INCREASING STUDENT ENROLLMENT AND RETENTION, AND COMMUNITY INVOLVEMENT IN STEAM CAREERS AND AWARENESS CENTERED IN PLANETARY SCIENCE THROUGH NASA’S SOLVE PROGRAMS AND LUNAR AND PLANETARY INSTITUTE’S AUGMENTED REALITY ACTIVITIES IN SERVICE LEARNING AND INTERNSHIP PROGRAMS. J. G. Olgin1,2, 1El Paso Community College – Physics Department (9570 Gateway N. Blvd, El Paso, TX 79924), 2University of Texas at El Paso – Geological Sciences (500 University, El Paso, TX 79968).

Introduction: The recent successes of education – public outreach events at the El Paso Community College (EPCC), such as the 2017 solar eclipse and Earth Science Day event’s in October 2018 and 2019, centered around the incorporation of Service Learning Program (SLP) participants and collaborations with universities and government and non-government organizations (NGO’s). These events engaged students to learn more about interdisciplinary themes and how to apply them toward their career goals and science awareness. The 2019 academic year showcased various activities that helped toward this goal. The 2020 academic year will host more integrated activities for students and community members to gain proficiency in conducting citizen science work.

Background: The incorporation of service learning in the geosciences is well documented [1-3], including its impact in astronomy education [4]. For each event, SLP’s role proved to be beneficial to the overall success of each event; broadening EPCC’s reach to students and the community.

Solar Eclipse 2017. This event provided the opportunity to teach the audience about solar eclipses through observation, NASA’s live feed from sites of totality, and invited the audience to participate recording temperature variations during the eclipse using the NASA GLOBE Eclipse app (fig 1).

Earth Science Day’s 2018 and 2019, SLP participants engaged the public in investigative activities ranging from geology tours, use of artificial reality (AR) sandbox, virtual reality (VR) tours of planetary environments, and talks on astrobiology and atmospheric processes. The event highlighted collaborations with EPCC’s faculty, staff and the SLP and Tejano Passport programs, along with local educational institutions and research organizations (e.g. USGS, Texas Park and Recreation). These collaborations were further enhanced through artistic representation of geologic events – modeling the “Dance your Ph.D.” approach – which helped cement the learning experience to the public. ‘Industrial sculptures’ made from musical instruments that were also designed and used as methane detectors brought insight on how man-made instrumentation can be interpreted in the merging of science and art (fig 2).

Goals. SLP integration and UTEP internship programs into these events helped achieve the public outreach goals of STEAM recruitment, awareness, and community learning by providing the necessary groundwork for successful program execution. The aim for the spring, summer and fall semesters of 2020 will include the following activities:

Planetary Analogs: EPCC students in physics and astronomy classes and participating in SLP will conduct cloud and dust storm observations using NASA’s GLOBE Observer app. They will learn how to qualitatively and quantitatively study atmospheric processes; downloading data from weather stations at each EPCC campus to complete GLOBE atmospheric protocols to better understand these atmospheric processes. Planetary science students will proceed further by participating in Zooniverse’s Planet 4: Ridges program and study atmospheric-surface processes on Mars and help contribute to data analysis for the program. Students in SLP will help instruct other students and the general public to engage as citizen science and further contribute to the GLOBE and Planet 4: Ridges project.

Lunar Planetary Institute – AR and VR Activities. EPCC debuted the planetARY demo at Insight’s Space Festival in October 2019 (fig 3). Building on this success, EPCC’s SLP will promote LPI’s planetARY activities, and will lead the general public on recreating planetary surfaces using an AR Sandbox run by the EPCC Transmountain Library (fig 4).

Planet 9. SLP students will help search for planet nine and other astronomical bodies through Zooniverse’s Backyard Worlds: Planet 9 program. They will then present their work at EPCC’s Earth Science Day event in October 2020.

Measuring Program Efficacy: EPCC mini-mester (8 week) astronomy courses and a designated physics class will be the target of measuring academic progress. Surveys will be conducted to monitor student’s knowledge prior to and after completion of the class to test these initiatives presented here made an improvement in learning. Spring, summer and fall classes will incorporate the GLOBE Observer and Planet 4: Ridges activities. UTEP Geological Sciences Educational Internship in the Physical Science (EIPS) interns will help guide class lecture development and execution of these interdisciplinary laboratories. Results will published on the efficacy of these activities.
Future Implementation: EPCC plans to continue these events with incorporation of activities provided by NASA and other related agencies to help make such events more robust, promote planetary science, and encourage those in the community to pursue STEAM related careers. Future collaborations with foreign institutions participating in NASA’s GLOBE and SOLVE programs will further enhance figure endeavors. STEAM interactive displays (i.e. planetary kiosk) are in development and will be implemented at the EPCC Transmountain Library. Collaborations with solar system ambassadors are planned for this academic year as well.

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Fig 1: Top row: solar eclipse event. Credit KVIA Bottom row: lunar event. Credit: El Paso Herald Post

Fig 2: Highlights from Earth Science Day, October 17, 2018 at EPCC. Participation of various agencies (e.g. USGS) and performances by EPCC Dance and EAR 1 project educated the general public in terrestrial and planetary science.

Fig 3: LPI’s planetARy activity at Insight Museum’s 2nd annual Space Festival.

Fig 4: AR sandbox used for recreating planetary landscapes.