2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC
Host Sponsor UNC Charlotte
Paper ID #50050

Building bridges to engineering education research: engaging faculty through undergraduate mentorship

Lawrence R Chen, McGill University

Lawrence R. Chen received a BEng in electrical engineering and mathematics from McGill University and an MASc and PhD in electrical and computer engineering from the University of Toronto. He is a professor in the Department of Electrical and Computer Engineering at McGill University and is the Academic Lead of the Enhancing Learning and Teaching in Engineering (ELATE) initiative in the Faculty of Engineering. His research interests include faculty development and the intersections between the teaching and learning environments; identity; and equity, diversity, inclusivity, and accessibility.

Amanda Saxe, McGill University

Amanda Saxe is the Pedagogical Lead of the Enhancing Learning and Teaching in Engineering (ELATE) program in the Faculty of Engineering at McGill University. With a doctorate in educational psychology, Amanda supports engineering instructors through pedagogical consultations, resource development, workshop facilitation, and engineering education projects.

Jill Perry, Rowan University

Building bridges to engineering education research: engaging faculty through undergraduate mentorship

1. Introduction

Engineering education research (EER) helps us to understand how students learn and promotes the use of evidence-based teaching practices. It also informs strategies to address educational barriers through equity, diversity, and inclusion initiatives, and contributes to efforts for re-imagining the future of STEM education [1]. By involving faculty in EER, we can ensure that curricular reforms reflect current practice and that teaching benefits from scholarly inquiry. Few engineering schools in Canada have a dedicated unit or program in EER and most have limited institutional history in the area. This leads to limited visibility, recognition, and support for education-focused research and scholarship. Limitations to pursuing EER reported by engineering faculty whose primary role is traditional engineering research include a lack of time, limited institutional incentives and recognition, and insufficient training in educational research methods (ERM) [2].

Undergraduate research experiences are 'high-impact' practices that improve student learning by allowing them to make connections between the theory and concepts learned in courses with real-world problem solving [3], [4], [5], [6]. Beyond providing students with authentic, hands-on experiences in which they can develop technical knowledge and critical thinking, these opportunities foster professional skills such as communication, teamwork, and project management. Early exposure to research influences intellectual growth and builds creativity, resilience, and a sense of belonging to the engineering community. Students also report gains in confidence and clarity in their career goals [3], [4], [5], [6]. Mentorship is central to the success of these undergraduate research experiences [7], [8]. Effective mentoring involves setting clear expectations, establishing timelines, providing skill development opportunities, and balancing guidance with student autonomy. Institutional support remains critical to help faculty overcome challenges such as time constraints and lack of recognition for undergraduate mentorship.

In this ***lessons-learned paper***, we describe a targeted initiative aimed at engaging faculty, especially those with traditional research backgrounds, in EER within a research-intensive university where EER has limited institutional history and visibility. We draw on our experience with the Summer Undergraduate Research in Engineering (SURE) program at McGill University to consider how structured opportunities for faculty to supervise undergraduate research projects focused on EER can serve as an entry point into pedagogical scholarship. By mentoring students in EER, faculty engage in reflective practice and develop greater interest and enthusiasm for EER. This approach can enrich student learning and also provide a foundation for sustained faculty engagement in education-focused inquiry [9].

2. Background on ELATE

Enhancing Learning and Teaching in Engineering (ELATE) is a Faculty-specific teaching initiative at McGill University whose mission is to cultivate communities of learners and educators and support them in enhancing and promoting excellence in teaching and learning. To achieve its mission, ELATE has identified five strategic objectives, one of which is to support

and promote engagement in EER. To meet this objective, ELATE has leveraged the Faculty's existing SURE program, which pairs undergraduate students with faculty mentors for 16 weeks during the summer to provide them with a research experience. The program uses a 50:50 cost-shared funding model with the faculty mentor, and projects have traditionally focused on design, development, and analysis-oriented engineering research. Starting in 2022, ELATE expanded the scope of the SURE program by fully funding faculty-led projects in EER, enabling faculty members to propose EER topics of interest. To date, 10 ELATE-SURE projects involving 7 faculty members—2 teaching-focused and 5 teaching & research (traditional engineering research)—and 12 undergraduate students have been supported. These projects span a broad range of topics, e.g., engineering identity, undergraduate engineering students' perceptions of failure, the impact of GenAI on teaching and learning, inclusive and accessible strategies for teaching engineering students with hearing impairments, climate change education through architectural design with K-12 students, small teaching methods [10], and emotional intelligence and design failure. The nature of these projects is also diverse: some involve literature or scoping reviews, others are situated within the scholarship of teaching and learning and examine current teaching practices or document the development and assessment of new teaching practices, and others focus on empirical research addressing aspects of student learning using quantitative, qualitative, and mixed methods.

3. Study

To understand faculty and student experiences with the education-focused ELATE-SURE projects, we collected data through written reflections or informal interviews with participating faculty members ($n = 7$), who were asked to respond to the following prompts:

1. *Motivation and expectations*: What motivated their participation, what initial expectations did they have, and how did the TLIF project facilitate their involvement in EER?
2. *Learning and reflection*: Did the project achieve its intended outcomes, how was success assessed, and what did they learn throughout the process?
3. *Sustaining engagement in EER*: Are they following up on the project and/or do they plan to continue their research in this area?
4. *Feedback*: What are their suggestions and recommendations for improving support and engagement?

We gathered student perspectives using a short anonymous survey that combined Likert-scale and open-ended questions. The survey questions asked students about the skills developed, mentorship received, perceived value of the experience, and suggestions for improvement. Of the 12 students who participated in the ELATE-SURE projects, 6 completed the survey (we believe that the lower response rate may be attributed to the fact that several students, in particular those involved in the first cohort in 2022, had already graduated by the time data collection took place during the summer / early fall of 2025). This study was conducted as part of a quality assurance and improvement evaluation of the ELATE-SURE initiative and as per Article 2.5 of the Tri-Council Policy Statement : Ethical Conduct for Research Involving Humans, Research Ethics Board review was not required [11]. Since we were interested in evaluating the initiative as opposed to conducting a formal research study, reflections and survey responses were reviewed holistically with the objective of synthesizing recurring ideas rather than performing systematic coding.

4. Findings and lessons learned

A. Motivation and expectations

Faculty were motivated by curiosity on topics such as how GenAI or engineering identity shape student learning or the effectiveness of strategies that enhance student learning. They also mentioned an interest in broader questions related to student learning, as well as the opportunity to work across disciplines or explore new pedagogical approaches. Most importantly, faculty highlighted that the availability of support provided, i.e., funding and student assistance, allowed them to pursue EER interests and projects that they would otherwise not have been able to undertake. For example, one faculty member explained, "*[the] projects provided me with the resources and tools to dive into pedagogical research and think about teaching in a much deeper way…Without such programs, neither my students nor I would have had these opportunities.*"

Lesson Learned: The availability of targeted (and funded) opportunities like ELATE-SURE can encourage and allow faculty to pursue EER interests.

B. Learning and reflection

Faculty reported gaining valuable insights into ERM, pedagogical scholarship, and frameworks for analyzing teaching and learning. Some projects encountered challenges, e.g., lack of student preparedness or an overly ambitious project scope; nevertheless, participation in ELATE-SURE led to meaningful reflection to inform future project design. Faculty noted that mentoring students in education-focused research prompted them to reconsider their own teaching practices, explore new pedagogical practices, and engage with unfamiliar research methodologies. One faculty member commented, *"Having a student forced me to invest time in the teaching literature and develop a defensible research question—something I would not ordinarily prioritize.*" However, faculty acknowledged a lack of formal training in ERM and several pointed to the need for some form of foundational preparation in qualitative, quantitative, and mixed-methods approaches. This gap highlights the importance of providing targeted professional development to equip faculty to mentor students in education-focused research. In terms of student outcomes, faculty commented positively on the development of transferable skills in communication, collaboration, and critical thinking.

Lesson Learned: Faculty who mentor undergraduate students in EER engage more in reflection on their own teaching practice and professional growth. To ensure quality mentorship of undergraduate students, it is important to support and/or train faculty in ERM.

C. Future engagement

All faculty expressed an interest in continuing EER; some submitted or presented their findings at engineering education conferences while others explored additional funding opportunities such as internal awards. The experience served as a springboard for deeper engagement; however, continued involvement was dependent on the availability of funding, time, and institutional support and recognition.

Lesson Learned: While involvement through an opportunity like ELATE-SURE can stimulate longer term interest in EER, strategic support and investment is needed to sustain participation.

D. Suggestions

Recommendations to improve the ELATE-SURE initiative include offering training in ERM, fostering interdisciplinary collaboration, e.g., partnerships with other departments and faculties

such as the Faculty of Education, and ensuring that students have opportunities to share their findings more broadly, as well as increasing the visibility and recognition of education-focused research within the broader summer research in engineering program and the Faculty. Faculty also recommended maintaining the current funding model as there were some concerns about implementing cost-sharing models as with regular summer research in engineering projects.
Lesson Learned: It is important to invest in training, promote collaboration, and ensure equitable access and visibility of education-focused projects to encourage faculty and student interest and participation in EER.

E. Student Perspectives
Students found the ELATE-SURE experience to be highly valuable for developing academic and professional skills. They appreciated the relevance and impact of their projects, especially when they could see connections to curriculum development and broader societal outcomes. Some gained a deeper appreciation for the complexity of engineering education and were prompted to reflect on their personal growth. They identified challenges associated with navigating limited literature and performing data analysis when survey response rates were low (in the case of empirical research). Nevertheless, students felt well-supported and provided useful suggestions to improve the experience, such as the need for training in ERM and helping them connect with education researchers. Illustrative comments included, "*I found the research very relevant and practical—the findings can be directly applied in one's own life*" and "*More workshops on research design and data analysis would be helpful.*"
Lessons Learned: Undergraduate students can participate meaningfully in education-focused research with proper mentorship and support. Programs like ELATE-SURE should invest in training and facilitate interdisciplinary collaboration in order to enhance student learning and impact.

5. Concluding remarks

Our experience shows that structured opportunities can effectively engage faculty, especially those with traditional engineering research backgrounds, in EER by pairing mentorship with accessible resources and institutional support. These experiences enrich student learning and promote faculty reflection, professional growth, and interest in pedagogical scholarship. Sustaining faculty interest and participation requires investment in ERM training, dedicated funding, recognition of EER, and enabling interdisciplinary collaboration. For students, support and mentorship provide opportunities for valuable contributions on education-focused projects and further preparation in ERM will enhance outcomes. While the initiative described here is situated within a Canadian research-intensive institution, the core principle may be adaptable whereby institutions newer to EER can begin with a small pilot cohort while those with more established cultures and traditions of education research can use the model to encourage further participation among faculty or strengthen communities of practice. Our next steps focus on securing additional funding to scale ELATE-SURE and broaden participation, especially among recently hired teaching-intensive faculty who have expressed strong interest in EER. By aligning mentorship opportunities with institution support, programs like this can create new connections between traditional research and educational inquiry, providing a foundation for long-term cultural change in engineering education.

References

[1] M. Borrego and J. Bernhard, "The emergence of engineering education research as an internationally connected field of inquiry," *Journal of Engineering Education*, vol. 100, no. 1, pp. 14-47, 2011.

[2] B. K. Jesiek, M. Borrego, and K. Beddoes, "Advancing global capacity for engineering education research: relating research to practice, policy and industry," *European Journal of Engineering Education*, vol. 35, no. 2, pp. 117-134, 2010.

[3] A. L. Zydney, J. S. Bennett, A. Shahid, and K. W. Bauer, "Impact of undergraduate research experience in engineering," *Journal of Engineering Education*, vol. 91, no. 2, pp. 151-157, 2002.

[4] A. Hunter, S. L. Laursen, E. Seymour, "Becoming a scientist: the role of undergraduate research in students' cognitive, personal, and professional development," *Science Education*, vol. 91, no. 1, pp. 36-74, 2007.

[5] D. G. Dimitriu and J. O'Connor, "Initiation of an undergraduate research program," *American Society of Engineering Education Annual Meeting & Exposition*, San Antonio, TX, June 10-13, 2012.

[6] P. Bass, N. Wahuta, J. Howson, R. Gonzalez, and C. Maier, "Benefits and challenges of undergraduate research*," American Society of Engineering Education Southeastern Section Conference*, Daytona Beach, FL, March 4-6, 2018.

[7] P. E. Smith, E. Balevic, M. Hannigan, A. Folwer, S. Hoehl, and P. Reeves, "Mentorship and community in engineering: a case study of undergraduate engagement in research," *IEEE Global Engineering Education Conference (EDUCON)*, London, UK, April 22-25, 2025.

[8] E. Foust, "Effective mentoring practices for undergraduate research," *American Society of Engineering Education Annual Meeting & Exposition*, Montreal, QC, June 22-25, 2025.

[9] R. Streveler, K. A. Smith, and R. L. Miller, "Enhancing engineering education research capacity through building a community of practice," *American Society of Engineering Education Annual Meeting & Exposition*, Portland, OR, June 12-15, 2005.

[10] J. M. Lang, *Small Teaching: Everyday Lessons from the Science of Learning*, San Franciso: Jossey-Bass, 2016.

[11] https://ethics.gc.ca/eng/policy-politique_tcps2-eptc2_2022.html. Accessed November 16, 2025.