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EARLY ASSESSMENT OF THE 'CANADIAN REDUCED GRAVITY EXPERIMENT DESIGN CHALLENGE': EXAMINING THE IMPACT OF CANADA'S FIRST MICROGRAVITY RESEARCH COMPETITION FOR STUDENTS

Abstract

In 2016, Students for Exploration and Development of Space (SEDS-Canada), together with the National Research Council of Canada (NRC), the Canadian Space Agency (CSA), and sponsors from the Canadian space industry and private citizens, started Canada's first microgravity research competition for students: the 'Canadian Reduced Gravity Experiment Design Challenge' (CAN-RGX). The competition is designed to immerse undergraduate student teams in a mutidisciplinary engineering setting and to guide them through a full design cycle—from experiment concept to flight-ready hardware—as the teams address a research topic of relevance of the space sector, while under supervision from a university Faculty Advisor and with support from Canadian Subject Matter Experts (SMEs). Students from all across Canada were able to propose experiments to the CAN-RGX for the opportunity to perform their own experiments in microgravity aboard the NRC Falcon-20 reduced gravity aircraft in the country's capital city, Ottawa.

At the 2017 International Astronautical Congress in Australia, we presented the CAN-RGX concept of operations and early results from the inaugural flight campaign. Now, two years later, we have gathered many lessons learned, allowing us to make the CAN-RGX schedule more streamlined, the competition requirements and expectations better defined and relevant, while expanding the types of experiments flown to include life science studies that do not require Research Ethics Board approval. These improvements were incorporated into the latest 2018-2019 CAN-RGX handbook that student teams must consult to propose and, if selected as winners, to build their experiments. Included in the handbook are detailed learning objectives, rubrics of assessment, and evaluation criteria against which proposed experiments are down-selected to the winning teams.

In this study, we focus on assessing the impact of the CAN-RGX on:

1. meeting the overarching learning objective of engaging students in the full design cycle of flight-ready experiments;
2. exposing students to teamwork and multidisciplinary engineering design;
3. training Highly Qualified Personnel (HQPs) for research in academia (e.g. number of students who pursued graduate studies) or technical jobs;
4. raising STEM and Space Science awareness in Canada (e.g. social media reach, involvement of local elementary and high schools); and
5. generating new research (e.g. peer-reviewed publications), technologies (e.g. patents), and businesses (e.g. start-ups).

The results of this assessment study provide motivation to expand future CAN-RGX flight campaigns to other cities across Canada in order to engage more Canadian students and to increase Canada's global standing as a leader in the space sector.