

UBC Teaching and Learning Enhancement Fund

Final Report – maximum 2 pages

Project Name: TLEF Project 2014 – Developing Engineering Design Workshop for First-Year Engineering
Students – APSC150 Case Study I
Date: April 30, 2015
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Year of Funding: 2014/15

Summary of Work Accomplished

A series of 2-hour hands-on designing and prototyping workshops were developed during the summer of 2014 for APSC150 tutorial sessions for Fall 2014 and Winter 2015. This development was built on top of previous-years' successful TLEF-funded hands-on works for hand-tools and micro-controllers. In addition to existing project kits, sheet-metal fabrication tools and electronic components appropriate to design electro-mechanical devices were purchased, and given to a total of over 700 students enrolled in APSC150. Three undergraduate students were hired to assist in planning the sessions, selecting equipment and activities, and generating content for the workshop websites. Unlike previous years' individual hands-on workshops, this time there was a central theme which had all student teams (8 students in each team) working together to achieve and present their designed prototype for prizes. In Fall 2014, the project goal was to design successfully a "launcher" that would achieve maximum distance of flight of a wine cork using a minimum number of rubber bands. The materials for this project can be found at the following link:

<http://projectlab.engphys.ubc.ca/apsc-150-2015/>

Quantitative feedback on student impressions of the workshop has been very positive (see "Evaluation of Project's 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.

This successful development of engineering design module will remain as a part of the new unified first-year engineering course, with TLEF funded program, "Redesign of First-Year Engineering", led by Dr. Peter Ostafichuk, in 2015-16 academic year and beyond.

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

- Three undergraduate students were hired part-time to assist in the development of the proposed module, rather than one full-time co-op student. This arrangement allowed for a much broader input and more efficient production of the course materials.
- No TAs were hired for the fall or winter sessions. Instead, a call for undergraduate volunteers resulted in 12 to 15 different students in each term volunteering their time to assist in each of the 56 workshop/tutorial sessions.

Evaluation of Project's Success (Include evidence of rigorous evaluation.)

Student perception of the workshops and consequent poster presentation and launcher demonstration as the case final examination:

Randomly selected and final competition winning teams were invited to open discussion sessions and interviewed their perception of the workshops. The results indicate very interesting outcomes of this new design module - This particular workshop was created for one of four large modules in APSC150. In several previous years, the engineering undergraduate society surveyed all the first year engineering courses and APSC150 was constantly rated the least appreciated and popular course. Except for the case I module, all the other modules were also evaluated very low. However, all the interviewed students positively enjoyed this case I module and as a consequent the other 3 modules as well. This newly developed workshop module provided appropriate perspective of engineering practice, thus providing clearer understanding of meaning

and objectives and goals in consequent modules. As noted in the original TLEF application, we would like to survey students entering into 2nd and 3rd year in the Fall 2015 in selected departments and programs (such as ENPH, IGEN, and CIVL) in order to assess on their level of engagement, confidence, and interest from the workshop.

Participation in each workshop sessions:

It was specifically noted by the tutorial section instructors that participation rates for all the tutorial sessions drastically improved after the case I workshop. Also reported, many student teams willingly put many extra-hours to work on their projects.

Student input at this point has been limited to a survey given to all APSC150 students in Fall 2012, Spring 2013, Fall 2013, Spring 2014, and Fall 2014, to assess student interest in a range of prototyping and designing activities, but results clearly indicate a strong interest in hands-on workshop with a design component at the end. As mentioned above, follow-up investigation to those students in senior years would be needed to evaluate the true impacts of this TLEF funded workshop module.