NASA MUREP Aerospace Academy (MAA)

Award Year: 2018

Title: MUREP Aerospace Academy Replication and Scaling (MAARS) Project

Organization: California State University, Fresno

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Summary: Partners: The Fresno State Kremen School of Education's Office of Community Based Learning (CBL) will partner with California Teaching Fellows Foundation (CTFF), Fresno County Superintendent of Schools (FCSS), and California Region VII STEM Hub to scale its existing MAA Program.

Target Audiences: 3,000 Fresno County 1–12 graders, 95.2% of whom are ethnic minorities; families of these students; and Fresno State preservice teachers, 85% of whom are minorities.

Method of Approach: The proposed MUREP Aerospace Academy Replication and Scaling (MAARS) Program will expand the CBL-CTFF partnership's existing MAA Program to increase the NASA STEM literacy of underserved Fresno County students, families, and preservice teachers, while conducting an evaluation study to document impacts and lay the groundwork for MAA scaling throughout California. Fresno State preservice teachers will integrate NASA-themed ELOs into FCSS expanded learning programs (afterschool, Saturday, summer). Family Café will engage parents/caregivers in research-based strategies, such as advising parents on the value of STEM education; improving parent STEM knowledge and confidence to partner in their children's education; and linking families to STEM resources.

Objectives and Outcomes: Goal 1: Increase underserved students' STEM interest, engagement, literacy, and skills by delivering technology-rich STEM Curriculum Enhancement Activities using content from NASA Mission Directorates and Communications Campaigns. Obj. 1.1: 1,500 students per year will complete at least 36 hours of hands-on STEM Curriculum Enhancement Activities (CEAs) using NASA content. Obj. 1.2: 85% of students will demonstrate an increase in STEM knowledge, literacy, and skills. Obj. 1.3: 85% of students will demonstrate increased STEM interest and engagement.

Goal 2: Increase parents'/caregivers' STEM literacy and capacity to support their children in STEM. Obj. 2.1: 85% of MAA students will have at least one family member who participates in one or more Family Café events. Obj. 2.2: Participation in Family Café will be positively correlated with an increase in the level of STEM collaborations at home.

Goal 3: Increase underserved preservice teachers' NASA STEM content knowledge and pedagogical skills. Obj. 3.1: 24 Fresno State preservice teachers will serve as MAA Instructors. Obj. 3.2: 90% of MAA Instructors will demonstrate an increase in NASA-specific STEM content knowledge and pedagogical skills. Obj. 3.3: 90% of MAA Instructors will report increased competence and confidence in teaching STEM curriculum.

Goal 4: Conduct a rigorous evaluation that documents impacts and lays the groundwork for MAA sustainment and scaling. Obj. 4.1: Complete an impact study that documents the relationship between MAA participation and increases in student STEM interest, literacy, and skills. Obj. 4.2: Broadly disseminate evaluation results to formal and informal educators to garner support for the program. Obj. 4.3: Secure contracts with districts to replicate MAA.

Relevance to NASA Themes and Use of NASA Content: Over the past decade, CBL has collaborated with NASA Ames Research Center and STEM educators to develop CEAs aligned with NASA Mission Directorates and Communications Campaigns, and the MAARS Program will leverage these NASA resources, including (1) Explorations on Planet X, a 45-hour curriculum based on NASA BEST activities; (2) existing NASA MAA CEAs covering STEM areas related to all Mission Directorates; and (3) new 9–12-hour technology-rich CEAs that CBL has developed over the past three years of implementing MAA, which explore NASA topics such as rocket science, artificial intelligence, planetary exploration, coding, 3-D printing, and unmanned remotely operated vehicles. The program will also incorporate NASA resources, such as digital badging, NASA Smartphone Apps, NASA Wavelength, and materials available through Fresno State's NASA Educator Resource Center.