

# Editorial . Science Technology, Engineering and Mathematics (STEM) education in Malaysia

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This Special Issue of *Eurasia Journal of Mathematics, Science and Technology Education* presents the current research trend of Science Technology, Engineering and Mathematics (STEM) education in Malaysia. As many may argue, a quality STEM education should be able to provide wider opportunities for students to develop their competencies in not only Science, but also Technology, Engineering and Mathematics and its related areas. A successful STEM education equips students with STEM core competencies in sequences that are built upon one another and can be applied within the context of real world application. The acquisition of STEM core competencies will gradually nourish them to be critical and creative thinkers, uplift their scientific literacy, and more importantly stimulate themselves to be creative innovators. These are among the main reasons why STEM education has been an area of great interest in Malaysia just like in any other countries in this world.

On looking back the historical panorama of STEM Education in Malaysia, it is noted that as early as 1970s, Malaysia has recognized STEM education as an impetus to its nation building and economic prosperity. Since Malaysia gained its independence, various and concerted efforts have been undertaken to address issues confronting educators in STEM, particularly with regard to teaching and learning. Among the major issues are lack of localised STEM learning materials, declining number of students pursuing in STEM related studies at secondary and tertiary level, and low performance in international benchmark studies such as PISA and TIMSS. Additionally, issues related to non-option teachers teaching STEM subjects, inappropriate STEM teaching and learning strategies, as well as suitable assessment procedures which inspire further STEM learning are factors that need to be considered in order

to create effective and yet meaningful STEM learning experiences.

In this Special Issue, seven articles have been selected to present a snapshot of what have been researched in Malaysia that is related to STEM education. The articles range from reviews of STEM-related researches published in journals, innovative STEM teaching and learning strategies, and assessment issues in STEM education. The studies cover from primary to tertiary educational level, which also informs that STEM development is being emphasised at every educational level in Malaysia.

Jayarajah, Saat and Rauf's article gives a 14-year period review of STEM research conducted in Malaysia starting from 1999 to 2013. This empirical review focuses on identifying four characteristics of STEM education, namely a) temporal distribution, b) the research areas involved in each discipline, c) the types of participants, and d) the methodological design employed. Finding from this analysis paints a greater picture of research trend in STEM education in Malaysia for the past 14 years.

As mentioned earlier, one of the major issues in STEM education in Malaysia is the teaching and learning of STEM subjects at schools. In this Special Issue, Abdullah, Halim and Zakaria created an innovative thinking strategy and visual representation approaches, which is known as V-Stops. The V-Stops learning strategies have been proven effective in improving achievement, conceptual knowledge, metacognitive awareness, awareness of problem-solving strategies, and students' attitudes toward mathematical word problem-solving among primary school children.

WebQuest is widely known as one of the applications commonly used in STEM classrooms. Alias, Siraj and DeWitt evaluated a specially developed

WebQuest, named PTechLS in the teaching of Gas Laws in Physics to students who have active learning styles. They particularly evaluated the PTechLS WebQuest for its usability and effectiveness among those students. Another innovative STEM teaching and learning approach presented in this Special Issue is Problem-Based Learning (PBL). Osman and Kaur examined the effect of using ICT within the PBL environment. It was found that when ICT was integrated with PBL approach, significant effects were generated to the students as compared to their counterparts in the control group.

The next article discusses Biotechnology as being one of the emerging pillars of STEM education research in Malaysia. Bahri, Suryawati and Osman investigated the level of Biotechnology literacy amongst school students. The literacy level included three main enterprises, which were knowledge, perception and attitude. They had also identified factors affecting the students' attitude towards biotechnology.

In order to ensure continuation of students' learning, Fadzil and Saat explored students' manipulative skills during transition from primary to secondary school. Findings indicated that the students' cognitive knowledge did not reflect their true ability particularly in manipulative skills. This article ends by suggesting that further collaboration between primary and secondary school should be considered in order to narrow the knowledge and competencies gap during the transition years.

The final article touches on the assessment in STEM education. Chew, Idris and Leong examined secondary students' perceptions of assessments in STEM-related subjects such as Biology, Chemistry, Physics, Science, Health Science, Integrated Living Skills, Mathematics and Additional Mathematics. The findings showed positive perceptions of assessments in STEM-related subjects. It was also found that there exists statistically significant difference in overall perceptions of assessments in STEM-related subjects in terms of school category. Certainly, this study provides suggestion of how STEM educators should go about in improving assessment practice in STEM teaching and learning process.

Although it might not have covered the whole spectrum of STEM education research, we strongly hope that STEM education research featured in this Special Issue sets up many milestones towards the development of STEM education, not only in Malaysia, but also in any other parts of the world.