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Paid Pre-College STEM Bridge Programs: Just-In-Time Support & Engagement for Community College STEM Learners

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INTRODUCTION

While America's "Innovation Economy" continues to thrive and drive strong employment trends in technology, advanced manufacturing, R&D, and defense, our country's postsecondary institutions fail to produce enough qualified graduates to meet employer demand (O'rourke, 2021). To further exacerbate the shortage of STEM workers, it is particularly unequal across gender and ethnicity—women, African Americans, Hispanics, and American Indians/Native Americans remain highly underrepresented in STEM degree programs (Center, 2023), as well as engineering and computer science professions.

Barriers for student enrollment and persistence in STEM degree programs are numerous and varied—especially in the community college context. From adverse math experiences in middle and high school to a lack of financial, academic, and social support for a rigorous STEM-based academic pathway to self-efficacy and impostor syndrome struggles, underrepresented students face many challenges in achieving transfer to 4-year university engineering and computer science programs and, ultimately, achievement of bachelor's degrees (Wang, 2020). The need for financial support, resulting in most community college students needing to work while pursuing degrees, is cited as a major barrier for many community college students (Mendoza, 2009), particularly for those who could benefit from full-time enrollment. *Just-in-time* academic support is one strategy for improving student persistence in STEM, among many other researched best practices.

Growth Sector, the backbone organization for the NSF Eddie Bernice Johnson INCLUDES Initiative's *STEM Core Expansion Alliance (#1834628),* along with partner institutions, has developed and implemented the STEM Core at 30+ partner colleges in seven states, serving over 3,000 students since 2012. The STEM Core is aimed at serving students who enter community college at developmental math levels or are underprepared in math. The STEM Core is comprised of the following best practices in higher education:

- *Broad-Based Outreach and Recruitment:* Working with partner campuses to recruit first-time in college, as well as veterans, women, out-of-school youth, individuals enrolled in workforce development programs, and existing community college students.
- *Block-Scheduled, Cohort-Based Learning Community:* Students are placed into block-scheduled, cohort-based learning communities for at least one "STEM Core" year.
- *Defined Math Sequence:* The goal of the STEM Core is to get students either to, or through, Calculus 1 in their first year. Depending upon the college (and state), math courses can be accelerated to achieve the goal of calculus readiness.
- *Introductory Technical Coursework:* Along with their math courses, STEM Core students take introductory engineering and/or computer science courses, ideally one per semester. These first-year courses vary by college, but often include Introduction to Engineering, Engineering Graphics/CAD, Introduction to Programming, Python, C++, etc.
- *STEM Career Orientation:* First-hand STEM career orientation via industry and university field trips, guest speakers from partner employers, a virtual career speaker series, etc.

- *Wraparound Academic and Social Support:* A dedicated individual, called a Student Support Specialist, sits in on classes with students *and* meets with them individually to set goals, monitors students' progress, and facilitates study skill workshops.
- *Industry Internships:* Upon satisfactorily competing calculus readiness, students are qualified for ***paid*** internships with partner employers. These internships are project-based and focused on computer science or engineering. To date, STEM Core students have interned at Lawrence Livermore Lab, Tesla, Lockheed Martin, Northrop Grumman, SLAC National Accelerator Lab, NASA Jet Propulsion Lab, San Jose State University, and the University of Colorado, among many others.

The STEM Core has proven impactful at transitioning students to or through calculus; overall, 64% achieve calculus readiness in one year. This is compared to only 4% of non-STEM Core students in California achieving calculus readiness in three years. Although this calculus readiness data is challenging to obtain for other states, we anticipate that the results are similar. Additionally, STEM Core students maintain higher GPAs than their non-STEM Core counterparts. Preliminary data suggests that STEM Core students are eight times more likely than non-STEM Core students to become calculus ready and three times more likely to pass calculus (ALLIANCE, 2022). Regardless, after nearly a decade implementing the STEM Core model across the nation, Growth Sector and partners realized the landscape was changing. While policymakers and college administrators may find value in transitioning developmental students to calculus readiness, students themselves did not find this to be as valuable of a goal. Rather, students were more focused on achievement of degrees, placement into STEM internships, and transfer to 4-year universities. Thus, Growth Sector and Alliance partners shifted focus to the key transition to college.

To further address the barriers faced by students typically underrepresented in STEM careers, Growth Sector and the STEM Core Expansion Alliance developed *paid* pre-college bridge programs to foster student inclusion in quality summer experiences that provide a key transition to college STEM pathways. Bridge Programs have been proven to have positive impacts on STEM students—particularly for racially or ethnically minoritized and low-income students (Ackerman, 1991). Ideally, this would help students form meaningful connections to college, as well as provide critical math remediation for those students who are not prepared mathematically to pursue STEM careers. Math readiness is an increasingly important issue, as many states discontinued the offering of non-college credit math courses, yet 70% of community college students currently enter community college at low math levels (Rutschow, 2019). During summer 2022, Growth Sector worked with 12 partner educational institutions in four states to deliver bridge programs (see Figure 1).

SUMMER BRIDGE PROGRAM – OVERVIEW OF PROGRAM COMPONENTS

Each Bridge site hosted either an in-person or hybrid 4-6 week Bridge Program, with a virtual enhancement for industry guest speakers. To aid in alleviating financial circumstances, which remain a significant barrier to student participation in extra-curricular programming, students were paid a $1,500 stipend for participation. Although each site was unique in their delivery of the summer bridge, the most common pillars between sites were math classes, hands-on projects, and college success workshops. Sites also had the opportunity to provide additional math tutorial support, field trips to employers and universities, hackathons, and design competitions. Partner

colleges were also encouraged to exhibit support services on their campus—a proven model for increasing student success (Olivia Palid, 2023).

Figure 1. 2022 Summer Bridge Site Detail

Summer Bridge Site	Math Course	Hands-On Projects	College Success Topics
Anne Arundel Community College	Pre-Calculus Foundations	Cyber Security; Coding; Additive Manufacturing	STEM Careers
Central New Mexico CC	Foundations of College Algebra	Civil Engineering; Aerospace; Chemical Engineering; Python Programming	Time Management Workshop; STEM Careers; Succeeding in STEM
Doña Ana Community College	College Algebra	Introduction to Engineering Mathematics and exploring careers in Engineering	STEM Career Pathways; How to Use the Library for Research;Resume 101
East Los Angeles College	College Algebra	Electric cars; Solar Energy; Electrical Engineering	Time Management Workshop; STEM Student Panel
Evergreen Valley College	Foundational Mathematics	Physics; Mechanical Engineering; Spectroscopy; Robotics	Engineering Design Process and Technical Communication Skills; Resume workshop
Forsyth Tech CC	Review: College Algebra	Robotics, Mechanical Engineering; Coding; Adaptive Design	Career Panel; Resume workshop; Transfer Office
Gallup McKinley County School	Precalculus (taught by Navajo Technical University)	National Lab projects: Los Alamos National Lab Additive Manufacturing, Lawrence National Livermore Lab Lasers/Non-Destructive Evaluation	Career Panels from National Lab, Resume Workshop, Internship Preparation
Navajo Technical University	College Algebra	Exploration of Engineering topics such as Chemical, Mechanical, Civil	Transfer Resources; Research Opportunities; Engineering Lab Tours
New Mexico State University	College Algebra	Introduction to Engineering Mathematics and exploring careers in Engineering	STEM Career Pathways; How to Use the Library for Research;Resume 101
North Carolina A&T	Review: College Algebra	Cybersecurity	College 101Classroom Etiquette Social Safety Resources on Campus
Ohlone College	Foundations of Math Success	Mechanical Engineering; Physics; Computer Science	Study skills; Note-taking methodology; Time management techniques
Pasadena City College	Intermediate Algebra	Nanotechnology	Study skills; Note-taking; Time management; Campus Resources

Foundational Math

Developmental math students face many barriers to achievement of STEM degrees and careers, including a fear of, and low confidence in, math, as well as a lack of successful touchstone experiences in the subject. Many students report having felt disenfranchised with their math courses since middle school. And, while community colleges have done much to address the systemic barrier of developmental, non-college credit math courses, academic preparation remains an issue. Community college math faculty teaching the calculus sequence often point to students' lack of understanding and mastery of algebra basics as a significant barrier to their progression in advanced courses. Summer Bridge is an opportunity to engage students in a strong foundational algebra curriculum to ensure precalculus readiness by their first semester of postsecondary education—that is, their first fall with the STEM Core. These math courses also aim to build cohort cohesion and community by delivering them with a learning community cohort model. All but one of 12 sites offered non-credit math courses for the Summer Bridge. This allowed for flexibility in delivery and an ability to "meet students where they are." For example, at Evergreen Valley College, the math professor began with a syllabus, but spent much more time than expected on factoring because students lacked understanding and practice in that area—critical for success in the precalculus and trigonometry courses they would take in the fall. Most math courses lasted about two hours per day.

Hands-On STEM Activities

Many STEM Core students report a lack of connection to the STEM economy in general and lack what research identifies as a clear "STEM identity." In order to develop the critical STEM identity, make clear connections to real-world math applications, and provide resume-worthy projects that will inform their impending internship search, STEM Core Summer Bridge students complete hands-on STEM projects. To assist with the creation of accessible and engaging content, Growth Sector worked with Oak Ridge Institute for Science Education (ORISE), based at Oak Ridge National Laboratory. ORISE developed hands-on projects based on research and work happening at partner national laboratories that includes engineering graphics, 3D printing, additive manufacturing, introductory-level computer programming, quantum information science, and cybersecurity simulations. ORISE, in addition to developing the modules, worked to train faculty facilitators on their respective campuses. These ORISE projects are a great fit because so many students apply to national lab internships after their STEM Core year. Additionally, many colleges leveraged their own expertise and led other types of hands-on projects. These included Arduino-programmed robots with a focus on climate-change research (robots included temperature sensors, computer vision, etc.), introductory Python programming, fabrication of water-saving devices including filtration systems and eco-friendly water heaters, and micro-nano technology experimentation including fabrication of microchips.

College Success Workshops

Across campuses, building a network of competitive and prepared STEM scholars is the underlying goal of Growth Sector's interventions. College success workshops were developed with the Student Support Specialists to address the needs of their specific population. Sessions included workshops with counselors/advisors focused on development of formal education plans and delineation of transfer pathways, workshops from Financial Aid Offices on FAFSA and scholarships, tours of the library and study centers on campus, time management and study skills workshops, and mock interviews with industry. Additional sessions led by Growth Sector and

guest speakers included: STEM identity, growth mindset, imposter syndrome, financial aid , personal statements, resume development, and LinkedIn workshops.

Workshops are a critical complement to the STEM Core academic schedule, where students apply classroom learning to the real world. The workshops are a great way to keep students motivated and developing their "whole self." As the bridge program continues, students report feeling exhausted and occasionally losing focus, so being able to attend sessions on goal setting, transfer, seeing high-level projects and visiting university campus can give students a renewed sense of the promise in their goals.

What makes the STEM Core workshops different than typical campus events is that these sessions are tailored to STEM Core student interest and availability. The STEM Core team plans the workshop schedule around the Bridge program and STEM Core academic schedule, i.e., test dates, busier times of the semester, etc. This is meant to be fun and exciting for students, not an extra task that might be stressful for students to attend.

STEM Career Awareness

STEM career industry awareness is a focus of the STEM Core program from the moment students begin participating in the bridge program, as they are tied to specific employers wherever possible. During summer 2022, sites completed ORISE modules in additive manufacturing and cybersecurity tied to research being conducted at national labs. The bridge program at Gallup McKinley County Schools, New Mexico, completed rotations of projects mentored by Livermore and Los Alamos National Labs in the areas of additive manufacturing, explosives testing, lasers, and non-destructive evaluation. At Ohlone College, students presented their fabricated water solution projects (filtrations systems, cooling/heating devices) to a panel of engineering industry representatives. In summer 2023, Cisco employees will be leading modules in cybersecurity and networking at two San Jose colleges. These real-world projects engage students and provide critical resume material they will need when applying for STEM Core internships the following academic year.

The STEM Core Internship Development Series is a virtual series offered to all STEM Core participants across the network. The series incorporates multiple workshops focusing on STEM resume writing (plus follow-up 1-on-1 resume writing sessions), LinkedIn workshops for students to create and update resumes and profiles specifically for STEM employers. Additionally, students participate in sessions with a STEM Diversity Specialist around DEI career readiness strategies. Using research and insight from top employers, the STEM Core program works to dismantle career readiness challenges that impact diverse students from pursuing and/or persisting in STEM-based careers and to excel while job searching.

Overall, the STEM Core Internship Development Series works to equip staff and students with specific techniques and tips to be prepared for upcoming placement opportunities. With an early start to internship and career readiness, the program promotes an increase in overall preparedness and confidence in STEM.

Virtual Employer Speaker Series

Engaging with STEM Core employer partners is key to student success. The STEM Core Employer Speaker Series creates the opportunity for students to hear first-hand from employer partners, i.e., NASA centers, National Labs (NREL, Berkeley, Lawrence Livermore), Cal Trans, Stryker etc. Exposure to different companies and sectors allows students to learn about an array of previously unknown employers and career pathways. The program invites (where applicable) STEM Core intern alum who participated in previous internships to share experience and advice. Hearing firsthand student testimonials gives students an opportunity to learn about the day-to-day schedules of student interns and about the opportunities for growth and skill development.

The STEM Core *Virtual Employer Speaker Series'* typical format is a 60-minute scheduled time; with practitioners and potential mentors from a specific employer site, and includes a company overview, practitioner career path, project highlights, an overview of the internships, and ways in which to get involved. All featured series include time at the end for questions and answers.

The engagement and information that students are able to gain early in their STEM Core year helps to dismantle barriers to pursuing STEM employment. There is undoubtedly the issue of imposter feeling that many underrepresented students in STEM feel when faced with the question of whether to pursue high-level internship opportunities. Being able to put a face to the name behind "Cisco" or "NASA JPL" through interaction in the Employer Speaker Series gives our students the confidence they need to apply and feel confident competing for internship placements that they may not have otherwise had.

Targeted Recruitment

Across the Country, the STEM Core targets low-income, first-generation students interested in STEM pathways who are eligible to enroll full-time at the college the subsequent fall term after the Bridge program. The Bridge program can serve as an added recruitment tool for partners because many times they engage with students before they are matriculated at their institution. Students are generally recruited from feeder high schools and local community-based organizations. In interviews, students pointed to the stipend, extra support, and ability to attain internships as the main reasons for joining the Bridge programs.

Bridge Program Participant Stipends

Stipends of at least $1,500 were provided to participants. Partners recognize that finances are a major barrier to persistence in STEM undergraduate pathways, and many low-income/first-generation students work simultaneously while attending school. The stipend helped to both attract underrepresented participants and allow them to take time off work to participate.

WRAP AROUND SOCIAL & ACADEMIC SUPPORT – STUDENT SUPPORT SPECIALIST (SSS)

The STEM Core SSS plays a primary role in managing programming and working directly with students to promote success and retention and generally building college knowledge. The SSS is the key factor that brings the STEM Core and bridge program together as they are responsible for providing a broad range of services to STEM Core participants and faculty. The SSS oversees the daily operations of the STEM Core program inclusive of Bridge and Academic year programming.

SSS Onboarding/Training/Resources

Growth Sector provides many resources to onboard and train SSS. To start, a comprehensive SSS orientation to introduce STEM Core components, staff and key players, program background and trends. Following an orientation, Growth Sector staff meets with the SSS on a regular basis to strategize program roll out, recruitment and overall planning. Additionally, SSS training is inclusive of a manual that is meant to be an initial starting point to: 1) familiarize with the STEM Core program and SSS role and 2) provided students a sense of the different programmatic elements. Lastly, the STEM Core network provides free resource for each aspect of the program, i.e., programming ideas (slide decks, handouts), recruitment, orientation etc., all available electronically. Each STEM Core campus is given access to all resources to assist in program implementation; the SSS and STEM Core teams are encouraged to use as much of the existing material as possible.

As the STEM Core program has multiple components, the SSS is the center of the STEM Core team. They coordinate all bridge and academic year initiatives, including creating a full workshop calendar, sitting in on classes, connecting students to campus partners, facilitating study skills workshops, meeting with students individually, and leading career readiness initiatives. The SSS works collaboratively with the Growth Sector team (backbone organization), campus faculty and staff, and community partners to ensure students have a competitive foundation for STEM pathways.

A closer look at the SSS role includes:

- Provide wraparound student support to all participants in the STEM Core/Summer Bridge program to help them address challenges inside and outside of school, including working with participants to develop successful study habits, communicating and working individually with faculty around student trends/academic progress, etc., referrals to on- and off-campus services as needed, planning, and implementing program orientation.
- Oversight and implementation of STEM Core recruitment initiatives (30-35 students). Recruiting a STEM Core cohort is one of the key pieces to running a successful program. The SSS works to spread the word about STEM Core, get the campus/community excited about what a great program this is and the huge benefits it provides for students. SSS coordinates marketing, outreach, screening and onboarding prior to admitting students into the cohort.
- Retain Summer Bridge participants to participate in academic year STEM Core cohort.
- Collaborate with partners to create and implement programming calendars, including field trips, on campus workshops and guest speakers based on student interest and discipline.
- Develop a high-quality and engaging program orientation aiming to build cohort community, introduce faculty and partners, and review program expectations prior to program star.
- Differing from a traditional advisor/counselor role, the SSS sits in on STEM Core classes to monitor student attendance, course content, student achievement, and maintain a handle on concepts taught in class to liaise with program tutors.
- Maintain detailed tracking of students' progress, assignments and learning milestones,
- Participate in regular meetings between faculty, Growth Sector, and program partners to program progress, curriculum, and programming initiatives.

- Organize and facilitate skills workshops, including time management, stress reduction at school, resume writing, successful study habits, communicating with faculty, transfer prep, financial aid assistance, etc. The STEM Core year is an opportunity to equip students with academic and professional skills prior to going into a professional setting.
- Host regular one-on-one meetings with students to discuss goals, academic progress, resume preparation, study habits, internship interests. This a great way to develop trust with participants, get to know them, and assist in wrap-around development.

In addition to onboarding, SSS are provided with the opportunity to have regular individual meetings with students to touch base on how they are doing in the cohort, along with more formal check ins with full STEM Core teams (deans, faculty, SSS) to discuss plans, curriculum, and internships, etc. These meetings have proven to be effective in aligning teams and reinforcing Growth Sector's ability to provide structure and support to campuses across the network.

SSS Professional Development

As the SSS role encompasses multiple levels of support and touch points with students, the STEM Core program prioritizes ongoing virtual professional development for the SSS network to continue to strengthen their skills. As the SSS role shifts throughout the year based on student needs, the Professional Development sessions work to accommodate those changes. Sessions are hosted by Growth Sector staff, employer partners and experts in the student affairs field to lead trainings around: mental health awareness, STEM identity, confidence/resilience, effective communication, STEM Core program collaboration/idea sharing, etc.

SUMMER BRIDGE PROGRAM FUNDING

Funding for summer bridge programs came from a number of sources, including National Science Foundation Eddie Bernice Johnson INCLUDES Initiative: the STEM Core Expansion Alliance (#1834628) , the Department of Energy MSIPP STEP2NLS grant, institutional funds from partner colleges, and regional philanthropic organizations. The largest single cost for the program are student stipends (@ $1,500 per student in 2022, raising up to $2,000 per student in some locations in 2023). The next largest expense is faculty for teaching the math and hands-on courses. One funding challenge has been paying for student lunches, which are often not allowable costs on federal grants. Purchasing lunches is critical to keeping the students fed and energetic, and also reducing the amount of time for the lunch period as opposed to letting students go off campus to purchase their own lunch. Since last summer, Growth Sector is part of a Department of Defense grant led by the University of Colorado Boulder (the *Denver-Metro Engineering Consortium,* #HQ00342220005) that will fund bridge programs at up to five Colorado community colleges as well as a Department of Energy RENEW grant led by California State University San Marcos that will fund bridge programs focusing on quantum science at CSU San Marcos and CSU Chico.

SUMMER BRIDGE IMPACT

Summer Bridge Program Evaluation Results

SRI International (formerly Stanford Research International) serves as the evaluator for the NSF's Eddie Bernice Johnson INCLUDES Initiative: the STEM Core Expansion Alliance and worked with Growth Sector to develop a comprehensive study of the bridge programs across the country. SRI International led the creation of pre and post surveys that each site administered to participants. Pre surveys were completed at orientation and post surveys on the last day of the program. The

study was developed to understand student background, how the bridge program can impact their growth, and the impact of the bridge program on their preparation for the academic year.

Some significant findings from surveys:

- There were no schools who had significantly different distributions of answers between pre and post. Growth Sector is working with SRI International to alter the tool for future studies. This could be in part due to the short nature of the Bridge program. Additionally, this could reflect the recruitment of many students who already are decided on a STEM field.
- Overwhelmingly, students said their experience in the Summer Bridge program made them more likely to enroll in STEM Core (57 of 62 respondents).
- Many students expressed that the Summer Bridge Program showed them that STEM was the right field for them (15), and they really liked seeing all the opportunities available with a STEM career (18)

Figure 2. Bridge Program Participant Sense of Math Preparation

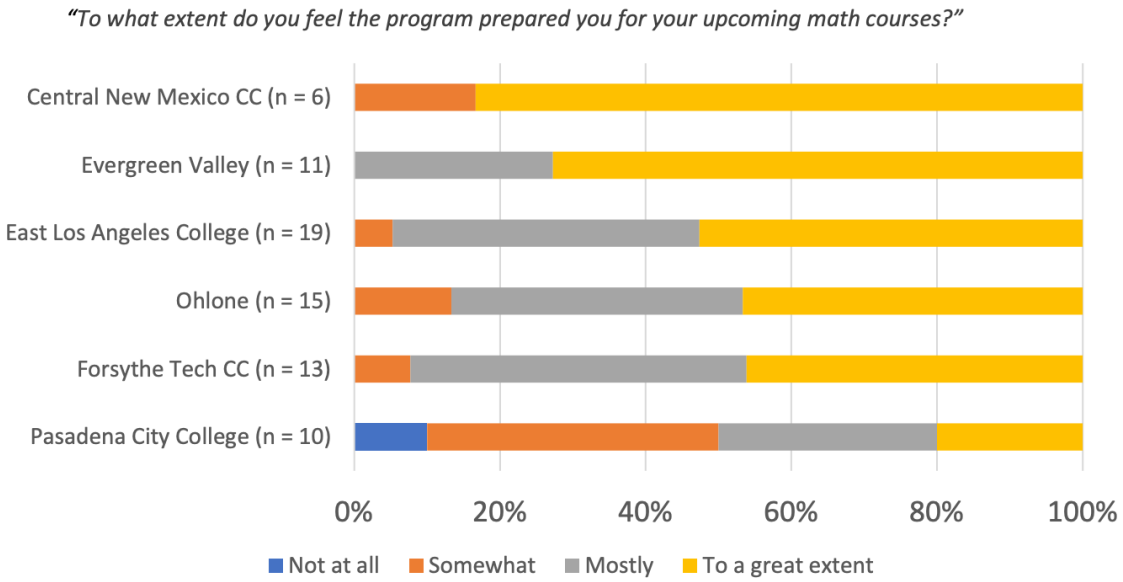
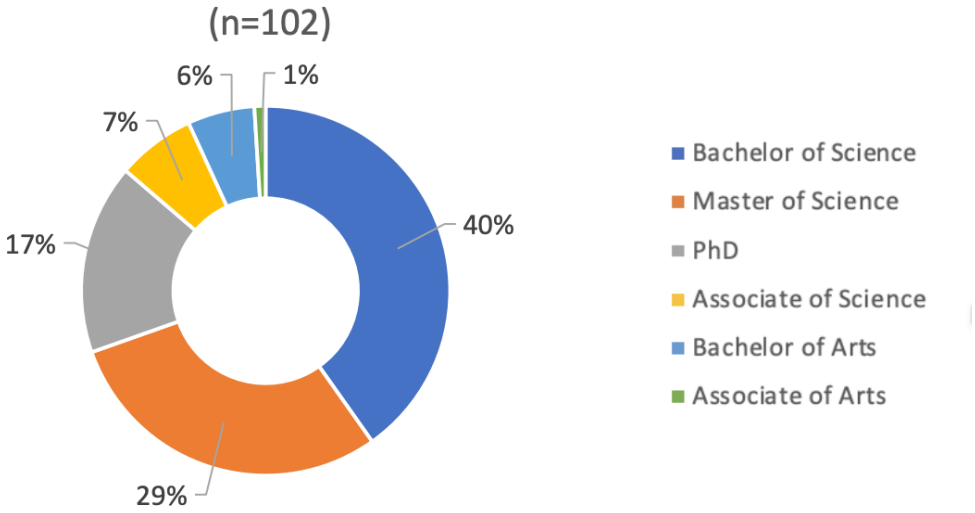


Figure 3. Bridge Participant Higher Education Goal



Summer Bridge Student Interviews:

What were the primary reasons you decided to participate in Summer Bridge?

- "I wanted to build a community before the semester started"
- "To prepare myself for STEM college courses, especially for math review as I wanted to refresh my math before going into pre calculus. The summer bridge stipend was also a reason as it allowed me to lessen my work hours in order to attend the summer bridge program."
- "I wanted to participate in summer bridge because I was unsure of my major. I always knew I wanted to be in the stem field but i wasn't exactly sure which direction to go in. When i first heard of summer bridge I saw it as an opportunity to really solidify my major and dip my toes into engineering and computer science."

What did you like most about participating in Summer Bridge?

- "I liked the opportunity to get to meet the people I would be working alongside with not only the students but also faculty it helped me feel a sense of relief to know so many opportunities for help are here, this along with the hands on experience we got involving engineering tools and coding practice helped me pinpoint my interest in cs and influenced my choice in careers positively."
- "I was able to expose myself to what my STEM college courses would be like, and I was also able to make friends who are interested in STEM as well. It also helped me with deciding between engineering and computer science and which would be a better major for myself."
- "I like the sense of community. It is something that really helped me break out of my shell and meet other people and build a sense of unity within my peers."

Are there ways you are thinking differently about your personal and academic decisions and/or your future job opportunities as a direct result of your experiences in Summer Bridge?

- "Yes, summer bridge has helped me realize that I would like to pursue a computer science degree, but I would also like to double major in engineering or at the least take some engineering courses as I realized that I like the practical aspect of engineering as much as the theoretical aspect of computer science."

- "I knew I wanted to go into cs but I didn't know that I had such a commitment to it until summer bridge allowed me to test my skills and get a taste for the type of work I would be dealing with."
- "Definitely. Before summer bridge my future just looked grey and blurry but after summer bridge I now have a perfectly drawn out outline on what i would like my career and future to look like."

Summer Bridge Program Staff Interviews:

- Student Support Specialists describe summer students as highly motivated and willing to persevere through struggle. As one said, "they are hungry to learn."
- Math faculty described an extremely wide range of math preparation and said, "It was difficult to create programming to tailor to everyone's needs, given how much they need to learn in a short time." On one campus, students were grouped by level and taught by two different professors; at another, students worked through an online program with the support of a professor.
- Outside of the math course, the curriculum was highly variable depending on the college. Offerings included internet of things, robotics, and Python programming.

Bridge Program Enrollment as first step in longer-term STEM Core pathway

The goal of the Summer Bridge has always been for it to be the first step in the longer-term, STEM Core-based pathway leading to transfer and degrees in engineering or computer science—rather than an isolated summer program. Table 1 illustrates the number of Bridge students who remained active with their STEM Core cohort as of February 2023. This was determined by cross-referencing bridge program participant lists with active STEM Core participant lists provided by campus-based Student Support Specialists & Coordinators in February 2023.

Table 1: Bridge Program to STEM Core

Summer Bridge Site	# of Students	# of students who completed the summer bridge math course or placement exam?	# of students active in STEM Core
Anne Arundel Community College (AACC)	8	6	No cohort
Central New Mexico Community College	16	16	16
Doña Ana Community College (DACC)	7	7	7
East Los Angeles College (ELAC)	35	35	26
Evergreen Valley College (EVC)	16	16	3 active, No formal cohort
Forsyth Tech CC (FTCC)	20	20	18
Gallup McKinley County School (GMCS)	16	16	16

Navajo Technical University (NTU)	6	4	No cohort
New Mexico State University (NMSU)	10	10	10
North Carolina A&T (NCAT)	20	20	18
Ohlone College (OC)	21	21	21
Pasadena City College (PCC)	10	10	3
TOTAL	**185**	**181**	**138 (76%)**

AVAILABLE RESOURCES

Many of the resources developed by Growth Sector and partner colleges for use in the Summer Bridge Program are available for widespread use by any interested party. Hands-on, project-based modules developed by Oak Ridge Institute for Science Education (ORISE) can be found here: https://drive.google.com/drive/folders/1uIEyxL5uDWZYCoF-aHP4Vz-E7b1Px84U?usp=sharing. Additionally, video recordings of virtual career speakers, study skill workshops, professional development sessions, and other presentations can be found on Growth Sector's YouTube channel here: https://www.youtube.com/@growthsectorstemcore9212/videos

Overall, Growth Sector and college partners remain pleased with the Summer Bridge Program. For summer 2023, our network has expanded, and we will offer more than 20 Summer Bridge Programs utilizing funding from NSF INCLUDES, Department of Energy MSIPP, Department of Defense STEM, philanthropic organizations, and college's institutional resources. Growth Sector has worked with partners to further develop hands-on activities is excited to host engineers from Cisco who'll be teaching Networking and Cybersecurity modules to two sites in San Jose, CA. Additionally, ORISE is developing 3 more modules based on research happening at national labs in the areas of robotics and engineering design.

In terms of evaluation, the team will be conducting queries with college Institutional Research offices to assess the impact of Summer Bridge participation on future math course completion, internship participation, and transfer to 4-year universities.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Office of Naval Research, the US Department of Energy, or the National Science Foundation.

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