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Guest Editorial

This special issue of the International Journal of Engineering Education includes an excellent sample of papers from the inaugural Canadian Design Workshop CDW1, which was held remotely, December 7–9, 2020.

Participants at the inaugural CDW1 delivered 23 presentations across 6 sessions: 12 with accompanying full papers, and 11 with only an extended 3-page abstract. Of the papers, 7 completed the peer review process and will be produced here as examples of the excellent design education and design education research initiatives presented at CDW1. These 7 papers represent 5 of the 6 session themes from CDW1: Teaching Design at Scale (Jamieson, Ead, Rowe, Miller-Young & Carey), Hackathons and Design (Coggan & Rennick; Flus & Hurst), Sustainability and Design (Nickel, Duimering, & Hurst), Instructional Design (Rennick, Litster, Hurst, Hulls, & Bedi; Leonardo & Olechowski), and Capstone Design (Jamieson, Naef, & Shaw). What follows is a brief introduction to each of these papers:

1. *Design at Scale in a First-Year Transdisciplinary Engineering Design Course* (Jamieson, Ead, Rowe, Miller-Young & Carey). In this paper, the authors outline the implementation of a new transdisciplinary first-year design course for all 1200 first year students in the Faculty of Engineering. The paper summarizes the development of the course, and presents useful observations from the initial offering of the course, including the adaptions required by the shift to remote instruction in winter 2020. Large scale, multi-program, first-year design experiences are common at Canadian institutions, and present unique challenges when implementing active, community-based learning. This paper provides an excellent overview of one such implementation.
2. *Development and Implementation of an Integrative and Experiential Design Project: Design, Build and Test a Scanning Tunneling Microscope* (Coggan & Rennick). This paper outlines a short duration (2-day) design-build-test activity for first year Nanotechnology Engineering students. In this multi-disciplinary ''Engineering Design Day'' activity, students worked in teams to design, implement, and demonstrate a functional scanning tunneling microscope. A mixed-methods evaluation of the activity was conducted showing that students enjoyed the activity, perceived it as useful, and showed growth in their design self-efficacy at end of term. The work presented in this paper is a novel adaptation of the increasingly popular hackathon format to a curricular learning activity.
3. *Hackathons as a Novel Pedagogy in Engineering Design Education* (Flus & Hurst). This paper summarizes the literature on hackathons as a means of teaching engineering design. The authors outline the advantages (e.g., the format is flexible, and the short duration provides a useful mechanism for introducing design), the limitations of hackathons as design instruction (e.g., need finding and analysis can be done very superficially in a hackathon due to time constraints), as well as the opportunities that hackathons present for future research on engineering design (e.g., deeper assessments of what student learn through participation, as well investigations into student motivation to participate).
4. *Distilling Sustainable Design Concepts for Engineering Design Educators* (Nickel, Duimering, & Hurst). This paper seeks to summarize and integrate the diverse bodies of literature on sustainability and sustainable design with an emphasis on design education. The paper presents overviews of the frameworks, methodologies, and tools for sustainable design, as well as the implications for engineering design pedagogy with many references to existing strategies and implementations. The paper concludes with a call to action for design educators to proactively incorporate sustainability as an important lens for future design pedagogies.
5. *Characterizing Engineering Design Activities Using Jonassen's Design Theory of Problem Solving* (Rennick, Litster, Hurst, Hulls, & Bedi). This paper presents an application of an existing problem-solving typology to a large set of engineering design activities. The authors apply the typology as a lens for investigating the differences in problem variation (viz. the level of structuredness, complexity, domain specificity, and context) and problem representation (viz. the level of information provided, and the level of fidelity of the activity) for a related set of engineering design teaching activities at a single institution. The application of the typology is presented through a case study of one of the activities. The paper presents a structured method for instructors and instructional designers to recognize and reflect on the decisions they made when designing engineering design activities for students.

6. *A Qualitative Analysis of Collaborative Computer-Aided Design Experiences to Inform Teaching* (Leonardo & Olechowski). Computer-aided design (CAD) tools have become an integral part of the design process for many engineering disciplines. In this paper, the authors present an investigation into the use of online, collaborative cloud-CAD platforms with engineering designers in industry. From their interviews with experienced designers, the authors present recommendations for incorporating this new technology in engineering education, as well as areas for future research. This paper is a timely addition to the growing body of work on remote collaboration in engineering design, and will be valuable as the use of collaborative cloud-based design tools continues to expand.
7. *On Teaching Tacit Knowledge in Engineering Design and Professional Practice* (Jamieson, Naef, & Shaw). This paper presents an approach for improving students' tacit knowledge of engineering design in Chemical Engineering. The authors outline the strategies and methods they use to instill tacit knowledge in students as they complete their capstone design project. The authors present reflections on their own journeys through professional practice as a way of framing the impact of this style of teaching on student development. This paper presents an interesting perspective on the role of mentorship and support in the teaching and learning process of engineering design.

While these seven, excellent papers represent only a fraction of the work that was presented at the Canadian Design Workshop, they serve as a testament to the wonderful work and ingenuity of the Canadian design education research community.

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