

# Multiverse

## Increasing Diversity in Earth and Space Science through Multicultural Education

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### Abstract

Multiverse at the University of California, Berkeley Space Sciences Laboratory provides earth and space science educational opportunities and resources for a variety of audiences, especially for those who are underrepresented in the sciences. **By way of carefully crafted space and earth science educational opportunities and resources, we seek to connect with people's sense of wonder and facilitate making personal ties to science and the learning process in order to, ultimately, bring the richness of diversity to science and make science discovery accessible for all.** Our audiences include teachers, students, education and outreach professionals, and the public. We partner with NASA, the National Science Foundation, scientists, teachers, science center and museum educators, park interpreters, and others with expertise in reaching particular audiences. With these partners, we develop resources and communities of practice, offer educator workshops, and run events for the public.

We will present on our pedagogical techniques, our metrics for success, and our evaluation findings of our education and outreach projects that help us towards reaching our vision: **We envision a world filled with science literate societies capable of thriving with today's technology, while maintaining a sustainable balance with the natural world; a world where people develop and sustain the ability to think critically using observation and evidence and participate authentically in scientific endeavors; a world where people see themselves and their culture within the scientific enterprise, and understand science within the context that we are all under one sky and on one Earth.**

### Multiverse @ UC Berkeley, Space Sciences Laboratory

Multiverse is housed at the University of California, Berkeley's Space Science Laboratory (SSL). SSL is a research unit internationally recognized for its high-profile space science missions such as the MAVEN mission to Mars, the THEMIS-ARTEMIS missions researching the Earth & Moon's magnetosphere, and the upcoming ICON mission exploring the Earth's ionosphere. Multiverse works directly with SSL scientists, engineers and researchers to bring cutting edge science, technology and engineering to students, teachers, informal educators and the general public.



Families and students engaged in science education at the Space Sciences Lab during Cal Day Open House.

### MAVEN Mission Leadership collaboration with CU Boulder

The MAVEN team shares our enthusiasm and excitement about Mars, space, and science in general through programs that meet the needs of specific audiences—formal K-12 teachers; informal educators; and members of the general public.



NASA Contract #NNH10CC04C

### MAVEN Educator Ambassador Project In collaboration with CU Boulder and Goddard

The MAVEN Educator Ambassador (MEA) Program provides professional development workshops for middle school teachers on the topics of magnetism and spectroscopy, and how they connect to MAVEN science. The project educators benefit from a train-the-trainer approach: MAVEN personnel train teachers in the project, and those teachers go on to train a second tier of teachers, learning valuable skills in presenting to their colleagues.

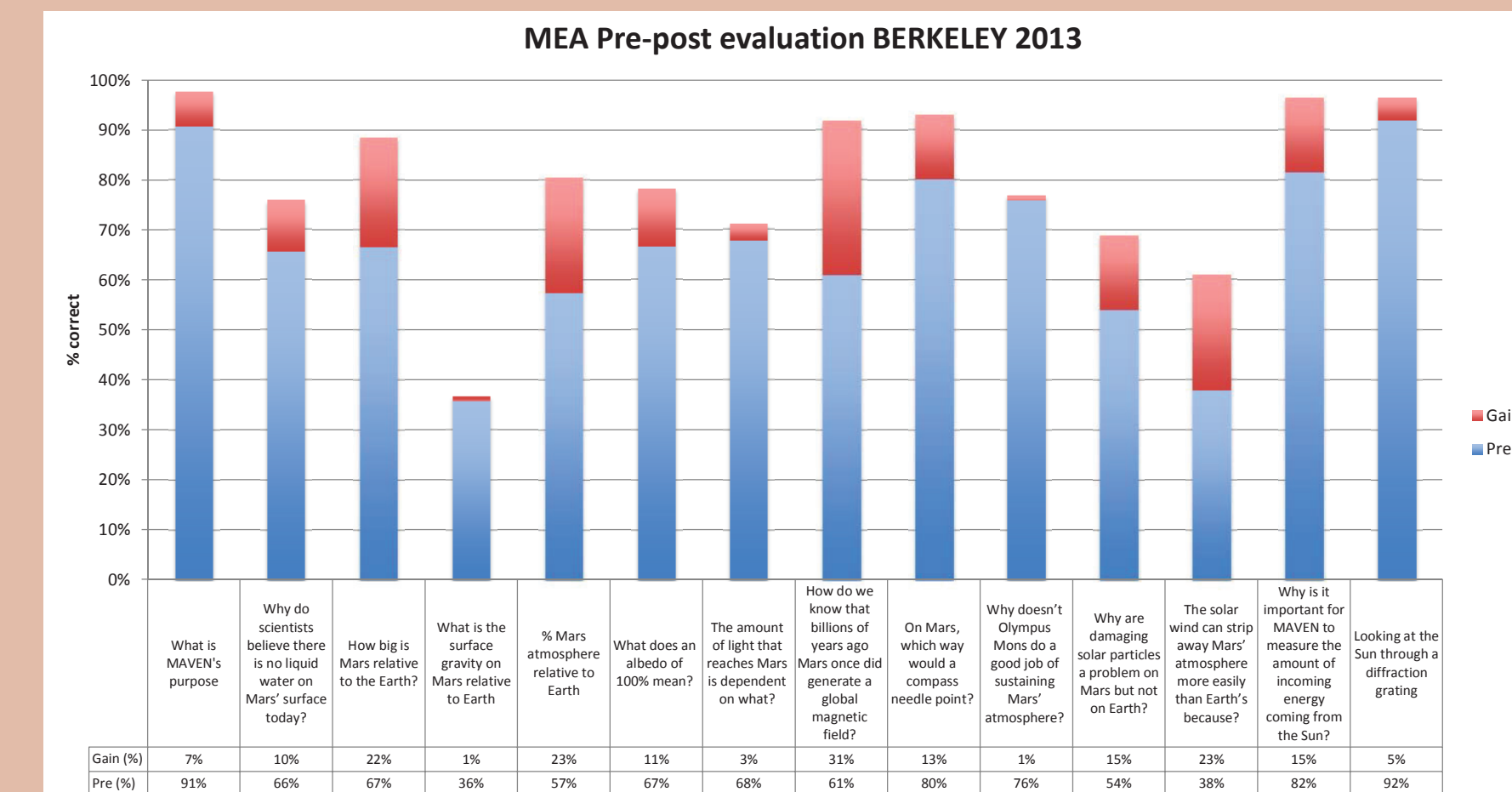
Right - MAVEN Education program numbers of people engaged up through March 2014.



The 30 MAVEN Educator Ambassadors from 2013 at the University of California, Berkeley.

MAVEN Reach March 2014					
Projects	Number of Participants	ACTUAL REACH Number of Audience Members	ANTICIPATED REACH BY PARTICIPANTS Number of Colleagues	Number of Students	Number of Individuals
Formal Education	400	610	7,007	184,921	192,938
Informal Education	23				613
Public Outreach	191,095			662,379	853,474
TOTAL	191,518	610	7,007	184,921	662,992 1,047,040

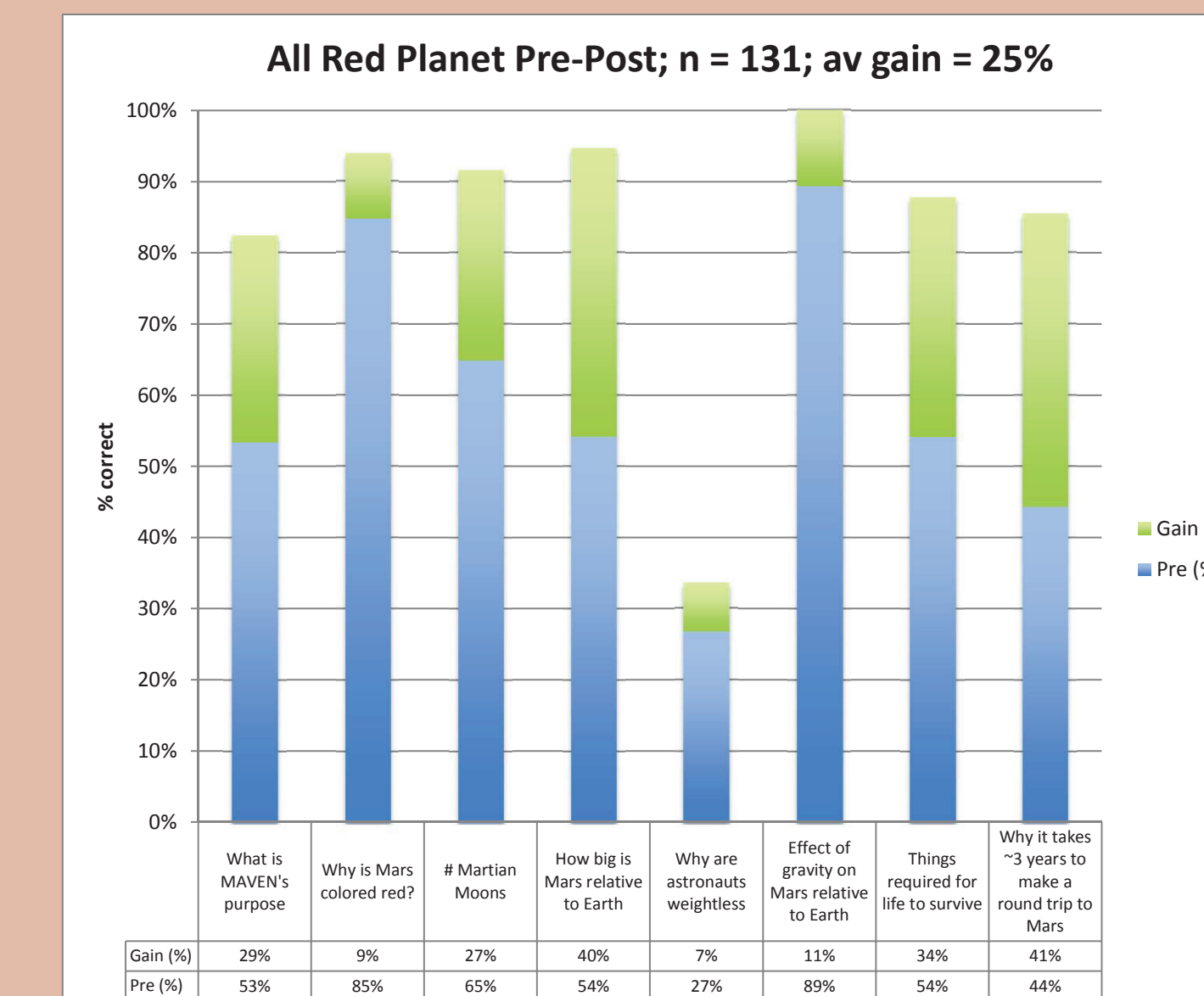
Below - Pre- and post-test findings from 87 MEA.



### Invisible Mars

**In collaboration with Lunar Planetary Institute**  
The Invisible Mars program uses the existing national Science On a Sphere program, planetarium programs, and other informal science education venues using visuals to engage the public in science to develop a facilitated image-based program about MAVEN and Mars science. This project includes professional development opportunities for museum practitioners on the scripts and images created by the MAVEN education team.

131 participants (right) in multiple week-long workshops.



### Imagine Mars through Native Eyes In collaboration with the Indigenous Education Institute

Imagine Mars through Native Eyes brings Earth, Mars, and space science to Native communities outside the classroom connected to classroom learning. Imagine Mars through Native Eyes builds on the national Imagine Mars program and is currently focused on students in Flagstaff, AZ at the STAR school (grades 5-8). Students explore their home community and decide what cultural, scientific, and artistic elements are important to traveling to and living on Mars.



Star School 5th and 6th graders ask questions about MAVEN.

### Native Universe: Indigenous Voice in Science Museums In collaboration with Indigenous Education Institute, 'Imiloo Astronomy Department, COSI Life Long Learning Group, & Native Pathways

Native Universe supported 3 major science museums in building institutional capacity to educate the public on issues of environmental change as well as the human relationship to nature from the perspectives of Indigenous peoples. The museums that participated included the Oregon Museum of Science and Industry (OMSI) and the Arizona Sonora Desert Museum (ASDM). Each museum deepened working relationships with local Native American communities from Reservations to urban populations. Each museum also expanded their working relationships with new Native American communities. Programs and exhibit elements were added to each museum showcasing the science understandings developed out of these relationships.



Native Youth Panel at the Durango Power House Science Center during the Native Universe residency at this museum in Durango, CO.



Native Universe team members and museum staff at the 'Imiloo Intensive professional development workshop in Hilo, HI.

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### NASA Opportunities in Visualization, Art and Science (NOVAS)

Led by members of UC Berkeley's Multiverse education team at the Space Sciences Laboratory, in partnership with UC Berkeley Astronomy, NASA Opportunities in Visualization, Art and Science (NOVAS) is a NASA-funded program mainly for high school students that explores NASA science through art and highlights the need for and uses of art and visualizations in science. The project's aim is to motivate more diverse young people (especially African Americans) to consider Science, Technology, Engineering, and Mathematics (STEM) careers. The program offers intensive summer workshops at community youth centers, afterschool workshops at a local high school, a year-round internship for those who have taken part in one or more of our workshops, public and school outreach, and educator professional development workshops.

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NOVAS interns painting exoplanet landscapes with Lynette Cook.

### Eclipse Megamovie Project In collaboration with High Altitude Observatory/NCAR, Google & many others

The Eclipse Megamovie Project brings people together to share their images and experiences around total solar eclipses and other astronomical events. Our hope is to create ultra-high time resolution movies of these spectacular natural events using your images. Our inspiration comes from the upcoming 2017 Eclipse, which will span the United States from Oregon to South Carolina. We imagine that you may be able to help the solar scientists on our team understand more about the Sun by providing quality, high resolution images of the eclipse in 2017.

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