

# The Embedded Teacher Project: Parabolic Flight Research for Middle School Classrooms

Kevin M. Crosby<sup>1</sup>, Becky Busby<sup>2</sup>, Ronda McCarthy<sup>3</sup>, Laura Tomlin<sup>3</sup>, Lisa Werner<sup>5</sup>

<sup>1</sup>Carthage College [kcrosby@carthage.edu](mailto:kcrosby@carthage.edu); <sup>2</sup>Frank Long Elementary School, Hinesville, GA, [bbusby@libertyk12.ga.us](mailto:bbusby@libertyk12.ga.us); <sup>3</sup>St. Theresa Catholic School, Des Moines, IA, [romccarthy@stsdsm.com](mailto:romccarthy@stsdsm.com); <sup>4</sup>Salado Middle School, Salado, TX, [laura.tomlin@saladoisd.org](mailto:laura.tomlin@saladoisd.org); <sup>5</sup>St. Bruno Parish School, Dousman, WI, [lisa.werner@stbrunoparishschool.com](mailto:lisa.werner@stbrunoparishschool.com).

## Abstract

The Embedded Teacher Program is a design-build-fly experience for middle school STEAM teachers at (primarily) Title I schools. The program invites applications for a two-day workshop on microgravity sciences, selects ten teachers to attend the workshop, and then trains the teachers to develop curriculum modules based around flight experiment proposals. Several teachers from among workshop participants are selected to fly their experiments on a parabolic flight campaign, “embedded” with other researchers with whom teachers interact and continue to learn. Teacher experiences are documented by videographers and each experience is translated into a curriculum module for wider dissemination and use.

The vision of the ET program is to inspire K-12 students to pursue careers in STEM and is achieved through two mechanisms. The first is by partnering with committed K-12 space educators to bring accessibility of space research to students who do not normally see themselves represented in science, much less space science. The second element is leveraging the experiences of flight participants to a broader audience through digital dissemination of their experience using the National Space Society’s SpacEdge Academy platform and the DreamUp Curriculum platform.

## ETP Objectives and Outcomes

The learning goals for this project are to provide middle school students with an understanding of the accessibility, importance, and relevance of STEM

and space careers. Outcome tracking is targeted to teacher populations (N=20) via pre- and post-workshop evaluations on impact and utility of workshop materials, in flight participant tracking (N=10) via program evaluations and assessments, and in student populations (N=8,000) through pre- and post-assessments targeting STEM engagement and content objectives.

## Benefits

The ET program produces media-rich curriculum modules aligned with standards and embeds industry-standard skills development through flight experiment development. The project is centered in research-based experiential learning: students are introduced to relevant concepts, conceive experiments to verify the concepts, develop hypotheses connecting the experiments and concepts, build the experiments, and test the hypotheses in both ground and flight experiments. Diversity and inclusion are central to the project vision and objectives around changing attitudes about the accessibility of STEM careers among traditionally underrepresented student populations.

## Partners

Program partners include the Wisconsin Space Grant Consortium, Carthage College, ZERO-G Corporation, National Space Society, and DreamUp. Funding is provided by the NASA Flight Opportunities Program, the International Space Station National Laboratory, and the Wisconsin Space Grant Consortium.



Figure 1. ETP 2022 Spring Cohort fly experiments in standing waves, surface tension driven flow and microgravity liquid shapes.