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## Learning analytics to study and support self-regulated learning

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## EDITORIAL

### LEARNING ANALYTICS TO STUDY AND SUPPORT SELF-REGULATED LEARNING

The theme of the current issue of *Studia paedagogica* is learning analytics and its potential for research and support of self-regulated learning.

Over the past ten to fifteen years, the field of learning analytics has undergone tremendous development, capturing the interest of an expanding community of researchers from diverse fields including educational sciences, psychology, computer science, and others. As the widely accepted definition suggests, learning analytics is concerned with the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purpose of understanding and optimizing learning and the environments in which it occurs (Ifenthaler & Yau, 2020; Joksimović et al., 2019; Juhaňák & Zounek, 2019; Siemens, 2013). Similarly, self-regulated learning has received increasing attention in educational research. Especially in the last two decades, extensive theoretical and conceptual development has taken place, and several distinct definitions and models of self-regulated learning have been proposed and developed (Boekaerts et al., 2000; Panadero, 2017; Zimmerman & Schunk, 2011).

Existing research on self-regulated learning has repeatedly demonstrated the importance and impact of self-regulation on student performance and learning outcomes, as well as its implications for student well-being. Students engaging in self-regulated learning are able to manage their own learning and adapt their learning behaviors effectively, and they exhibit more positive motivational characteristics, leading to their better performance on learning tasks and academic success in general (Boekaerts et al., 2000; McInerney et al., 2012). At the same time, research on self-regulated learning has become more prominent in recent years in relation to different online learning environments, as several studies have found that students' ability to self-regulate their learning differs in online versus traditional settings (Broadbent & Poon, 2015; Sedrakyan et al., 2018; Wong et al., 2019). While the use of learning analytics to study self-regulated learning is still in its early stages, researchers in the field have already begun to systematically explore what indicators of self-regulation can be tracked in online learning environments

and which computational and analytic tools can be used to analyze these data, with the goal of accurately measuring self-regulated learning in online learning environments and better understanding the various aspects of students' learning behaviors (Viberg et al., 2020).

Still, despite the increasing number of studies applying learning analytics to study and support self-regulated learning (Park et al., 2023), many questions remain unanswered. Therefore, this monothematic issue provides a space for researchers to present their research and discuss current issues and questions related to self-regulated learning research.

We are pleased that the articles in this issue approach the intersection of learning analytics and self-regulated learning from a variety of directions, highlighting the breadth of the topic and the range of possible research approaches that can be used to study self-regulated learning.

Natalie Borter, in her study *Differential Effects of Additional Formative Assessments on Student Learning Behaviors and Outcomes*, adopts a quasi-experimental approach to examine whether additional formative assessments completed by students lead to improved learning outcomes and changes in students' self-regulated learning behaviors. The study, conducted in a real-world blended learning environment, employed a learning analytics approach by combining both behavioral and self-reported data and using several analytical techniques such as exploratory factor analysis and cluster analysis. The results support the notion that the additional formative assessments lead to improved learning outcomes, but at the same time, suggest that the change in students' self-regulated learning behaviors based on their participation in additional formative assessments can be both positive and negative.

As an integral part of self-regulated learning, Libor Juhaňák, Karla Brücknerová, Barbora Někardová, and Jiří Zounek focused on goal setting and goal orientation in their study *Goal Setting and Goal Orientation as Predictors of Learning Satisfaction and Online Learning Behavior in Higher Education Blended Courses*. Using a relatively large sample of hundreds of students and dozens of different blended courses, and employing multilevel modeling, the authors examine the relationship between goal setting and goal orientation and student behavior in the online learning environment, as well as the effects of these two measures on student learning satisfaction.

Another example of using learning analytics to study online learning behavior is presented by Ricardo Santos and Roberto Henriques in the article *Decoding Student Success in Higher Education: A Comparative Study on Learning Strategies of Undergraduate and Graduate Students*. Similar to Juhaňák et al.'s study, Santos and Henriques analyze student behavioral data extracted from a learning management system (LMS); however, they focus primarily on uncovering various self-regulated learning behaviors and learning strategies adopted by students in the LMS. Using k-means clustering, the authors were able to

distinguish five different learning strategy profiles among the undergraduate and graduate students. Further, the authors examine how the identified learning strategy profiles relate to student learning outcomes.

Mattias Wickberg Hugerth, Jalal Nouri, and Anna Åkerfeldt use a different methodological approach in their study *“I Should, but I Don’t Feel Like It”: Overcoming Obstacles in Upper Secondary Students’ Self-Regulation Using Learning Analytics*. The authors explore how learning analytics can be helpful for students to support their self-regulation, paying primary attention to the challenges experienced by students in the process of self-regulation and focusing on the data and information students need to better regulate their own learning. Based on the findings, the authors suggest that learning analytics systems need to be designed with students’ self-regulation needs in mind, incorporating support for scaffolding self-regulation, while taking into account that support for the planning and performance phases appears to be most critical.

Nicol Dostálová and Lukáš Plch contributed to this special issue with a review study entitled *A Scoping Review of Web-Cam Eye Tracking in Learning and Education*. The study builds on existing research in the area of multimodal learning analytics, where different types of technologies are employed to capture and analyze student behavioral data, including eye-tracking technology, which is used to study students’ gaze and eye movements. The authors focus specifically on webcam eye-tracking, which can be considered a relatively new technology, and show that webcam eye-tracking has great potential in self-regulated learning research and educational research in general.

The issue concludes with the emerging researcher section, which contains Barbora Al Ajeilat Kousalová’s study *Vocabulary Learning Strategies, Self-Regulated Learning, and Learners’ Outcomes in Primary School Pair Work*. Al Ajeilat Kousalová addresses a research gap identified in previous approaches to studying vocabulary learning strategies used by learners during pair work in the context of foreign language learning and, inspired by the research area of multimodal learning analytics, employs a qualitative design study approach. By analyzing audio and video recordings, the author was able to uncover different patterns of vocabulary learning strategies and distinguish between successful and unsuccessful strategy applications.

We believe that this special issue of *Studia paedagogica* has the potential to contribute to the current discussion on the use of learning analytics in self-regulated learning research and to enrich the research practices of using learning analytics in self-regulated learning research, thereby enabling higher education students to be more effectively and qualitatively supported in developing their ability to regulate their own learning.

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Editors

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