The University of British Columbia, School of Engineering, Okanagan Campus

Embedding Professional Development Competencies in the Engineering Curriculum

Leslie Saca, Nasim Hajati, Etienne Loney, Erika Pineo, and Alon Eisenstein

Project Goal:

Transform undergraduate engineering education by embedding **industry-informed professional competencies** into the curriculum to improve students' **career readiness**.

Background

This project, launched in Fall 2022, strengthens UBCO engineering students' professional competencies through targeted, embedded interventions.

- Uses an **entrepreneurial approach** to identify and prioritize competencies
- Adopts a **holistic model** for integrating professional development across the curriculum
- Bridges the gap between **academic training** and **workplace expectations**

Two-Phase Collaborative Project

The project followed a two-phase approach with input from faculty, students, alumni, and industry partners.

Phase 1: Identify Competency Gaps

- Alumni data (via OPAIR + LinkedIn) was used to identify relevant employers
- Interviewers were trained using a **customer-development approach**
- **Semi-structured interviews** were conducted with hiring managers from companies who have hired UBCO engineering alumni
- Explored **real and perceived skills gaps** in newly graduated engineers
- Focused on understanding decision-making in **hiring of junior engineering**

Phase 1: Results

Interviews with industry partners and hiring managers revealed five key areas where new grads can improve on.

- **Soft Skills**: Communication, teamwork, and adaptability are top priorities.
- **Gained Experience**: Demonstrate hands-on skills, even from school or volunteer projects.
- **Passion Projects**: Evidence to show taking initiative and help candidates stand out.
- **Work/Co-op**: Relevant experience, even outside coursework, adds strong value.
- **Application Strategy**: Customized cover letters and research into the company.

Table 1. List of **soft skills** and **real-world experience** in order of frequency mentioned and their attributed significance as expressed by interviewees

Explicit Key Findings	Count	Significance
Interpersonal Skills	21	Very Significant
Relevant skills that match the job posting	17	Quite Significant
Personal passion	12	Quite Significant
Work/Co-op experience	7	Slightly Significant
Researching the company prior to applying	6	Slightly Significant

Phase 2: Develop & Pilot Interventions

Curricular interventions were developed based on the identified priority list of competencies from Phase 1. Select undergraduate courses were identified to **pilot, evaluate, and refine** based on learning outcomes ensuring changes are both **evidence-based** and aligned with industry needs.

Further research suggested **integrating ePortfolios** into the curriculum can help students effectively showcase their skills, experiences, and projects in a personalized and competitive format. The ePortfolio is a powerful tool in the hiring process, providing a **comprehensive and authentic** representation of a candidate's abilities.

Insights gained from a **focus group** conducted prior to the ePortfolio pilot helped shape the adaptation of the curriculum for each course and clarified what hiring managers expect to see.

Courses involved

Phase 2 was piloted in the following courses: The ePortfolio was contextualized to the respective course outcomes of:

- **APSC 169** – Fundamentals of Engineering Design
- **ENGR 499** – Engineering Capstone

Phase 2: Findings and ePortfolio Implementation

The image below shows an example slide used in APSC 169 lectures to introduce the **ePortfolio concept and set expectations.**

Figure 1. Exemplary slide used in lectures to introduce the **ePortfolio concept and set expectations.**

The students were assigned to complete an ePortfolio entry based on their course project, with requirements focused on:

- **Design** – Structure, layout, and visual clarity
- **Content** – Clear description of the project and outcomes
- **Reflection** – Insights into learning, challenges, and growth

This assignment was first piloted in **APSC 169 (2024W1, 405 students)** and later refined for **ENGR 499 (2024W2, 326 students)**.

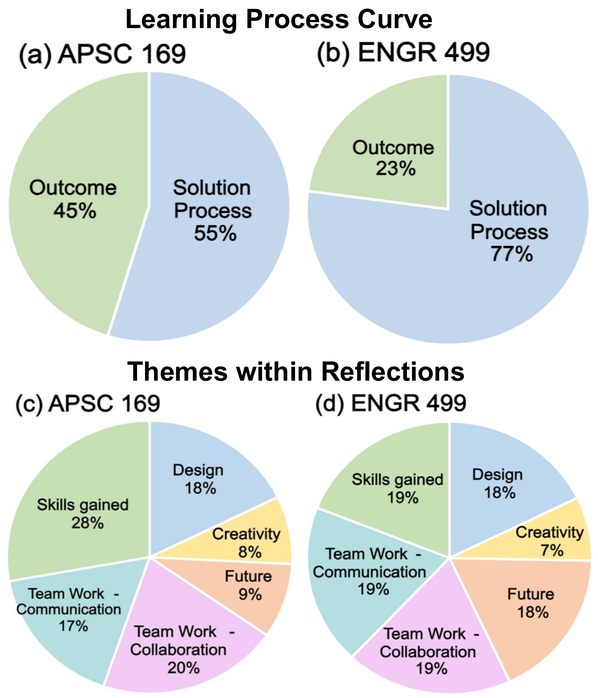

Figure 2. Analysis of top-tier assessed work of student submissions with scores of 90% or higher, based on sample sizes of n=212 for APSC 169 and n=76 for ENGR 499. Pie charts **(a)** and **(b)** illustrate the learning curve for APSC 169 and ENGR 499, respectively. Pie charts **(c)** and **(d)** highlight the distribution of reflection themes addressed by students within the corresponding sample sizes for each course.

Students reported either the **learning process** or the **project outcome** in their ePortfolio entries. The reflection themes addressed by students in each course were categorized and analyzed, providing insight into the focus of their reflections based on the course context.

Conclusion and Next Steps:

Preliminary feedback from students has been largely positive. In interviews, students expressed **enthusiasm** about developing their ePortfolio alongside their academic journey. A **focus group** is being planned with industry to gather further insights and guide future improvements.

Acknowledgements:

We gratefully acknowledge the funding for this project provided by UBC Okanagan students via the Aspire-2040 Learning Transformations Fund, and the involvement, engagement, and support of Richard Aleong, Wouter Bam, Kenneth Chau, and Jannik Eikenaar.

We acknowledge that this work was performed on the UBC Okanagan campus which is situated on the traditional, ancestral, unceded territory of the Syilx Okanagan Nation.