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Editorial: Designing, implementing and evaluating self-regulated learning experiences in online and innovative learning environments

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Editorial on the Research Topic
Designing, implementing and evaluating self-regulated learning experiences in online and innovative learning environments

In recent years, online learning environments and innovative educational technologies have fundamentally transformed teaching, learning, assessment, and instructional design. These advancements have driven a paradigm shift, providing unprecedented opportunities for personalization, flexibility, and accessibility in education. However, despite the growing adoption of these technologies, many students face significant challenges in effectively navigating these environments. These challenges are especially pronounced for learners who lack essential personal attributes, such as goal orientation and self-discipline, which are critical for success in autonomous learning contexts. To thrive in technology-enhanced learning environments, students must demonstrate greater autonomy and self-direction than was traditionally required in conventional classroom settings. This shift highlights the dual responsibility of both educators and learners: educators must implement evidence-based pedagogical practices and develop robust assessment frameworks, while learners must adopt, refine, and internalize self-regulated learning (SRL) strategies (Li et al., 2023; Miedijensky, 2023). SRL is a multidimensional construct encompassing cognitive, metacognitive, behavioral, and affective dimensions (Panadero, 2017), and refers to how learners actively plan, monitor, and evaluate their progress toward academic goals, enabling them to take ownership of their learning. While SRL is a critical component of effective learning in any context, it is particularly essential in technology-enhanced environments, where learners often work with heightened levels of independence and self-management. Research consistently shows that students who engage in SRL not only achieve higher academic outcomes, but also derive greater intrinsic value from the learning process, positioning them to become competent, motivated, lifelong learners (Efklides, 2011; Pintrich, 2004). Furthermore, active engagement, characterized by the deliberate application of SRL strategies, has been shown to significantly enhance learning outcomes compared to passive participation in instructional activities (Panadero, 2017; Wang et al., 2013). Despite its importance, SRL remains a challenge for many students, often leading to

suboptimal academic performance and disengagement. Recognizing this gap, this Research Topic brings together empirical studies focused on the design, implementation, and evaluation of SRL interventions within technology-enhanced learning environments. By exploring these contributions, we aim to advance our understanding of how SRL can be fostered and supported in diverse educational contexts, ultimately empowering learners to succeed in the dynamic and ever-evolving landscape of modern education. Below, we present a description of each study featured in this Research Topic.

The article by Horvers et al. explores the impact of co-regulation with Adaptive Learning Technologies (ALTs) on primary school students' goal-setting, regulation of practice behavior, and learning outcomes. The study developed and tested the Learning Path app, which integrates goal-setting prompts and monitoring support to facilitate co-regulation between students and ALTs. The experimental design involved students from four schools, divided into an experimental group (co-regulation with ALT) and a control group (ALT only). The students worked on mathematics problems, with pre-tests and post-tests administered to measure learning outcomes. The results show that students in the experimental group solved more problems with greater accuracy compared to the control group. This suggests that co-regulation with ALTs positively influences students' ability to regulate their practice behavior. The study's significance lies in its contribution to understanding how technology can support SRL in primary education.

The study by Saban et al. employs a mixed-methods approach to investigate the efficacy of digital escape rooms in improving spelling skills among fourth-grade English as a Foreign Language (EFL) learners. The intervention group, which used digital escape rooms, showed significant improvement in spelling skills compared to the control group, which followed traditional textbook methods. Additionally, engagement and motivation were significantly enhanced by the gamified nature of the escape rooms. The students also reported increased self-confidence and self-esteem due to the immediate feedback and opportunities for repeated practice without fear of failure. The significance of this study lies in its contribution to the field of EFL education by providing empirical evidence supporting the use of digital game-based learning and emphasizing the importance of integrating technology into the classroom to enhance student engagement, motivation, and autonomous learning.

The study by Wolff et al. investigates the effects of task-irrelevant visual distractions and time pressure on performance in low-stakes Computer-Based Assessments (CBAs), as well as the potential moderating role of mindful SRL. Students were randomly assigned to four conditions: control, distraction, time pressure, and a combined distraction and time pressure condition. The findings reveal that visual distractions increased self-reported distraction, while time pressure increased self-reported time pressure. Interestingly, visual distractions did not significantly affect test performance. The study also found that mindfulness was negatively correlated with test performance, self-reported distraction, and self-reported time pressure. This study contributes to the growing body of knowledge on online learning environments and CBAs, suggesting that continuous task-irrelevant visual distractions may not significantly impact low-stakes test performance but do influence self-perceptions. The unexpected negative correlation between mindfulness and test performance challenges assumptions regarding the role of mindfulness in educational contexts. Overall, the study provides valuable insights for educators and researchers designing and implementing CBAs and online learning strategies, emphasizing the need to better understand the factors affecting student performance in digital environments.

The study by Glick et al. investigated whether completing three AI-powered virtual-human training modules—focused on planning, self-monitoring, and reflection—leads to increased use of the corresponding MS Planner tools among STEM majors, compared to a control group. The results indicated that students who did not complete the first two training modules were less likely to use MS Planner features for planning and self-monitoring; however, the reflection module did not yield similar results. These findings highlight the potential of AI-powered virtual-human training as a scalable solution for promoting desirable learning behaviors among STEM majors, particularly in large, diverse classrooms. This study contributes to the understanding of effective interventions for fostering SRL behaviors in STEM education and suggests avenues for future refinement and implementation of digital training tools.

This Research Topic underscores the importance of designing, implementing, and evaluating SRL experiences in online and innovative learning environments. It also reviews best practices for conducting research to assess the extent to which intelligent self-regulation features support learning outcomes.

Author contributions

Conflict of interest

Publisher's note

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