EDITORIAL BOARD

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EDITORIAL

STEM Education: A New Journey to Excellence, Equity and Innovation in Education

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Innovation in science, technology, engineering and mathematics (STEM) plays an important role in creating new economies, increasing competition in the global market, and improving the quality of life. Recognizing the importance of STEM in nation's economic development, political leadership, and protecting the environment, many developing and developed countries have been investing in efforts to improve both the quality of STEM education and access to quality STEM education. Several reports published in the last two decades across these countries have conveyed the public concern that 1) our schools fail to prepare students for the changing demands of the emerging economy: many workers lack the essential STEM knowledge and skills, critical thinking and problem solving skills, 2) the achievement gaps between subgroups of students continue to persist, 3) schools fail to graduate sufficient number of STEM majors in developed countries and 4) that STEM curriculum must become relevant to students' everyday lives.

In response to these challenges, developing and developed countries have initiated several STEM focused projects ((ALLEA Working Group Science Education, 2012; Rocard et al., 2007; Dufaux, 2012; Fortus, Mualem, & Nahum, 2009; Jones, 2013; Ministry of Education, Science and Technology (S.Korea), 2009; National Research Council, 2012; Norwegian Ministry of Education and Research, 2010; OECD, 2007; Sjøberg, 2002; Turkish Ministry of Education, 2013). Some projects focus on recruiting talented students to STEM fields, some focus on broadening participation of historically marginalized subgroups of students in STEM fields, and others focus on curriculum innovation. The emerging curricular innovation discussions primarily focus on the integration of science, technology, engineering and mathematics (STEM) at the K-12 level.

While the idea of STEM is relatively new, STEM programs are flourishing in schools in every corner of the world. The rapid adoption of the STEM idea calls for new understandings about how to reframe the curriculum?, how to help teachers to develop new knowledge/expertise to implement the interdisciplinary curriculum?, and how to help students to most effectively and meaningfully engage in learning in a blended and interdisciplinary environment? The adoption and implementation of STEM programs also bring new responsibilities for STEM education research community.

Integrated STEM Education has been at the forefront of current discussions in STEM education, yet limited research has explored the state of current practices in STEM education, and whether in its current state, STEM education is addressing the concerns that motivated the emergence of STEM as a model to fix the reported problems and to drive the design and study of future teaching and learning.

If STEM education is to continue to grow and develop further, we reason that it should initiate issues at the forefront of educational research and to anticipate future directions, rather than continually trying to play

scholarly "catch-up" with research trends. It should anticipate and critique future approaches that seek to address new and persistent questions in education in innovative ways. *The Journal of Research in STEM Education (J-STEM)* emerged in response to this need.

In the inaugural issue of J-STEM, colleagues make contributions to the discussion with an eye toward anticipating future questions. The articles span a variety of settings and draw on different frameworks to study questions related to STEM. Yoon et al (2015) introduce a professional development model to better prepare teachers to teach STEM. Ghandi-Lee et al. (2015) explore STEM faculty's perceptions of factors that influence success in STEM fields. Lamberg and Trynadowski (2015), for their part, seek to develop an understanding of elementary teachers' views of STEM in order to develop future research designs and profession development to support STEM learning. Continuing with a focus on K-12 education, Vainikainen, Salmi, and Thuneberg (2015) examine motivation in the context of informal STEM learning. Carroll et al. (2015) present the findings of a project on STEM communication that informs STEM teaching and learning in the 21st century, and finally Khoo and colleagues (2015) focus on an engineering education project in Australia through a research brief.

Common themes that cut across these articles include aligning practices and curricula in school with students' informal knowledge and interests and the notion that interests and STEM learning are social constructions that draw on individuals, resources, and discourse. Tensions include how the field of STEM is conceived as an integrated entity versus a reflection of two or more content areas.

J-STEM is an international peer-reviewed open access journal. It publishes and communicates original research findings to inform researchers, practitioners, and policy makers in an effort to improve the quality and accessibility of STEM education. *J-STEM* assigns highest priority to reviewing original manuscripts that use rigorous quantitative, qualitative, or mixed methods studies on topics related to STEM education in educational settings. Such contexts may include K12-, higher education, and informal education contexts such as museums. We also welcome analytical papers that evaluate important research issues related to any field of STEM education.

In considering the current and future state of STEM education, we are reminded of a quote by Geertz (1983) about the field of Anthropology. It "... is a science whose progress is marked less by a perfection of consensus than by a refinement of debate"(p. 58). We hope that this journal offers a forum for such productive, ongoing debates about STEM education and seek your contribution in future issues.

References

ALLEA Working Group Science Education. (2012). *A renewal of science education in Europe: views and actions of national academies analysis of surveys conducted in 2010 and 2011*. Retrieved August 08, 2015 from

http://www.allea.org/Content/ALLEA/WG%20Science%20Education/ALLEA%20Report_A%20renewal%20of%20science%20education%20in%20europe.pdf

Caroll, M. (2015). Stretch, dream, and do- a 21st century design thinking & STEM journey. *Journal of Research in STEM Education, 1*(1), 3-16

Dufaux, S. (2012). *Assessment for qualification and certification in upper secondary education: A review of country practices and reserach evidence*. OECD Education Working Papers, no. 83. OECD Publishing.

Fortus, D., Mualem, R., & Nahum, T. L. (2009). *Science and technology in the junior high school - the contribution of yesterday to tomorrow: what can be learnt from the "tomorrow 98" programme*. Israel: Weizmann Institute of Science.

Elaine Khoo, E., Peter, M., & Cowie, B. (2015). Re-engineering an engineering course: Exploring the affordance of flipped classrooms for transformative teaching, learning, and workplace competency. *Journal of Research in STEM Education, 1*(1), *82-87*

Rocard, M., Csermely, R., Jorde, D., Lenzen, D., Walberg-Henriksson, H., & Hemmo, V. (2007). *Science education now: A renewed pedagogy for the future of Europe.* Luxembourg, Belgium: European Commission.

Geertz, C. (1983). *Local knowledge: Further essays in interpretive anthropology*. USA: Basic Books, Inc.

Gandhi-Lee, E., Skaza, H., Marti, E., Schrader, P.G., & Orgill, M. (2015). Faculty perceptions of the factors influencing success in STEM fields. *Journal of Research in STEM Education, 1*(1), 31-47

Jones, R. S. (2013). *Education Reform in Korea*, OECD Economics Department Working Papers, No. 1067, OECD Publishing

Lamberg,T. & Trzynadlowski, N. (2015). How STEM Academy teachers conceptualize and implement STEM education. *Journal of Research in STEM Education. 1*(1), 65-81.

Ministry of Education, Science and Technology (MEST) (2009). Becoming a S&T Powerhouse through the "577 Initiative", Seoul.

Ministry of National Education (2013). *Ilkogretim kurumları (Ilkokullar ve Ortaokullar) fen bilimleri dersi (3, 4, 5, 6, 7 ve 8. Siniflar) ogretim programı* [In Turkish]. Ankara.

National Research Council. (2012). A framework for K-12 science education: Practices, crosscutting concepts, and core ideas. Washington, DC: Committee on a Conceptual Framework for New K-12 Science Education. Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education.

Norwegian Ministry of Education and Research (2010). Science for the future. Strategy for strengthening Mathematics, Science and Technology (MST) 2010–2014.

Retrieved September 13, 2015 from https://www.regjeringen.no/globalassets/upload/KD/Vedlegg/UH/Rapporter_og_planer/Science_for_the_future.pdf

OECD (2007). *Science competencies for tomorrow's World. Executive summary*. Paris: OECD Publishing.

Sjøberg, S., 2002. Science and Technology Education in Europe: Current Challenges and Possible Solutions. Connect: *UNESCO International Science, Technology & Environmental Education Newsletter, 27*(3-4). Retrieved September 13, 2015 from http://unesdoc.unesco.org/images/0014/001463/146315e.pdf

Vainikainen, M-P, Salmi, H., & Thuneberg, H. (2015). Situational interest and learning in a science center mathematics exhibition. *Journal of Research in STEM Education*. 1(1), 48-64

Yoon, S., Emma Anderson, E, Koehler-Yom,J., Klopfer,E. Sheldon, J., Wendel, D., Schoenfeld, I., Scheintaub, H, Oztok, M., & Evans, C. (2015). Designing Curriculum and Instruction for Computer-Supported Complex Systems Teaching and Learning in High School Science Classrooms. *Journal of Research in STEM Education, 1*(1), 17-30