

## **Developing a Learning Analytics Tool to Empower Teachers to Conduct Analysis of Learners Online Behavior**

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### **Abstract**

A tool for conducting analysis of students' learning management system (LMS) behavior shows promise for putting powerful learning analytics (LA) capabilities into the hands of front-line teachers. The combination of advanced analyses and visualisations with explanations to aid interpretation and guide action provides teachers with LA capabilities not previously available. Teachers can use the tool as an early warning system, to predict student performance and to analyse discussion posting information. While teachers' feedback on the tool is positive, this initiative has highlighted remaining challenges, which include ensuring that data is available for analysis and user perceptions of the tool and its usefulness.

*Keywords:* learning management systems, Excel tool, learning analytics, teacher development

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### **Introduction**

Our specially designed tool for teachers to independently conduct analysis of students' online behavior in their subject's learning management system (LMS) course shows promise for putting powerful learning analytics (LA) capabilities into the hands of front-line teachers.

Applications for LA in higher education have mainly focused on academic success and retention (Siemens, Dawson & Lynch, 2014), with most reported studies focusing on predicting student grades or identifying students at risk (Gašević, Dawson, Rogers & Gasevic, 2016).

While early work on LA applications was conducted by researchers with specialist skills in data analysis and computer science, more recently there has been a shift towards providing teachers with tools that allow them to analyse learner data themselves—for example, LOCO-Analyst (Ali, Hatala, Gašević & Jovanović, 2012) and The Loop Tool (Corrin et al, 2016). Although there are other such tools already available, ours has been developed in consultation with teachers to take into account factors such as instructional conditions, curriculum design and assessment methods. Our tool combines advanced analyses and visualisations with explanations to aid interpretation and guide action to provide teachers with LA capabilities not previously available to them. Data can be easily and quickly extracted from the learning management system (LMS) for analysis during the teaching period and teachers can use the tool as an early warning system to identify students who may be at risk of failing or who need additional assistance. At the end of the teaching period, teachers can analyse LMS data to predict student performance, examine relationships between what students do in the LMS and their academic outcomes and to analyse discussion posting information.

Since the current learning management system was implemented at our university in 2012, many of our teachers have adopted blended learning approaches and implemented part of their teaching in the virtual learning environment. Blended learning approaches such as the flipped classroom are gaining acceptance among our staff, especially those who teach large classes. At the same time, teachers are becoming more curious about what students are doing online and whether they are engaging in the way the teachers expected when the course was

designed. During face-to-face teaching, instructors can tap into a wide range of responses from students such as attendance, students' expressions or body language, their reactions or questions they ask. In the virtual learning environment, these student responses may be less accessible. Thus analysis of usage data from the LMS can provide important information about what students are, or are not, doing online.

Attempts at documenting students' LMS activity are usually in the form of standardized reports, which most LMS provide as a standard feature. However, these reports are typically limited to lists of students' click counts and are less helpful for teachers looking for analyses to provide deeper insights about the courses they teach. As a result, demand is increasing for learning analytics tools that allow university teachers to do more personalized and sophisticated analyses based on individual course data. To help meet this demand, we have developed an Excel tool for analysis and visualisation of LMS usage data using classroom teachers' perspectives to allow frontline teachers to gain a better understanding about students' LMS activity and to provide actionable insights for enhancing teaching and student learning.

### **About the tool**

As Hackbarth (2017) notes, learning analytics tools for classroom teachers should be easy to use and can stimulate and satisfy teachers' curiosity about student learning. Feedback from teachers at our university provided through our Community of Practice (CoP) on learning analytics has shown that there is considerable interest in analysing LMS usage data to inform teaching and learning amongst our staff. Therefore, we have also developed an Excel-based tool (incorporating Excel add-ins) that allows classroom teachers to analyse LMS data from course archives, as well as generating useful tables and visualizations for them to better understand what students do online. There are several advantages to developing this learning

analytics tool in Excel. First, Excel provides an environment that many teachers already know and use and have installed on their computers. This in turn can help promote acceptance and adoption of the tool (Ali et al., 2013). Second, the tool is easy to use, can be employed without the need to be online and does not require the teachers to “ask” anyone for the data.

Teachers only need to go to the LMS (which at our University is Blackboard) and use the *archive courses* function to produce a zipped file, which is a permanent record of a course that includes all the content and user interactions. Furthermore, all this data is available in the archive, even if the “statistics tracking” function has not been activated for the course. After downloading the zipped file, teachers only need press a button in the Excel file to import the data from the zipped archive file and all the tables and visualizations are automatically generated for them. Lastly, teachers can specify the period of analysis they are interested in. By using this function, classroom teachers have greater flexibility to monitor students’ learning, study the impact of or evaluate their teaching strategy during specific time periods.

The Export/Archive Course function in Blackboard has been used by other researchers to develop analytics tools for LMS data. Two Australian examples of this are *numbas* developed by Newcastle University (<https://www.numbas.org.uk/blog/2016/02/a-tool-to-analyse-numbas-attempt-data-from-a-blackboard-course/>) and the *Completing the Loop* project at the University of Melbourne (<http://melbourne-cshe.unimelb.edu.au/research/edutech/completing-the-loop>). Our tool has been developed iteratively, based on the literature relating to LMS usage data analysis, study of similar tools and feedback from our teachers.

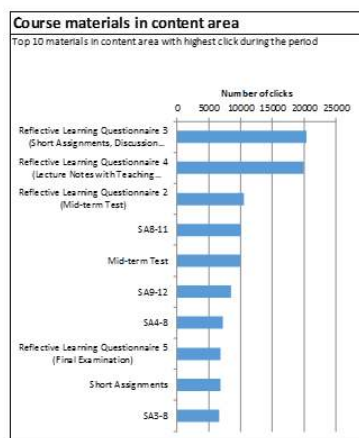
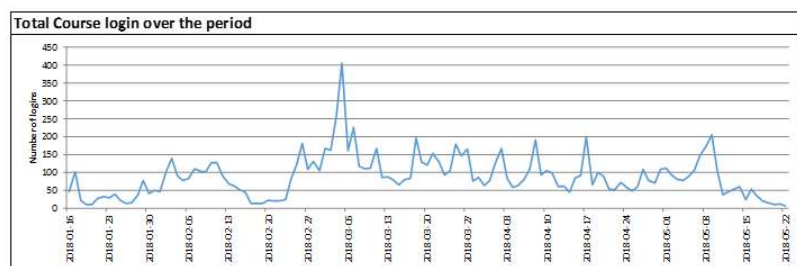
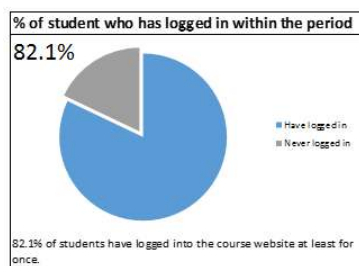
The current version of the tool has six worksheets, which correspond to separate analyses and visualisation of LMS usage data. The first worksheet gives an overview of students’ LMS activity, such as the percentage of students who have logged into the course,

total login duration, top ten items of content material with the highest student clicks, and clicks in different LMS tools such as content, announcement, tests/surveys, etc. (see Figure 1). The second worksheet displays clicks in different LMS tools and content material by individual students with indicators that highlight students with the top (bottom) 5% of clicks in respective LMS tools among the class (see Figure 2). Teachers can specify the period displayed in these two worksheets so they can examine students' online activity during the period of interest.

#### Dashboard - Overview

| Period: | From                | To                  |
|---------|---------------------|---------------------|
|         | 2018-01-16 04:19:57 | 2018-05-22 13:44:42 |

|                                        |     |
|----------------------------------------|-----|
| Total Student Enrollment in LMS course | 134 |
|----------------------------------------|-----|



Feature Usage

This table shows the percentage of students accessing a feature at least once. The mean, standard deviation and percentiles for clicks for different features are also shown.

|                 | Feature          | % of Students who have accessed the feature | Number of clicks |        |        |                |                 |                 |                 |
|-----------------|------------------|---------------------------------------------|------------------|--------|--------|----------------|-----------------|-----------------|-----------------|
|                 |                  |                                             | Mean             | SD     | Median | 5th percentile | 25th percentile | 75th percentile | 95th percentile |
| Course-oriented | Content          | 97.0%                                       | 116.70           | 68.29  | 106.00 | 18.45          | 73.25           | 149.75          | 260.15          |
|                 | Grade Center     | 96.3%                                       | 37.51            | 33.87  | 26.00  | 1.65           | 13.00           | 52.75           | 113.40          |
|                 | Groups           | 9.0%                                        | 0.13             | 0.47   | 0.00   | 0.00           | 0.00            | 0.00            | 1.00            |
|                 | Assignment       | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Test/survey      | 94.0%                                       | 118.27           | 58.27  | 116.50 | 0.00           | 84.25           | 149.75          | 215.75          |
| Communication   | Announcement     | 97.0%                                       | 25.92            | 17.24  | 22.50  | 4.30           | 15.00           | 34.00           | 59.40           |
|                 | Email            | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Message          | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Discussion Forum | 95.5%                                       | 199.42           | 173.95 | 177.50 | 5.55           | 76.50           | 263.00          | 561.20          |
| Tools           | Journals         | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Blogs            | 0.7%                                        | 0.01             | 0.09   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Wikis            | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Turnitin         | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Glossary         | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
| Admin           | Calendar         | 11.9%                                       | 0.19             | 0.58   | 0.00   | 0.00           | 0.00            | 0.00            | 1.00            |
|                 | Roster           | 0.0%                                        | 0.00             | 0.00   | 0.00   | 0.00           | 0.00            | 0.00            | 0.00            |
|                 | Contacts         | 16.4%                                       | 0.24             | 0.64   | 0.00   | 0.00           | 0.00            | 0.00            | 1.00            |

Figure 1: “Overview” worksheet showing the students’ LMS activity in a class

| Student Usage on Blackboard features and course materials |           |                 |              |        |            |             |               |       |         |                  |          |       |       |                      |          |          |              |          |
|-----------------------------------------------------------|-----------|-----------------|--------------|--------|------------|-------------|---------------|-------|---------|------------------|----------|-------|-------|----------------------|----------|----------|--------------|----------|
| User ID                                                   | User Name | Course-oriented |              |        |            |             | Communication |       |         |                  | Tools    |       |       |                      | Admin    |          |              |          |
|                                                           |           | Content         | Grade Center | Groups | Assignment | Test/survey | Announcement  | Email | Message | Discussion Forum | Journals | Blogs | Wikis | Turnitin Assignments | Glossary | Calendar | Admin Roster | Contacts |
| 123436                                                    | Stud1     | 119             | 26           | 0      | 0          | 84          | 32            | 0     | 0       | 16               | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123437                                                    | Stud2     | 0               | 0            | 0      | 0          | 0           | 0             | 0     | 0       | 0                | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123438                                                    | Stud3     | 127             | 42           | 0      | 0          | 112         | 32            | 0     | 0       | 158              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123439                                                    | Stud4     | 96              | 21           | 0      | 0          | 120         | 34            | 0     | 0       | 280              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123440                                                    | Stud5     | 184             | 32           | 0      | 0          | 87          | 40            | 0     | 0       | 185              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123461                                                    | Stud6     | 79              | 24           | 0      | 0          | 121         | 19            | 0     | 0       | 29               | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123462                                                    | Stud7     | 72              | 15           | 0      | 0          | 117         | 16            | 0     | 0       | 164              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 1        |
| 123463                                                    | Stud8     | 69              | 7            | 0      | 0          | 99          | 9             | 0     | 0       | 284              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123464                                                    | Stud9     | 111             | 17           | 0      | 0          | 125         | 25            | 0     | 0       | 127              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123465                                                    | Stud10    | 140             | 25           | 0      | 0          | 87          | 19            | 0     | 0       | 164              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123466                                                    | Stud11    | 38              | 9            | 0      | 0          | 67          | 15            | 0     | 0       | 30               | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123467                                                    | Stud12    | 94              | 29           | 0      | 0          | 117         | 11            | 0     | 0       | 174              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123468                                                    | Stud13    | 110             | 25           | 0      | 0          | 66          | 21            | 0     | 0       | 126              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123469                                                    | Stud14    | 108             | 38           | 0      | 0          | 130         | 40            | 0     | 0       | 166              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123470                                                    | Stud15    | 295             | 105          | 0      | 0          | 201         | 66            | 0     | 0       | 428              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123471                                                    | Stud16    | 2               | 6            | 0      | 0          | 0           | 0             | 0     | 0       | 1                | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123472                                                    | Stud17    | 7               | 5            | 0      | 0          | 0           | 1             | 0     | 0       | 0                | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123473                                                    | Stud18    | 41              | 1            | 0      | 0          | 21          | 15            | 0     | 0       | 20               | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123474                                                    | Stud19    | 25              | 0            | 0      | 0          | 0           | 8             | 0     | 0       | 8                | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123475                                                    | Stud20    | 52              | 10           | 0      | 0          | 44          | 11            | 0     | 0       | 11               | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123476                                                    | Stud21    | 98              | 14           | 0      | 0          | 114         | 25            | 0     | 0       | 182              | 0        | 0     | 0     | 0                    | 0        | 0        | 0            | 0        |
| 123477                                                    | Stud22    | 92              | 38           | 2      | 0          | 101         | 18            | 0     | 0       | 264              | 0        | 0     | 0     | 0                    | 0        | 3        | 0            | 3        |

Figure 2: Worksheet showing individual student's usage in a class

The third worksheet lists the scores or grades achieved by each student in assignments, tests or other items recorded in the LMS grade center. The fourth worksheet presents calculations of the correlation (Pearson correlation coefficient) between the scores/grades in the grade center and students' clicks in different LMS tools and the content material. This worksheet was designed to give teachers information about how LMS usage is related to the scores or grades achieved by the students in the assessment or other activities (see Figure 3).

| Grade Center Items      | Course-oriented |              |        |            |             | Communication |       |         |                  | Tools    |       |        |                      |
|-------------------------|-----------------|--------------|--------|------------|-------------|---------------|-------|---------|------------------|----------|-------|--------|----------------------|
|                         | Content         | Grade Center | Groups | Assignment | Test/survey | Announcement  | Email | Message | Discussion Forum | Journals | Blogs | Wikis  | Turnitin Assignments |
| Week 3 Test             | -0.008          | -0.380       | 0.718  | 0.755      | -0.252      |               |       |         |                  |          |       | -0.907 |                      |
| Manually created column | 0.269           | 0.154        | -0.808 | -0.808     | 0.655       | 0.115         | 0.115 |         |                  |          |       | -0.078 |                      |
| Week 3 test             | 0.027           | 0.097        | -0.515 | 0.446      | 0.123       | 0.515         | 0.515 | -0.027  | 0.181            | 0.217    | 0.461 | 0.217  | 0.461                |
| Writing task 1          | 1.000           | 1.000        | 1.000  | 1.000      | 1.000       |               |       |         |                  | 1.000    |       |        | 1.000                |

Figure 3: Correlations matrix generated from analysis of items in the Gradebook. The direction of the correlation is represented by the color (Green=positive, Red=negative) with the intensity of the color indicating the strength of the correlation (the stronger the intensity, the stronger the correlation)

The last two worksheets provide teachers with analysis and visualisation of discussion forum activity and give them the capability to perform predictive analyses. Figure 4 shows an example that demonstrates the approach we have taken in developing this tool. After the

release of the first version of the tool, a subject teacher from an introductory course with an enrolment of around 300 students was invited to participate in an in-depth interview. He was asked how the LMS was used in the subject he taught and what information or insights he wanted to obtain from learning analytics. According to this teacher's responses, students enrolled in the course are divided into groups of eight and join group discussion in the LMS about specific topics during the semester. Students need to create or reply to at least four posts on the group discussion board within a three-week period and the posts are graded, with this grade representing 20% of the final subject grade. Subject teachers wanted to obtain a better understanding of the behavior of student groups and individual students while monitoring students' progress and for LMS to provide information so teachers could give suitable assistance to the students and facilitate discussion within the groups.

With this understanding of the teachers' pedagogy and learning objectives in using learning analytics, a new worksheet was designed in the Excel tool showing summary statistics on students' and groups' activity in the discussion board (see Figure 4). At the top of the worksheet is a chart showing the number of posts created by students over time. Below the chart, individual students' activity in the discussion board are shown on the left hand side (e.g., number of posts, average word count per post, date of first post and last post, days since last post) while group activity was shown on the right hand side (e.g., date of last post, days since last post). Teachers can also specify the period they wish to look at and select specific groups of students to study. Students were categorized according to their posting behavior (e.g., active users, inactive users, active before deadline, active at the beginning, no show) or style (e.g., top authors, talkative authors, short response authors) with the percentages for each category reported. All this information was provided to help teachers to monitor the progress of the group discussion and help in assessing students' and groups' performance.

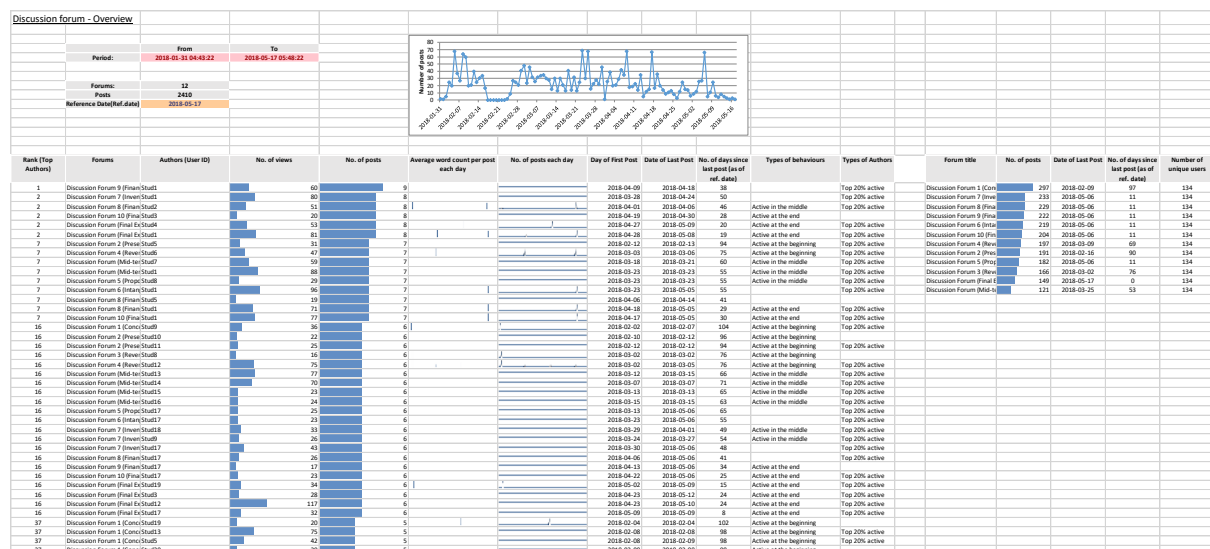


Figure 4. Analysis of discussion forum data produced by the tool.

Similarly, the prediction worksheet was developed in response to feedback that teachers wanted to be able to understand what predicts students' grades in their subjects. In this worksheet, teachers can conduct linear regression to examine predictors of assessment items in the Grade Book selected from clicks in Blackboard features (e.g., Content, Grade Center or Announcement), Content (e.g., files or specific pages) and items in the Grade Center (see Figure 5.). After selecting the variable being predicted and the predictor variables, the teacher clicks on the *Run Prediction* button to produce the output from the analysis as shown in Figure 6., which includes the *R*-square value for the analysis, which is an indication of the predictive power of the variables included in the analysis, along with other typical output from linear regression such as the beta weights for the predictor

variables.

The 'Prediction' window is a standard Windows-style dialog box with a title bar containing a checkmark icon and the text 'Prediction'. It features standard window controls (minimize, maximize, close) in the top right corner.

At the top, a label reads 'Select One dependent variable (i.e., what you are predicting)'. Below this is a list box containing three items: '1: Week 1 Test', '2: Manually created column', and '3: Week 3 test'. The list box has up and down arrow buttons on its right side.

The main area is divided into two sections. The left section is titled 'Factors affecting dependent variable' and contains three sub-sections, each with a list box and a set of buttons:

- Clicks in Bb features:** The list box contains '1\_1: Content', '1\_2: Grade Center', '1\_3: Groups', '1\_4: Assignment', '1\_5: Test/survey', and '1\_6: Announcement'. To its right are buttons for 'Select all', 'Add', and 'Deselect all'.
- Clicks in Content Materials:** The list box contains '2\_1: Content', '2\_2: Lesson plan', '2\_3: Learning object', and '2\_4: Week 1'. To its right are buttons for 'Add' and 'Deselect all'.
- Grades in Grade Center:** The list box contains '3\_1: Week 1 Test', '3\_2: Manually created column', '3\_3: Week 3 test', and '3\_4: Writing task 1'. To its right are buttons for 'Add' and 'Deselect all'.

The right section is titled 'Selected factor(s)' and contains a large, empty list box with up and down arrow buttons on its right side. To the right of this list box are two buttons: 'Remove selected factor(s)' and 'Remove all factors'.

At the bottom of the window, there are two buttons: 'Run Prediction' and 'Cancel'. Below these buttons, a small text box contains the following text: 'This program uses multiple linear regress to analyse the data. However, model assumptions are not checked.'

Figure 5. Popup window for selecting variable for analysis under the “Prediction” worksheet

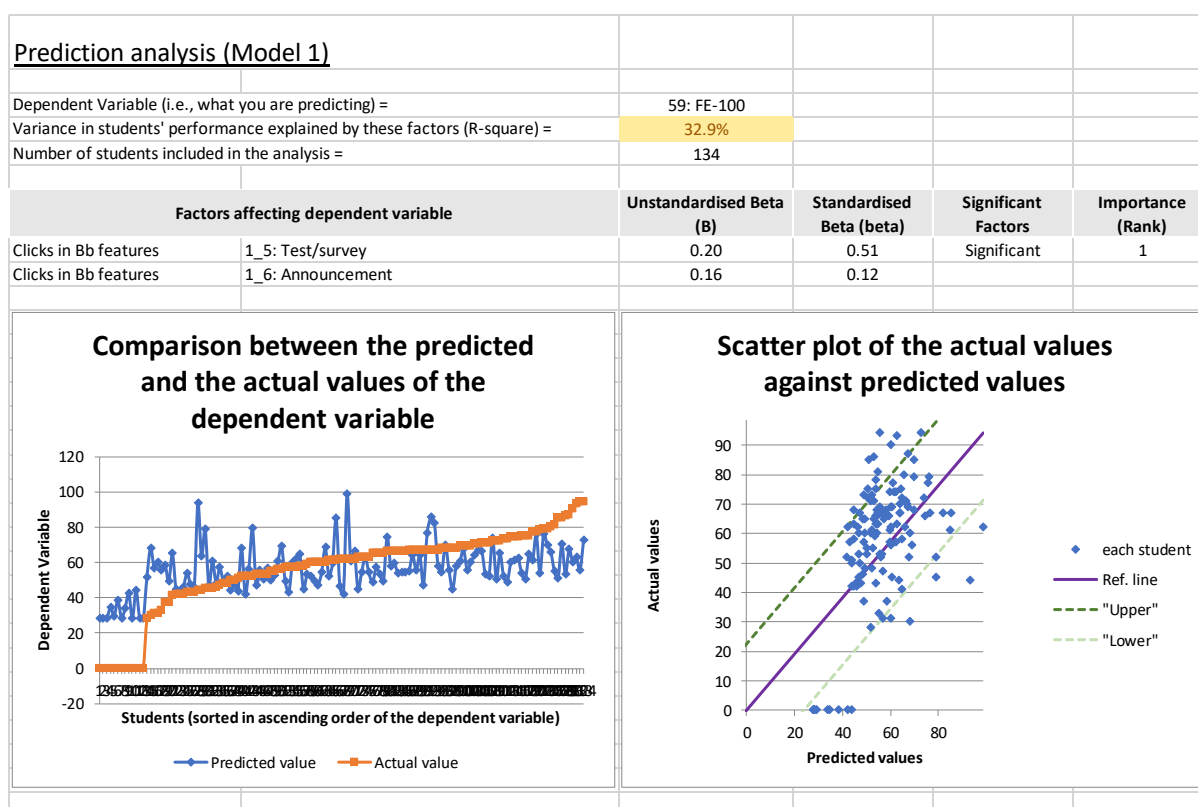


Figure 6. Outputs from the “Prediction” analysis.

To help with interpreting the the results, the output indicates whether a predictor is “significant” or not and assigns a rank to the predictor, with 1 being the strongest predictor amongst those selected for the analysis. Two additional graphs are provided to give teachers a means of visually assessing the accuracy of the predictive model. The graph shown on the left of Figure 6. shows the actual values of the predictor variable plotted against the value predicted from the variables in the analysis. The closer these lines coincide with each other, the more accurate the model. Similarly, the scatterplot shown in the graph on the right of Figure 6. provides a visual indication of the model’s accuracy, but this time actual and predicted values are plotted and upper and lower boundaries provided—the fewer values that fall outside these lines, the more accurate the model. This worksheet makes it very easy for teachers to conduct predictive analyses and interpret the results, thus putting powerful analysis tools into their hand. Our teachers tell us that this is a very valuable feature of the

tool, since they can use it to understand what factors predict students' performance in their subjects.

### **Feedback from teachers**

This Excel tool was released in July 2017 for pilot and a workshop was held for teachers to introduce and demonstrate the tool. In total, 18 teachers participated in the workshop, and positive comments concerning the first version of the tool were received. In particular, teachers appreciated the user-friendliness of the tool and being able to specify the period for analysis as they felt that this would really help them to know what students did online at different times during the semester. They found the tool useful for understanding students' LMS usage and identifying students who needed assistance. Importantly, teachers reported that the tool was better than the default reports provided by the LMS because they could easily locate the information they needed. However, there were suggestions for further enrichment, which included adding more functions such as being able to contact at-risk students by email, analysis of assessment results, providing information about students' behavior in the discussion forum, and compatibility with other teaching software. These improvements have since been added. Generally, feedback from classroom teachers highlighted the advantages of this tool and showed that there was a demand for similar learning analytics tools for classroom teachers for their online teaching.

For further development of the tool a teachers-as-designer (Kali, McKenney & Sagy, 2015) approach was adopted in preference to the research team enhancing the tool after consolidating the feedback received from teachers. Classroom teachers were invited to give in-depth interviews about their course design, online teaching strategy, the sort of information about students' online activity they needed, and how this could be used to improve their teaching. With this feedback, indicators and visualizations provided by the tool were

customized to match the needs of classroom teachers and to support the pedagogy they used. In addition, these use-cases could become resources in the form of real-life examples.

A second workshop to demonstrate the tool and solicit further feedback was conducted in July 2018. The 12 participants who completed the evaluation for the workshop agreed that they could imagine using this tool and that the workshop activities helped them see ways to apply it. They also commented on the usefulness of the tool on helping them to analyse data about their students for the purpose of enhancing the learning experience.

Most teachers at our university lack experience in conducting learning analytics on their own. Our tool can assist these teachers to start using analytics. By using the teacher-centred design approach, the tables and visualizations provided by the tool have already been shown to be practical and applicable in teaching. At the simplest level, the tool can be viewed as a demonstration of how to make use of statistics about online activities to help teachers just starting out with online or blended learning. But teachers can also learn from their colleagues, not just about how to interpret the indicators offered by the tool, but also about how to incorporate these LMS engagement statistics in their teaching and course design.

## **Conclusions and future directions**

Although the tool is relatively new, a number of our teachers have attended workshops on how to use the tool and have adopted it for their own subjects. These teachers report that the tool provides access to analysis capabilities not currently available to them in other formats and that it provides more (and better) information than the default reports in the LMS.

However, while teachers' feedback on the tool is positive, this initiative has highlighted some issues that need to be addressed if the tool is to be widely adopted. The first is the need for careful online course design in order to ensure that LMS data is available for analysis and for integrating LMS data with learner data generated outside of the LMS. This in turn has

informed the provision of professional development opportunities for teachers to help address these areas. The second is that this tool cannot be “all things to everyone.” We have quickly realised that for LA to be useful to teachers it needs to suit their teaching and learning needs, which can be very diverse. This is a challenge for further development of the tool, which we will meet by continuing to include teachers in the design process (as we have done from the beginning) in order to help promote user acceptance and adoption.

The purpose of this Excel tool is to provide an easy and convenient way for classroom teachers to gain an understanding of their students’ online behavior and the online learning process. By involving classroom teachers in the design of the tool, we have identified effective indicators that provide useful and insightful behavioral cues about students’ online engagement that teachers can use to monitor students’ learning process, as well as to enhance and reflect on their teaching. Moreover, as the tool becomes more sophisticated, more pedagogical indicators will be included. In addition, we will develop real-life, online teaching case-studies, showing how these indicators have been used, as a resource for users of the tool. Together, the tool and the use-cases will do more than just allow teachers to perform learning analytics. They will also provide a repository of online teaching practice that classroom teachers can refer to when they design future courses and plan future teaching. We hope that by further developing and enhancing this tool, with teachers taking a lead role in the design, our teachers will develop the competence and skills needed to perform learning analytics that assist them in understanding and enhancing their online teaching.

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