

Managing E-learning: An Insight from Moodle Course Logs

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Abstract—This study analyses the behaviour of students and lecturers activities in an e-learning using Moodle course logs and pivot table. Moodle course logs are mined and subsequently are integrated to be data pivoting toward visualization. The number of “view” and “update” activities are extracted from Moodle course logs and are visualized into meaningful insight of e-learning evaluation. There is high correlation between lectures and student in “update” activity. Its similarity in activity trends between lecturers and students provides an opportunity to build a preliminary hypothesis that lecturer activity will affect student activity in an asynchronous e-learning model. Meanwhile, the correlation value between “views” and “update” activities was low within lecturer activities. Several rationalities are discussed in this study. The most performed activity by lecturers is File while the Lesson is the least activity. The future work of research is that “views” and “update” are an indicators of student and lecturer participation where its amount have been said to be an important predictor of engagement and success in running e-learning.

Keywords—view, update, moodle, log data

I. INTRODUCTION

There are several Learning Management Systems (LMS) being used by thousands of educational organizations worldwide. Some of them are open source (e.g., Sakai, Moodle, Dokeos) and the others are commercial (e.g., eFront, Blackboard, Brightspace). All of them aim to facilitate learning activities to be conducted in a planned manner and more systematic. The learning process can be continually improved such that educational manager enable monitoring and evaluating of education activities [1].

Moodle or Modular Object Oriented Dynamic Learning Environment [2], a free software in the e-learning platform, is one of the most widely used web application packages for delivering teaching materials in universities and college [3]. It allows lecturers to create online classes, post assignments and assessments, calculate grades, and more. Students can access the class and resources online, complete assignments, and communicate with the lecturers (See Figure 1).

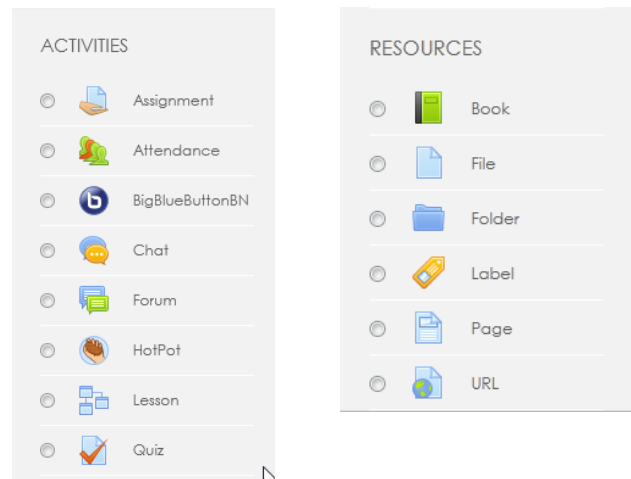


Fig. 1. Activity objects in moodle.

Since all activities are recorded, it is possible to the manager to monitor all online activities of both lecturer and student including just viewing or further activities such as updating and giving feedback to the course engaged. Scientific data analysis through educational data mining (EDM) can be conducted to get an insight into improvement of e-learning activities [4]. Therefore, much research on educational data mining (EDM) has been conducted to analyse such data [5-7].

Attempts to track the behaviour of online visitors using access logs are increasingly common [4]. Such attempts [8-11] have led to the development of research that analysed the behaviour of students in LMS activity such as Moodle. Despite the vast analysis of Moodle course logs, few empirical studies have been conducted to investigate the correlation analysis between lecturers and students activities. This paper describes a data integration method for Moodle course logs and pivot table functions to analyse the behaviour of students’ and lecturers’ in Balikpapan State Polytechnic’s blended learning. It is necessary to analyse the behaviour of lecturers and students in their blended learning activities as an attempt to know to what extend the LMS of Moodle is running.

All online activities after students log-on are recorded into the Learning Management System (LMS) database. The “Reports”, a tool available in the menu of Moodle, is used to collect data in attempt to evaluate Moodle-blended learning activities within Balikpapan State Polytechnic. The tool of “Report” in Moodle is enable to result the data in several formats, i.e. csv, xlsx, json, html, ods and pdf. The data in Excel format (.xlsx) are mined in this study toward further analysis. The drop down menu can be used to generate “All activity (All roles)” to get a comprehensive picture of interactivity in an e-learning courseware. The course logs are subsequently integrated to be data pivoting as presented in Figure 2. Data pivoting are enabling the columns and rows to be rearranged so can be viewed in different perspectives of analysis.

The previous study of “Reports” utilization was conducted to analyse the “views-posts” data in attempt to examine the level of interactivity [1]. The “post” is the previous term in equal with the “update” in the recent Moodle. A glimpse of weekly pattern of student’s “view” and “posts” activities revealed that there are a meaningful and effective interaction with learning objects (TO) in a Virtual Learning Environment (VLE) system enhancing the learning experiences. It was found that there were a significant correlation between “view” and “post” within student’s activities. This study extends the aforementioned analysis toward lecturer’ activities. It would be discussed whether there is any correlation between student’s activities and lecturer’s activities in their VLE, and whether there is any meaningful insight of its interpretation.

Thus, the research questions purposed in this study were: (RQ1) To what extent are “views” and “update” activities can be analysed to be a meaningful insight of e-learning evaluation, particularly in Balikpapan State Polytechnic? (RQ2) What are the most and least used activities in the MOODLE across diverse courses in Balikpapan State Polytechnic?

II. METHODOLOGY

The major data collection method used was extraction of the log data from the Moodle database in Balikpapan State Polytechnic e-learning, which could be accessed at <http://blp2.poltekba.ac.id>. It included information on total members, login frequencies of each member and log data related to the teaching and learning activities of each member for specific or all courses. The e-learning activities in second semester of academic year 2019/2020 are taken to be analysed in this study. The period of e-learning activities is from February to August 2020. Data processing in this study, beginning form data mining to its visualization, follows flow of processing presented in Figure 2.

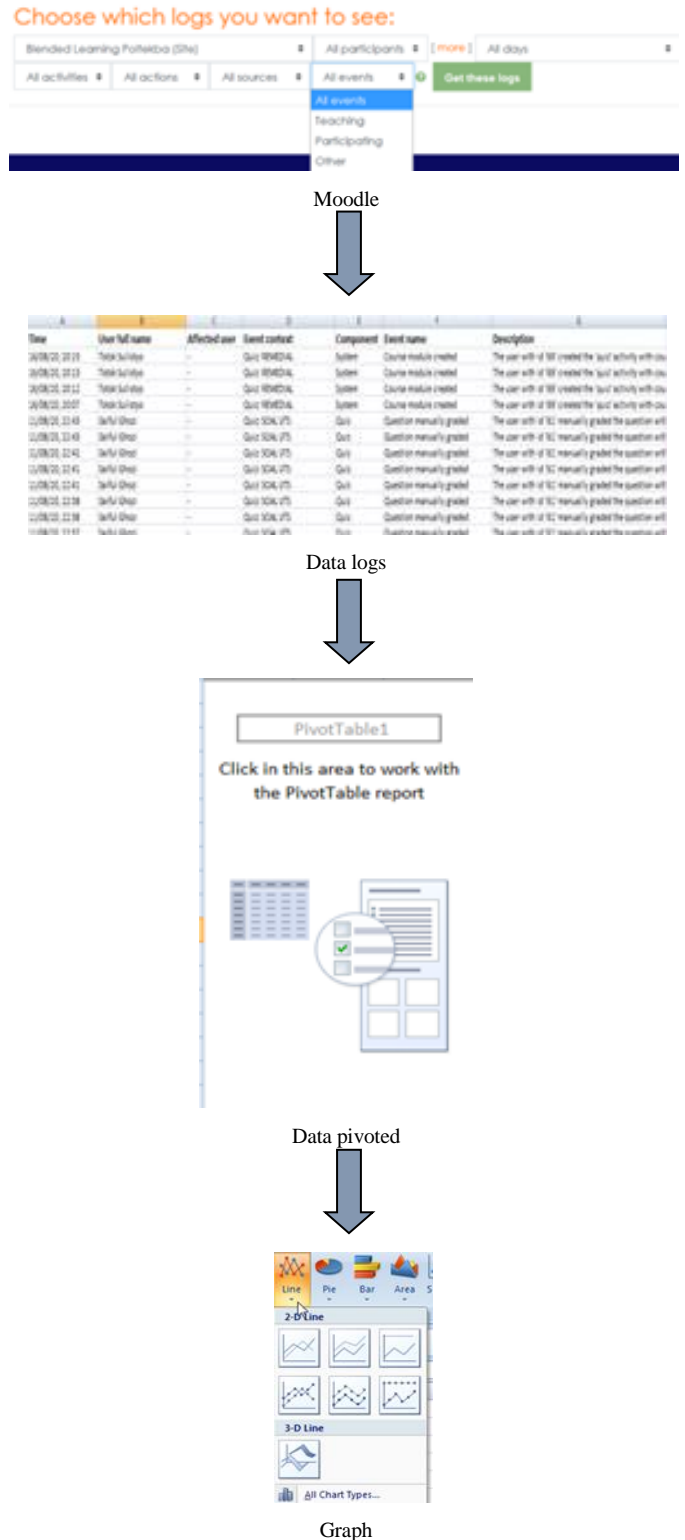


Fig. 2. Flow of processing.

III. RESULTS AND DISCUSSION

A. The Platform of E-learning in Balikpapan State Polytechnic

LMS (Learning Management System)-based learning using CMS Moodle has actually been initiated by the Balikpapan State Polytechnic since 2011. Development and wider implementation were coincidentally carried out in 2019 along with the demands of implementing distance learning for higher education due to the COVID-19 pandemic conditions. The e-learning platform can be accessed in <http://blp2.poltekba.ac.id>. However, there is still an unsteady e-learning monitoring system that enables academic activities to be performed based on quality assurance policies. Due to this empirical data, it should be taken attention by top management that the rapid transition from normal learning to online learning, whether synchronous or asynchronous, requires a credible and accurate evaluation of the need for development and improvement [12,13].

TABLE I. THE NUMBER OF UNIT REGISTERED IN BALIKPAPAN STATE POLYTECHNIC'S E-LEARNING

Unit	N
Lecturers	77
Students	1131
Study programs	9
Courses registered	180
Courses (all parallels)	454

As presented in Table 1, there are 77 lecturers that are registered in the Balikpapan State Polytechnic's e-learning, but only 71 were actively engaged in e-learning activities. Since there is no recorded any activity in e-learning, the rest were identified as not active in e-learning. To be joined in compulsory course, the self-enrolment was set for students. So the lecturers control the amount of students in their courses respectively. All registered students were 1,131 students that were enrolled in 180 deferent courses.

B. "View" and "Update" Activities

Clicking on the "Reports" guides us to a menu shown in Figure 2. Clicking "All events" drop-down menu lists the following events, i.e. teaching, participating, and others.

- "Teaching" refers to the action performed by a lecturer, e.g. updating a resource, or just viewing.
- "Participating" refers to action performed by a student, e.g. posting an assignment files, etc.
- "Other" refers to action performed by user with a role other than lecturer or student.

By clicking "All actions" menu, it lists the following actions, i.e. create, view, update, delete, and all change. The actions data analysed in this study are limited on "view" and "update" only.

- The 'views' means that the data about access to an object doesn't get saved into the database, e.g. a student logs on to the system and watches an online video for a particular chapter or just views the slides posted.
- The 'update' means anything new that is created and uploaded (forum posts, assessment uploads, etc.) to be saved in the database, e.g. submitting or uploading an assignment or a quiz.

The figures below depicts monthly pattern of "view" and "update" activities for all students and lecturers registered in Balikpapan State Polytechnic e-learning.

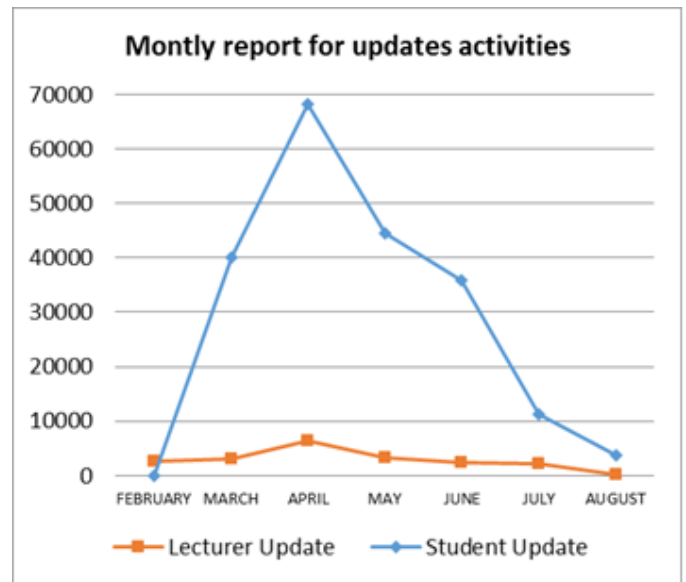


Fig. 3. Comparison between students and lecture in monthly report for "update".

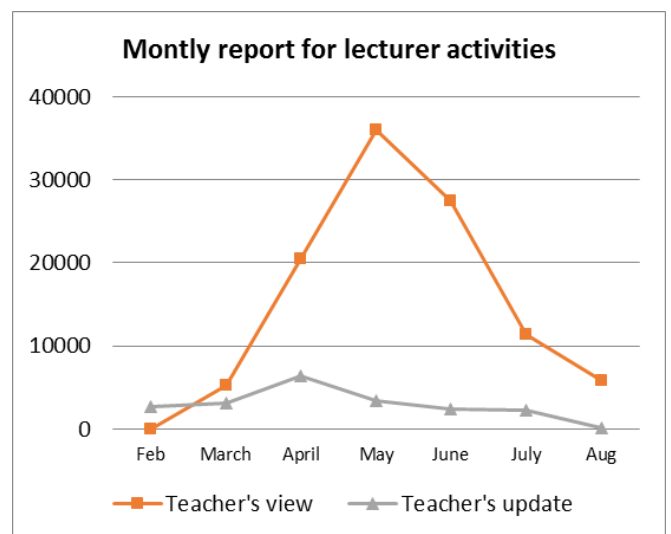


Fig. 4. Comparison between teacher's "view" and "update".

TABLE II. THE CORRELATION MATRIX OF “VIEW” AND “UPDATE”

Statistics	students	lecturers	r Correlation
Mean for “view”	xx	15,183	xx
Mean for “update”	2,915	2,932	0.830
r Correlation	xx	0.35	xx

It can be seen from Figure 3 that the updating activities by students and teachers have a peak frequency at the same point of time. The trend of increasing and decreasing updating activities is similar in both teacher and students. It would be interesting to test the correlation and to investigate its phenomenon. After the data normality requirements were met, Pearson Product-Moment Correlation test was conducted. The correlation between lecture and student in “update” activity is 0.830 (Table 2). The high correlation indicates that there are a sufficient proof of interaction between teacher and student. Its similarity in activity trends between lecturers and students provides an opportunity to build a preliminary hypothesis that lecturer activity will affect student activity in an asynchronous e-learning model. In other words, the more lecturer’s “update”, the more student’s “update” as well.

Figure 4 shows that the lecturer viewed more than updated the data posted in LMS. The peak frequency of “view” and “update” activity positioned at different points of time. The highest activity for “update” occurred in April, while the “view” was in May. The correlation value between the two such activities was low in category, i.e. 0.35 (Table 2). The low correlation value indicates that there is insufficient initial evidence that the "view" activity is directly proportional to the "update" activity by the lecturer. There are several rationalities, in our views, such that this finding understandable, i.e. motivation, goal, and complicatedness as presented in table 3.

TABLE III. THE DIFFERENCES BETWEEN “VIEW” AND “UPDATE”

	“View”	“Update”
Motivation	Seeking new information posted in LMS	Presenting, editing and replacing the hosted material in LMS.
Goal	Getting update in information relating material posted in LMS	Updating the material hosted in LMS
Complicatedness	Simple	More complicated

C. Moodle Activities

Activity is something that a student will do that interacts with other students and or the lecturer. An activity, as a term in Moodle terminology, such as Assignment, Quizzes etc. (as captured in Figure 1), properly means something students can contribute to directly. It is contrasted to a Resource such as a File or Page, which is presented by lecturer. However, the term activity refers to both Activities and Resources as a group [2].

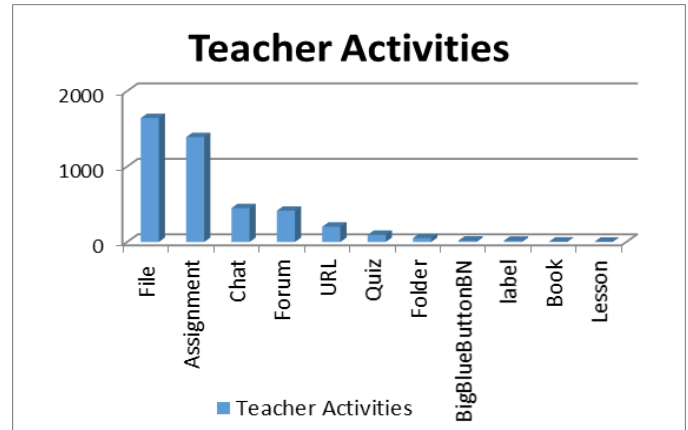


Fig. 5. Bar chart presenting actions traces in activity items.

Figure 5 shows that the most performed activity item is File. File is a facility for uploading, editing and customization the course material in Moodle. Meanwhile, the lesson is the least activity done by lecturers. The Lesson is the activity which is allowing the lecturer to create some exercises where students are presented with content and then, depending on their responses, are directed to specific pages [14]. The more complicated of Lesson in nature than the File indicates that lecturers tend to run as simple way in their e-learning activity.

IV. CONCLUSION AND FUTURE WORK

This paper proposes an analysis to investigate the e-learning behaviour of student and lecturer by mining data obtained from LMS database such as Moodle. The main result of this research is that “view” and “update” are an indicator of student and lecturer participation where its trend and correlation have a significant pattern in nature. Similarly reported in previous research [15] that there were a statistic significant correlation between the number of page views and students final grades in their e-learning activities. The “view” and “update” are an important variable can be further analysed in the next research in an attempt to evaluate LMS implementation. It could be a contribution on the foundation for future work on applying the concepts of learning analytics [16]. There is an empirical finding that lecturers tend to run as simple way in their e-learning activity.

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