

Q107. Assigned ID

644

Q7.1. Sections F to I will be shared with the adjudication committee. Please do not include any identifiable information, such as project team names.

F. PROJECT INFORMATION

This question was not displayed to the respondent.

Q7.2. F1. Project Title

Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy

Q7.3. F2. Project Duration

- ☐ Two-year project
- ☒ Three-year project

Q7.4. F3. Does your project team include an emerging scholar? An Emerging Scholar can be a graduate student, academic staff, support staff, or postdoctoral scholar listed as a member of your Project Study Team that is participating in a UCalgary Teaching & Learning Grant for the first time.

- ☒ Yes
- ☐ No

Q7.5. F4. Total Requested Budget

- \$10,000 maximum for two-year project, or \$15,000 with emerging scholar incentive
- \$40,000 maximum for three-year project, or \$45,000 with emerging scholar incentive

\$44,769

Q7.6. F5. Select one or more UCalgary Teaching & Learning Grant streams:

- ☐ Development and innovation
- ☒ Scholarship of teaching and learning (SoTL)

☐ Educational leadership

Q7.7. F6. Select one or more UCalgary Teaching & Learning Grant [areas of focus](#) that apply:

- ☒ Equity, inclusivity, diversity, and accessibility
- ☐ WIL, EL, undergraduate research and creative scholarship
- ☐ Land based learning & Indigenous Ways of Knowing
- ☐ Community well-being and mental health
- ☐ Online and blended learning
- ☐ Sustainability and global engagement
- ☐ Entrepreneurial thinking and innovation
- ☒ Open Educational Resource (OER)
- ☒ Program innovation and renewal
- ☐ Transdisciplinary teaching and learning
- ☐ Community-engaged teaching and learning
- ☐ Graduate student mentorship and learning experiences
- ☐ Academic integrity & ethics
- ☐ Professional learning in higher education

Q7.9. F8. Abstract (250 words)

All Canadian undergraduate engineering programs are required to follow an accreditation process to ensure that their graduates meet the high standards necessary to become professional engineers. In recent years, this process has shifted from an input-based approach of analyzing curriculum content and contact hours, to an outcomes-based approach with an increased focus on student learning outcomes and continual improvement. Engineers Canada is now recommending a full shift to outcomes-focused accreditation (FEA, 2024). To support this transition to outcomes-focused accreditation, we propose to develop a set of surveys that will assess student self-efficacy across the Canadian Engineering Accreditation Board's 12 graduate attributes (CEAB, 2023). This data will be used in combination with existing graduate attribute targeted classroom assessments to provide a critical additional view – the students personal perspective - on the attributes that students obtain during their studies. However, before this form of assessment can be effectively used in the outcomes-based assessment process, it is important to first understand the relationship between self-efficacy and the teaching and learning environment. For this Scholarship of Teaching and Learning project, we are interested in exploring how students' self-efficacy is impacted over time as they progress through their programs, and whether students' self-efficacy is impacted by changes in the curriculum. The primary question that guides this research is: How is student self-efficacy and confidence affected over time and in response to curriculum change?

Q8.1. G. PROJECT DESCRIPTION

This question was not displayed to the respondent.

Q8.2. G1. Describe how your project is grounded in the University of Calgary teaching and learning context. To establish how your proposed project is relevant to student learning at the University of Calgary, explain how it emerges from your local experiences in teaching and learning in an academic course or program. 250 words (3 points)

This project emerged from our collaboration with engineering educators at the Schulich School of Engineering and at other Canadian engineering schools on addressing the Canadian Engineering Accreditation Board (CEAB) graduate attribute assessment and continual improvement (GA/CI) requirements (CEAB, 2023). Introduced in 2014, these requirements expanded the accreditation process from the traditional input-based approach of analyzing curriculum content and contact hours, to an output-based approach with an increased focus on student learning outcomes. This outcomes-based assessment process focuses on 12 graduate attributes (Figure 1) that span a full spectrum competency profile (FSCP) for engineering practice (Figure 2). In October 2024, Engineers Canada published the “Futures of Engineering Accreditation Path Forward Report” and recommended a full shift to outcomes-focused accreditation: i.e., “remove criteria related to the measurement of curriculum content with Accreditation Units (AUs) [and] focus on Graduate Attributes ...” (FEA, 2024). An interesting consequence of this change is that accreditation has moved from a strictly administrative process to a potential framework for continual program innovation and renewal – especially when graduate attributes are used for evidence-based examination of academic programs and assessment practices. However, despite 10 years of effort, Canadian engineering institutions still struggle to establish a simple, useful system to identify indicators and demonstrate learning within these 12 attribute areas, which greatly hampers continual improvement efforts. Based on our experience as engineering educators, the missing element is the student experience: i.e., little work is being done on how to incorporate student voices into the outcomes-based assessment and program renewal processes.

Q8.3. G2. Describe how your project aligns with the [area\(s\) of focus](#) of the UCalgary strategic initiatives you indicated in question 3 of section D. UCalgary is committed to supporting scholarship in these key areas of focus. How will your project strengthen one or more of these priorities? 250 words (3 points).

This project aligns with three TL Grant Areas of Focus: Equity, diversity, inclusion and accessibility; Program innovation and renewal; Open educational resources. Equity, Diversity, Inclusion and Accessibility: The proposed self-efficacy survey will promote engagement of all undergraduate engineering students in the graduate attributes assessment and continual improvement process. Our hope is that this will increase representation and remove barriers for equity-deserving groups and empower students as key stakeholders in this process. Program Innovation and Renewal: A key focus of this project is on program innovation and renewal. The information gathered from students through the self-efficacy survey and the interviews will be used to foster a more flexible and autonomous learning environment by empowering faculty to explore innovative teaching methods and students to explore diverse learning pathways. Open Educational Resources: The goal of the project is to develop a set of surveys along with a quick analysis guide, which can be administered as part of the accreditation process. The surveys plus additional resources will be made available for all Canadian engineering programs to use to support their graduate attribute and continual improvement processes. The Open Educational Resource will take the form of surveys plus additional resources that will be made available on GitHub and on the Canadian Engineering Education Association (CEEA-ACÉG) website.

Q8.4. G3. Identify the development or innovation, scholarship of teaching and learning (SoTL), and/or educational leadership in teaching and learning that you will pursue through your project, and the specific goals, opportunities and/or challenges you hope to address. Demonstrate how existing pedagogical scholarship informs this work, and explain how your work is situated within the field. 1000 words (3 points).

- For **development or innovation projects** – What is the novel approach you will develop through this work? How will you use this approach to improve student learning?
- For **SoTL projects** – What is the question or goal about teaching and/or student learning you will pursue through this project, and how will the project help to better understand or improve student experience?
- For **educational leadership projects** – How does your project support your colleagues in developing their teaching and learning skillset, and how will you ensure this work has a broad impact on teaching and learning across campus?

For this Scholarship of Teaching and Learning project we propose developing a set of self-efficacy surveys for use in the undergraduate engineering graduate attributes assessment and continual improvement process. The aim is to add students' voices to the program innovation and renewal process to identify areas of focus to help increase students' achievement of engineering graduate attributes. The overarching goals are: 1. Integrate student perspectives: gather data on students' self-efficacy throughout their academic journey to inform the program innovation and renewal process. 2. Enhance curriculum development: create a more student-centered approach to curriculum innovation and renewal by including students' perspectives on their self-efficacy throughout the program. 3. Promote inclusive practices: use the self-efficacy data to support diverse populations within engineering, particularly focusing on the experiences of underrepresented groups. 4. Strengthen accreditation processes: develop a self-efficacy survey that can be integrated into the engineering accreditation process, providing a way to integrate students' voices into the program innovation and renewal process. However, before self-efficacy can be effectively used in the outcomes-based assessment process, it is important to first understand the relationship between self-efficacy and the teaching and learning environment. For this Scholarship of Teaching and Learning project, we are interested in exploring how students' self-efficacy is impacted over time as they progress through their programs, and whether students' self-efficacy is impacted by changes in the curriculum. The primary question that guides this research is: How is student self-efficacy and confidence affected over time and in response to curriculum change? Self-efficacy is defined as "the belief in one's capabilities to organize and execute the course of action required to manage prospective situations" (Bandura, 1995). Importantly, when people have high assurance in their capabilities, difficult tasks will be approached as a challenge to be mastered rather than a threat that should be avoided (Bandura, 1994). Further, people with high self-efficacy will be more likely to "heighten and sustain their efforts in the face of failure" and will recover their sense of efficacy more quickly after failures or setbacks because the failure is attributable to insufficient effort or deficient knowledge and skills, which can be acquired (Bandura, 1994). Importantly, Bandura indicated that "people's level of motivation, affective states, and actions are based more on what they believe than on what is objectively true" (Bandura, 1995). As a result, people who feel a strong sense of self-efficacy are less vulnerable to depression, have lower stress, and are able to experience a sense of personal accomplishment (Bandura, 1994). In the context of engineering design, research conducted by Carberry et al. (2010) noted that "the effect of self-efficacy on learning can be more pronounced because of the frequent uses of design tasks as part of an engineering learning experience." Further, they indicated that students' motivation towards engineering design relates to higher levels of self-efficacy (Carberry et al., 2010). More recently, Mamaril et al. (2016) demonstrated that engineering self-efficacy scales were reliably used to assess undergraduates' perception of their capabilities in engineering. The link between self-efficacy and motivation to master experiences indicates that self-efficacy may be a useful measure of whether a course or program has provided the necessary elements for students to feel motivated and capable of mastering the content. Including a self-efficacy measure in the program innovation and renewal process can help offer practical insights that will enhance educational practices to support diverse populations. Research conducted by Power et al. (2024) examined self-efficacy in first-year engineering students and found that female students had lower self-efficacy at the start of the year but increased their self-efficacy statistically significantly more than their male counterparts. Additionally, they highlighted the importance for practical experiences in building self-efficacy, particularly in design and manufacturing, indicating that more hands-on and collaborative experiences enhance self-efficacy and increased retention rates (Power et al., 2024). Including student voices will help provide insight and bridge gaps that instructors may be unaware of. As a result, instructors will be able to apply insights gained from the surveys to create targeted, evidence-based curriculum modifications that address the gaps in student confidence and preparedness to increase students' chance of success. The Canadian Engineering Accreditation Board (CEAB) identifies twelve attributes that students must possess upon graduation (left side of Figure 1) (CEAB, 2023). The proposed study aims to address each of the twelve attributes individually, meaning that each attribute will require multiple survey questions. As a result, survey length may be a challenge as previous research indicates that as survey length increases, response rates decrease (Kato & Miura, 2021). To address this challenge, we propose aligning the graduate attributes with Engineers Canada's six proposed core competency domains of the Full Spectrum Competency Profile (FSCP) as shown in the middle of Figure 1 (FEA, 2024), resulting in three shorter, more focused surveys (right side of Figure 1): (1) "professional body of knowledge", (2) "problem solving and design", and (3) "employability skills". This will produce more reliable results and increase validity (compared with a single, long survey) and will also support the "Futures of Engineering Accreditation" plan of using graduate attribute assessment as stepping stone towards full implementation of the FSCP. This work will contribute to pedagogical scholarship and practice in program innovation and renewal. We are primarily curious as to the impact of including student experience in graduate attribute assessment using a self-efficacy survey. This will contribute to existing work on accessibility and inclusion of postsecondary learning environments by removing barriers for equity-deserving groups and promoting overall engagement in the continual improvement process. As part of this work, we are also interested in increasing accessibility to our self-efficacy survey by developing an Open Educational Resource for use by engineering programs across Canada. Given the general nature of the CEAB graduate attributes (especially employability skills and professional responsibility related graduate attributes), we also anticipate that the results of this project will be extendable to other post-secondary professional degree programs for outcomes-based assessment and curriculum renewal.

Q8.5. G4. Identify the activities you will undertake for your project and clearly describe how they align with, and contribute to, the project you identified above. Specify the innovation, interventions, or activities you will create or use. For **SoTL projects**, include the kinds of evidence and/or information to be gathered or generated, how they will be gathered or generated, and the methods or approaches you will use to analyze the evidence gathered. For **educational leadership projects**, discuss the kinds of engagement you seek, and the methods or approaches you will use to engage colleagues in this initiative. 1000 words (3 points).

To support our RQ (How is student self-efficacy and confidence affected over time and in response to curriculum change?) this project will involve three main activities: (1) survey design, (2) data collection and analysis, (3) Open Educational Resource (OER) development. Activity 1. Survey Design A draft version of the self-efficacy survey was developed by the principal investigator to support graduate attributes (GA) collection for the Fall 2024 CEAB visit at the Schulich School of Engineering. The draft survey includes 38 questions that are posed in the form of “how confident you are that you have the capability to perform each task listed below, if you were to enter the workforce today ...”. Each GA is associated with 3 to 4 survey questions, developed using the CDIO syllabus (Crawley et al., 2007) and its mapping to the CEAB GAs (Cloutier et al., 2010). Despite the relatively small number of questions associated with each GA, our preliminary results have shown strong internal consistency within each of the categories of survey for most the GAs. For this activity, we plan to use both quantitative and qualitative data (Activity 2) to better refine the survey questions in the GA categories showing lower internal consistency. In addition to refining our survey questions, we plan to break the current long survey into three shorter, focused surveys based on the FSCP categories (Figure 2). The mapping between FSCP core competencies and the focused surveys is shown on the right side of Figure 1. The aim is to provide shorter surveys for the participants and a more focused data for continual improvement. Activity 2. Data Collection and Analysis The participate group for this study will be undergraduate engineering students at the Schulich School of Engineering. To support our RQ we plan to collect two types of data in this mixed methods study: (1) quantitative survey data from the self-efficacy survey, and (2) qualitative interview data from self-efficacy survey participants. We will follow ethical protocols approved by the CFREB to recruit participants and collect data. Activity 2(a) Survey Data For this activity, we will administer the three online surveys via Qualtrics during each academic year of the project. As shown in Figure 3(a), each survey will be assigned to a specific major program cohort. Although there are minor year-by-year variations in demand for majors, we anticipate that this allocation will result in approximately equal cohort sizes (250 students) given current student interests in majors. Undergraduate engineering student enter their major program in year 2 (Y2). For this activity, we plan to conduct both longitudinal and cross-sectional studies by dividing each major program cohort into three student cohorts, each surveyed over the three years of the study (Figure 3(b)). Cohorts A, B, and C include students entering their major in F25, F26, and F27 respectively. Given that approximately 60% of our students go on a 12- to 18-month internship at the end of Y3, this cohort is split into two sub-cohorts in Y3. Data collected from Cohorts A and B will be used to inform the first part of our RQ: How is student self-efficacy and confidence affected over time? We anticipate that student self-efficacy and confidence will change as they gain more knowledge and experience through course work and extracurricular activities (e.g., clubs, teams, MakerMultiplex, etc.). As well, we are interested to determine if there are links between elements of the curriculum (e.g., team-based design activities) and graduate attributes (e.g., “Design”, “Individual and Team Work”) as they are introduced and developed throughout their programs. By introducing Cohorts B and C, we aim to address the second part of our RQ: How is student self-efficacy and confidence affected in response to curriculum change? Given that the intention of the self-efficacy survey is to inform our continual improvement process, we anticipate that the survey data will be used by the programs’ curriculum committees to inform course level and program level curriculum changes. For example, the impact of changes made to the second-year program, based on the 2025/2026 (Cohort A) data, will be analyzed using the 2026/2027 (Cohort B) and the 2027/2028 (Cohort C) data. It will also be interesting to investigate the impact of internship on student self-efficacy and confidence by comparing the 2027/2028 survey results within Cohort C. In addition to directly supporting our RQ, we plan to compute Cronbach’s alpha coefficients over the full set of data to evaluate the reliability of the survey. This data will be used to inform the survey design as noted in Activity 1. Activity 2(b): Interviews To gain further insights from participants who took part in the self-efficacy surveys, we will invite students from those groups to engage with us in a one-on-one qualitative interview. Our interview questions will be developed based on data gathered through the surveys and will focus on two broad areas: (1) self-efficacy, and (2) survey design. In the first area, we will probe more deeply to gain more insights into the rationale for specific survey responses to inform our work on the RQ. In the second area, we anticipate asking questions about the nature of the questions (Are they clear? Is there overlap? etc.) and the survey (Is the length appropriate? Was it administered at a convenient time during the semester? etc.) to inform our work on the survey design. The interviews will be recorded and transcribed, and notes will be taken during the interview. Thematic analysis will be used to examine their experiences using NVivo. Activity 3: OER Development The survey, the analysis syntax, and a quick analysis guide will be made accessible to other engineering programs across Canada for use in their accreditation process, which all use the same criteria for outcome-based assessment. After the survey has been revised and produces results with consistent reliability and validity a Qualtrics Survey Format file will be uploaded to GitHub and/or the Canadian Engineering Education Association (CEEAA-ACÉG) website. Additionally, syntax files for SPSS and R will be uploaded for statistical analysis along with a quick analysis guide.

Q8.6. G5. Describe how you will engage students in your project, including their roles and activities and how you will recognize their contributions. Scholarship is strengthened by the inclusion of all relevant perspectives, particularly those of learners, at the center of teaching and learning experiences. How will you include these perspectives in your project? 250 words (3 points).

Students will play key roles in this project in three ways: 1. We plan to hire undergraduate and/or graduate students to collaborate on the literature review, assist with the ethics application (file organization, ethics procedures, etc.), learn and engage in survey and interview design, learn and engage in data collection and analysis. These students will gain skills in quantitative survey design and analysis (Qualtrics), statistical analysis techniques (SPSS and R), qualitative analysis techniques (NVivo), and open source platform design and administration (GitHub). 2. Undergraduate students will be involved in interviews to discuss the survey’s length, administration, questions, and will be given information regarding the accreditation process and how the information gathered will be used to improve the program. Importantly, students will give their perspective on the length and coherence of the surveys to help us determine if the Full Spectrum Competency Profile categories noted in Section 4 are appropriate. 3. A graduate research assistant will attend the 2026 and 2027 Canadian Engineering Accreditation Conferences as a co-presenter. This will allow the student to have the opportunity to present and receive feedback on their work at a national level in addition to making connections with peers and faculty across the country.

Q8.7. G6. Describe the impact your project will have on improving teaching and student learning, and link this impact back to your question and the context you described above. Explain how your work will benefit others; how you will share your findings locally and beyond, and how these impacts will be sustained beyond the funding period for the project. What would successful completion of your project look like: how would it affect the context you described? How would it provide helpful responses to the question described? How will teaching and learning at the University of Calgary—other academic courses, educators, and contexts—benefit from your project’s activities, instruments, or findings? Specify how you will disseminate your findings. 500 words (3 points).

The proposed self-efficacy survey promises to directly address gaps in student confidence and capability by pinpointing specific areas where enhancements in teaching and learning methodologies are necessary. As undergraduate engineering programs transition to fully outcomes-focused accreditation, this tool will ensure that the student experience is integrated into our outcomes-based assessment processes. One of the core objectives of this research project is to directly address gaps in students' confidence and capability by pinpointing specific areas where enhancements in teaching and learning methodologies are necessary. Understanding where students struggle the most will enable curriculum designers and instructors to tailor educational strategies and resources more effectively. This targeted approach ensures that students not only absorb theoretical knowledge but are also equipped with the practical skills needed for a successful transition into professional engineering roles. The benefits of this project extend far beyond the initial research institution. By developing the survey as an Open Educational Resource (OER), we intend for it to be accessible to universities across Canada. This widespread availability enables other institutions to implement the survey within their programs, facilitating a nationwide enhancement of engineering education. The downstream effect of such improvements is a well-prepared cohort of students who are ready to meet the challenges of a professional engineering career with confidence and competence. Moreover, the insights gained from the implementation of this survey will serve as a valuable resource for curriculum designers and educators seeking to refine and improve teaching and learning approaches within engineering programs. By highlighting areas of student difficulty, it will provide a blueprint for where pedagogical changes are most urgently needed, thereby fostering a culture of continual improvement within the academic community. We are committed to disseminating our findings both locally and beyond to maximize the project's impact. We will present our results through articles and presentations at the Canadian Engineering Education Association (CEEAA-ACÉG) conference. This platform not only provides an opportunity to share our insights with fellow educators and researchers but also offers a chance to engage in meaningful discussions that can inspire further innovations in engineering education. The survey's design also lends itself to adaptation, offering potential applications beyond engineering. While originally focused on undergraduate engineering education, its framework could be extended to other undergraduate programs interested in outcomes-based assessment and continual improvement. This adaptability ensures that the project's influence can reach a broader academic audience, ultimately fostering an inclusive approach to educational enhancement across disciplines. The long-term goal of this project is to contribute significantly to the field of engineering education by improving teaching and student learning outcomes thereby bolstering the readiness of future engineers. Our hope is to instigate a meaningful, lasting impact on education both at home and abroad, creating a ripple effect that will benefit students, educators, and the engineering profession as a whole.

Q8.8. G7. How have you included consideration of principles of equity, diversity, inclusion, and accessibility (EDIA) in the design and execution of your project? Incorporation of the principals of EDIA strengthens communities and has been shown to improve the quality, social relevance and impact of scholarship and practice. How will you strengthen your work by following these principles? 250 words (3 points).

Throughout the research design decisions were made to ensure principals of EDIA were considered. Including interviews as part of the research process allows participants' voice to be central to refining the surveys and ensuring underrepresented groups have a voice in the research. We chose interviews over focus groups because interviews allow for a more diverse and inclusive participant pool as interviews require less time as they can be done virtually, which can eliminate needs for travel time and childcare costs. This project is focused on continual improvement in undergraduate engineering programs by including self-efficacy as a measure to see where there may be gaps in the program. This focus can promote EDIA through increased representation of underrepresented groups. Research conducted by Ballen et al. (2017) indicated that implementation of active learning, meaning the course was less exam based, found that overall knowledge of course material improved, specifically the underrepresented minorities benefited disproportionately. Importantly, the relationship between the active learning program and improved course performance was mediated by the increase in self-efficacy in underrepresented minorities (Ballen et al., 2017). Conversely, it was found that there was no mediation effect in non-underrepresented groups (Ballen et al., 2017). This indicates that self-efficacy can serve as an indicator of educational equity, which indicates that monitoring and enhancing self-efficacy through curricular changes may reduce disparities and create more inclusive educational environments. As a result, the overall quality and effectiveness of the education students receive will improve, especially for students in underrepresented groups.

Q8.9. G8. Do you wish to receive the \$5,000 Emerging Scholar Incentive?

In an effort to encourage scholars to develop their skills in research and scholarship around teaching and learning, we are providing an Emerging Scholar incentive of \$5,000 for successful applications that include graduate students, academic staff, support staff, or postdoctoral scholars as co-applicants. This individual must be new to the Teaching and Learning Grants program and not have received one previously. This incentive can be used for any eligible grant expense. This is in addition to the specified maximum award amount for two-year grants (\$10,000) and three-year grants (\$40,000). If you apply for this incentive, please ensure that you incorporate the \$5,000 into your budget request and total funds requested.

☐ No

☒ Yes

Q8.10. G8.1. If yes, please identify and describe the role of the Emerging Scholar on your team in this project, and explain how participation in this project will benefit the development of their skills and knowledge in the scholarship of teaching and learning.

Please do not include identifying information such as team member names in this answer.

The Emerging Scholar will be the research assistant (grad) identified in the project budget. Participation in this project will benefit this emerging scholar through training and practice in the following scholarship of teaching and learning areas: (1) collaborate on the literature review (this will involve performing literature searches, summarizing findings, and writing the literature review), (2) assisting with the ethics application (file organization, ethics procedures, etc.), (3) training on survey and interview design and engaging in the survey and interview process, and (4) training on data collection and analysis (survey, qualitative interviews, NVivo, SPSS).

Q8.11. G9. If needed, you may upload one pdf document with relevant graphics and figures (max. 2 pages).

Q8.12. G10. Please list full citations for all sources cited above using a citation style relevant to your context.

Ballen, C. J., Wieman, C., Salehi, S., Searle, J. B., & Zamudio, K. R. (2017). Enhancing diversity in undergraduate science: self-efficacy drives performance gains with active learning. *CBE—Life Sciences Education*, 16(4). <https://doi.org/10.1187/cbe.16-12-0344> Bandura, A. (1994). Self-efficacy. In V. S. Ramachandran (Ed.), *Encyclopedia of Human Behavior*, Academic Press, (4), 71–81. Bandura, A. (Ed.). (1995). *Self-Efficacy in Changing Societies* (1st ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9780511527692> Carberry, A. R., Lee, H., & Ohland, M. W. (2010). Measuring engineering design self - efficacy. *Journal of Engineering Education*, 99(1), 71–79. <https://doi.org/10.1002/j.2168-9830.2010.tb01043.x> CEAB (2023). 2023 Accreditation Criteria and Procedures, Canadian Engineering Accreditation Board. Online: https://engineerscanada.ca/sites/default/files/2023-12/Accreditation_Criteria_Procedures_2023.pdf Cloutier, G., Hugo, R., & Sellens, R. (2010). Mapping the relationship between the CDIO syllabus and the 2008 CEAB graduate outcomes. *Proceedings of the 6th International Conceive-Design-Implement-Operate (CDIO) Conference*. Crawley, E., Malmqvist, J., Ostlund, S., & Brodeur, D. (2007). *Rethinking Engineering Education: the CDIO Approach*, Springer. FEA (2024). *Path Forward Report: Futures of Engineering Accreditation*. Engineers Canada. Online: <https://engineeringfutures.ca/sites/default/files/2024-11/FEA%20Path%20Forward%20Report.pdf> Kato, T., & Miura, T. (2021). The impact of questionnaire length on the accuracy rate of online surveys. *Journal of Marketing Analytics*, 9(2), 83–98. <https://doi.org/10.1057/s41270-021-00105-y> Mamaril, N. A., Usher, E. L., Li, C. R., Economy, D. R., & Kennedy, M. S. (2016). Measuring undergraduate students' engineering self - efficacy: a validation study. *Journal of Engineering Education*, 105(2), 366–395. <https://doi.org/10.1002/jee.20121> Power, J. R., Tanner, D., & Buckley, J. (2024). Self-efficacy development in undergraduate engineering education. *European Journal of Engineering Education*, 1–25. <https://doi.org/10.1080/03043797.2024.2368149>

Q9.1. H. TIMELINE

This question was not displayed to the respondent.

Q9.2. H1. Please fill out the provided timeline template for your project in the form of a Gantt chart. Export as a pdf, review formatting, and attach with your proposal. Note: The timeline for grant activities should be April 1 – May 31.

Q10.1. I. BUDGET

This question was not displayed to the respondent.

Q10.2. I1. Please fill out the provided budget summary table template. Include a detailed estimate of expenditures with a rationale for how all spending will support the project's goals. Export as a pdf, review formatting, and attach with your proposal.

Note: The timeline for budget spending should be April 1 – May 31. If requested, the emerging scholar incentive should be included in the total funds requested.

Q11.1. Please complete the following questions for the Open Educational Resource area of focus if relevant. For more information on OER or links to resources, please review the OER section on the [website](#).

OER1. Have you already conducted a search for open educational resources that relate to your proposed OER project? You can access the [OER By Discipline Guide](#) or the [Open Course Matching Service](#) for support in getting started with your OER search.

- ☐ Yes
- ☒ No
- ☐ Other

Q11.2. OER1.1. Please provide more information.

This question was not displayed to the respondent.

Q11.3. OER2. Will you be adapting an existing OER, creating a new OER, or developing ancillary/supplemental materials (e.g. question banks, videos, sample exams, etc.)? (Select all that apply)

- ☐ Adapting an existing OER
- ☒ Creating a new OER
- ☐ Developing ancillary or supplemental materials

Q11.4. OER2.1. URL(s) for existing OER:

This question was not displayed to the respondent.

Q11.5. OER2.2. Type of materials:

This question was not displayed to the respondent.

Q11.6. OER3. It is expected that OER projects will be shared under a Creative Commons (CC) license. What Creative Commons License are you planning on applying to your OER project? (50 words) Note that the

assignment of a CC license does not impact the creator's copyright ownership of their work.

CC BY-NC-SA

Q11.7. OER4. Are there platforms or tools that you are currently considering for the development and release of your OER project? (50 words)

Note: If you are unsure, contact [Libraries and Cultural Resources](#) to discuss your options.

GitHub for distribution; Qualtrics for the survey; SPSS for the data analysis.

University of Calgary Teaching and Learning Grants Budget Template

Please see budget information and guidelines at <https://taylorinstitute.ucalgary.ca/grants/apply#key-application-elements>

When complete print to PDF and upload to the Budget section of your Qualtrics application form. Please do not include any identifying information in your budget.

Project Title	Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy
Grant Type (s) - up to 3	Scholarship of Teaching & Learning (SoTL)

Budget

Year 1 (April 1-March 31)

EXPENSE TYPE	RATIONALE <i>(delete categories not used)</i>	Cost
Personnel	<i>estimate total cost of student hire use hourly wage x 20% for mandatory employer related costs (e.g. EI, CPP)</i>	
Research Assistant (Grad)	<i>Graduate student will collaborate on the literature, assist with the ethics application (file organization, ethics procedures, etc.), learn and engage in survey and interview design, learn and engage in data collection and analysis (survey, qualitative interviews, NVivo, SPSS). As per the Graduate Student Association (GSA) collective agreement, Graduate Assistants (Research) may be paid above the GSA minimum of \$18.03 / hour; research assistants (grad) will be paid per the TI recommendation of \$30 / hour + 20% = \$36 / hour. We estimate an average of 6 hours/week for 40 weeks = 240 hours.</i>	\$ 8,640.00
Research Assistant (Undergrad)	<i>Undergraduate student will collaborate on the literature, learn and engage in survey and interview design, learn and engage in data collection and analysis (survey, qualitative interviews, NVivo, SPSS). Research assistants (undergrad) will be paid per the TI recommendation of \$25 / hour + 20% = \$30 / hour. We estimate an average of 6 hours/week for 20 weeks = 120 hours.</i>	\$ 3,600.00
Project manager	<i>This is an AUPE recurring part-time role dedicated to oversight of the project, reporting to the PI (Dr. Brennan). The Project Manager will be paid \$28/hr + 18.5% benefits/hr= \$33.8/hr for this casual hourly work. We anticipate 3-4 h/wk for 40 weeks = 150 hours.</i>	\$ 4,977.00
Transcription fees		
Travel	<i>* should NOT exceed 30% of total project budget *</i>	
Non-conference		

University of Calgary Teaching and Learning Grants Budget Template

Please see budget information and guidelines at <https://taylorinstitute.ucalgary.ca/grants/apply#key-application-elements>

When complete print to PDF and upload to the Budget section of your Qualtrics application form. Please do not include any identifying information in your budget.

Project Title	Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy
Grant Type (s) - up to 3	Scholarship of Teaching & Learning (SoTL)

Budget

Conference	
Materials and supplies	Office supplies / books \$ 75.00
Dissemination fees	* should NOT exceed 30% of total project budget *
Other (describe)	
Honorarium and cultural protocols	
Participant incentive	
Total Year 1	\$ 17,292.00

University of Calgary Teaching and Learning Grants Budget Template

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Project Title	Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy
Grant Type (s) - up to 3	Scholarship of Teaching & Learning (SoTL)

Budget

Year 2 (April 1-March 31)		
EXPENSE TYPE	RATIONALE (delete categories not used)	Cost
Personnel	estimate total cost of student hire use hourly wage x 20% for mandatory employer related costs (e.g. EI, CPP)	
Research Assistant (Grad)	Graduate student will collaborate on the literature, engage in survey and interview design, learn and engage in data collection and analysis (survey, qualitative interviews, NVivo, SPSS). As per the Graduate Student Association (GSA) collective agreement, Graduate Assistants (Research) may be paid above the GSA minimum of \$18.03 / hour; research assistants (grad) will be paid per the TI recommendation of \$30 / hour + 20% = \$36 / hour. We estimate an average of 6 hours/week for 40 weeks = 240 hours.	\$ 8,640.00
Research Assistant (Undergrad)	Undergraduate student will collaborate on the literature, learn and engage in survey and interview design, learn and engage in data collection and analysis (survey, qualitative interviews, NVivo, SPSS). Research assistants (undergrad) will be paid per the TI recommendation of \$25 / hour + 20% = \$30 / hour. We estimate an average of 6 hours/week for 20 weeks = 120 hours.	\$ 3,600.00
Project manager	This is an AUPE recurring part-time role dedicated to oversight of the project, reporting to the PI (Dr. Brennan). The Project Manager will be paid \$28/hr + 18.5% benefits/hr= \$33.8/hr for this casual hourly work. We anticipate 3-4 h/wk for 40 weeks = 150 hours.	\$ 4,977.00
Transcription fees	Recordings of interviews will be professionally transcribed. Our professional transcriptionist is fast, accurate, and has worked with our previous data. 1 hour of recording = approx. 2.5 hours of transcription. We estimate 4 hours of recording in year 2 (4 x 1 hr focus groups), therefore 4 hours of transcription x \$35/hr = \$140.	\$ 140.00

University of Calgary Teaching and Learning Grants Budget Template

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Project Title	Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy
Grant Type (s) - up to 3	Scholarship of Teaching & Learning (SoTL)

Budget

Travel	* should NOT exceed 30% of total project budget *		
Non-conference			
Conference	Feedback on survey design at the 2026 Canadian Engineering Education Conference - budget for RA (grad) - PI and CI will apply for SSE funding to participate. Estimated registration fee based on 2024 conference (\$980), economy airfare (\$1000), accommodations and meals (\$1000).	\$	2,980.00
Materials and supplies	Office supplies / Books	\$	70.00
Dissemination fees	* should NOT exceed 30% of total project budget *		
Other (describe)			
Honorarium and cultural protocols			
Participant incentive	Participant incentives (20 estimated participants in year 2) \$20 gift card x 20	\$	400.00
Total Year 2		\$	20,807.00

University of Calgary Teaching and Learning Grants Budget Template

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Project Title	Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy
Grant Type (s) - up to 3	Scholarship of Teaching & Learning (SoTL)

Budget

Year 3 (April 1-March 31)	N/A for Development and Innovation grants		
EXPENSE TYPE	RATIONALE <i>(delete categories not used)</i>	Cost	
Personnel	<i>estimate total cost of student hire use hourly wage x 20% for mandatory employer related costs (e.g. EI, CPP)</i>		
Research Assistant (Grad)			
Research Assistant (Undergrad)			
Project manager			
Transcription fees	<i>Recordings of interviews will be professionally transcribed. Our professional transcriptionist is fast, accurate, and has worked with our previous data. 1 hour of recording = approx. 2.5 hours of transcription. We estimate 4 hours of recording in year 3 (4 x 1 hr focus groups), therefore 4 hours of transcription x \$35/hr = \$140.</i>	\$	140.00
Travel	<i>* should NOT exceed 30% of total project budget *</i>		
Non-conference			
Conference	<i>Present OER at the 2027 Canadian Engineering Education Conference - budget for RA (grad) - PI and CI will apply for SSE funding to participate. Estimated registration fee based on 2024 conference (\$980), economy airfare (\$1000), accommodations and meals (\$1000).</i>	\$	2,980.00
Materials and supplies	<i>hardware, software, additional items to be purchased</i>		
Dissemination fees	<i>Open Access Publication Fee (Assessment & Evaluation in Higher Education) = \$2,250 USD = ~2800 CAD</i>	\$	3,150.00
Other (describe)			

University of Calgary Teaching and Learning Grants Budget Template

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Project Title

Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy

Grant Type (s) - up to 3

Scholarship of Teaching & Learning (SoTL)

Budget			
Honorarium and cultural protocols			
Participant incentive	Participant incentives (20 estimated participants in year 3) \$20 gift card x 20	\$	400.00
Total Year 3		\$	6,670.00
PROJECT TOTAL		\$	44,769.00

University of Calgary Teaching and Learning Grants Timeline Template

Please fill out the following timeline for your project using a gantt chart. Please do not include any identifying information

Project Title	Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy
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Grant Type(s) - up to 3 Scholarship of Teaching & Learning (SoTL)

When complete print to PDF and upload to the Timeline section of your Qualtrics application form

Timeline

[illegible]

University of Calgary Teaching and Learning Grants Timeline Template

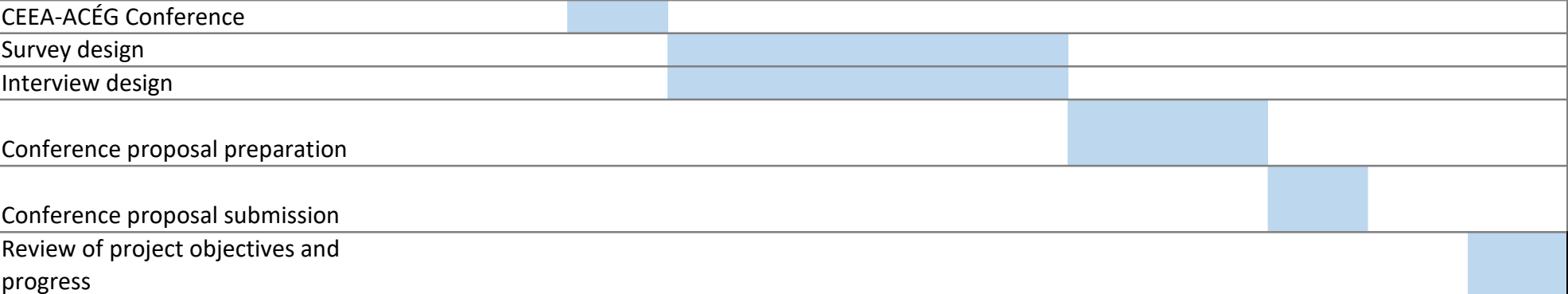
Please fill out the following timeline for your project using a gantt chart. Please do not include any identifying information

Project Title	Integrating Student Perspectives in Outcomes-Based Assessment: a longitudinal study of student self-efficacy
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Grant Type(s) - up to 3 Scholarship of Teaching & Learning (SoTL)

When complete print to PDF and upload to the Timeline section of your Qualtrics application form

Timeline



Year 3

