Letting Students Design their Own Dashboards - Learning Analytics from a Student's Perspective

Alena Droit[1], Bodo Rieger[1]

[1] Management Support and Information Systems, Katharinenstr.3, 49069 Osnabrück Germany,{alena.droit|bodo.rieger}@uni-osnabrueck.de

Keywords
Learning Analytics, Educational Data Mining, Dashboards, Flipped Classroom

1. Summary

Learning Analytics (LA) can bring many benefits for learners, teachers and higher education organizations themselves. However, there are also many concerns, especially among students, who are the main target group and at the same time the main suppliers of the data. In order for students to use learning analytics services, which are often provided in a visual format, they should be involved from the start. This can reduce the risk of LA being rejected by the students and the LA dashboards can be designed efficiently and sensibly according to the students' requirements. Therefore, we have conducted a study with 139 participants of a business intelligence course, which aims to provide insights for the development and implementation of LA at the University of Osnabrück, with the help of a questionnaire and a case study in which students were asked visualize learning data in a Tableau dashboard.

2. Extended Abstract

E-Learning has become more than just a trend in the world of higher education and blended learning concepts are nowadays very well established in many universities. At the University of Osnabrück we have just begun to redesign some of our existing information systems lectures to the flipped classroom (FC) method, which is "an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom." (Bishop & Verleger, 2013). Within the scope of digitization through FC, we now also have the possibility to introduce learning analytics, which can be defined as "the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning" (Conole et al., 2011). While there are many benefits for all stakeholders, like the evaluation of learning materials, monitoring student's success and engagement, and identification of learners at risk (Jovanović et al., 2017), we have noticed that our students are skeptical about the topic. The students union has raised concerns about data protection, interference with privacy, and surveillance by teachers and staff. We take the concerns of the students very seriously and therefore try to be as transparent as possible. Often LA dashboards are the result of technology or data-driven design. We focus on user-centered design, involving students even in the early stages of the development. Our hope is to reduce the risk of LA being rejected and to design learning dashboards that will actually be used by our students. For this reason, we have conducted a study with 139 participants of a business intelligence course in order to learn more about the students' perspective on learning analytics.

The participants of the study are all enrolled in the business intelligence course at Osnabrück University. The contents of the course include data modeling, data warehousing, analytics, and information design. The course was redesigned according to the flipped classroom (FC) method in 2018. Learning materials like videos, texts, and quizzes are made available on the Learning Management System (LMS) StudIP, using Courseware and Vips, one week prior to the in-class activities.

The in-class activities mainly consist of exercises in the computer labs, where students apply their theoretical knowledge in small groups using case studies in current market-leading software such as Informatica and Tableau. In the winter semester 2018/2019, 160 students took part in the course, all

of them enrolled in the bachelor degree programs Business Administration (B.Sc.) or Information Systems (B.Sc.). They had the opportunity to participate in the study "Learning analytics from a student's perspective", an online study which took place in the last weeks of the winter semester. The study included a questionnaire and an application part and required an average of 3.5 hours to complete. As an incentive, participating students could earn additional points for their final exam.

A total of 139 students of which 64% were male and 36% female participated in the study. Before the participants were allowed to answer the questions, they were presented with a 1.5-page case study, which was about a very similar but fictional business intelligence course with 60 participants. The case study includes, for example, fictional activities in the LMS, grades and midterm results as well as demographic data. In addition, there were patterns that could be found in the data.

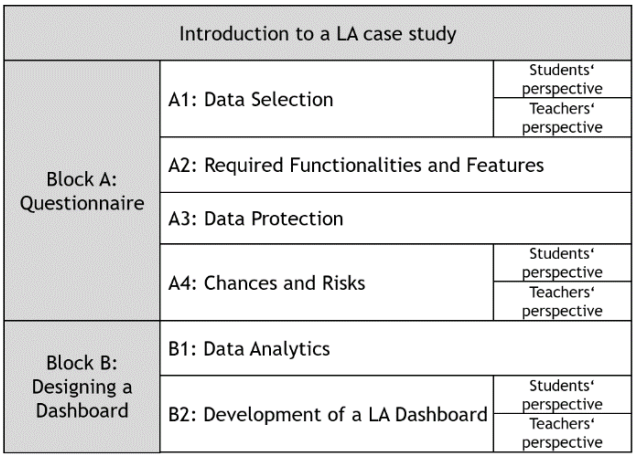

Figure 1: Design of the Study

The study itself is made up of two parts: Part A (questionnaire) and part B (designing a dashboard) (see figure 1). Part A consists of the subsections data selection (A1), required functionalities and features (A2), data protection (A3) and chances and risk (A4). In A1, students were given 33 attributes and asked to indicate the relevant attributes for themselves (students' perspective) and for their teachers (teachers' perspective). They could also add further attributes to the list. The attributes were mostly taken from current case studies and publications on learning analytics and can be classified into demographic data, academic data and learning activity data (Niall, 2017). In A2, a Likert Scale was used to determine useful functionalities of an LA Dashboard in terms of their importance to students. Subsection A3 contains questions and open text fields focusing on data protection. At the end of the questionnaire, students were asked to explain and evaluate the opportunities and risks that, in their opinion, Learning Analytics creates for learners as well as teachers.

Part B deals with the exemplary modeling of dashboards. First, the students were asked to explore the data of the case study in a data analytics section. The students had to join three CSV files (demographic data, academic data, and learning activity data) in Tableau and perform simple, comprehensive analyses, such as determining the current average grade of female participants. This ensured that the students were able to merge the data and analyze it usefully in dashboards for part B2, where the students then had to develop a dashboard from a student's point of view that they would want for future courses. Similarly, they were asked to put themselves in the role of a teacher and implement a suitable dashboard in Tableau. In addition, there was the possibility for students to describe textually if they had wished for something in the dashboard that they could not create in Tableau (due to their own abilities, absent functions or insufficient data).

The results of the study were analyzed and interpreted by various scientist and will be presented in detail at the EUNIS conference. Our next step will be the development, implementation and testing of an LA dashboard for business intelligence courses, using the requirements and ideas of the students. The development will take place in close collaboration with former course participants, student union, and the Center for Digital Teaching, Information Management and Higher Education Didactics (virtUOS).

3. REFERENCES

Bishop, J., Verleger, M.A. (2013). The Flipped Classroom: A Survey of the Research. *ASEE National Conference Proceedings*, 1–18.

Conole, G., Gašević, D., Long, P., Siemens, G. (2011). Message from the LAK 2011 General & Program Chairs. *Proceedings of the 1st International Conference on Learning Analytics and Knowledge, 1.*

Jovanović, J., Gašević, D., Dawson, S., Pardo, A., Mirriahi, N. (2017). Learning Analytics to Unveil Learning Strategies in a Flipped Classroom. *The Internet and Higher Education, 33*, 74–85

Sclater, Niall. (2017). *Learning Analytics Explained.*

4. AUTHORS' BIOGRAPHIES

A. Droit is a research and teaching assistant at the Insitute of Information Management and Information Systems Engineering (IMU) at the University of Osnabrück. She studied business administration with a focus on information systems at the University of Münster and the University of Osnabrück. Currently, she is managing the "FlipOS" project, focusing on redesigning business intelligences courses using the flipped classroom method. She is working on her doctoral thesis on the topic of flipped classroom and learning analytics and also holds a teaching assignment at University of Applied Sciences in Osnabrück.

B. Rieger is a full professor for Managament Support Systems at the University of Osnabrück. Based on a Master degree in Business Administration, a PhD in Computer Science and a habilitation in Information Systems, he is doing teaching and research since 1994 about Management Support Systems (Business Intelligence), including Data Warehousing, Decision Support and Artificial Intelligence. Aside close cooperation with the industry, he initiated DWH/BI at the University of Osnabrück in 1998 and until now accompanies its implementation and operation towards Decision Support and Knowledge Management by coaching relevant PhD theses and projects.