

UBC Teaching and Learning Enhancement Fund

Final Report – maximum 2 pages

Project Name: TLEF project #13-001 - Using Prototyping Workshops to develop a broad skill set in our students - Software, Electronics, and Mechanical Tools and Training for First-Year Engineering Students

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Year of Funding: 2013/14

Summary of Work Accomplished

Two 2-hour hands-on prototyping workshops were developed during Summer 2013 for APSC 150 tutorial sessions in Fall 2013 and Winter 2014. 30 kits were planned, purchased and organized covering "Prototyping with Microcontrollers" and "Hand Tools" sessions for all 700+ students enrolled in APSC 150. Four undergraduate students were hired part-time to assist in planning the sessions, selecting equipment and activities, and generating content for the workshop websites. The website material can be found here:

- [APSC 150 – Electronics Prototyping](#)
- [APSC 150 – Hand Tools](#)

Quantitative feedback on student impressions of the sessions has been relatively positive (see "Evaluation of Project Success"). These results are in line with very positive anecdotal feedback passed on from first-year students to course instructors and senior students on undergraduate competition teams.

These two workshops will remain as part of the APSC 150 course. A new TLEF funded program, "14-001- Developing Engineering Design Workshop for First Year Engineering Students – APSC150 Case Study", led by Nobo Yonemitsu, will provide the next step in hands-on workshop development.

Other notable uses since September 2014:

- Six Electronics kits were loaned to Woodward Library available for sign-out on 2-day loan. This gave access not only to first-year students but to senior students to help give them experience and access to equipment as they work on their open-ended capstone projects (statistics for the sign-out will be provided by Woodward Library)
- ~75 first-year Sauder School MBA students did the electronics workshop as part of their "Business and Entrepreneurship" (BAEN 542) course in Fall 2013, as a lead-up to a Physical Prototyping course available through their Entrepreneurship stream.
- Two visiting high-school groups of ~25 students each (John Oliver Secondary, Khalsa School) had students from grades 8 through 10 use the kits on campus for a hands-on electronics experience.
- Two electronics workshops were arranged at the Britannia Community Centre to allow ~20 people in the general community to use and experience the kits.

Work to come:

- Purchase and organization of equipment in long-term storage equipment (appropriate cart)
- Purchase and organization of spare equipment to service both sets of 30 kits, and consumables for the next 2 years (through 2015/16).
- Remaining purchases and work should cost approximately \$3,500, and should be completed by September 2014.
- Further efforts to allow access to materials specifically for first-year Engineering students (producing project using tools, partnering with existing clubs and teams to host tutorials using the materials, etc)

Notable differences from the work plan described in the TLEF application:

- Four undergraduate students were hired part-time to assist in the development, testing and physical preparation of the workshops rather than hiring a single full-time position. This allowed for much broader input to the direction of the tasks.
- No TA's were hired for the fall or winter sessions. Instead, a call for undergraduate volunteers resulted in 16 different students volunteering their time to assist in each of the 30 workshop sessions.

Evaluation of Project's Success

Include evidence of rigorous evaluation.

Student Perception of the Workshops:

From 354 student responses in Sept 2013 after the first session, students were asked the following questions: "Did you find the following tutorial session helpful? (rate from 1low to 5high)"
The Electronics and Hand Tool workshops scored substantially higher (4.58 and 4.66 respectively) than 3 other traditional workshops (3.59, 3.74, 3.57).

Participation in Follow-up Activities and Access to Materials:

When asked whether students would like to access the equipment at other times during the term for their own projects, students were only moderately interested (2.95 and 3.1 respectively).
Information from Woodward library about sign-out of material will also be gathered.

As noted in the original TLEF application, we aim to survey students entering into 2nd year in Fall 2014 in selected faculties (ENPH, possibly IGEN and CIVL) be assessed on their level of engagement, confidence, and interest from these workshops.