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# Sharing Science in the 21st century: a CUBESAT challenge for primary- & high-school junior engineers

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## Abstract

The launch of its first nanosatellite AMICaSAT in June 2019 by the Grenoble University Space Center (CSUG) creates an opportunity to reinforce science in a community of schools via the "Sharing Science" educational program developed in Grenoble since 2015. School "laboratories" comprising schoolchildren, college pupils, high school and engineering school students use the space engineering process, exchange and validate data and ideas as genuine researchers. Workshops are scheduled in May 2019, with oral presentations by the elementary school children (partly in English), project reviews, poster sessions, followed by science fair and a show about space exploration.

The CNES challenge: a CUBESat in my high school

A team of 20 high-school students from Cité Scolaire Internationale de Grenoble (CSI) were given the chance of evaluating a CUBESat kit for educational and outreach purposes at a primary and high-school level. The CUBESat educational kit was provided by CNES. It had been previously used to teach university students the process of satellite engineering via problem based learning. The CSI team reports here their achievements after 3 month of efforts, regarding technical, scientific, management and communication issues, the skills they had to develop and the difficulties they encountered.

The educational CUBESat in operation will be presented by the students with a computer as ground station, together with a "selfie" of the team taken by the sat camera, and the launch

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with a helium balloon of a 3D-printed "KUBE" structure designed for communication and outreach purposes. Short and long term perspectives of the project will be discussed.

The CSUG challenge: a Sharing Science community from primary school to University

During the academic year, 12 classes of elementary school students\* have taken off on the space exploration adventure triggered by the "friendly" AMICal Sat from CSUG.

After an accelerated engineering course ("spaghetti challenge"), the classes have taken ownership of the missions entrusted by a pool of 8 Phelma engineering school students as Teams Exobiology, Propulsion, Power Engineering, Material Sciences, Bioinspired Techs ... each mentored by high school students. Two lab sessions were built and conducted by the high school students according to the problem to be solved by the class. The engineering school students act as outside experts, boosting project authenticity.

School pupils discover that failure and risk are part of the innovation process. They are deeply motivated when they review their work with young boys and girls from high school or "professionals" in the field they can relate to. High school students develop general skills and the meaning of citizen engagement. Engineering students develop management skills as they are responsible for organizing the workshops and online communication within a virtual community. Building up this project between elementary and secondary school teachers is a key part of this project devoted to inclusive science in school and classes with children far from the scientific culture\*.

The CSUG is at the forefront of the project by providing the "trigger" for the project, cardboard models of the AMICal Sat (used in classes to address the concepts of mission, sensors and functions associated with the CubeSat system). The director of CSUG will give a talk during the workshops, discuss with the primary school pupils about their achievements, and give a live communication with some classes from Vostnotchy (Russia) where AmicalSat will be launched in June. A two-day teacher training was also offered by CSUG with the Maison pour la Science Alpes-Dauphiné, so that STEM teachers discover space science and engineering processes and the diversity careers in the space domain, via seminars and a role-play to design a satellite mission.

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The Sharing Science community:

\* 300 primary , > 50 high school, > 12 university students; > 30 educators.

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