Addressing Students' Needs: Development of a Learning Analytics Tool for Academic Path Level Regulation

Eglė Gedrimienė, Anni Silvola, Henna Kokkonen, Satu Tamminen, Hanni Muukkonen
egle.gedrimiene@oulu.fi, anni.silvola@oulu.fi, henna.kokkonen@oulu.fi, satu.tamminen@oulu.fi
hanni.muukkonen@oulu.fi
University of Oulu, Finland

Abstract: Development of learning analytics (LA) tools requires theory-based approach, careful implementation, and user-centred evaluation. In this paper we report on a two-stage user-centred and theory-based development and evaluation of a LA student tool. Results show that LA tool's support for different phases of self-regulation needs to be clearly differentiated and tested with students.

Introduction

Learning analytics (LA) development and implementation lack focus on students as the primary users and grounding in self-regulated learning theory (Tsai, 2020). Design and use of LA tools require careful consideration as LA has been shown to have both positive and negative impact, in some cases diminishing students' motivation and goal orientation (Lonn, et al., 2015) which is argued to be in connection with atheoretical approaches and low participation of users in the design of LA tools (Matcha, 2019).

To develop the LA tool for students we took a user-centred, theoretically grounded approach combining expertise of the multidisciplinary team. We grounded the development and evaluation of the LA tool in theory of self-regulated learning, which is described as consisting of four phases: Planning, monitoring, controlling and reflection (Pintrich, 2005). The aim was to create scientifically grounded, student-centred LA tool supporting self-regulated learning on the level of academic paths, referring to study periods and academic years. This is a novel approach in comparison to previous studies emphasizing LA use in course level. We present the development process, developed visualizations (Fig.1 and Fig.2), and students' feedback.

First, student needs were identified through recorded small-group conversations focusing on higher education academic paths and LA. Addressing self-regulation skills, students' needs for continuous overview of their progress and development on the academic path level and support for time management were the most prominent themes (Silvola et al., 2021). The first LA tool version, consisting of two visualizations, was developed, and tested in the context of academic advising conversations. The visualizations described student progression based on their personal study plans and student success within courses included in the plan. Student experiences showed that the LA tool made students' support needs more explicit and was especially useful for students experiencing difficulties in their studies (Hooli, 2020). The design and implementation of the LA tool was carried out by educational psychology and IT specialists and utilizing legal experts to identify and prevent possible data privacy risks. The second LA student tool version was developed with additional visualization aimed to support self-regulation. As visualizations of grades in the first version of the LA student tool resulted in mixed student experiences (Hooli, 2020), two new visualizations were added to give an overview of the progression on the academic path level, two on planned courses and credit distribution through time (two visualizations in the left upper corner), and one on distribution of attended courses across study fields.
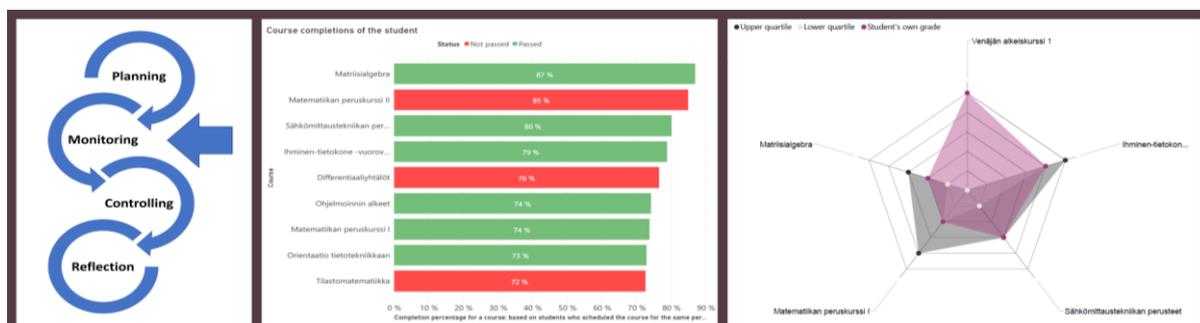

Figure 1. Visualizations in the first version of the LA student tool supporting phases of self-regulated learning.

Results and discussion

Figure 2. Visualizations in the second version of the LA student tool supporting phases of self-regulated learning.

Preliminary results indicated that students evaluated information about study plans (courses and credit distribution through time) and study progress (completed and not completed courses) as the most useful. Estimated graduation time and own grades were also evaluated positively. Comparative information (grades and course completion percentages of other students) remained controversial. Second version of the tool worked well to support students' study planning (goal setting and creation/revision of the study plan) and monitoring. On the other hand, the tool was less helpful for reflecting over the study behaviours and results or improving study habits.

This study showcases the ongoing research and implementation of theory driven, user-centred LA student tools in a higher education institution. Results show, that created LA tools must be carefully tested to understand if they serve their prescribed aims from the students' perspective. Further research is needed to better understand how the final version of the tool supports phases of self-regulated learning on the academic path level and what functionalities are useful for different students in comparison with regularly used tools.

References

Hooli, H. (2020). Students' experiences of learning analytics in academic advising for supporting self-regulated learning. Master thesis. University of Oulu.

Lonn, S., Aguilar, S. J., & Teasley, S. D. (2015). Investigating student motivation in the context of a learning analytics intervention during a summer bridge program. *Computers in Human Behavior, 47*, 90–97. https://doi.org/10.1016/j.chb.2014.07.013

Matcha, W., Gašević, D., Uzir, N. A., & Pardo, A. (2019). A systematic review of empirical studies on learning analytics dashboards: A self-regulated learning perspective. *IEEE Transactions on learning technologies, 13*, 1–20.

Pintrich, R. P. (2005). The role of goal orientation in self-regulated learning. In M. Boekaerts, et al. (Eds.), *Handbook of Self-Regulation.* (pp.451-502). Elsevier Science.

Silvola, A., Näykki, P., Kaveri, A., Muukkonen, H. (2021). Expectations for supporting student engagement with learning analytics: An academic path perspective. Manuscript submitted for publication.

Tsai, Y. S., Rates, D., Moreno-Marcos, P. M., Muñoz-Merino, P. J., Jivet, I., Scheffel, M., & Gašević, D. (2020). Learning analytics in European higher education—Trends and barriers. *Computers and Education, 155*.

Acknowledgments