

Computer Applications in Engineering Education

Call for Papers

Special Issue On

Modeling and Simulation Practices in Engineering Education

Editors:

Alejandra J. Magana, Purdue University, USA

Ton de Jong, University of Twente, NL

Contributions are invited for a special issue of the Computer Applications in Engineering Education on Modeling and Simulation Practices in Engineering Education.

Modern engineering workplaces are more frequently using modeling and simulation practices, aiding the analysis and design of systems [1, 2]. As a result, these practices have started to pervade across many science and engineering programs as analytic and predictive tools that support the study of phenomena and the suitability of new designs. In tandem, academy and industry experts have emphasized the need for a new and modern approach to educating and training the next generation of engineering professionals to effectively complement experimental and theoretical approaches to discovery and innovation processes [e.g., 3, 4, 5]. Similarly, the engineering education community and policymakers such as ASEE, ABET, and the Washington Accord, among others, have recognized the importance of these skills and has recommended their incorporation into the undergraduate engineering curriculum. To successfully integrate these practices into the undergraduate engineering education, a crucial step is to identify effective pedagogies, learning strategies, learning environments, assessment tools and research methods in acquiring these skills successfully. Thus, educational research at the intersection of the learning sciences and engineering education is needed to identify a suitable learning objectives, curriculum, and abilities that can equip future workforce professionals with practice-ready modeling and simulation skills.

The key theme in this special issue is to identify effective modalities/methodologies, specific learning outcomes, types of learning, reasoning processes, and assessment methods associated with modeling and simulation practices that effectively align disciplinary engineering knowledge with modeling and simulation skills. Submissions focusing on learning about modeling and simulation skills, or learning through modeling or simulation, are encouraged. Submissions focusing on the integration of engineering and modeling and simulation practices at the K-12 level are also welcomed.

Example topics in the issue may include, but are not limited to:

- Faculty/teachers' pedagogical beliefs, attitudes, or perceptions for integrating modeling and simulation as a learning objective or as a means to learn about engineering content.

- Faculty/teachers' pedagogical content knowledge or technological pedagogical content knowledge for integrating modeling and simulation practices.
- Scaffolding methods for supporting student learning with or about modeling and simulation.
- Instructional strategies or pedagogical methods for integrating learning about or through modeling and simulations.
- Technology-enhanced learning environments that promote modeling and simulation practices.
- Curricular innovations that integrate modeling and simulation practices into disciplinary undergraduate education (e.g., mechanical engineering programs, civil engineering programs, etc.).
- Engineering faculty professional development programs or K-12 teacher professional development programs that integrate modeling and simulation.
- Assessment tools or instruments for measuring modeling and simulation skills.
- Computer-based assessment tools or methods to identify modeling behaviors (e.g., learning analytics, educational data mining, etc.).
- Research methods to understand learning and engagement with modeling and simulation practices.
- Student reasoning processes involved in learning with or about modeling and simulation.

Important Deadlines:

Extended abstract (around 1,000 words long):	March 15, 2017
Preliminary editors' feedback:	May 30, 2017
Submission of full manuscripts (8,000–10,000 words long):	August 15, 2017
Notification of Reviewers' feedback:	December 15, 2017
Revised manuscript submission:	February 15, 2018
Tentative Publication Date:	April/May 2018

Submission Guidelines:

Scholars from all disciplines and levels are invited to submit manuscripts. We invite empirical, research-to-practice and review papers for this special issue. Empirical papers must identify the research questions, methods or methodologies for approaching them and detailed results along with implications. Empirical papers are also expected to be grounded in theory. Research-to-practice papers should identify the learning objectives guiding the learning experience, the pedagogical methods used to design and facilitate the learning experience and assessment methods. Evidence of student learning is expected for contributions describing the design of modeling and simulation tools. Review papers are expected to provide the description of the search strategies for identifying the papers, the inclusion/exclusion criteria and procedures for analyzing the literature. We are open to diverse methodological approaches, learning settings, and intellectual perspectives.

Interested authors should submit questions and extended abstracts (around 1,000 words) to the Guest Editors, Alejandra Magana, Department of Computer and Information Technology and School of Engineering Education, Purdue University, admagana@purdue.edu, and Ton de Jong, Department of

Behavioral Sciences, University of Twente, a.j.m.dejong@utwente.nl. Please be sure to include your contact information and institutional affiliation. After an initial round of editorial reviews we will invite full articles that will go through the standard CAE review process. Given the short review cycle, we expect the submitted manuscripts to be complete works.

Submissions of full manuscripts are to be sent online to:
<https://mc.manuscriptcentral.com/cae>

General information and guidelines are available at the CAE Web site:
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1099-0542](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-0542)

Author guidelines are available at:
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1099-0542/homepage/ForAuthors.html](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1099-0542/homepage/ForAuthors.html)

References:

- [1] S. Emmott and S. Rison, "Towards 2020 science," *Science in Parliament*, vol. 65, pp. 31-33, 2008.
- [2] A. F. McKenna and A. R. Carberry, "Characterizing the role of modeling in innovation," *International Journal of Engineering Education*, vol. 28, pp. 263-269, 2012.
- [3] [NRC], *BIO 2010: transforming undergraduate education for future research biologists*. National Research Council. Committee on Undergraduate Biology Education to Prepare Research Scientists for the 21st Century.: National Academy Press, 2003.
- [4] K. Thornton, S. Nola, R. E. Garcia, M. Asta, and G. B. Olson, "Computational materials science and engineering education: A survey of trends and needs," *JOM Journal of the Minerals, Metals and Materials Society*, vol. 61, pp. 12-17, 2009.
- [5] [NRC], *Integrated computational materials engineering: a transformational discipline for improved competitiveness and national security*. National Research Council. Committee on Integrated Computational Materials Engineering.: Natl Academy Pr, 2008.