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Metacognition for Science and Mathematics Literacy and Learning in Technology-Infused Learning Environments

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Research about metacognition for learning and teaching has become a central and expanding issue in education (Zohar & Barzilai, 2013). Metacognition composed of knowledge about cognition (metacognitive awareness of what, how, and why/when) and control of the cognition (executive control/self-management of planning, monitoring, and regulating) plays a central role in contemporary models of constructivist-oriented and self-regulated learning (SRL). Recent literature (Ford & Yore, 2012; Winnie & Perry, 2000) on metacognition identified concerns regarding (a) if this construct applies to general learning events or to task-specific events, (b) the apparent gap between metacognitive awareness of cognition and real-time control of cognition, (c) difficulties in measuring metacognitive awareness and self-management, and (d) the role of metacognition and other factors in SRL. Science and mathematics educators and researchers have infused technology into their teaching to scaffold learners’ cognition and supplement their metacognition in classroom settings or have moved toward e-learning environments that place more self-regulation demands on learners (Manlove, Lazonder, & de Jong, 2007). Therefore, it is worthwhile to consider technology-infused environments as a potential solution to address the poverty of self-regulation and metacognition in science and mathematics learning; however, technology by itself does not appear to fully address learners’ metacognitive awareness, personal control of cognition, and motivation. Some scholars have suggested that metacognition and SRL research could benefit by adopting a neuroscience perspective (Fernandez-Duque, Baird, & Posner, 2000; Schwartz, Scott, & Holzberger, 2013) and by analyzing multiple data
sources from think-aloud protocols, eye tracking, and log files to more fully document metacognitive monitoring and control (Azevedo, Moos, Johnson, & Chauncey, 2010; Greene, Dellinger, Tüysüzoğlu, & Costa, 2013). Data mining may help model and study sophisticated metacognition and self-regulation (Baker et al., 2013).

This Special Issue intends to publish empirical research (including qualitative, quantitative and mixed methods), secondary analysis, and review articles on mathematics and science literacy, metacognition, and self-regulated learning in technology-infused environments. This early announcement should allow interested researchers to plan, enact, and complete related studies for consideration. Researchers working in the following areas are encouraged to submit articles:

- E-learning of mathematics or science and the metacognitive abilities and demands of such learning environments
- Cognitive and metacognitive supports to enhance science or mathematics achievement and metacognitive awareness and self-management
- Designing serious learning games to enhance science and engineering practices, conceptual learning, metacognition, and self-regulation
- Metacognition issues in technology-infused science reading, mathematics problem solving, and other engineering/technological design, mathematics and science tasks
- Methodologies for metacognition and SRL research in technology-infused science and mathematics learning and teaching environments
- Interdisciplinary collaborations between neuroscience, cognitive psychology, and technology-infused science and mathematics learning and teaching focus on metacognition and SRL research
- Review papers and secondary analysis (meta-analysis, metasynthesis, structural equation modeling, hierarchical linear modeling, document analysis, etc.) of metacognition and SRL, and measurement issues research in technology-infused science and mathematics learning and teaching
- Position paper on future development of metacognition and SRL research in technology-infused science, mathematics, and engineering/technology education.
This special issue is expected to be published in early 2016. The due date for paper submissions is **February 15, 2015**. Please forward any indications of interest and participation stating research focus and authors to Ying-Shao Hsu at the National Taiwan Normal University (yshsu@ntnu.edu.tw) by November 1, 2014. All special issue manuscripts will be reviewed in a double-blind review process.

**References**


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