

**INCREASING STUDENT ENROLLMENT, ACADEMIC CURRICULUM AND COMMUNITY INVOLVEMENT IN STEAM CAREERS AND AWARENESS CENTERED IN PLANETARY SCIENCE THROUGH NASA'S SOLVE PROGRAMS, LUNAR AND PLANETARY INSTITUTE'S AUGMENTED REALITY, AND ZOONIVERSE'S CITIZEN SCIENCE ACTIVITIES IN SERVICE LEARNING.** J. G. Olgin<sup>1,2</sup>, <sup>1</sup>El Paso Community College – Physics Department (9570 Gateway N. Blvd, El Paso, TX 79924), <sup>2</sup>University of Texas at El Paso – Geological Sciences (500 University, El Paso, TX 79968).

**Introduction:** The successes of education/public outreach (E/PO) 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 proved challenging amidst a pandemic; however existing online resources helped facilitate the promotion and continuation of E/PO. The goal for 2021 is to further expand the use of online citizen science projects to augment STEM classes, specifically in the geosciences and outreach through EPCC's service-learning program (SLP) and Tezano Passport program (TPP).

**Background:** The incorporation of service learning in the geosciences is well documented [1-3], including its impact in astronomy education [4]. SLP's role proved to be beneficial to the overall success of each event; broadening EPCC's reach to students and the community. In general SLP also improved curriculum, especially in geoscience classes [5]. Increased application of SLP at EPCC in the physical sciences will help support current online curriculum and further increase virtual collaborations among students, faculty and the scientific community.

**Goals.** The integration of TPP, an outreach program that engages and rewards EPCC students, faculty and staff in community activities, and SLP will promote the public outreach goals and curriculum enhancement in the following areas:

**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 and its effects on the environment. Planetary science students will proceed further by participating in Zooniverse's Planet 4 program and study atmospheric-surface pro-

cesses 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 project.

**Lunar Planetary Institute – AR and VR Activities.** EPCC debuted the planetARY demo at Insight's Space Festival in October 2019 (fig 1). Building on this success, EPCC's SLP will promote LPI's planetARY activities through online Tezano Passport and SLP projects geared to assist participant's knowledge in the planetary exploration.

**Perseverance Mars Landing.** SLP and TPP participants will engage in learning modules that will accompany the viewing of Perseverance landing in February 2021. This event will help students learn more about space exploration and how other citizen-science activities contribute toward planetary research.

**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 in virtual events and conferences in 2021.

**Measuring Program Efficacy:** Designated physics, astronomy and geology courses 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 classes will incorporate the GLOBE Observer, Planet 9, LPI's planetARY AR, and Planet 4 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: LPI's planetARy activity at Insight Museum's 2nd annual Space Festival.*

**References:** [1] B. F. Branco, et al. (2017) *AGU*, Abstract ED53C-0176. [2] S. Oconnell et al. (2016) *AGU*, Abstract ED13D-0948. [3] S. Truebe and A. L. Strong. (2016) *AGU*, Abstract ED13D-0950. [4] M. Orleski. (2013) *Phys Teach*, 51, 535 – 538. [5] Megk & King, (2018) *J. Geol. Educ*, 43, 461 – 465.