International Journal of Engineering Education Vol. 39, No. 3, pp. 500–501, 2023
Printed in Great Britain
0949-149X/91 $3.00+0.00

Guest Editorial

The W Booth School of Engineering Practice and Technology within McMaster University's Faculty of Engineering is dedicated to student-centred experiential learning through flexible, adaptable, and innovative programs and teaching using state of the art resources and facilities. Our learning environment emphasizes hands-on education and transferable skills to produce engaged graduates ready to serve a diversity of communities and societal needs.

In 2021 we were gearing up to host the International Conference on Engineering Practise and Innovative Knowledge (EPIK). The International Journal of Engineering Education generously agreed to publish a special issue highlighting some of the most creative papers. As the reader rightly predicts, we had to cancel the conference due to COVID-19.

This special issue of the International Journal of Engineering Education includes an excellent sample of papers that were proposed for EPIK. Herein we summarize the seven papers that completed the peer review process and are presented as examples of the excellent advances in engineering pedagogy.

- Emelia Delaney and Wei Liu, in their paper: *An investigation into the current status and importance of sustainability education for designers and engineers*, make the case that sustainability is a growing and important theme within New Product Development (NPD). The design stage of NPD has been identified as playing a key role in the effective implementation of sustainability elements when developing new products and services. As the theme of sustainability continues to develop, they further highlight the importance of sustainability education of all students, but especially those who will play key roles as they progress into their careers. However, they point out that it remains unclear whether sustainability is being taught in relation to design and engineering disciplines, how it is being taught, and whether this education has made a positive impact on industry. This paper aims at investigating these themes.
- Mohammad Alsager Alzayed, Elizabeth Starkey and Rohan Prabhu, in their paper: *Exploring the effects of variations in the timing of a sustainable design educational intervention*, rightfully assert that the accelerating depletion of natural resources has brought sustainability to the forefront of engineering and therefore, design educators must integrate sustainability into the engineering design curriculum. They note that several researchers have proposed educational interventions and design tools for sustainable design education. The timing of introducing such interventions, particularly in project-based courses, could influence the effectiveness of these interventions, and these effects remain largely unexplored. This paper provides the results of a study that researched this phenomenon through a mixed-methods experiment conducted with first-year engineering design students. The findings are instructional for faculty who are pursuing the most effective means to embed sustainability principles for early engineering students that influence their understanding and performance.
- Faiez Alani and Rehmat Grewal, in their paper: Perspectives of Advanced Biotechnology Undergraduates on the Effect of Case-Based Learning on their Individual Academic Achievements, note that case-based learning (CBL) as an active learning modality customarily underutilized in the undergraduate engineering technology education. The authors analyzed student perspectives on the effect of CBL on their individual learning in the undergraduate advanced biotechnology course. Their research determined that CBL improved critical thinking, problem solving, teamwork, communication, real-life technical skills, course performance, self-confidence, and the overall learning experience for the students.
- Siara Isaac, Aditi Kothiya, Pier Luca Borsò and Bryan Ford, in their paper: *Sustainability and Ethicality are Peripheral to Students' Software Design*, investigated the criteria that students used to guide and evaluate their developing conceptual designs. While the trio of feasibility, economic viability, and consumer desirability are often used to guide design decisions, the authors' approach also looked for how aspects of ethics (i.e. ethicality) and sustainability might inform students' thinking. This contemporary research found that considerations of feasibility and consumer desirability dominated students' thinking time, while economic constraints were rarely addressed. Students' consideration of ethicality in terms of data privacy and accommodations for disability revealed that many students did not see ethical aspects as sufficiently important to guide their design choices. This leads to the authors' conclusion that ethicality and sustainability should be explicitly included in the design thinking model taught to students for software design to ensure that they bring these considerations to their professional work and therefore to the next generation of software.
- Andrea Hemmerich, Avani K Mehta, Janet Kasperski, and Robert Fleisig, in their paper: *Community-*

Student-Faculty Partnership: a Model for Learning via Deep Engagement with the Community, explore the ways that students benefit from engaging with community partners as part of higher education experiential learning opportunities. As part of one project in the Master of Engineering Design Program's Design Thinking course at McMaster University, students were introduced to several volunteer Patient and Family Advisors (PFAs) from St. Joseph's Healthcare Hamilton Ontario who spend several hours per week with the design teams sharing stories about their experiences as patients and/or family members of patients at the hospital. The community-student-faculty partnership model provided students an opportunity to learn about healthcare challenges from the patient – rather than professional – perspective, which also involved mentorship by the PFAs as they help students understand their experience as the primary participants within the healthcare system. This model of experiential learning is cutting edge. The authors conclude that the collaborative teaching approach supports course learning objectives for students to adopt a human-centred mindset, iterate on prototypes, and learn through feedback.

- Rosó Baltà-Salvador, Marta Peña, and Noelia Olmedo-Torre, in their paper: *factors influencing career choice, perceived discrimination, and segregation of foreign-born engineering undergraduate*, argue that the underrepresentation of foreign-born students in engineering degrees is persistent and fosters social disparities in future generations' job opportunities and income. Their research provides new evidence on the differences in students' career choice factors according to their place of birth and the relationship that these factors may have with academic persistence. Moreover, their investigation explores students' ethnic exclusion and segregation and the relationship between segregation and perceived discrimination, providing new data on the specific situations in which these segregation and discrimination occur. Their study was carried out based on a cross-sectional survey of 602 engineering students. The results showed significant differences between the factors that make students decide to enroll in engineering studies and the paper explores possible explanations for their findings which could inform future educational advances.
- Rayapati Subbarao, in his paper: *Analysis of the Ability of 'Understanding' in Support of its Measurability*, begins by noting that Course Outcomes are prepared based on the action verbs according to the syllabus provided by Bloom's taxonomy table. However, he notes that many teachers assert that the 'Understand' term is not measurable. His analysis indicates that it is only a myth that 'understand' is not measurable and that it is not advisable to be used as an action verb, while preparing the learning outcomes. Through different short answer questions used in both engineering and non-engineering streams, its measurability is further established. This paper identifies the appropriateness of 'understand' as a measurable quantity.

These papers represent innovations in learning, and serve as a validation of the innovation and ingenuity of the education practise research community.

Gail Krantzberg, Faiez Alani, and Seshasai Srinivasan
W Booth School of Engineering Practise and Technology,
McMaster University, Hamilton Ontario Canada.