



Pre-College STEM Programs: A Showcase

THE FUTURE NEEDS A PUSH

JULY 2023

FEATURED

HIGHLIGHT THEMES

STUDENT VOICE

FAMILY ENGAGEMENT

DUAL ENROLLMENT

RESOURCES IN ACTION

RECRUITMENT

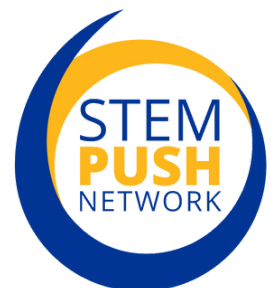
Through our Networked Improvement Community (NIC) - our Learning Engine - STEM PUSH works with more than 40 pre-college STEM programs (PCSPs) to strengthen their capacity to support Black, Latina/o/e and Indigenous students on a pathway to STEM undergraduate study.

Within the NIC, PCSPs participate in learning cycles to test small changes or “change ideas,” rooted in our theory of improvement, which identifies key levers we believe will increase programs’ ability to serve students. The learning from these small tests of change can then be used by other out-of-school providers to better serve Black, Latina/o/e and Indigenous students in STEM.

Each year, STEM PUSH convenes the entire network to share areas of improvement, data on network progress and accomplishments. Convenings include sharing from learning cycles within the NIC, as well as grassroots up learning from the Network.

Gatherings like these and on-going communication within our learning engine have generated valuable information for the field - information that will allow us to create lasting systemic change in the college admissions process. By learning together in the NIC, PCSPs also feel comfortable to share best practices that have worked within their programs outside of official learning cycles, such as family engagement practices.

As we continue our research and work to broaden participation in STEM, STEM PUSH reflects on the learning shared this year - both within NIC learning cycles and unofficial sharing within the Network. This issue will highlight some of the key learnings and ideas shared during the latest STEM PUSH Network convening.





Joaquin Bustoz Math-Science Honors Program

Highlights

MARCH 2023
CONVENING

Student Voice

Recruitment

**Family
Engagement**

Mentoring

Dual Enrollment

**Resources in
Action**

Themes

Shared Learning from the 2023 Convening

.....

In Spring 2023, over 40 pre-college STEM programs convened in Pittsburgh, PA for the STEM PUSH Network whole network meeting to share their challenges, learning and more.

The following themes were highlighted during the convening: Student Agency and Voice; Family and Community Engagement; Dual Enrollment; Resources in Action, such as PCSP profiles and Invention Toolkits; and Student Recruitment.

These topics were the focus of change ideas tested by programs or best practices identified by programs and shared within the Network as a grassroots mechanism of learning. The change ideas are rooted in STEM PUSH's theory of improvement, which outlines critical areas of focus that are likely to have the largest impact in serving Black, Latina/o/e, and Indigenous students.

Student Agency & Voice in Programming

This area of work is grounded in the theory that nurturing a STEM identity and sense of belonging in ways that honor the experiences of minoritized students will lead to a PCSP's ability to best serve Black, Latina/o/e, and Indigenous students. Below are some examples of success from STEM PUSH Network's pre-college STEM Programs.

Our Theory of Improvement drives the work of the NIC.

Learn More About Our Theory of Improvement at www.stempushnetwork.org/theory-of-improvement

Student-Driven Project Design

The Nature Museum TEENS summer program utilizes student agency and voice through collaborative, teen-created urban ecology and environmental science field investigations.

In Chicago, students demonstrate agency in *project design* by developing and narrowing a specific, small-group research question and collecting data themselves to address this question in the second half of their 6-week summer program.



Recruitment

Recruiting more Black, Latina/o/e, and Indigenous students to pre-college STEM programs supports STEM PUSH's overall goal to increase the capacity of 40+ PCSPs to support Black, Latina/o/e, and Indigenous students on a pathway to STEM undergraduate study. According to STEM PUSH's theory of improvement, recruitment of more or different Black, Latina/o/e, and Indigenous students has been identified of one of the three primary drivers to reach the Network's underlying goal.



Don't forget that you can learn more about our Theory of Improvement at www.stempushnetwork.org/theory-of-improvement

Gene Team

Instead of relying heavily on a written application, Gene Team utilizes individual interviews with students to assess which students to select for the program.

Gene Team staff engage in a 10-minute in-person conversation with each applicant. The applicants are given the prompts ahead of time to see how they think through a problem. Applications are merely used as data collection methods.

Additionally, the PCSP moves away from grades and works to recruit students by looking at core indicators of success:

- Students who can think about ideas (the scientific process).
- Students who are excited about science.
- Students who have a desire to work hard.

University of Pittsburgh



Student Input & Feedback

Joaquin Bustoz Math-Science Honors Program at Arizona State University involves students in the planning process (alumni, current students, staff), a best practice for creating effective and engaging programming. Students and staff appreciate having a say in their learning and are more likely to be engaged and vested.

Students demonstrate agency *through feedback/input surveys* by completing a questionnaire before the program and subsequent surveys throughout the program; in parallel, surveys are collected from staff and alum after the program.



"STEM PUSH has enabled us to grow and think in ways we could not have otherwise predicted. It has given us so many ideas, showed us research-based best practices and introduced us to so many great people to provide the best possible summer math experience for our students."



-Cindy Barragan Romero, Joaquin Bustoz Math-Science Honors Program at Arizona State University

Student Leadership Program

California State University (CSU) East Bay MESA centers student voice by using strategies that leverage participant insights collected through various means (e.g., focus groups, developing recruitment materials, virtual and in-person trainings, and interactive panels) for designing and refining program content and approaches.

Students demonstrate agency *through a leadership program across MESA sites* by inviting all students to participate over Zoom, sharing feedback organically, and engaging in targeted projects like making recruitment fliers.



Family and Community Engagement

This area of work is grounded in the idea that connecting students and their families with existing resources will help to strengthen college-going pathway supports for Black, Latina/o/e, indigenous students. Below are some examples of success from STEM PUSH pre-college STEM Programs shared organically within the Network for greater learning.



Asset Mapping

Project Exploration knows community engagement is crucial for promoting interest and participation in STEM fields to lay the foundation for creating a more diverse and inclusive workforce that reflects the broader population. Effective community engagement can help STEM professionals stay connected with the real-world challenges and concerns that face local communities.

Project Exploration, located in Chicago, supports effective community engagement in the following ways:

- Seek to identify assets in a community (Austin) to figure out how to connect with every entity and ensure they have a voice in the process.
- Local leaders were invited, broken into sections to discuss problems/needs and assets.
- Show families what Project Exploration does based on their needs and input.



Resources in Action

Two examples from STEM PUSH pre-college programs showcase the power of tools to strengthen college-pathways supports for Black, Latina/o/e, and Indigenous students. The program profiles are something created within the STEM PUSH Network and the Invention Toolkit is an example of the grassroots up type of learning that happens often within the Network.

Leveraging the STEM PUSH Profile in Program

Arthur Ashe Institute for Urban Health used a logic model to create a STEM PUSH college profile. The program profile has been an effective tool for showcasing the work of students within the program.

[Outcome Measurement Strategies by Laurel Malloy](#) for further reading on logic models is recommended.

Oregon MESA Invention Toolkit

As Oregon MESA has worked to support advisors and students in developing 21st century skills through invention, the Invention Toolkit evolved to provide learning tools. These tools help create successful learning experiences using open-ended invention projects. Oregon MESA believes that anyone can be an inventor-- Oregon MESA believes in harnessing student creativity to create solutions for real-world problems.

- The Invention Toolkit is a curriculum that views invention as a tool for liberation. It emphasizes a student's role as an inventor promoting their agency and engagement with real-world problems.
- The backbone of the toolkit is human-centered design that starts with client interviews and understanding the problems of real people. Students work as collaborative teams on solving a client's problem using empathy and communication skills. The toolkit promotes an active learning approach that is student-driven and culturally relevant.
- The toolkit is available for purchase from Oregon MESA. It is available in multiple languages, including Spanish. More information is available [here](#).

The Academy: Health Science Academy's High School Program



Member of the STEM PUSH Network, an NSF INCLUDES Alliance

The Health Science Academy (HSA) is a STEM health science enrichment, afterschool pipeline program that prepares under-represented students to succeed in college health science courses. The Academy, HSA's 3-year high school program, provides advanced educational opportunities to high achieving students. The Academy is offered in partnership with SUNY, Health Sciences University (SUNY-HSU). SUNY-HSU provides the physical resources to hold weekly anatomy & physiology classes & labs.

The Academy emphasizes & develops several targeted outcomes, including:

- Scientific reasoning skills
- Knowledge & training in biology, research, and presentation skills
- Understanding of health disparities & impact of the social determinants of health
- Understanding how racism operates in STEM pathways and how to navigate it
- STEM identity & sense of belonging

Students demonstrate these skills in college-level courses through research projects, poster presentations, assignments, and group work.

About STEM PUSH

STEM PUSH, an NSF INCLUDES Alliance, is a national network of pre-college STEM programs who are engaging youth historically underrepresented in STEM to learn & do in-depth, authentic science, and ultimately to persist in STEM through college & beyond. More information available at stempushnetwork.org.



The Academy Features

STEM Focus
Health Science



Three year science enrichment program

13 week fall & spring semesters with optional summer programming

Free for students to attend

140 10-12th grade students served each year

>90% of students are underrepresented in STEM

Academy Results

>86% of the Academy alum attend college

>88% of alum enrolled in college **pursue degrees in health science**

75% of alum enrolled in college **graduate with STEM degrees**





As our learning engine continues to test small change ideas within our network of over 40 pre-college STEM programs, the STEM PUSH Network remains dedicated to sharing what we are learning with the nation. Through newsletters, like this one, social media, blogs, and stories, STEM PUSH hopes the information will continue to encourage more pre-college STEM programs to implement new ideas in their own programming.

Additionally, the STEM PUSH Network engages with admissions professionals to learn about their processes and brainstorm together about broadening participation in STEM within their institutions.

Join the STEM PUSH Network at www.stempushnetwork.org and follow us on social media for more tips, resources and stories.



The STEM PUSH Network is funded by The National Science Foundation's (NSF) Eddie Bernice Johnson INCLUDES Initiative, a comprehensive national effort to enhance U.S. leadership in discoveries and innovations by focusing on diversity, inclusion and broadening participation in STEM at scale. STEM PUSH is also co-funded by the NSF Innovative Technology Experiences for Students and Teachers (ITEST) program and the Advancing Informal STEM Learning (AISL) program.



www.stempushnetwork.org