Guest Editorial

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Hypothetically, the advancement of Information & Communication Technology (ICT) holds a promise of improving educational quality and learning. How far or in what direction that the technology improve educational quality may depend on how the technology is being used and placed in teaching and learning. This special issue will address various aspects of developing and integrating the technology in learning from the perspective of a research community from Southeast Asia. This special issue publishes some high-quality scholarly papers which have been extended in to a journal article from those origninally presented at the 2nd International Conference on STEM Education 2018, jointly organized by the Ministry of Education Malaysia and the Centre for Engineering Education, Universiti Teknologi Malaysia. The conference is an initiative by the Ministry to improve STEM (Science, Technology, Engineering, Mathematics) education in Malaysia as the declining trends of both enrolment and achievement in STEM are evidenced in the region.

There are 15 papers in this Special Issue, which can be broken down into four groups: the first group of papers explores the application of technology in learning which are integrated through the internet, the second group of papers focuses on utilizing technology for supporting learning in a general setting, the third group of papers illustrates the use of technology for learning in higher education and finally the fourth group of papers illustrates the use of technology for learning and teaching at the school level. Technologies written about in this special issue include mobile applications, AutoCAD, microcomputer-based laboratory, Chatbot, Augmented Reality (AR) and Massive Open Online Course (MOOC).

There is an increasing interest in using Massive Open Online Course (MOOC) in delivering learning content, as seen in the first group of papers. Students' learning retention and engagement when using MOOC remains an ongoing issue especially in this part of the world. Shukor and her colleagues offer their insight on using learning analytics to explore strategies and characteristics of instructional design in MOOC. In another similar study carried out by Santoso and his research team, they investigated students' experience when using MOOC as a medium of instruction that leads to formation of phases of users' experience when using the medium of instruction. Meanwhile, from the perspective of MOOC developers, Jalil and her colleagues examined instructors' level of attitude and their behavioral intention to develop and use the medium of instruction in their teaching environment.

The second group of papers provide various studies on developing and using technological tools to support students in motivating them and developing skills to learn. Santoso and his colleagues described a study to develop the prototype of a mobile application for self-monitoring towards enhancing self-regulated learning. In the next paper, Palasundaram and his team studied experiments on utilizing chatbots for education using Recurrent Neural Network based Seq2Seq model that can function in many ways to help students learn, such as in the role of a personal tutor. Game-based learning which can be implemented for engaging students to learn, is the subject

analyzed by Talib et al. in a review focusing on the enhancement of students' reasoning skills.

The third group of papers illustrates the application of technology in specific subject areas in higher education. Khamis et al. develop a mobile application for ergonomic risk assessment that can help students learn and solve real-world tasks. In a separate study, where information and resources are readily available online, Mohammad and his research team presented a study on teaching and learning approach that are surrounded by massive amount of online information for learners who are highly autonomous and self-determined in their learning. Adnan and his team identified the essential elements in conceptual knowledge of 3D CAD modeling among practicing engineers using transcendental phenomenology, to help mechanical engineering undergraduates learn about good product design. Supporting students in learning Thermodynamics using BLOSSOMS video to assist lecturers in conducting active learning was the subject of the research by Zawawi et al. Rahman et al. described the use of virtual laboratory for learning about level control in the process control laboratory to supplement an aging equipment. In the final paper for this group, Ramlee and her colleagues explore the integration of 5E inquiry model by ByBee in an online learning environment where they demonstrated that human higher order thinking skills (HOTS) can be nurtured using appropriate method and practice of teaching. Their study leads to a framework for educators and learners to engage in the development of learning environment where integration of information from various sources is widely used.

Similar to the third group of papers, the fourth group of papers are also on the application of technology to specific areas, but this time the applications are at the school level. Nawi and her team illustrated the effective use of technology for supporting the creation a learning community among students and teachers new to Cooperative Problem-Based Learning (CPBL) for learning about low carbon society. In the next paper, Zakaria et al. described the use of a mobile micro-computer-based laboratory for learning about forces and motion, called PotGo (Physics on the Go), and its impact of student learning. Finally, the last paper elaborates the challenges faced in primary schools in Malaysia in the effort to integrate ICT. This study, conducted by Razak and her colleagues, shows that ICT can enhance the learning of STEM in some ways, provided that the pedagogy of teaching STEM is mastered among the educators. Quality ICT may not support learning if the pedagogy is not adequate. Therefore, the concept of Technological Pedagogical Content Knowledge (TPCK) among educators should be disseminated to a wider audience to ensure the success of ICT usage in teaching and learning STEM.

We hope that the papers published in this special issue can shed some light on the current uses of technology as well as their impact in our region, and lead to further development and studies for quality learning utilizing various forms for technology.

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