

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
On Track - Undergraduate Space Education (3)

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BARCELONA ZERO-G CHALLENGE: AN EDUCATIONAL PERSPECTIVE FROM A  
MEDITERRANEAN TECHNICAL UNIVERSITY

**Abstract**

We report on educational and research activities related to microgravity experiments on innovative parabolic flights conducted in Barcelona, operated by the Barcelona-Sabadell Aviation Club. A CAP10B single-engine aerobatic aircraft is used, operating in Visual Flight conditions (VFR). This development pioneered in 2006 the use of light aircraft for microgravity research. The 180 hp engine provides this particular aircraft with safety, reliability and little sensitivity to wind gusts. Results from test flights have shown a zero-g quality of at least 0.005 g for as long as 8.5 seconds. Challenge-Based Learning (CBL) is introduced herein, as a theoretical, pedagogical framework that enables motivation in students to pursue ambitious, focused goals, while they develop different technical and soft skills that are very useful for their academic and professional training. A student campaign consists of between 2 and 6 local flights. A local flight provides up to 20 parabolas. These educational campaigns are known as "Barcelona Zero-G Challenge", an international contest aimed at motivating students to conduct research in this field. More than 50 students have already flown their experiments on board the aircraft in previous educational campaigns, having published their results in relevant symposiums and scientific journals, and having completed with them their degrees. These campaigns have attracted media attention and have promoted public awareness on STEAM studies. A new edition of this contest is underway, with the winners expected to fly their experiment before the end of 2022. This ongoing edition is organized by UPC, the Barcelona-Sabadell Aviation Club and SGAC, the Space Generation Advisory Council. Diverse, multidisciplinary and international groups of 2 to 4 students are encouraged with an expert mentor advising them. Independent experts from the European Space Agency (ESA) Academy conduct the selection of the winner team. The

winner group receives a grant worth 2.500 euros to develop its experiment, and the opportunity to fly it in parabolic flight. Furthermore, students from our own University, UPC, have also the opportunity of designing and testing their experiments during their studies within the framework of this parabolic flights platform. Three key factors to succeed have been identified from our years of experience: 1- Strong involvement of students' associations, 2- International cooperation and 3- Quality of students' mentoring. In conclusion, this platform has shown to be excellent for educational and outreach campaigns within a Technical university such as UPC BarcelonaTech with a nearby Aviation Club close to the Mediterranean Sea.