School of Engineering

Design Thinking Hub

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Background

Design Thinking is not an exclusive attribute of engineers and designers. Renowned innovators in music, art, critical writing, science, and business have all practiced and mastered it. So, why is it called Design Thinking?

The uniqueness of Design Thinking lies in its structured methodology, which formulates a process to extract, teach, learn, and apply human-centered skills and techniques to solve problems in a critical, creative, and innovative way. This approach to problem-solving is highly valued among employers.

World-class educational institutions must transition from conventional theoretical knowledge-based approaches to applied Design Thinking problem-solving methodologies.

Project Description

This initiative offers students, faculty, and staff from various disciplines at UBC Okanagan the opportunity to engage in experiential learning centered on design thinking, design manufacturing, and collaborative design work. Participants are introduced to a human-centered design and manufacturing process that emphasizes empathy, ideation, iteration, prototyping, and testing.

The project has developed blended learning modules that enable students to earn certificates (badges) demonstrating their proficiency in the following areas:

❖ Design thinking (e.g. need finding, need scoping, ideation, and virtual design);

❖ Design prototyping and manufacturing (e.g. techniques for building and testing designs);

❖ Implementing design thinking and design prototyping in small groups inside or outside the classroom.

The certificate program extends beyond core curriculum requirements, with Badge 3 being integrated into several courses, including APSC 171, APSC 169, APSC 258, and STEM education. Looking ahead, this program may be offered regionally as part of community outreach initiatives. The development of the program has been facilitated by the establishment of a new makerspace at UBCO, located in EME 1256.

The program, in collaboration with Makerspace UBCO, offers access to a comprehensive array of rapid prototyping tools. These include 3D printers, a 3D scanner, CNC machines, soldering stations, PCB fabrication equipment, textile cutting and embroidery machines, BioRadio systems, power tools, and hand tools. Additionally, the program provides advanced software for 3D modeling and simulation.

Project Execution

The UBCO Design Thinking Hub program has created several tangible elements that significantly enhance the teaching, learning, and research environment on campus. The primary outcome is the development of sustainable online and in-person training modules designed to build makerspace competencies. Through the completion of these badges, students acquire the following skills:

•Badge 1:
- Apply design thinking to projects, bridging theoretical learning with real-world contexts
- Develop solutions to well-defined problems
- Create virtual prototypes to address problems

•Badge 2:
- Apply design prototyping and manufacturing skills
- Select and utilize rapid prototyping techniques
- Create physical prototypes to solve problems
- Test and evaluate prototypes

•Badge 3:
- Apply design thinking and prototyping skills in small group settings
- Utilize design thinking in various contexts of advanced manufacturing

Students can integrate these badges into specific courses within their program and highlight them on their CVs, demonstrating their practical and theoretical expertise in design thinking and manufacturing.

Figure 1. How to acquire Badge Zero (Safety) badges

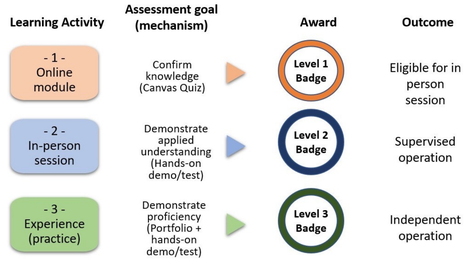

Figure 2. Operations Badge Series Conceptual Overview

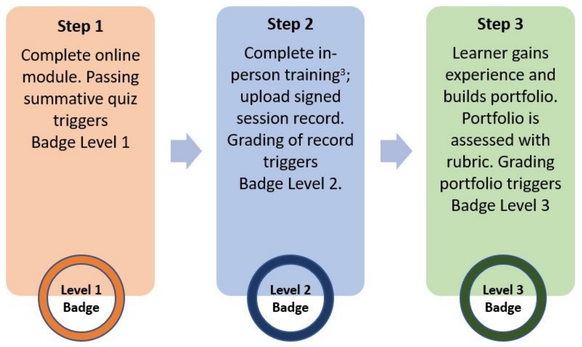

Figure 3. Idealised Operations Badge-earning Process

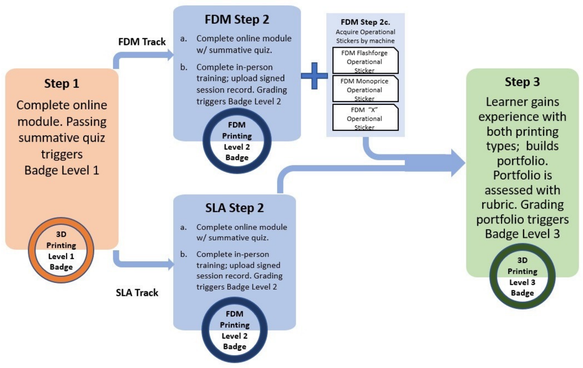

Figure 6. Badge earning process for 3-D Printing

Note common Level 1 and 3 badges, differentiated at Level 2 to account for distinct method differences and multiple manufacturers.

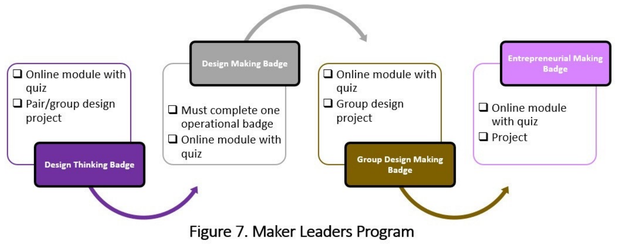

Figure 7. Maker Leaders Program

Project Impact

The impact of the project was assessed by the number of UBCO community members who completed the badges. As of June 2024, the program has achieved significant milestones:

- ❖ Total Number of Badges Awarded: **3,873**
- ❖ Unique Students Enrolled in Canvas Module: **2,455**
- ❖ Individual Users Who Claimed All Required Badges (Including In-Person Visits and Space Use Confirmations): **1,545**
- ❖ Students Employed and Trained in Design Thinking and Maker Equipment: **21**
- ❖ Young STEM Workshops: **19** (Including two student summer camps per year from **2019-2022** and more than five per year until **2024**)
- ❖ Recruitment Open House Events: **9** (Three per year starting from **2021**)
- ❖ Collaborations with Interior Health: **3** (In **2020, 2022**, and **2024**)
- ❖ 'Making' for Mental Health Workshops: **12** (Starting in **2023**)
- ❖ Academic Competitive Team Entries Supported: 10 (Including UBCO Motorsports x 2, UBCO Aerospace x 3, UBCO BattleBots, UBCO Solar Decathlon, and UBCO Concrete Toboggan)
- ❖ New Badges in Production and Testing: **4**
  - Makerspace **101**: Safety and Design Thinking
  - 3D Printing: Additive Manufacturing
  - Electronics: Introduction to Soldering and Microcontrollers

Makerspace Design Process Coordinator: Student Staff Onboarding Module. We express our heartfelt gratitude to UBC Okanagan for their financial support via the Aspire-2040 Learning Transformations Fund.

Figure 6. Chart displaying intentional use of space outside of curriculum based requirements, demonstrating passion for the space

Acknowledgement

We express our heartfelt gratitude to UBC Okanagan for their financial support via the Aspire-2040 Learning Transformations Fund. Additionally, we extend our sincere thanks to the UBCO Makerspace and its Manager, Cortnee Chulo, for their indispensable contributions to this project.

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