
Editorial

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Simon K.S. Cheung is the Director of IT from Hong Kong Metropolitan University. He received his BSc and PhD in Computer Science from the City University of Hong Kong, and MPA from the University of Hong Kong. He is a Chartered Engineer, Chartered Scientist, and Fellow of BCS, IET, IMA, HKIE, and HKCS. His publications include one research monograph, 27 edited books, and 150+ refereed journal articles, book chapters, and conference papers, mainly in two distinct areas, namely, software and system engineering, and technology in education. He won the Outstanding Research Publication Award from the Open University of Hong Kong in 2016. He has delivered 12 keynote speeches at relevant international conferences.

Smart learning is rapidly gaining popularity among educational practitioners and researchers because of the availability of modern sophisticated smart technologies, smart systems, and smart devices, which offer new opportunities to improve and innovate teaching and learning in a smart learning environment. Being ‘smart’ means showing intelligence, good judgment, or quick action in handling problems. Therefore, a smart learning environment focuses on not only the technological aspects in facilitating learners to access digital resources and interact with learning systems anywhere and anytime, but also the management aspects of learning including keeping track of learners’ learning progress and competency and providing timely learning guidance, learning suggestions and supportive tools in a suitable form. The call of this special issue on *Smart learning environment* aims to report the latest trends and innovative practices of smart learning environments from both pedagogical and technological perspectives.

This special issue contains seven selected papers from the 13th International Conference on Blended Learning and the 6th International Symposium on Educational Technology, both hosted at the Kasetsart University, Bangkok, Thailand on 21 to 24 July 2020, with substantial expansion and revision.

Technological perspectives of smart learning environments

The first four papers focus on facilitating teaching and learning with the integration of technologies, including immersive reality (including virtual and augmented reality), online gamification learning platforms (OGLPs), and online collaborative thinking tools.

In the first paper, Li and Ip proposed a new definition for using virtual reality (VR) in education called ‘VR-enabled learning’, which covers five dimensions of concerns, including immersion, presence, pedagogy, intended learning outcomes, and learner specifics. The new definition not only helps formalise a more practical, more structured, and less ambiguous definition to facilitate theoretical and practical research in using VR for education, but also serves as a framework to guide the planning and practicing of future research studies in VR-enabled learning.

In the second paper, Han et al. proposed an innovative instructional model enabled by the augmented reality (AR) technology to address several problems in the maker education in China's K-12 schools, including disconnection between theory and practice, shallow application of the maker spirit, and shortage of educational resources. After three iterations of design, evaluation, and revision, they empirically refined the model and validated a set of instructional design principles for conducting AR-supported maker education in elementary school. Their study indicated that AR can be used as an adhesive to integrate subject content from various disciplines, and can inspire students' creative thinking and collaborative inquiry.

In the third paper, based on the unified theory of acceptance and use of technology (UTAUT) model, Ng et al. identified factors that affect the choice of an OGLP as a learning tool for 270 students in hospitality and tourism at a university in Macau, China. Their model included knowledge improvement, engagement, and immersion as the three new antecedent factors, which helps to explain how the students perceived the OGLP to be playful and useful; such a research model would be of independent interest for fields other than hospitality and tourism. Based on the identified factors, recommendations were provided for OGLP developers to optimise the design of OGLP for teaching and learning.

In the fourth paper, Su et al. investigated the effect of applying two types of online collaborative thinking tools, namely text-based ones and diagram-based ones, on 34 pre-service science teachers' argumentation skills in a flipped learning course at a university in central China. It was found that though the participants agreed that the diagram-based thinking tool could better reflect their thinking processes, they tend to use the text-based thinking tool, which was more effective in improving their argumentation skills.

Pedagogical perspectives of smart learning environments

The next three papers report case studies, which identified good pedagogies and challenges in smart learning environments.

In the fifth paper, Zhang et al. shared their successful experience in creating a critical culture to cultivate students' critical thinking in a media literacy course at a university in Japan (where media literacy education aims to educate students to critically analyse and judge information in media). The course was taken by 280 undergraduate students in a blended learning environment with a learning management system (LMS). The authors found that critical culture can be formed by a cycle of thinking activities in the class, discussion on LMS, and reflection activities. Factors that were important to cultivate students' critical thinking were also identified.

Flipped classrooms have been proven an effective and promising approach to improve the students' learning outcomes, and the advancement in smart learning environments further facilitates its use. In the sixth paper, Hirata compared how Japanese university students perceived the effectiveness of flipped learning in a computer programming course in the flipped offline and flipped online settings. The study covered two academic years, one year with 50 students taking flipped in-person classes, and another year with 61 students taking flipped online classes due to the COVID-19 pandemic. It was found that the flipped online class is more challenging to the students

and various challenges were presented, which provide useful insights for instructors to develop their own flipped learning strategies.

In the seventh paper, Zuo et al. presented a case study on the negative emotions of 21 teachers teaching in synchronous online classrooms in rural China. The case study found that teachers' emotional responses were highly relevant to their assessment of the perceptions and expectations of student behaviours and how they coped with teaching problems. This case study offered insight into the impacts of online technology and culture on teacher roles, identity, and teaching experience and can identify the potential challenges faced by teachers in synchronous online classes.

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We hope that you would enjoy reading the papers.