is to systematically collect evidence within the teaching-learning system itself.

2 RESEARCH CONTEXT AND FINDINGS

The LA platform was introduced as a pilot across three schools giving access to students in both junior high and high schools. For initial analysis, this study considered only one junior high school, and focused on mathematics course for the third-year students at junior high school in urban school district in Japan. During the exploratory data analysis phase of the logs from the initial period, the researchers were motivated to examine *“What are the trend of using the LA platform and its relationship to the student's performance?”*

2.1 Descriptive Statistics of Overall Usage and Collected Data

This study focused on math class taught for the third-year junior high school students. A total of 120 students were enrolled in the class composed of three sections on Moodle LMS with 40 participants each. All the three Moodle courses and the reading resources shared in BookRoll, such as text books, teacher's notes, and practice quizzes were the same for all of these three sections. Moreover, LAViEW, the dashboard linked to the Moodle, displayed information regarding students reading behaviors and Moodle activities. The teacher could review aggregated or individual student information while students could reflect on their own learning data. For the current study, course interaction logs related to textbook reading and LA Dashboard viewing were considered during the period of June to September 2019. The reading log is only of the students (N=120) and the Dashboard log includes the teacher (N=121). A total of 6,639 reading logs over 53 unique days were related to only opening and annotation in the textbook. Similarly, 541 logs related to specific graph seen in LAViEW dashboard was collected over 30 unique days of usage. Apart from the interaction log data, we also collected students' mid-term test score in the beginning of June 2019. The teachers uploaded the test scores through the LAViEW dashboard.

2.2 Initial Findings: Dashboard Usage and Relation to Performance and Reading

Though students were not instructed to check the dashboard for any specific purpose, an interesting finding from the analysis of the log data showed that some students (n=16) still accessed LAViEW from the course Moodle. This observation further motivated to compare the test performance and reading activities for the group of students who choose to review the dashboard (In, n=16) vs. one did not (Out, n=104). Figure 1. presents the count of particular graphs viewed by the teacher and all the students. While the teacher checked the detailed graphs related to the annotations of the students (overlay of the annotations in contents review, memos and detail in data table) more, the students focused on the overview summary, their reading time and completion information.

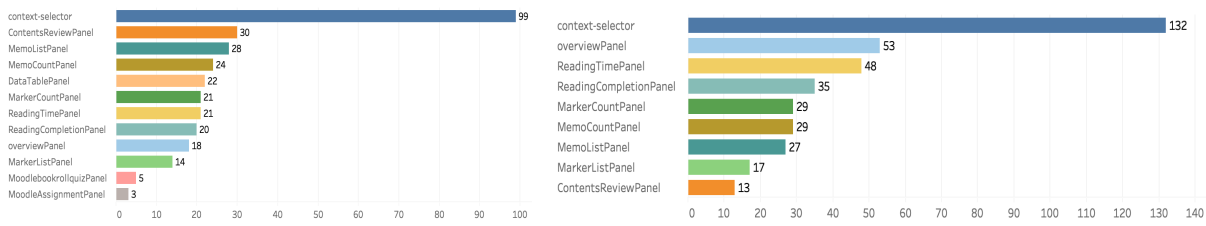


Figure 1: LA Dashboard Graphs Accessed. a. Teacher b. Students (n=16)

The study found there were significant differences in the test score (T-test). However, there was no difference in the count of reading logs for those two groups (Mann–Whitney U test). The group of students who checked the dashboard (In, n=16) had significantly higher ($p=0.004$) test score (Mean=71.56, Std dev.=20.92) than the ones (Out, n=104) who did not see dashboard (Mean=59.08, Std dev. = 14.96). The number of reading logs were not significantly different ($p=0.093$). Figure 2 shows the distribution of the test score and number of reading logs for both groups.

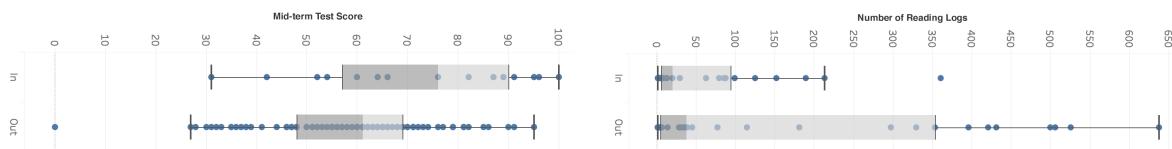


Figure 2: Distribution of attributes of two groups a. Mid-term Test Score b. Reading Logs

This initial analysis uses interaction data collected in regular classroom without any specific teaching-learning interventions. Hence it motivates further examination in the natural usage pattern of the components of the LA platform and then co-design learning interventions involving the teachers and LA researchers to meaningfully integrate the dashboard in the students learning experience. Future studies are planned to implement and evaluate such interventions.

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