

Impact of an Extracurricular Activity Funding Program in Engineering Education

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Introduction

Participation in extracurricular activities improves engineering students' professional and leadership skills, civic-engagement and engineering abilities^{1,2}. These activities provide students with cultural and scientific immersion, and are an excellent complement to a technical engineering degree³. However, students can be restricted in their ability to participate due to limited finances and due to lack of awareness of opportunities. To minimize this challenge, the Schulich Student Activity Fund (SSAF) was developed to promote participation in activities that enhance engineering education and leadership development through a variety of activities. This paper will discuss the details of the SSAF, and provide insight into the levels of impact seen from the program.

Fund Establishment

In 2005, the engineering faculty received an extensive donation from a prominent philanthropist and entrepreneur. The SSAF fund was created as part of this donation, and has since gained other contributions through donations, including support from local industry and in-memoriam grants⁴. There are three application intake cycles per year, and students may apply to the fund competition as either individual or groups. Each undergraduate student has an individual award cap of \$5000 over the lifetime of their degrees, which allows the support to be spread to a greater number of deserving applicants. Graduate students are also eligible for a limited scope of support, which is again capped at \$5000.

The SSAF is not intended to fund 100% of any activity. Students are expected to raise additional funds on their own, through team fundraising campaigns, supervisory support, external donations, or personal funds. While the fund is designed to reduce financial barriers, it is important that students recognize the value of the opportunity and to contribute their own resources where possible. This also reduces the likelihood of students dropping out at the last minute from an opportunity or not following up with accountability. For each successful application, the SSAF will support up to 50% of the costs locally and nationally, and up to 75% of the costs for an international activity. All of the amounts related to the SSAF are considered to be in Canadian dollars.

Application Procedure

With many deserving applicants applying each year for a wide variety of activities, it was necessary to impose a strict and detailed application process. Complete applications must include proposed budgets, detailed itineraries, and a clear description of how the activity will contribute to their leadership, professional, and personal development. While a wide range of experiential and highly participatory activities are eligible, it is up to the applicant to prove how the proposed extracurricular experience complements and enhances classroom learning while supporting the development of the engineering graduate attributes. Some examples of successful applications in the past include the development of a solar car, educational trips to major cities, group studies

abroad, and academic conferences.

The application process itself consists of two components: an online submission and a hard copy submission. The online component allows the applications to be organized and accessed efficiently, including applicant contact information, while the hardcopy provides original signatures and a physical file for committee member review. Incomplete applications are not considered.

While extra-curricular experiences add value to a student's education, it was also important to ensure that students were not falling behind in their degree requirements as a result of the fund. The application criteria requires any undergraduate trips that occur during regularly scheduled classes not be allowed to result in absences greater than three days, and students are responsible for any work missed as a result of their trip. A trip application will not be approved if it occurs in the final two weeks of a semester or during final exams.

Application Evaluation and Accountability

The funding decisions are made by a single appointed committee consisting of representatives from across all areas of the engineering faculty: undergraduate students, graduate students, faculty members, higher administration, and alumni. Each review meeting requires a quorum of six representatives, including at least three undergraduate members. This allows the applications to be judged not only by faculty members, but by the students' peers as well. Any committee member with a conflict of interest in a particular application is asked to leave the room while the application is being discussed. All committee members are expected to maintain strict confidentiality in the analysis of the applications during and following the evaluation process. The Dean of Engineering must approve all funding decisions before awards are finalized and distributed.

The evaluation committee considers whether each applicant has demonstrated how the activity will enhance his or her engineering education. Other considerations include whether or not the applicant has attempted to find additional funding sources, the organization and quality of the application, the realism of the activity and budget quotes, and the number of students impacted by the opportunity. The committee may decide to grant the full ask amount, determine a reduced amount, or decline to fund the application at all. Decisions are made with a great amount of thought and debate, and may require a vote for any difficult or unconventional cases.

All successful applicants and participants are required to attend a mandatory safety and conduct meeting. As the activities are undertaken across the international community, students supported by the SSAF are held to a high standard of responsibility and conduct. Participants are also required to adhere to the university risk management policies.

Successful applications are funded in two parts. The first half of the awarded amount is provided before the activity to help with preparation costs, while the second half of the awarded amount is provided following an accountability report. Students must report back to the fund indicating how the awarded funds were spent and how they brought their experience and knowledge back to campus. All successful applicants must submit a final report afterwards describing the impact

on their learning experience, a reflection on their personal and leadership development goals, and a description of their contribution.

Impact on the Engineering Leadership

Since its inception ten years ago, the SSAF has provided support for an immense variety and number of student activities. These opportunities range from local to international, and provide leadership development possibilities to hundreds of students each year. In 2015, 471 students received funding to pursue activities and opportunities of their own initiative and design. Each application requires students to self-identify and evaluate the engineering leadership skills and graduate attributes that will be developed through their participation. The next section describes the impact on leadership development in a few case studies.

Measurement

Students who partake in funded activities are often asked to present on their experiences and are expected to share lessons learned with the wider engineering campus community. How the students have chosen to share that impact has varied according to their interests and involvements on campus. The organizers of each initiative assess the success of their organized opportunity themselves through quantitative and qualitative measurements. Due to the immense number of activities and university ethics regulations, only a few case study examples are described here.

Leadership in Cross-Disciplinary Groups

Undergraduate Music Society: In 2008, a group of like-minded undergraduate students with classical music training sought to establish a music society specifically for engineering students to support the education and awareness around acoustical and noise engineering. This group requested financial support to purchase musical instruments that could be used by any engineering student without access to their own instruments, either due to residence living arrangements or cost, which would also be used in scientific demonstrations and related lectures regarding the physics of music. After being successfully funded, this group was able to purchase a drum kit and keyboard, and offered casual jam sessions and an acoustical engineering lecture series to any interested students. The society also provided student musicians at engineering faculty events, and became an important part of interdisciplinary outreach to the community.

The leadership team involved in this group was recognized by the faculty for their initiative and creativity, as well as their communication and organizational leadership abilities. These students were also offered research positions and opportunities due to their unique ability to champion connections between technical engineering, arts, performance, and professional skills.

Leadership in Global Initiatives

International Study Abroad: Since its inception, the SSAF has regularly supported international study trips, both for faculty supervised student groups and individuals. These trips integrate curriculum requirements, engineering graduate attributes, and cultural immersion to create a valuable leadership and study experience. Past faculty supervised opportunities include a five-week civil engineering study trip to Greece, a five-week electrical engineering study trip to Switzerland, and a six-week mechanical and environmental engineering design course in China.

Individual students have been supported in summer study positions in a variety of countries, including China, Switzerland, and Germany, sometimes leading to later long-term internship positions abroad.

Leadership in Gender and Diversity

Group Conference Travel: In 2012, a professor in electrical engineering started an initiative that would allow ten undergraduate female electrical, computer and software engineering students to travel to the Grace Hopper Conference for Women in Computing, along with a supervising professor and two graduate students. This internationally renowned conference unites a community of women in computing, including those in industry, research and education, and offers opportunities for networking, learning, and collaboration. With varied conference locations and tight student budgets, it was necessary to seek funding to support this trip. The SSAF committee funded this inaugural trip in 2012, and again in 2013, 2014, and 2015. Because of the success and feedback of returning participants, the committee agreed to expand funding to include twenty undergraduate students, multiple faculty members and graduate students. The student leadership skills and outcomes developed by this opportunity led to student internships, graduate program positions, and summer research jobs. In this case, leadership funding was particularly important in that it allowed young women in engineering to meet and listen to different role models and mentors in their desired field.

The Grace Hopper Conference trip has demonstrated longitudinal impact on female students at the Schulich School of Engineering, primarily through the past participants taking leadership within the campus community and sharing their experiences. The 2016 trip is already receiving application requests, months before the call for applications will be sent. Past participants were asked to fill out pre and post trip surveys for quantitative evaluation of the trip. In 2015, 65% of participants agreed or strongly agreed that they actively seek leadership opportunities in and out of the classroom. Past participants were also recently given the opportunity to attend a networking and recruitment event for Google, which resulted in a high turnout and therefore increased reach towards female engineering students.

Qualitative feedback was also recorded through open-ended survey questions and unstructured interviews. Trip participants demonstrated an increased level of confidence and ability to network among both their peers and others. All participants reported ideas and motivation for taking on related leadership roles in related initiatives on campus and in community. Some examples include:

“I will try and get some of the events and activities I learned about [at the conference] used on campus or in high schools nearby to encourage engineering.”

“I plan to offer plenty of encouragement to anyone who needs it! Men or women in engineering who feel for some reason they can’t do something.”

“Educate others that engineering is not only for women and dominant races but for everyone to join and that race and gender plays no role in your competence.”

Conclusions

The SSAF provides a model for encouraging extra-curricular activities for other schools as it reduces the barrier to these experiences while building student leadership through the application and competition. The implementation of a detailed application process, a varied committee, and accountability measures have contributed to the success and impact of this extracurricular activity funding program in engineering education. Providing students with support for added-value opportunities allows them to develop professional, leadership, and engagement skills that may not be found in the regular classroom atmosphere, and contributes to the further development of engineering graduate attributes.

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