Paper ID: 67427
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IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Lift Off - Secondary Space Education (2)

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CUBES IN SPACE: CAN THE IMPLEMENTATION OF STUDENT-DESIGNED SPACE PAYLOADS INCREASE ENGAGEMENT AND CONTINUED MOTIVATION IN SCIENCE, TECHNOLOGY, ENGINEERING, THE ARTS AND MATHEMATICS (STEAM)?

Abstract

Cubes in Space, an innovative program with idoodlEDU inc., collaborates with the National Aeronautics Space Administration (NASA) to launch student-designed experiments on sounding rockets at NASA's Wallops Flight Facility, and atmospheric balloons with NASA's Columbia Scientific Balloon Facility. Additional collaboration takes place with NASA's Goddard Space Flight Center and Langley Research Center, the Colorado Space Grant Consortium and, in this action research project, the Ecuadorian Civilian Space Agency (EXA) . This international competition is available for students between 11 and 18 years old, is offered at minimal cost, and seeks to encourage long-term interest and skills development in science, technology, engineering, the arts and mathematics (STEAM). The Cubes in Space program encourages students to effectively engage in the following: meaningful scientific research, hands-on engineering, technology integration, project-based problem solving, inquiry, embedded arts objectives, and student-centered and cooperative learning opportunities. After creating an experiment that addresses an Earth and/or space-based need or problem, students submit proposals for experiments that fit within 4x4x4 centimeter cubes. After passing a Preliminary Design Review Panel, approximately 200 experiments are accepted annually and their designers, most in teams, are then eligible to participate in a Rocketfest; and this includes student presentations, networking and observing their experiments launched by a sounding rocket. Afterwards, students analyze data and share their findings globally. This action research project sought to discover if the implementation of a student-designed space payload program could increase engagement and continued motivation in STEAM. Students in the study participated in an after school space club, from September 2016 through June 2022, at an international American school, Academia Cotopaxi in Quito, Ecuador; during which 14 experiments were flown into space and two more expected in the next launch. Due to pandemic restrictions, the program was temporarily paused in March 2020, and then resumed online as of January 2021. Data was collected through both qualitative and quantitative sources, and utilized resources such as a FortusVedder-Weiss Continuing Motivation for Science Survey, a Likert-type attitude survey, parent surveys, photos, videos, interviews and observations. Additionally, a control group was utilized in grades five to seven for purposes of comparison. Data results overwhelmingly showed positive gains in the participants with regard to high engagement and continuing motivation in STEAM; thus contributing to a better understanding of ways in which to inspire students to pursue STEAM fields and interests, and for the benefit of humankind in a post-COVID world.