

Title: Information Technology Experiences for Students and Teachers Using Simulated Tele-Science Exploration of Mars – Expansion and Proliferation of Capacity

Institution: Southwestern Indian Polytechnic Institute

State: New Mexico

P.I.: Alexander McMahon

Summary: The Information Technology Experiences for Students and Teachers Using Simulated Tele-Science Exploration of Mars – Expansion and Proliferation of Capacity project focuses on developing and implementing an engineering and robotics immersion program for high school and undergraduate students. The funds will complete the last two levels of a four tier project funded previously by NASA TCU-ELO 2014-2017 program at Southwestern Indian Polytechnic Institute (SIPI). The project includes the following stages: an introductory level of foundations in space sciences and technologies for grades 6-9; a basic level with simulated Mars exploration for 10th graders; an intermediate level for 11th graders that simulates Mars Exploration through the addition of ten to fifteen hands-on tele-presence robotic missions using the SIPI Large Mars Yard facility; and a final advance level focused on research and development in rover technology designed for grades 12, 13, and 14. The project will have an intra/inter-generational experiential learning model component that will advance both the program development and its operation. This model involves graduate students down to middle school students mentoring their younger near-peers. The current proposal will expand the reach of the previously funded project by including partnerships with three other Tribal Colleges and their feeder high schools. These three institutions will collaborate with the NASA Swarmathon Program to conduct exploratory missions on the already existing Large Mars Yard facility at SIPI. Participating Tribal College students will experience authentic science and technology explorations that will motivate students in their pursuit of STEM studies and careers.

Intrinsic Merit: This project has high intrinsic educational merit. The project continues to develop a previously successful project resulting in the engagement of a large number of American Indian students in STEM, it focuses on current NASA-driven topics of robotics and programming, and its students will learn about system integration, a very important approach for learning STEM and understanding complex systems. Additionally, the matured project design is based on a traditional intra/inter-generational experiential learning model that implements learning tactics from American Indian communities. Finally, the hands-on activities described in the proposal are an effective way to engage students in STEM projects that emphasize creativity.

On the technical merit side, the project work and management plans are well defined in this proposal. It includes a diverse project team with a strong expertise in science, technology, education, outreach, and teaching in Indian Country. Additionally, SIPI has the instructional technology capacity as well as the use of the University of New Mexico science and technology resources. Finally, each TCU partner in the proposal has already identified their collaborating high schools whose students matriculate to their institutions.

NASA established MUREP for American Indian Alaskan Native STEM Engagement (MAIANSE) to utilize NASA's unique contributions in collaboration with TCUs and tribal-serving institutions to improve the overall quality of the Nation's STEM education. This project seeks to expand outreach activities between NASA and TCUs to increase their access to NASA's unique science and exploration assets and data in the creation of experiential learning opportunities for students. Additionally, the MAIANSE activity provides opportunities for TCU faculty, staff, and students, as well as high school students who are likely to matriculate to TCUs, to engage in NASA-related STEM scientific research and engineering activities.