

ENABLING A DIVERSE AND INCLUSIVE STEM WORKFORCE BY IDENTIFYING AND MITIGATING THE BARRIERS TO SUCCESS. S. Klug Boonstra¹, D. Garcia¹, K. Kretke², A. Acuña¹, M. Storksdieck³, S. Buxner⁴, H. Fischer³. ¹Arizona State University, School of Earth and Space Exploration, ASU Mars Space Flight Facility, 201 E. Orange Mall, Tempe, AZ 85278-6305, sklug@asu.edu; ² Southwest Research Institute, 1050 Walnut St. #300, Boulder, CO, 80302; ³ Oregon State University, 1701 SW Western Boulevard, Corvallis, OR 97333

Introduction: Inclusion, diversity, equity, and access (IDEA). The ideas and opportunities that these words represent are critical in determining equitable career pathways of NASA's emerging STEM workforce. To achieve a diverse workforce, there needs to be a recognition that not all education is equal and that barriers (sometimes hidden barriers) that can be in place, preventing some who want to achieve a STEM degree from doing so. Understanding and investigating why students either don't make it into or leave a STEM career pathway is a crucial need if programs are to be designed equitably to provide workforce development for all who want it.

"Looking under the hood" to see what is broken: The Lucy Student Pipeline Accelerator and Competency Enabler (L'SPACE) Program is a NASA-funded, virtual STEM workforce Development Program that focuses on offering undergraduate STEM students relevant technical workforce training using NASA-focused projects. As the student collaboration program for the Lucy Mission, L'SPACE re-imagined how to provide technical workforce preparation to students attending a US College or University at scale. The core leadership of the L'SPACE Team is intentionally diverse, drawing from varied educational experiences and cultures and is continually seeking ways to be more impactful through the lens of IDEA.

The L'SPACE Team's initial focus was to first identify the barriers where STEM undergraduate students struggled to move forward, either in attaining skills or being able to take advantage of opportunities in which they could gain experience. Once identified, program design elements were added to mitigate those barriers to enable success instead of failure. L'SPACE is designed to be fast-track, and iterative in nature. The program design is organic and evolves rapidly, based on evidence of need, participant input, or a change in workforce needs.

Metrics for Success: So, what does success look like in terms of inclusion, diversity, equity, and access? For L'SPACE, gathering metrics and the use of evaluation tools have been essential to give our program leadership insight into how well our program is performing in the areas of IDEA. Questions that help us determine our overall success and highlight where additional work needs to be done. For instance, "Are the

people participating in the L'SPACE Program representative of the demographics our program is desiring to achieve? If not, why not? Are we being inclusive in our language and program design? Identifying who is not participating and investigating the reasons as to why helps our leadership team to identify ways to continually update and redesign our program to be more inclusive, equitable, and accessible to all who are seeking STEM success.

Our team of evaluators have set up surveys and have regularly interviewed with our Lucy Interns and L'SPACE students. These metrics, along with our data from the applications have given us actionable ways that we have changed our recruitment, approach to working with the project teams, and identifying the challenges that have needed to be mitigated for student success. Some of the student challenges our team has identified within our participants are homelessness, food insecurities, PTSD, victims of domestic violence, lack of high-quality instruction in earlier education experiences, imposter syndrome, lack of role models, lack of funding, and condescending faculty, to name a few. These types of challenges cannot all be solved through our program. However, acknowledging them as challenges, we can help the students work through solutions and see what is possible beyond them.

From our experience, we have learned that some traditional methods for students to gain such technical workforce experience can be challenging and present limitations that can exclude some students from participating. A common example of a workforce experience barrier is internships. Traditional internships for student who are in lower socioeconomic situations, traditional internships are very often a "break-even" proposition as students usually use their internship stipends to pay for room, board, and transportation to participate. Students who need to earn or supplement their school funding during summer employment often cannot afford to take advantage of summer internships. Students who have family obligations (children or elder care) cannot relocate to take advantage of internships offered elsewhere. Many barriers are more limiting for students of color and students who are of lower socioeconomic status.

These challenges represent significant barriers to achieving success in STEM. The L'SPACE Program works with students to help them understand their future

can be successful, even when faced with past or current difficulties. We offer one-on-one mentoring, resources, and skill modules to help them build on their success.

Making Progress... After 3-years of implementation, the L'SPACE Program is seeing gains in diversity, success in students getting experience and getting hired in STEM career positions. By offering virtual training that can be done in addition to school at no cost, students attending any school within the US can gain workforce competencies and practice that aren't dependent on who they know, where they live, or what skill levels they have.

The L'SPACE Program Academies - Mission Concept Academy (MCA) and the NASA Proposal Writing and Evaluation Experience (NPWEE) are offered 3 times per year, and last for 12-weeks. Each academy can accept up to 500 students and are very interactive in nature. Academy participants and alumni are also eligible for Lucy Mission internships which have been modified to remove inequitable barriers to participation.

To date, over 4,500 students have participated in L'SPACE Programs, students from 650+ US colleges and universities (248 community colleges and 249 minority-serving institutions) across all 50 states, Puerto Rico, and Guam. Students of color represent 41% of participants, and female students represent 40% of participants. L'SPACE has a completion rate of over 93% and represents 393,480 hours of STEM workforce development.

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