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Editorial: Design, implementation, assessment, and effectiveness of hybrid problem-based learning

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Editorial on the Research Topic
Design, implementation, assessment, and effectiveness of hybrid problem-based learning

Problem-based learning (PBL) is an innovative pedagogical approach widely adopted in higher education. It is considered one of the most significant developments in education, having originated at McMaster University in the 1960s and spreading globally since then (Bond and Feletti, 1997). At its core, PBL is an active learning strategy that promotes student-centered learning. It starts by introducing a problem (also project or query) to the students. The instructor guides the students to solve the problem without deep involvement in the management or solution of the project. This allows students to take ownership of the learning process, as knowledge appropriation and assimilation can only be accomplished by the learners, not the teachers (Duch et al., 2001). Unlike traditional lecturing, PBL emphasizes the development of learners' higher-level skills such as problem-solving, critical think, self-directed learning, information gathering, and decision making.

Despite its widespread success in various educational disciplines, PBL poses many challenges in different modalities, including both hybrid problem-based learning (h-PBL) and project-based learning (Tan and Shen, 2022). The four papers in this special topic address the challenges of developing PBL courses from different perspectives. These perspectives include interdisciplinary courses, distance and online courses, and the assessment of critical thinking.

The implementation of h-PBL has drawn attention from many educators. Many research questions, for instance, the design of PBL project, the weight of PBL learning, the implementation methods, and assessing the effectiveness, are still not well understood (Tan and Shen, 2018). The paper by Carrio et al. compares h-PBL implementation models, namely, the integrated module of different subjects and the full interdisciplinary PBL. The trajectory of their efforts in developing h-PBL is revealed in three stages. In their initial h-PBL developed in 2004, only 20% of the course time was devoted to PBL. However, in their subsequent developed integrated module approach about 20% of the time was used for traditional tutoring with the rest 80% for student PBL activities. Finally, in the recently developed interdisciplinary approach, they combined the biomedicine and medicine courses into one seamless PBL approach. Their study reveals, regarding both student skills development and the student learning experience, the interdisciplinary approach is consistently scored higher, indicating that this is a more effective h-PBL implementation

method. Not surprisingly, they also observed significant correlation among the development of student transversal skills (such as communication, teamwork, etc.), the research skills (such as formulation, data analysis, etc.), and student overall satisfaction. Their findings are interesting and shed light on more creative ways of h-PBL implementation in order to maximize the educational benefits.

While PBL has been extensively studied, the new educational models require more research on how to implement PBL. For instance, distance learning, either due to the demands of the students or forced by pandemic situation, is becoming more popularly adopted at universities around the world. The paper by Malyuga and Petrosyan explores the development of PBL on distance learning. Specifically, they investigate the integration of English language learning in a distance course. In addition to affirming that PBL motivates and improves students' learning by actively engaging them, the authors argue that the approach also contributes to the development of social and professional competencies. They also point out that future research is needed to better assess the effectiveness of PBL in distance learning.

In a similar vein, the paper by Xie et al. develops online PBL during the COVID-19 pandemic. They integrated a virtual simulation training platform into PBL in a clinical biochemistry course. By divide 84 medical students into a control group and an experimental group, they find out that the group with PBL and virtual simulation training had higher scores on knowledge acquisition and problem-solving than the traditional teaching group. The authors conclude that PBL combined with virtual simulation training can be an effective teaching method, especially during the pandemic when face-to-face teaching is not feasible.

Last but not the least, the paper by Witarsa and Muhammad looks into the learners' development of critical thinking. They performed quasi-experimental research. Initially, no significant difference regarding the critical thinking ability was observed from students in the control group and the experimental group. However, after implementing the PBL project, significant differences were seen from three categories of student with low, median, and high critical thinking abilities, between the control and the experimental group. Based on statistical analysis, they claim that the PBL project can help learners to develop better critical thinking skills compared with the conventional teaching.

The papers in this special topic reveal the multi-facet nature of PBL with its design, implementation, effectiveness, and assessment issues, highlighting the importance of PBL to facilitate better teaching and learning. Since its development over half a century ago, PBL has evolved into various modalities and continues to play a vital role in modern education. We believe that its timeless relevance will persist into the future.

Author contributions

ST wrote the first draft of the manuscript. All authors revised the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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