

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

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## ENSURING SPACE RESILIENCE - LEARN TO FAIL, OR FAIL TO LEARN

**Abstract**

Coined by John F. Kennedy, “Space is hard”, is a famous saying in the space world. In February 2023 NASA and SpaceX launch of Crew 6 to the ISS was postponed due to technical difficulties only 2 minutes before launch. At the beginning of SpaceX, the company failed in 3 rocket launches with almost got its founder Elon Musk to bankruptcy before successfully launching the fourth rocket and becoming the company we all know. In September 2022 A Blue Origin rocket experienced a “booster failure” during an uncrewed launch of its New Shepard rocket. These are just the tip of the iceberg examples, as most space missions are delayed or experience minor or major failures. The fear of failure is common and can often prevent individuals from pursuing their goals and fulfilling their full potential.

At the Ramon Spacelab educational program, we embrace failure as a valuable learning experience capable of promoting personal and professional growth and resilience. The Ramon Spacelab is a research-based educational program, providing middle school students with a unique opportunity to plan and develop an experiment to be conducted in the International Space Station. Launched in 2016, the program has 6000 alumni operating worldwide: with over 1500 Israeli students annually and 500 students abroad from Singapore, Chile and Slovenia. To date, Spacelab students have launched 34 experiments to the ISS. The program advanced pedagogy is designed to encourage young students to major and excel in STEM fields as well as enabling middle schoolers to acquire necessary soft skills for the changing reality of the 21st century and future workforce. The program is designed so students are likely to fail, and to take the failure experience and learn from it. This is achieved by personal and group inquiry and by accepting that failure is a vital part of success in life and the space industry.

The educational methodologies will be presented, and an emphasis will be put on strategies dealing and learning from failure, and its contribution to success to the group’s experiment to space and as a skill that will contribute to the students further. Other STEM methodologies and soft skills acquired by our students throughout the program will also be discussed.