

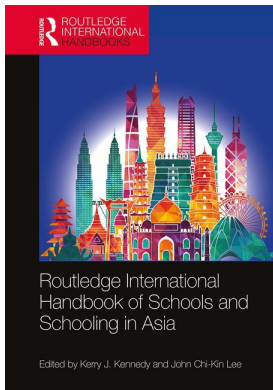
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### **Digital learning for development of Asian schools**

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# 34

## DIGITAL LEARNING FOR DEVELOPMENT OF ASIAN SCHOOLS

*Section Editor*  
*Cher Ping Lim*

### **Section introduction**

Government and non-governmental organizations have perceived and embraced digital technologies as a vehicle for change across different sectors in Asian economies and particularly in the developing countries. The use of digital technologies in the K–12 education and higher education sectors offers opportunities for the enhancement of equitable access to quality learning experiences and the development of lifelong learning competencies. For example, massive open online courses (MOOCs) may provide quality education to marginalized members of the community. The adoption of intelligent tutoring systems (ITS) may create personalized learning experiences for each student based on his or her individual abilities, pace and interests. The harnessing of digital game-based learning (DGBL) and gamification may raise motivation levels and enhance student learning engagement and outcomes. Learning analytics (LA) may empower teachers to make data-informed teaching decisions that better support students in achieving the expected learning outcomes of the course or program.

Despite the potential of digital technologies to contribute to the enhancement of access to quality education and the development of lifelong learning competencies, many knowledge gaps remain in how, for whom and in what contexts digital technologies actually do contribute to improved, equitable educational outcomes. More research is needed that creates and tests ‘proven models’ of digital learning in Asian schools and deepens our understanding of the conditions that are necessary and sufficient for success. And this research needs to build on the research that has already been done in the region and worldwide. The primary aim of this book section is to provide snapshots of the current state in research and to identify and explain the research gaps and future directions of digital learning for development in Asian schools.

The first chapter of this section, co-authored by Cher Ping Lim, Victoria L. Tinio, Matthew Smith and Miron Kumar Bhowmik, provides an overview of how digital learning innovations – specifically MOOCs, ITS, DGBL and LA – have been used in addressing the issues of equity, quality and efficiency (EQE) in education in developing Asian countries. It also considers issues of effectiveness, sustainability and scalability; outlines key research gaps in digital learning for development; and suggests actions towards achieving the Sustainable Development Goal 4 (SDG4) of the United Nations’ 2030 agenda.

In the second chapter, Kaushal Kumar Bhagat, Ma. Mercedes T. Rodrigo and Chun-Yen Chang present an overview of the current status of ITS research in developing countries in Asia.

The chapter identifies various research foci within the region and, based on a meta-analysis of empirical research, assesses the effectiveness of ITS developed or deployed in these regions. The chapter concludes by highlighting some of the limitations of current ITS research, namely that (1) the research on ITS tends to be compartmentalized, rather than taking into account the entire lifecycle from conceptualization to classroom use; (2) many contributions to theory do not address implementation; (3) ITS that are developed locally are tested in laboratories rather than in schools; (4) ITS that are used in schools tend to be developed in other countries and only for a limited time as part of formal experiments; and (5) there is evidence of the integration of ITS as part of the regular school curriculum. Based on the limitations identified, possible opportunities for further study are suggested.

The main purpose of the third chapter, co-authored by Hyo-Jeong So and Minhwi Seo, is to conduct a systematic literature review of research studies on DGBL and gamification conducted in Asian K–12 schools. Twenty-two papers were initially identified based on the authors' inclusion criteria. These papers were then analyzed using a coding framework with four dimensions, namely (1) the research contextual dimension, (2) the methodological dimension, (3) the game dimension and (4) the outcome dimension. While the overall findings in the articles reviewed advocated the positive effects of games on learning outcomes, the authors identified several research gaps, including the lack of diversity in subject disciplines and game genres, the dominance of media-comparison experiments, and issues of sustainability and scalability. Given these gaps, the authors call for research to employ more diverse research methods, to provide thick descriptions on lessons learned, to examine learning impacts over a longer term and to examine the impact of games in resource-poor and under-developed countries.

In the final chapter of this section, Bodong Chen, Chih-Ming Chen, Huang-Yao Hong and Ching Sin Chai review emerging strands of LA research and state-of-the-art data mining techniques applied in the field. The chapter reports on three general technical approaches to LA and provides case examples of how these have been applied by educational researchers from Asia. Specifically, the reported cases illustrate the use of lag sequential analysis for analyzing learning behaviors, social network analysis for investigating collaborative learning and data mining techniques for understanding learning processes. The chapter concludes by highlighting the implications for education emerging from the review and elaborating on potential areas for future research as well as on the implementation of LA.