Guest editorial: Personalisation in open and flexible learning environments

Personalisation has become a major trend in contemporary education. It emphasises support for learners to choose what, how, when and where to learn according to their strengths, needs and interests (Patrick *et al.*, 2013). Practices in personalised learning have become increasingly diversified in terms of educational levels and modes of education, as well as the objectives and means to achieve personalised learning (Li and Wong, 2021). Also, with the increasing application of information and communication technologies in education, personalised learning has been widely supported by technological advances which have made learning to become more open and flexible in areas such as time, content, delivery, instructional approach, assessment and support (Li and Wong, 2018). This special issue aims to provide a platform for sharing research, practices and views related to personalised learning, as well as the potential of the latest technological developments for supporting the personalisation of educational delivery in open and flexible learning environments. It includes eight papers which cover broadly the developments of technology-based personalised learning.

In the first paper "An explainable attention-based bidirectional GRU model for pedagogical classification of MOOCs", Sebbaq and El Faddouli proposed an attention-based model for classifying the learning objectives of MOOCs based on Bloom's taxonomy and natural language processing techniques. They demonstrated that their proposed model outperforms other models in terms of accurately classifying and identifying the most essential features of learning objectives of MOOCs. The text classification method in their model is potentially applicable to other types of learning contents.

In their paper "Research on personalized recommendation of MOOC resources based on ontology", Yuannmin *et al.* presented a hybrid method for generating personalised recommendation of MOOC resources. Their method integrates ontology construction technology and semantic association analysis, taking into account both learners' characteristics and their rating of MOOC resources. The authors showed that this method is effective in analysing the semantic features of MOOC resources for recommending suitable resources for learners.

In the paper "The influence of personalized learning intervention system on student learning: A study of junior middle school", Zhou drew on a collaborative filtering algorithm and the concept of knowledge map to build an intervention system to provide students with personalised learning recommendations and organised learning contents. The author highlighted the effectiveness of the system through an improvement in students' learning achievement, and found out various effects of personalised learning interventions on learning confidence and anxiety in relation to students' learning levels.

Mareta *et al.*'s paper "A study of the virtual reality cybersickness impacts and improvement strategy towards the overall undergraduate students' virtual learning experience" reports a study on factors related to virtual reality (VR) motion which may cause cybersickness. In a VR classroom environment, Mareta *et al.* found the major factors causing cybersickness such as virtual movement speed, perspective angle, and visual

properties of the virtual environment. Also, the severity of cybersickness experienced by learners may be related to their gender. These findings provide useful pointers in minimising the cybersicknesses symptoms for the development of an effective VR learning environment.

In the paper entitled "Fostering self-regulation and engaged exploration during the learner-content interaction process: The role of scaffolding in the online inquiry-based learning environment", Al Mamun investigated the incorporation of technologies into a scaffolding framework for informing instructional design to support students' science inquiry, self-regulated learning, and emotional engagement. The author examined this framework with four phases – predict, observe, explain and evaluate – to guide students' inquiry in a self-regulated online learning environment. The results of this study offer pedagogical insights into the creation of instructional designs and contexts for providing effective guided learning, particularly in online, blended and flipped learning modes.

In the paper "Design and implementation of an intelligent tutoring system in the view of learner autonomy", Le and Jia presented an intelligent tutoring system which features learner autonomy. Their system provides adaptive drill-and-practice at various levels of difficulty and a pedagogical agent with a customizable personality, so as to create a learning context to cope with learners' preference in a human-machine cooperative way. The authors emphasized the importance of offering proper learner autonomy in intelligent tutoring systems which has been neglected in related work.

In the paper "Students' achievement in an online course on technical writing and communication skills", Yasin *et al.* analysed students' satisfaction of learning technical writing and communication skills in an online mode in order to establish an efficient feedback assessment mechanism. Their study found the potential effects of online learning on students' satisfaction, self-efficacy and learning outcomes. The findings of their study provide insights into transforming the mechanism for assessment and feedback for students of writing and communication skills.

The last paper "Tuning up a CMLL toolbox: Analyzing web-based applications for critical media literacy learning" by Afrilyasanti *et al.* evaluated web-based applications for critical medial literacy learning (CMLL). The authors proposed a framework of criteria for evaluation, covering the dimensions of learner compatibility, authenticity, beneficial impact, practicability, engagement and support. A total of 17 applications for CMLL were assessed based on the proposed framework to illustrate the effectiveness of the criteria for selecting appropriate applications to cope with the needs of teachers and students.

Overall, the papers in this special issue constitute a collection of work illustrating diverse ways in which technologies have been applied in educational environments to promote personalise learning in an open and flexible manner. The relevant work covers broadly technology-enhanced learning environments such as MOOC, VR classroom and intelligent tutoring system, as well as various aspects of personalisation in learning such as learning objective, learning resource, learning recommendation and learner autonomy. It is hoped that these papers will stimulate new insights and more innovative research and practices in relevant areas.

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