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Using Blended Learning Activities to Enhance Students' Learning Effectiveness and Performance

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Introduction

The blended learning approach implies usage of different learning delivery modes, such as **face-to-face learning** (F2F), **learning management system-based** (LMS) learning, and **web-based learning** (WBL). This teaching development project focuses on two main learning modes - face-to-face learning and LMS-based learning. The latter include various online platforms (e.g. Blackboard, Moodle, and etc.) that are widely used in universities to facilitate teaching.

We design learning analytics tools using Moodle statistics and apply these tools to examine effects of students' engagement with LMS on their academic performance. Contrary to previous literature, we ignore the total number of clicks and overall time spent on Moodle, instead we first investigate whether students follow online instructions and use relevant material within the allocated time. Then we explore how this behavior affects students' performance. The project answers a number of important questions.

- How do students use online activities?
- Does participation in the blended learning program relate to students' performance in the course?
- What factors affect the efficiency of the blended course?

Project context

We study behavior of undergraduate business students in the context of an 11-week module "Public Economics" in the 2018-2019 academic year. The course was offered at the University of Nottingham Ningbo China (UNNC) Business school in a blended learning environment. The module consists of 10 lectures and two seminars. The materials for each topic were posted on Moodle, an open sourced LMS used in UNNC, and were available to students at least 3 days before the lecture. Weekly one-and-a-half hour lectures were complemented by online learning resources provided via Moodle. Completion of all online activities was optional and did not contribute to the final grade in the module.

Sample topic structure

For each topic, students were offered the following online contents:

1) *Before-class activities* (a video or an article that introduces topic to students)
2) *Lecture material* (ppt slides, suggested reading, and links to external resources)
3) *After-class activities* (quiz on the topic of the lecture and/or essay writing practice)

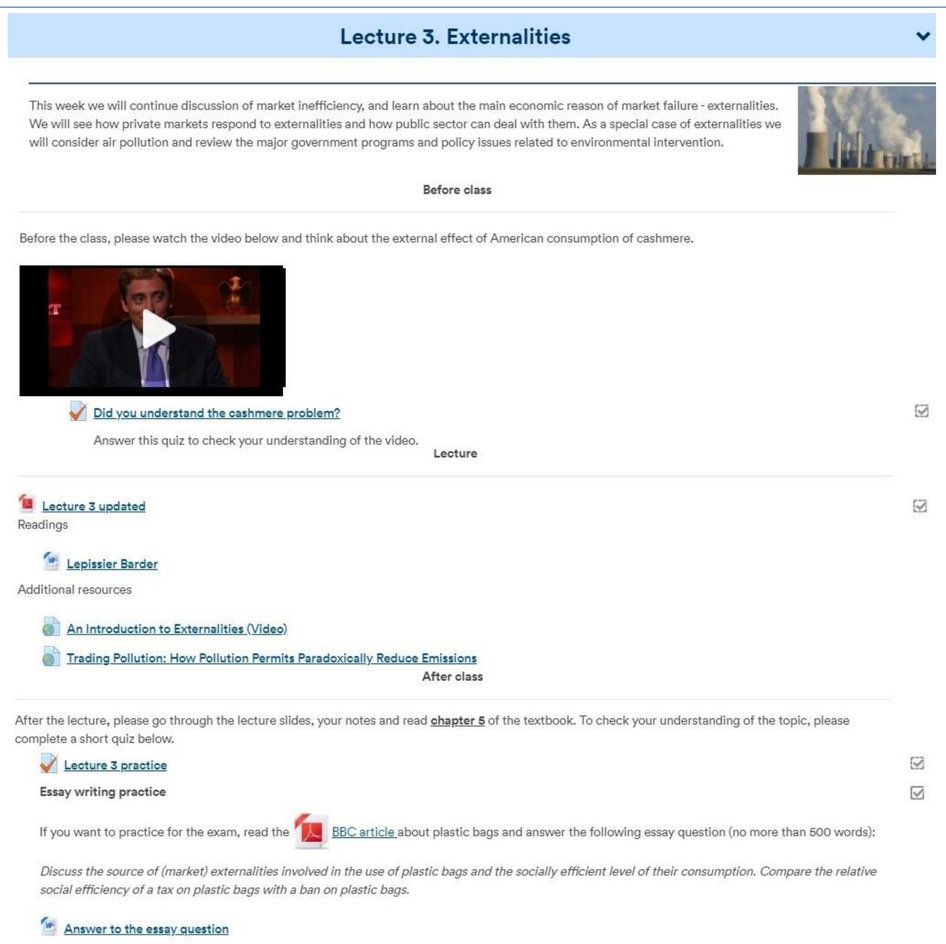
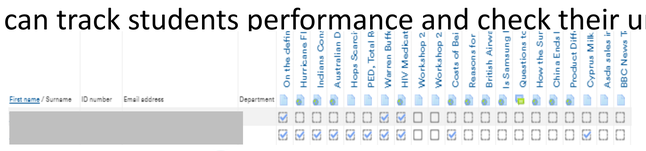


Figure 1. Sample Moodle page

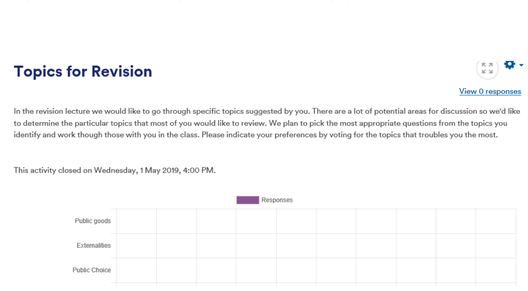
Useful Moodle Functions

- Activity completion ☑ and activity completion report (could be used as part of the active participation evaluation; can track students performance and check their understanding of the material) →



- Badges (motivation for students) →

- Choice activity (interactive activity; could be used to organize polls, e.g. to choose topics for the revision lecture) →



- Quizzes/ Assignments/ Forums

How do students use online activities?

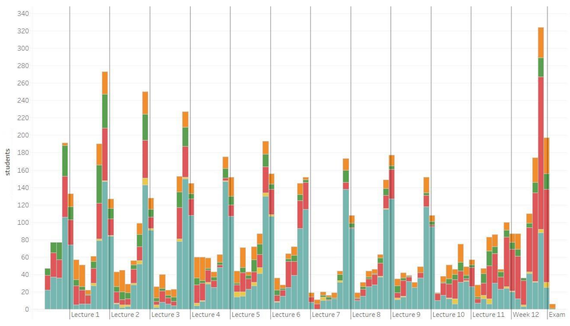


Figure 2. Interaction with online contents by activity type

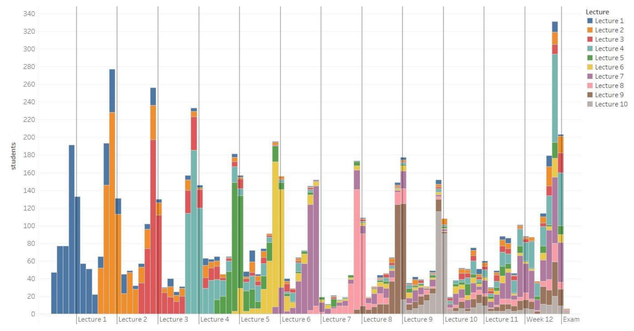


Figure 3. Interaction with online contents by lecture

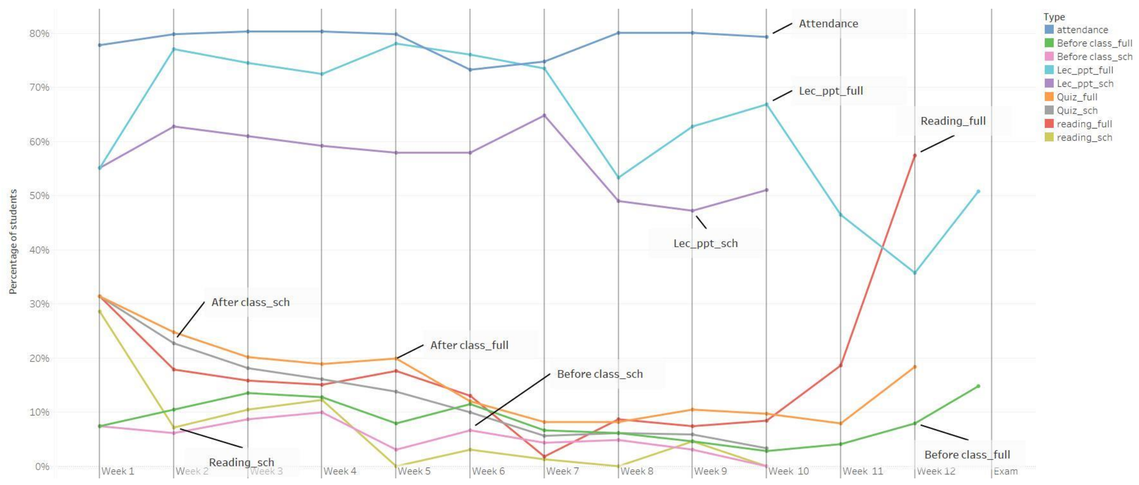


Figure 4. Percentage of students engaged in face-to-face and online activities

Discipline:

- Students tend to interact with online contents either on the day before the lecture or on the day before the exam.
- The majority of students preview a content of the forthcoming lecture.
- Students are likely to finish the activities after the deadline. A large number of students complete online activities for the first time just one day before the exam.

Activities:

- Students do not pay much attention to the before class-activities, and instead prefer to complete reading and after-class quizzes.
- Engagement with online activities (except for the ppt slides) is much lower than attendance of face-to-face sessions.
- Students engagement with online material is declining over time while attendance of the face-to-face sessions stays constant (wear-out effect in using e-learning resources).
- Students are relatively reluctant to usage of assigned reading during the semester, but majority of students refer to the reading during the preparation for the exam.

Blended learning and students' performance

We estimate a set of regressions to check whether students' engagement with online contents and attendance of lectures affect their performance in the module. Average GPA of each student is included in the regressions in order to capture unobserved individual characteristics of students. We find that:

- Attendance of lectures has positive effect on student's performance (the coef. varies between 2.639* and 3.058**), which is smaller than the effect of using online contents.
- Usage of online activities regardless of the completion time contributes to a higher final mark (the coef. on the share of completed activities equals 5.898**). This effect is mainly associated with the completion of the before-class activities (the coef. on the share of the completed before-class activities equals 5.569***, while the coef. on the share of the completed after-class activities equals 2.412*)
- We find that the average students' performance is highly correlated with students' attitude towards the timely completion of activities. Students with high GPA tend to complete most activities on time, while students with low GPA miss the deadlines and use the activities just before the exam. Therefore, the effect of timely activities completing becomes insignificant once we include GPA in the regression, with one exception of the before-class activities that have significant positive effect on performance (3.462*) even when GPA is included.

Students' Feedback

We got very positive feedback, here just some of the comments: "the most well-structured module in my Y4 study", "Best course of my 4 years study", "the most well designed and useful module I have ever taken", "teaching content is interesting and useful", "the material is the most comprehensive one in my last semester", "PE module is an exciting journey for me."

Conclusions

Usage of the online before-class-activities and the after-class-exercises plays significant role in determining students' performance in the module. Interestingly, there is no extra effect on final mark if a student complete the after-class assignments on time, but effectiveness of the before-class activities increases if students complete them before the beginning of a new topic. Overall, we find that not only online engagement but also discipline plays an important role in improving students' performance, although most of the students tend to ignore the deadlines and complete the online activities just before the exam.

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