Guest editorial

Educational innovations in the smart digital era

Advances in smart and interactive technologies have facilitated innovative practices in learning and teaching across the globe and brought about a paradigm shift in contemporary education. The use of smart technologies has penetrated various aspects of education. For example, technologies such as learning analytics, artificial intelligence, cloud computing and wearable devices have been increasingly integrated into learning environments, pedagogical methods, curriculum development and educational management, which shows the inseparable role of smart technologies in a broad range of educational developments.

This special issue, with the theme of "Educational innovations in the smart digital era," addresses the prevalent use of smart technology in educational practices. It includes extended version of selected best papers presented in the 2020 International Conference on Open and Innovative Education. The work reported in the papers reveals the potential of the advances in smart technologies for innovative learning and teaching. These papers cover broadly the dynamic landscape of smart education – in terms of research, delivery methods and resources available, as well as the impacts of smart education on teaching practice and assessment.

In the first paper "Research landscape of smart education: a bibliometric analysis," Li and Wong report the results of a comprehensive review of the present state and trends of smart education research. Through a bibliometric analysis of more than 1,300 relevant publications between 2011 and 2020, their findings reveal the key publications, the patterns of research collaboration and the emerging research topics in this area. This study has contributed to illustrating the evolution and emerging trends in smart education, highlighting the latest developments and research needs and suggesting potential future work to be carried out.

In their paper "Technology in education: efficacies and outcomes of different delivery methods," Mahmud *et al.* conduct a meta-analysis to examine the efficacies and outcomes of three categories of delivery methods in smart education. This meta-analysis addresses the diversity of the roles and forms of technology use and the challenges in understanding the full potential of smart education. Based on nearly one hundred samples, Mahmud *et al.* compare the overall effectiveness of the delivery methods in enhancing learners' performance. The results provide insights for the selection of suitable delivery methods, especially for coping with the needs of various subject disciplines.

In the paper "Educational use of free and open source software (FOSS): international development and its implications for higher education," Duan and Lee present a cluster analysis of the literature in this area. FOSS has a number of advantages, such as user control, cost saving, flexibility and openness. Through reviewing the relevant literature for more than a decade, Duan and Lee show the growing importance and interdisciplinary development of FOSS. Meanwhile, they also found the regional imbalances and differentiation in its development and application. Their results show the need to promote FOSS among students and teachers, with relevant training and support as well as exchanges and cooperation among tertiary institutions.

The paper "Forming digital shepherds of the church: evaluating participation and satisfaction of blended learning course on communication theology" by Stanislaus reports a case on integrating information and communication technologies in the context of theological education – an area which has rarely been addressed in the smart education

Interactive Technology and Smart Education
Vol. 19 No. 1, 2022
pp. 1-2
© Emerald Publishing Limited
1741-5659
DOI 10.1108/ITSE-03-2022-249

literature. In this study, a course on communication theology was implemented using a blended learning approach, and students' participation in and satisfaction with their blended learning experience were evaluated. Based on the results, the paper gives recommendations on the research and practice of blended learning in this subject area.

The paper "Are Japanese university students ready for remote language learning?" addresses the readiness of Japanese students to use smart devices for remote language learning activities. Its author, Hirata, surveys students' experience in this regard after they have completed online English courses. The findings cover the difficulties encountered by the students, and the support and guidance they needed, as well as their enthusiasm and aptitude for the online language learning components. The results highlight the factors that need to be taken into consideration when offering remote language learning for this learner group.

In the paper "Completeness based classification algorithm: a novel approach for educational semantic data completeness assessment," Akhrif *et al.* propose a smart collaborative learning service which aims at building teams of learners who are complementary in their skills. They illustrate a machine learning approach for classifying learners' features and grouping the learners. Akhrif *et al.* suggest that this service allows learners' flexible participation, offers interdisciplinary collaboration opportunities for them and promotes the sharing of knowledge among them.

The last paper, "The design, implementation and pilot application of an intelligent online proctoring system for online exams," is devoted to online assessment. Jia and He illustrate the use of artificial intelligence technology for online proctoring. They propose a smart system which can monitor learners' behaviours during online exams, such as facial expression, eye and mouth movement and speech, and detect suspicious cheating behaviours. Their work helps to ensure the same level of integrity and equality for examinees during online exams as in conventional classroom exams, which is particularly important for educational institutions which used online learning to maintain education delivery during the period of the pandemic.

Overall, the papers in this special issue constitute a diverse collection of work, which illustrates the potential of smart technologies for advancing education in aspects such as delivery methods, educational resources, disciplinary practices, collaboration and assessment, as well as revealing relevant emerging research topics and trends. It is hoped that this special issue will contribute to stimulating new insights and more innovative work in these areas.

Kam Cheong Li, Billy T.M. Wong, Reggie Kwan and Simon K.S. Cheung
Hong Kong Metropolitan University, Hong Kong, China