Opportunities for learning analytics supporting learning and teaching in teacher education

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Summary

Most studies of learning analytics have so far focused mainly on higher education students, but recently also on how the learning analytics dashboard could provide feedback for the learners' learning process. Macfayden et al. (2014) have said that automated analytics provided for teachers and learners is not only supporting learners' academic performance, but also shapes the skills of self-directed learning which has been considered as a significant factor to academic success. Self-directed learning and its promotion of the learning analytics dashboard is also the focus of the current article. Learning analytics dashboards have been an interest of several researchers for several years, but there is a lack of studies that demonstrate how learners interpret the learning analytics dashboard visualizations and how such visualizations change the learning behaviour: goal setting, planning, reflecting etc., because such evaluations are time-consuming and require a longitudinal research approach. There is a lack of evidence and little research to indicate which monitoring variables may be pedagogically meaningful (Macfayden & Dawson, 2010). Additionally few attempts have been made to study how learning analytics and its visualizations can be used in the curriculum development process and evidence-based decision making in higher education, especially in teacher education. The aim of the paper is to investigate the expectations and needs of the learning analytics dashboards for teacher education with the aim to enhance the student's self-directed learning competencies. Research questions of the study were formulated as follows:

- What kinds of learning analytics dashboard visualizations are meaningful for the pre-service teachers to support self-directed learning?
- How do the teacher educators perceive the learning analytics dashboard visualizations as a tool to support teachers' self-directed learning?

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- What kind of possibilities can learning analytics dashboards provide for supporting the enhancement of research-based interventions in Estonian teacher education?

Research design follows the principles of design-based research (DBR) (Barab & Squire, 2004) because DBR is a flexible framework which aims to improve educational practices through iterative design, analysis, development and evaluation phases in collaboration with the researchers and practitioners. Practitioners in the current study are different stakeholders from the teacher education context. Involving stakeholders in the design process enables researchers to better understand the research context and needs of the users. In order to better understand the needs and expectations related to the learning analytics dashboard, participatory design sessions were carried out with the nine pre-service teachers, five teacher educators, and five curriculum heads.

The study shows that students, academic staff and also curriculum leaders who oversee the development and implementation of the curricula believe that the most important thing when using online environments is that the learning environments and learning systems communicate and exchange data. All the participants stated that using online learning environments should support learning and teaching and not cause extra work. The research found that getting an overview on the development of student competencies both in curriculum form and speciality context is important for students, academic staff and curriculum designers.

Developing learning analytics solutions teacher training stakeholders considered it important that the environments should enable a systematic and time appropriate feedback that would support the learner. Although the students stated that they understood the scarcity of individual feedback which is due to the lack of time, the academic staff and curriculum leaders stressed that the learning outcome based on automated feedback systems should be developed. Furthermore, the academic staff considered it important that the students should have the skills and abilities to analyse the feedback that they experienced from the online environments and thus implement it to enhance learning skills development.

The students and academic staff brought out multiple times that learning analytics solutions should be integrated into the online environments although the option of using learning analytics should be optional, and they should offer the opportunity to compare learners' own activities, including performance, results etc. With other students, it was not considered important by the students and academic staff. A section of both research groups found that it would be motivating, but others stated that for a self-directed learner, comparison with others is not important to learning.

The initial results from the learners, lecturers and heads of curricula indicated that for supporting the autonomy of learners the system should:

- Provide an overview for the learner about the progress and performance of the course context;
- Give an opportunity to compare ones' own progress, achievements and the results with the rest of the study group;
- Enable to analyze the correlation between self-evaluated efforts (time spent, degree of the difficulty) and results of the learning activity;
- The development process of the competencies defined in the qualification standard at the individual, group and curriculum level.

The study showed that all participants agreed that working together and collaboration were extremely important. At the same time, they stated that an overview of social interactions in learning analytics is not considered important rather than the online environment should have a wide range of technological solutions, for example limiting the number of participants.

The participants of the study stated that the development and student competencies and the possibility of comparing the learning results with the groups overall average are considered important in learning, teaching, curriculum design and implementation and also in learning design.

Expectations on learning analytics solutions are as follows:

- Creating a course in the learning environment should have the option of integrating subject based and speciality standard learning outcomes;
- An overview and group average comparing;
- The opportunity to view student competencies development individually, on the basis of a learning group and across the curriculum.

The next phase of the study will focus on the design of dashboards together with the students, lecturers and head of the curricula with the aim of validating the needs and expectations defined in the current study.