Educational Technology & Society

(Impact Factor of 2.086 and 5-Year Impact Factor of 2.720 in Thomson Scientific 2019 Journal Citation Report)

Call for papers for a special issue on "Teacher Professional Development in STEM Education"

Guest Editors

Morris S. Y. JONG
The Chinese University of Hong Kong, HKSAR
mjong@cuhk.edu.hk

Yanjie SONG
The Education University of Hong Kong, HKSAR
ysong@eduhk.hk

Elliot SOLOWAY
University of Michigan, USA
soloway@umich.edu

Cathleen NORRIS
University of North Texas, USA
cathie.norris@unt.edu

Objective

The term STEM (science, mathematics, technology and engineering) has become a buzzword among the global education practitioners who have called for curriculum reforms that will boost the competitiveness of the next generation by nurturing their problem-solving ability and creativity (Jane, Jong, & Chai, 2019). STEM education refers to "solving problems that draw on concepts and procedures from mathematics and science while incorporating the teamwork and design methodology of engineering and using appropriate technology" (Shaughnessy, 2013, p. 324). Simply put, it serves as a means to integrate different disciplines as used in tackling real-life problems. In the long term, this cross-disciplinary subject is expected to enhance students' problem-solving, critical and analytical thinking skills, and cultivate them to be constructive and innovative citizens (Jong, 2015; Merrill, 2009).

The significance of STEM education in today's technologically-dominated world cannot be underestimated. STEM competencies, nowadays, are not only required within but also outside of the STEM occupations (So, Jong, & Liu, 2020). In this regard, the development of students' STEM competencies has become an urgent goal of many education systems around the globe, especially in K-12. The U.S. government has heavily invested in STEM education by implementing some state-level initiatives. For example, The "Educate to Innovate" initiative, launched in 2009, aims to enhance STEM literacy, improve teaching quality and increase educational and career opportunities for the youth through the collaboration between the government, the private sector and the non-profit and research communities (Burke & McNeill, 2011). In the U.K., the STEM education reform aims to ensure the provision of qualified people in the STEM workforce and the development of STEM literacy for the public (Department of Education and Skills, 2006). In Asian countries such as Korea, Hong Kong, Taiwan, China and Japan, STEM education has also emerged as an important curriculum reform (Ritz & Fan, 2015; So et al., 2020).

In addition to the growing global interest and strong endeavour in STEM curriculum development, efforts should be particularly made in the increase of STEM teacher supply through a well-designed teacher professional development, which is a critical factor of a successful education (Jong 2019a, 2019b). Since STEM is a cross-disciplinary subject, it is expected that students are empowered to apply their disciplinary concepts and skills in integrated contexts (Kelley & Knowles, 2016; Tytler, Prain, & Hobbs, 2019). However, the majority of the current teachers who have received training in only one subject area may be unable to adopt an integrated and holistic approach to teach STEM (Aslam, Adefila, & Bagiya, 2018;). A well-suited teacher professional development will not only equip teachers with sufficient STEM knowledge and related instruction approaches that can address the learning needs of students, but also develop their confidence in and positive perception of STEM education, which significantly correlates to the effectiveness of STEM learning.

In the existing literature, while there is considerable research on the teacher professional development in science, technology, engineering and mathematics individually, few quality professional development programmes on STEM education have been conducted for teachers to develop the capacity in designing and implementing STEM instructional practices (Aslam et al. 2018; Rinke, Gladstone-Brown, Kinlaw, & Cappiello, 2016). Thus, learners have rarely been exposed to "experiencing" how science, technology, engineering, and mathematics are integrated into their learning in authentic learning environments (Starr & Minchella, 2016). Educators should start reflecting on the issues such as what limitations

the current teacher professional development have, what challenges the STEM teachers have encountered, and how to tailor-make an effective teacher professional development programme that meets current pedagogical needs at different education levels. Therefore, this special issue aims to provide an academic platform for educational researchers to share insights and research experiences in teacher professional development in STEM education for pre- and in-service K-12 teachers, as well as tertiary educators. Topics of interests include, but not limited to, the following:

- Theories and models of teacher professional development in STEM education;
- Innovative approaches to teacher professional development in STEM education;
- Teachers' perceptions and challenges of STEM education;
- Pedagogies for STEM education;
- Assessment of STEM education;
- Reviews of existing research to envision the STEM education now and future needs;
- Policies for the implementation of teacher professional development in STEM education;
- High-quality professional development programmes on STEM education;
- STEM competencies that teachers should have for STEM education.

Important Dates

Submission Due: ~~Aug 31, 2020~~ Oct 31, 2020
1st Round Review Notification: ~~Oct 31, 2020~~ Dec 31, 2020
1st Round Revision Submission Due: ~~Dec 15, 2020~~ Feb 15, 2021
2nd Round Review Notification: ~~Feb 15, 2021~~ Apr 15, 2021
2nd Round Revision Submission Due: ~~Mar 15, 2021~~ May 15, 2021
Final Acceptance Notification: ~~Apr 15, 2021~~ Jun 15, 2021
Estimated Publication Date: Oct, 2021

Paper Submission

- Submissions to this special issue should email your manuscript to the corresponding guest editor – Prof. Morris S. Y. Jong at mjong@cuhk.edu.hk;
- Submissions must comply with requirements stated in the ET&S Author Guidelines, see: https://www.j-ets.net/author_guide;
- Please submit a Microsoft Word file of your manuscript and name your file with the full name of the corresponding author, followed by the title of this special issue (e.g., Morris Jong_STEM Teacher Professional Development.docx);
- Please make sure that you use the ET&S template along with the add-ins tool here for preparing your manuscript;
- Please remove the names and affiliations portion for the review process and only add them back into the manuscript after your manuscript is accepted for publication;
- Please provide a Microsoft Word file of the following details along with each submission in a separate file titled "Title Page_Name of the corresponding author" (e.g., Title Page_Morris Jong.docx):
  a. *Name(s) and title(s) of the author(s);*
  b. *Name of the corresponding author;*
  c. *Job title(s);*
  d. *Organization(s); and*
  e. *Full contact details of ALL authors including email address and postal address.*

References

Aslam, F., Adefila, A., & Bagiya, Y. (2018). STEM outreach activities: an approach to teachers' professional development. *Journal of Education for Teaching*, *44*(1), 58–70.

Burke, L., & McNeill, J. B. (2011). Educate to Innovate: How the Obama plan for STEM education falls short. *Backgrounder*, *2504*, 1–8.

Department of Education and Skills. (2006). *The science, technology, engineering and mathematics (STEM) programme report*. Retrieved from http://www.nationalstemcentre.org.uk/res/documents/page/050110114146stem_programme_report_2006.pdf

Geng, J., Jong, M. S. Y., & Chai, C. S. (2019). Hong Kong teachers' self-efficacy and concerns about STEM education. *The Asia-Pacific Education Researcher, 28*(1), 35–45.

Honey, M., Pearson, G., & Schweingruber, H. (Eds). (2014). *STEM integration in K-12 education: Status, prospects, and an agenda for research*. Washington, DC: The National Academies Press.

Jong, M. S. Y. (2015). Does online game-based learning work in formal education at school? *The Curriculum Journal, 26*(2), 249–267.

Jong, M. S. Y. (2019a). Sustaining the adoption of gamified outdoor social enquiry learning in high schools through addressing teachers' emerging concerns: A three-year study. *British Journal of Educational Technology, 50*(3), 1275–1293.

Jong, M. S. Y. (2019b). To flip or not to flip: Social science faculty members' concerns about flipping the classroom. *Journal of Computing in Higher Education, 31*(2), 391–407.

Kelley, T. R., & Knowles, J. G. (2016). A conceptual framework for integrated STEM education. *International Journal of STEM Education*, *3*(11), 1–11.

Merrill, C. (2009). *The future of TE masters degrees: STEM*. Paper presented at the 70th Annual International Technology Education Association Conference, Louisville, Kentucky.

Rinke, C. R., Gladstone-Brown, W., Kinlaw, C. R., & Cappiello, J. (2016). Characterizing STEM Teacher Education: Affordances and Constraints of Explicit STEM Preparation for Elementary Teachers. *School Science and Mathematics, 116*(6), 300–309.

Ritz, J. M., & Fan, S. C. (2015). STEM and technology education: international state-of-the-art. *International Journal of Technology and Design Education*, *25*(4), 429–451.

So, H. J., Jong, M. S. Y., & Liu, C. C. (2020). Computational thinking education in the Asian Pacific region. *The Asia-Pacific Education Researcher, 29* (1), 1–8.

Shaughnessy, M. (2013). By way of introduction: Mathematics in a STEM context. *Mathematics Teaching in the Middle School, 18*(6), 324.

Tytler, R., Prain, V., & Hobbs, L. (2019). Rethinking disciplinary links in interdisciplinary STEM learning: A temporal model. *Research in Science Education*. Retrieved from https://doi.org/10.1007/s11165-019-09872-2