

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
Hands-on Space Education and Outreach (8)

Author: Ms. Lauren Milord  
DreamUp, PBC, United States, lauren@dreamup.org

Ms. Carie Lemack  
DreamUp, PBC, United States, carie@dreamup.org

Mr. Johannes Wepler  
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany, Johannes.Wepler@dlr.de

DREAMCODER – RESPONDING TO A STEM CRISIS WITH AN INQUIRY-BASED SPACE  
EDUCATION CURRICULUM**Abstract**

While the need to motivate students to pursue and excel in science, technology, engineering, and mathematics (STEM) coursework is ever more apparent, the ability for educators to do so remains a challenge. A 2016 U.S. Department of Education report stated that a strong STEM education is one that “is culturally responsive, employs problem- and inquiry-based approaches, and engages students in hands-on activities that offer opportunities to interact with STEM professionals.”

DreamUp’s DreamCoder, an inquiry-based program geared primarily to middle school students (ages 11-14) provides educators with a relevant, inquiry-based, hands-on, and engaging curriculum that allows students to conduct an engineering investigation in space. Specifically, students conceptualize, design, and code a research idea that is transmitted to hardware on the International Space Station (ISS). Prior to this transmission, students test and iterate their code using replica hardware in their classrooms. Once the students’ code is executed on the ISS hardware’s sensors in microgravity, the students receive their data and present their results to their community. This presentation can be done in a way that reflects the students’ particular interests, for example through a podcast, blog post, infographic, or a traditional scientific report. As such, students’ personal values can be incorporated beginning with the inception of their project idea, and concluding with the final presentation, thereby increasing their engagement in the program and in STEM subjects more broadly.

Preliminary data from beta and pilot tests of DreamCoder in the United States, coupled with results from surveys of students who participated in the program under its Australian moniker, Cuberider, have demonstrated the program’s strength. A relevant example is found at Sydney Secondary College Leichhardt in Australia, where approximately 230 students took part in the program’s pilot year in 2018. After participating in the program, 75

Data gleaned from the US pilot and Australian implementation of the program is being used to adapt DreamCoder to the context of a classroom in the United States while maintaining students’ freedom to explore the topics in space that they find most exciting and interesting. These adaptations and improvements will allow for DreamCoder to be used by educators in traditional and non-traditional settings to inspire a diverse range of students in Australia, the United States, and beyond.