

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Ignition - Primary Space Education (1)

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STARWARD STEM: INTEGRATING SPACE STATION EXPERIMENTS AND TRANSDISCIPLINARY
PROJECT-BASED LEARNING IN A K12 SCHOOL DISTRICT IN NORTH CAROLINA, USA**Abstract**

In Cumberland County, North Carolina, USA, 4,600 K12 students, including students from seven elementary schools, and 300 educators are participating in the three-year STARward STEM program, in which educators use transdisciplinary project-based learning (PBL) to guide students to launch experiments to the Space Station. This hands-on approach brings real-world projects into classrooms, blending subject areas and equipping students with critical skills necessary to succeed in the 21st century.

STARward STEM focuses on promoting the inclusion of underrepresented populations in STEM careers, is funded by the United States Department of Defense, and is led by RTI International in collaboration with Cumberland County Schools (CCS), the US Space and Rocket Center, the Emerging Technology Institute, and DreamUp.

In STARward STEM's planning year, program facilitators designed curricular materials, recruited industry mentors, and trained teacher ambassadors to spearhead the program in their school communities. RTI and DreamUp also consulted on how to integrate spaceflight experiments into a traditional K12 school district, based on RTI's expertise in transdisciplinary PBL and lessons learned from DreamUp's experience supporting over 500 student microgravity payloads and scaling spaceflight experiment programs across school organizations. In particular, DreamUp consulted an experienced educator who has brought spaceflight experiments to students across a charter school network based in California, USA. To cap this year, RTI conducted a Summer Institute for the teacher ambassadors in July 2021.

In year 2 (School Year 2021-2022), teachers are utilizing transdisciplinary PBL to guide their students through a spaceflight experiment design challenge, and a panel of experts will select three student experiments destined for the Space Station at an Expo on April 12, 2022. During this time, RTI is also iterating upon and improving the STARward STEM curriculum based on student and educator feedback.

During Year 3 (School Year 2022-2023), Cumberland County students will participate in a second design challenge resulting in three more spaceflight experiments. Ultimately, by STARward STEM's planned conclusion in August 2023, six student teams build and execute their own unique experiments on the Space Station, and RTI will also have helped CCS to develop skills and infrastructure for using transdisciplinary PBL to incorporate spaceflight experiments in a traditional K12 setting.

Ultimately, the successful implementation of this program will allow STARward STEM to be replicated in subsequent years in Cumberland County as well as in other school settings, lowering the barriers for educators and students to access microgravity research on the Space Station and beyond.