# Pima-UAZ STEM Bridge Program

# Summative Evaluation Report

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# Introduction

This document summarizes the evaluation efforts that took place during the five years (2019-2024) of the NSF S-STEM grant, "Bridging Faculty and Student Cultures: Culturally Responsive Support for STEM Students Transferring Between Two- and Four-Year Hispanic Serving Institutions." The grant funded the Pima-UAZ STEM Bridge Program, a partnership between Pima Community College (PCC) and University of Arizona (UA) focused on increasing the persistence and graduation rates of low-income, academically talented PCC students pursuing and transferring into STEM majors at the UA. Pima-UAZ STEM Bridge is part of Arizona's Science, Engineering, and Math Scholars program (ASEMS). ASEMS provides services and support to students pursuing STEM majors at UA, with a specific focus on first generation, low-income, and transfer students.

All data were collected, analyzed, and reported by the external evaluation team, an independent evaluation group from the Community, Research, Evaluation and Development (CRED) team in UA's Norton School of Human Ecology.

# Program Overview

**The Pima-UAZ STEM Bridge program aims to address two key challenges for STEM community college transfer students at UA:**

**1. Community college transfer students underestimate the academic rigor of STEM coursework at UA, resulting in underperformance in STEM courses.**

**2. Community college transfer students have not had the opportunity to establish mentoring relationships with UA STEM faculty and peers, resulting in feelings of isolation and not belonging.**

**The overall goal of the program** is to implement and test a scalable, transferrable model for creating a culturally responsive, bridged CoP between 2- and 4-year Hispanic-Serving Institutions (HSIs) that results in higher persistence and graduation rates of low-income, academically talented community college students pursuing and transitioning into STEM majors at 4-year institutions.

**The program has three primary objectives:**

**1. Increase student sense of belonging by creating a welcoming environment through a bridged PCC–UA learning community and culturally responsive mentoring**

**2. Improve academic achievement at UA by providing individualized support and academic and financial guidance.**

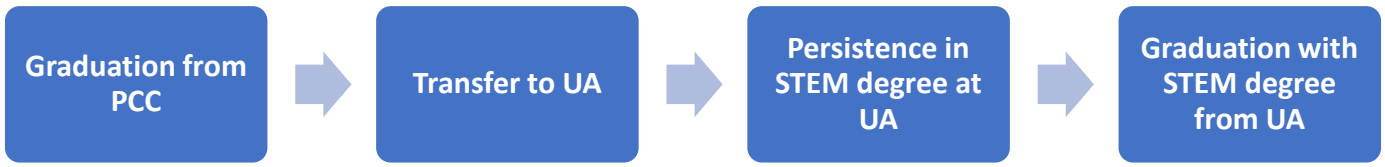
**3. Increase interest in STEM careers through early career planning and engagement in relevant experiential learning opportunities.**

**These objectives are accomplished through a three-year program structure:**

| Year 1 (Pima Community College) | Year 2 (University of Arizona) | Year 3 (University of Arizona) |
|---|---|---|
| • Scholars begin receiving program support as they are completing their last year at Pima Community College<br>• Scholarship funding<br>• Strong academic and personal support to balance school/life, develop successful academic strategies and gain confidence in STEM career options<br>• Career planning workshops<br>• STU 210 STEM Transfer course<br>• Support from Pima Community College faculty mentor and University of Arizona faculty mentor<br>• Guidance and assistance with submitting applications to research programs or internships<br>• Monthly meetings with peer mentor | • Scholars transfer to the University of Arizona<br>• Scholarship funding<br>• SCI 297 B Research Readiness course<br>• Support from University of Arizona faculty mentor<br>• Biweekly meetings with peer mentor<br>• Research shadowing or research review<br>• Guidance and support related to study skills, time management, and connecting with faculty<br>• STEM tutoring | • Scholarship funding<br>• Ongoing guidance and support related to study skills, time management, and connecting with faculty<br>• STEM tutoring<br>• Support with applications to graduate schools or jobs<br>• Opportunity to be a peer mentor or learning coach |

During the three-year program structure, scholars also receive ongoing opportunities to build community with faculty and other STEM transfer students. Scholars continue to receive support from professional staff, attend program workshops and events, and receive scholarship funding.

Through increasing academic achievement (capacity, STEM interest and identity (interest), and sense of belonging (belonging), the program aims to result in the following outcomes for program participants:



## Evaluation Approach

The evaluation team took both a developmental and utilization-focused evaluation approach for this project. Developmental evaluation is intended to support more innovative approaches to program implementation and evaluation, recognizing that when working to create something new and different, the approach and goals will necessarily be in a constant state of development and adaptation.[1] This was particularly necessary given the reality that the program launched in the midst of the COVID-19 pandemic. Program staff had to pivot their intended approaches for recruitment of participants and faculty mentors, training of faculty mentors, and implementation of key program components. The pandemic also put a spotlight on structural issues and inequities in education, including at both institutions and in the transfer process. One positive result of the pandemic was a shift towards virtual meetings; moving meetings to a virtual format meant the entire team from both institutions could more easily come together to plan and strategize. This also meant that the evaluation team was included in the planning process from the very beginning and was involved with the larger team through the lifecycle of the project. It also allowed for better alignment of recruitment and data collection processes between program staff, research team members, and evaluators.

Given the evaluation team's inclusion, this also allowed for a utilization-focused approach to evaluation, one focused on ongoing review and utilization of evaluation data for formative program improvements.[2] From the beginning, accessible visual evaluation reports were generated to return data collected to program staff within around a week. In addition to the annual reports written for NSF, the evaluation team provided ongoing data interpretation sessions to review key findings, both internally with program staff and faculty and with the advisory board. As part of the summative report process, the evaluation team created a series of interactive data dashboards to allow the program team to do their own exploration of the evaluation results and easily generate their own visual reports from evaluation findings.

Evaluation instruments were adapted from relevant literature and developed in collaboration with program staff to align with broader evaluation efforts in the ASEMS program and other STEM efforts across campus. This included instruments to longitudinally measure students and comparison group members on the three primary project objectives (sense of belonging, STEM identity, and persistence in STEM), tools to assess faculty mentor cultural responsiveness, and brief satisfaction and feedback surveys for the various program activities.

To help contextualize changes in student participant responses, student comparison groups were recruited from Pima alongside each of the three student participant cohorts. Comparison group students completed the same annual survey instruments to better measure the specific impact of the program on students' sense of belonging, STEM identity, and persistence and graduation in STEM.

In consultation with program staff, the evaluation team developed a profile of comparison group characteristics to inform data needed from Pima and comparison group recruitment strategies. In order to recruit a targeted comparison group, a data sharing agreement was established between PCC and UA. Members of the evaluation team met with Pima institutional researchers in Pima's Strategy, Analytics & Research (STAR) Office to determine appropriate data points and submitted an initial data request to Pima. Pima data were utilized to conduct a targeted recruitment effort for the first cohort of comparison group members between December 2020 and March 2021, for the second cohort from January 2022 to February 2022, and the third cohort between February 2023 and July 2023. Students were first required to pass a screener survey to ensure they met key eligibility requirements that were not available in the Pima data provided – low-income, intent to transfer to a four-year college, and intent to pursue a STEM degree. More details about the comparison group are provided in the Comparison Group section of the report.

Figures outlining the timeline of key programmatic components and associated evaluation data collection efforts for student participants, comparison group students, and faculty mentors can be found in Evaluation Approach Details.

# Summary of Findings

## Demographics

This report focuses on data for the **91 students** who participated in the Pima-UAZ STEM Bridge Program between 2020 and 2024. Among participants, 46% identify as having a gender identity underrepresented in STEM, 55% identify as part of a racial/ethnic minority group underrepresented in STEM, 67% identify as a first-generation college student, and 22% identify as a parent or caregiver. Participants ranged in age from 19 to 45, with an average age of 28. Nearly half of participants (49%) were pursuing a major in engineering, while the remainder of the participants were pursuing a degree in biological science (21%), computer and informational science (15%), geoscience (7%), physical science (4%), mathematical science (3%), or another STEM major (1%).

A total of 169 students were recruited into the comparison group. Eight of those students later joined the Pima-UAZ STEM Bridge Program as participants, leaving a total of **161 comparison group students**. Among comparison group members, 60% identify as having a gender identity underrepresented in STEM, 51% identify as part of a racial/ethnic minority group underrepresented in STEM, 71% identify as a first-generation college student, and 14% identify as a parent or caregiver. Comparison group students ranged in age from 20 to 55, with an average age of 27.

## Transfer Experience

In their final semester at Pima, participants enrolled as a cohort in STU210-UA, a special section of the transfer readiness course offered at Pima that was adapted to meet the unique needs of program participants, focusing on transferring specifically into STEM at UA. Overall, participants showed the largest increase in their **understanding of University of Arizona resources**, including academic advising, scholarships, physical and mental health services, library resources, and tutoring. This was particularly true for participants with both an **underrepresented gender and race/ethnicity in STEM**. Participants with an underrepresented gender and race/ethnicity in STEM were also more likely to have a **financial plan for college** after participating in the course.

Additional transfer experience data was available for 75 participants and 28 comparison group members. **Participants reported higher levels of engagement with academic advising during their transition to the University of Arizona than their comparison group peers.** At least 85% of participants met with academic advisors at each of the critical time points, compared to 57-79% of their comparison group peers. This suggests that the program may be effectively promoting best practices for academic advising, which are crucial for a successful transition to a four-year university.

Overall, **at least a quarter of participants experienced each of the key barriers to transfer**, though they reported experiencing fewer barriers to transfer compared to their comparison group peers. Barriers included: challenges with campus logistics and adjustment to a new campus (41% vs 57%), financial challenges and hardships (37% vs 57%), course credit transfer and degree pathways (32% vs 54%), and overall shock of the new campus/university (27% vs 36%). This suggests that participants may have been better equipped to navigate the complexities of transferring to a four-year institution.

When asked what they wished they would have known about the transfer experience, the most common responses for participants were **transferring credits and degree pathways** (28%) and **adjusting to new campus/university logistics** (25%). While these items were both top responses for the comparison group as well (both 36%), nearly twice as many comparison group members selected **financial challenges and hardships** compared to participants (39% vs 20%). The significant financial supports participants receive in the program likely played a role in this difference. Similarly, twice the proportion of comparison group members (32%) wished they knew more about **how to access help and support services** compared to participants (15%). This is likely influenced by the bridged staff and faculty support participants

receive, beginning when they're at Pima. While both participants and the comparison group identified areas where they wished they had more information, the comparison group consistently reported higher percentages in most categories. This indicates a potentially **greater sense of uncertainty or lack of preparedness among the comparison group** regarding various aspects of the transfer experience.

Students were also asked about the **strengths** they experienced during their transfer from Pima to a four-year university. The most frequently mentioned strength for both groups was **utilizing campus resources** (participants, 45%; comparison group, 64%). While fewer participants selected utilizing campus resources, broadly, a notably larger proportion of participants selected **UA academic support programs (e.g., ASEMS)** (40% and 14%, respectively). **Adapting and personal development** was the second most commonly identified strength for both participants (40%) and comparison group members (57%), indicating that personal growth is a potential outcome of the transfer experience for both groups. In terms of community and mentorship, **fellow students** were a valuable source of support, with 33% of participants and 43% of the comparison group recognizing their peers as important in their transition. Participants and comparison group members also found strength in their **STEM community** (21% and 18%) and **mentors** (20% and 29%).

## Program Experience

Nearly all (95%) of the 43 participants who were asked to rate the top 5 most valuable components of the Pima-UAZ STEM Bridge program selected **scholarship funds**. The other top 5 program components included – being part of a cohort of STEM transfer students (79%), academic and financial advising and support (60%), UA faculty mentors (58%), and program staff (49%).

When asked to rate how valuable they found different ASEMS program services and resources, **ASEMS financial assistance** was rated as most valuable, with 94% of respondents rating it 'very valuable.' Other top services included academic support (80%), personal support (79%), and referral to other resources (73%). Participants with a **gender identity and race/ethnicity underrepresented in STEM** expressed higher ratings of value across the ASEMS services, particularly the workshops and program events, peer mentoring, and Research Readiness course.

Participants were also asked to rate how much ASEMS helped them with a variety of outcomes on a scale from 'not at all' to 'a great deal.' Unsurprisingly, the top-rated item was **getting financial assistance or scholarships** (74%). Participants in the **College of Science** expressed higher ratings on how much ASEMS helped them with career exploration and graduate and professional school. Participants who identified as a **parent or caregiver** expressed higher ratings on how much ASEMS helped them develop community, belonging, and friends, as well as interact more with faculty.

When asked to describe the impact that ASEMS had on them, participants described the **community and sense of belonging** they experienced (36%), the ways that the program impacted their **persistence in STEM** (32%), **the support and mentoring** they received from staff and faculty (27%), the **financial support and guidance** (25%), and the **academic support** (18%).

## Sense of Belonging in STEM

Participants showed statistically significant changes in their overall sense of belonging and several subscales from baseline to post-transfer. Participants' overall sense of belonging score significantly decreased, reflecting a **general reduction in participants' sense of belonging** in STEM environments after transferring from Pima to UA. Their scores also significantly declined on the affect subscale, suggesting that **they felt less comfortable** in their STEM environments, and the trust subscale, suggesting that they had **less trust in their STEM instructors and course materials**.

Positively, participants showed a statistically significant increase on their desire to fade (reverse-coded) subscale, signifying that they were **more likely to actively participate and less likely to fade into the background** in STEM environments once they transferred to UA.

**Nearly half (46%) of participants experienced a meaningful decrease in their overall sense of belonging** from baseline to post-transfer, while, positively, one in four (25%) participants experienced a **meaningful increase**. Of those that experienced a meaningful increase in sense of belonging, there was an overrepresentation of participants with an **underrepresented race or ethnicity in STEM** (79%) and **first-generation students** (74%) compared to the overall participant demographics (55% and 67%, respectively). Nearly half of participants with a meaningful increase in sense of belonging (47%) entered the program with the **lowest baseline sense of belonging** scores. There were no significant differences between transfer year and final survey scores of sense of belonging, suggesting that **once students transferred to UA, their sense of belonging remained stable.**

Among participants, there were significant demographic differences in changes in sense of belonging from baseline to post-transfer. Participants majoring in **computer and information science**, participants with **underrepresented gender identities in STEM**, and participants with **underrepresented race/ethnicities in STEM** showed significant declines in sense of belonging after transferring to UA. Computer and information science students also showed significant declines in their STEM identity post-transfer. Positively, **first-generation college students** showed significant increases in their STEM identity after transferring to UA.

There was **no significant difference in change in sense of belonging from baseline to transfer based on program participation**. Similar proportions of **comparison group members** showed meaningful decreases (43%) and meaningful increases (29%) in overall sense of belonging upon transferring to a four-year university compared to program participants (46% and 25%, respectively).

Participants were asked about factors influencing their sense of belonging in STEM. Top positive factors included **involvement in UA academic support programs, like ASEMS** (91%), their STEM community (82%), the topics they're learning in their STEM classes (82%), other peoples' perceptions of whether they belong (75%), and involvement in UA activities (70%). While two-thirds (66%) of participants rated **instructors and faculty** as mostly positive, 14% rated them as mostly negative. One in four (25%) **College of Engineering** participants considered instructors and faculty a negative influence on their sense of belonging in STEM. Participants with an **underrepresented gender and race/ethnicity in STEM** expressed more mixed experiences, with a larger proportion experiencing factors like fellow students, their identities, and their understanding of the material and grades in STEM classes as a mixture of positive and negative.

**Comparison group students** were asked the same sense of belonging questions to isolate program impact. Comparison group students had more mixed positive and negative experiences than program participants, particularly when it came to others' perceptions of whether they belong (50%), their STEM community (45%), involvement in UA activities (36%), and their identities (36%).

## STEM Identity

Participants, collectively, did not show any meaningful changes in **STEM identity** measures from baseline to post-transfer or from post-transfer to final survey. This aligns with STU210 survey data, which showed that participants entered the program with a strong sense of their STEM major and STEM career. There were also no meaningful changes in STEM identity among **comparison group members** who transferred to a four-year university.

While participants majoring in **computer and information science** experienced a significant decline in their STEM identity after transferring to UA, **first generation** students experienced a significant increase in their STEM identity.

More than half of participants agreed that ASEMS impacted their decision to **apply for graduate or professional school** (64%), apply to an **undergraduate research program, position, or experience** (63%), and apply for a **non-research related internship** (52%)**.** A larger proportion of participants from the **College of Science** agreed that ASEMS impacted their choice to apply for undergraduate research (81%) and graduate or professional school (74%), and a larger proportion were accepted into a research program or non-research internship (62%). Participants who identified as **parents and caregivers** were also more likely to consider applying for graduate or professional school because of ASEMS (79%).

## Persistence in STEM

As of Fall 2024, **28% of the Pima-UAZ STEM Bridge participants have graduated**, including 3 participants who completed their undergraduate degree and are currently enrolled in a graduate program at UA. A total of 8 participants exited the program and are not enrolled; one participant exited the program but is still enrolled in STEM at UA.

Overall, 72% of participants agreed that **ASEMS impacted their decision to continue pursuing STEM** 'a lot' or 'a great deal.' This was particularly true for participants with an **underrepresented gender identity and race/ethnicity in STEM** (100%) and for participants who entered the program with the **lowest baseline sense of belonging** scores (89%).

**Nearly one-third (32%) of participants are projected to complete their undergraduate degree in 2 years or less and 80% are projected to complete their undergraduate degree in 3 years or less**, far surpassing the graduation rates of their community college transfer peers, particularly when isolating peers in the same UA STEM colleges who were Pell eligible (22.5% and 53.9%, respectively). The projected two-year graduation rate for participants in the **College of Engineering** (35%) is more than double that of their College of Engineering peers who transferred from a community college in Fall 2020 (14.5%); their three-year graduation rate is also markedly higher (84% versus 47.4%). Participants in the **College of Science** similarly have notably higher 2-year (33%) and three-year (79%) graduation rates than their community college transfer peers (23.3% and 53%).

Of the 161 total **comparison group students**, transfer and STEM retention status is known for 78 (48%). Of those 78 students, **44% transferred to a four-year university** between Fall 2021 and Spring 2024. The majority of those students who successfully transferred went to the University of Arizona (82%). The demographics of the comparison group students who successfully transferred were slightly different from the overall comparison group, with a larger proportion of students who identified with an underrepresented gender (65%) or underrepresented race/ethnicity (59%) in STEM and as a first-generation college student (74%). As with participants, the largest proportion of comparison group students who successfully transferred were pursuing a major in engineering (35%), with another large proportion pursuing biological science (26%).

Based on results from the Fisher's exact test, **participants in the program are 20% more likely to persist in STEM** than their peers in the comparison group. **Students with underrepresented gender identities** (RR =1.14) and **first-generation students** (RR=1.09) were particularly more likely to persist in STEM as participants in the program compared to their comparison group peers. Participants who had the lowest baseline scores for sense of belonging were significantly more likely to persist in STEM compared to the comparison group; **while nearly half of the students with the lowest quartile sense of belonging did not persist in STEM in the comparison group (44%), all of the students in the bottom quartile for sense of belonging in the participant group persisted in STEM**.

There were meaningful differences in participants' persistence in STEM based on two demographic variables – gender identity and pre-survey sense of belonging. Participants with **underrepresented gender identities in STEM** and participants that had the **lowest pre-survey sense of belonging scores** were significantly **more likely to persist in STEM**.

## Broader Campus Experience

Recognizing that participants' experience in the program is only one factor influencing their sense of belonging and STEM identity, additional survey questions were included in the 2024 annual survey to understand their broader campus experiences at Pima and UA. The majority of participants agreed that students from their cultural background are **respected and made to feel welcome** on campus and in their STEM classes at Pima and UA.

When asked specifically about their experiences with **STEM instructors**, participants had notably lower ratings of their experiences with instructors at UA and notably higher ratings of their instructors at Pima. More than one in three participants disagreed when asked whether their **UA STEM instructors** cared about whether they succeeded in college (37% disagreed) or in a STEM field (35% disagreed). More than one in four disagreed when asked whether their UA STEM instructors recognize their value and contribution (26% disagreed) and encourage them to succeed (27% disagreed). This is in particularly stark contrast to the overall positive ratings of **Pima STEM instructors**, with nearly all participants agreeing that they care whether they succeed in college (96%), succeed in a STEM field (94%), recognize their value and contribution (93%), and encourage them to succeed (98%). Participants in the **College of Engineering** and **College of Science** were more likely to disagree with these statements about their UA STEM instructors.

Participants' experiences with **advisors** were similar to their experiences with STEM instructors. Participants were more likely to disagree with feeling like their advisors cared about whether they succeeded in college and in STEM at UA (24% and 22% disagreed) compared to Pima (8% and 15% disagreed). As with STEM instructors, participants in the **College of Engineering** and **College of Science** were more likely to express disagreement compared to participants in CALES and CAST.

**Comparison group students** who transferred to UA were asked the same campus experience questions to isolate any potential impacts of the program on campus experience. Overall, they expressed similar experiences at Pima and UA, with a few exceptions. A larger proportion of comparison group members agreed that their UA STEM instructors cared about whether or not they succeeded in a STEM field, though a smaller proportion agreed with feeling like their advisors cared about whether they succeeded in college and in STEM at UA compared to Pima.

## Faculty Mentors

A total of 24 faculty mentors were recruited to support program participants in the Pima-UAZ STEM Bridge program; 4 mentors from Pima and 4 mentors from UA were recruited to support each of the 3 cohorts of participants. Sixty-three percent identified as having a gender identity underrepresented in STEM, 29% identified as part of a racial/ethnic minority group underrepresented in STEM, and 67% identified as a first-generation college student. Faculty mentors worked across the STEM disciplines, with the majority in biological science (50%) and smaller proportions in physical science (21%), engineering (13%), geoscience (13%), mathematical science (13%), and computer and information science (8%). The majority of faculty mentors were teaching faculty (83%), with a smaller proportion considered research faculty (21%) and other classifications (e.g., post-doc; 8%,).

Faculty mentors completed an annual follow-up survey with retrospective pre-post items measuring **culturally responsive mentoring skills**. Overall, faculty mentors reported increases in their mentoring quality, confidence in their ability to mentor effectively, and ability to meet their mentees' expectations. While **Pima mentors** rated themselves lower than UA mentors before participating, they showed greater average increases in their confidence and ability to meet mentees' expectations. This was a trend seen across the survey results, with Pima mentors having lower pre-program scores but often catching up with UA mentors by the end of the first year.

Mentors showed the greatest increases in their self-ratings of **aligning expectations** in their mentoring relationship. Of particular note is the increase in their ability to work with mentees to set clear expectations of the mentoring

relationship (md=1.9). Mentors showed the second-greatest increases in their skills related to **addressing equity and inclusion**, with notable increases in their ability to use microaffirmations and growth mindset techniques (md=1.6), manage conscious and unconscious bias (md=1.6), and work with mentees from different backgrounds (md=1.3). Using microaffirmations and growth mindset techniques was also one of the highest rated skills one year after the training (mean=5.9/7).

In terms of **maintaining effective communication**, mentors showed the greatest increases in their ability to employ strategies to improve communication with their mentees (md=1.6) and identify and accommodate different communication styles (md=1.4). Across all of the skills addressed in the survey, mentors rated themselves the highest on active listening and establishing a relationship based on trust (both means of 6.0/7) one year after the training.

While faculty mentors showed the smallest gains in their skills related to **promoting professional development**, their growth was still notable and not dramatically different from the growth they showed in the other areas. **Pima mentors**, in particular, showed greater increases in their professional development skills than UA mentors. This was also an area where folks with **identities underrepresented in STEM** (i.e., underrepresented race/ethnicity, underrepresented gender identity, first generation) also showed greater increases in skills, particularly in helping mentees balance work with personal life and set career goals.

# Recommendations

## Financial Assistance

Unsurprisingly, given the reality that this program was specifically for low-income students, the most critical component of the program for students, and a notable reason they were able to persist in STEM, was the financial assistance and guidance navigating financial aid and scholarships. While promoting sense of belonging and STEM identity are important pieces of supporting students through their STEM experience, the reality is that low-income students need to be able to meet their basic needs in order to fully engage in their academic experience. The successful persistence of the majority of participants in this program provides additional justification for the need for sustained scholarship funds for low-income students to improve retention and graduation.

## Sense of Belonging in STEM

Across various metrics, participants expressed the value of the community and sense of belonging provided by the program. This was particularly true for students with underrepresented identities in STEM (i.e., gender, race/ethnicity, first generation, parents/caregivers). Participants and comparison group members also noted fellow students and their STEM community as strengths in their transfer experience. Continuing to provide opportunities for students to connect with a cohort of peers who are also navigating the transfer experience and have similar lived experiences seems critical for scaling up efforts like this to improve retention and graduation of Pima students at UA.

While overall sense of belonging significantly decreased for participants when they transferred to UA, it is important to clarify that this sense of belonging is influenced by a variety of factors beyond the program. Comparison group members also showed comparable declines in their sense of belonging when transferring from Pima to a four-year university (the majority of whom transferred to UA). When asked about the factors that influenced their sense of belonging in STEM and their experiences with faculty at Pima and UA, participants and comparison group members conveyed that their experiences in the classroom at UA -- with faculty, their course materials, and grades -- also play a critical role in whether they feel like they belong. Continued efforts to promote sense of belonging in STEM at UA should prioritize opportunities for more engagement with faculty, promoting more inclusive and culturally responsive practices in the classroom, like through the Culturally Responsive Curriculum Development Institute.

## Persistence in STEM

Participants in the program are more successfully being retained in STEM and graduating on a faster timeline compared to their community college transfer peers. This is particularly true for participants who entered the program with the lowest sense of belonging in STEM, as well as participants who are female or nonbinary and first-generation students. While the initial theoretical framework for why the program would promote increased retention and graduation focused on sense of belonging and STEM identity, the reality is that much of what participants needed was logistical and administrative support to navigate the challenging processes of successfully transferring schools and navigating a new campus with new rules and processes. They also needed dedicated academic support. The STU210 course, staff, and faculty mentors provided students with this needed logistical and academic guidance. When thinking about scaling up a program like this, dedicated staff support, in particular, seems essential to assist students with the challenging landscape of a large university like UA.

## Future Analyses

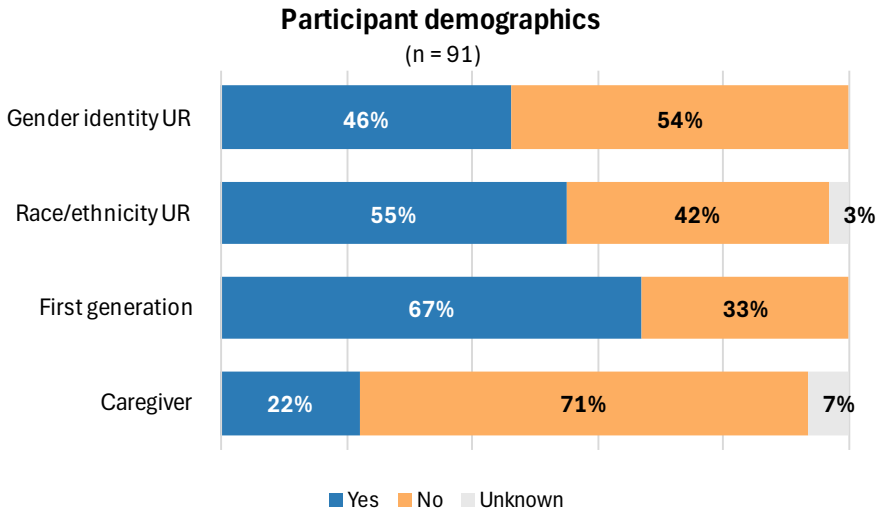
Recruiting and retaining a comparison group of students from Pima and tracking their progress over time posed numerous challenges, and our low response rate led to limitations in our ability to draw conclusions about the impacts of the program using our comparison group. To better understand differences in persistence in STEM based on demographics of interest, it is recommended that future analyses include propensity score matching that compares program participants at UA with an institutional comparison group using data provided by UA University Analytics and Institutional Research (UAIR). This would allow for more robust analysis of multiple variables of interest, including semesters to graduate, retention in STEM, and graduation with a STEM degree. The evaluation team was working with UAIR to generate a dataset that would allow for these types of comparisons, but the dataset was not finalized in time for the submission of this report.

In order to better understand changes in sense of belonging and STEM identity at the individual level, we calculated individual-level reliable change indices. These allowed us to drill down further, beyond overall group changes, to understand how many people experienced meaningful changes in their sense of belonging and STEM identity and in which direction. We were also able to compare the demographic profile of those groups of students to understand who, in the participant group, was experiencing changes. Given the use of these scales across STEM programs at UA, it is recommended that other programs also consider using reliable change indices to track change over time.

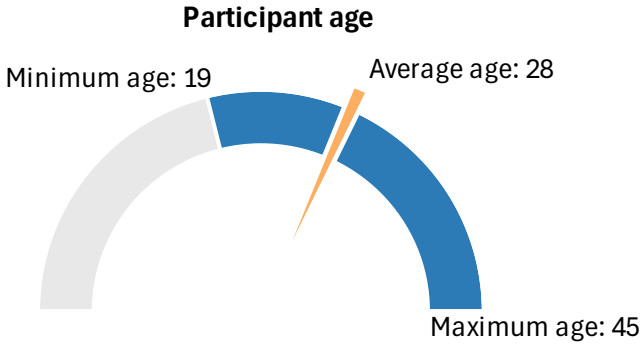
# Program Participants

## Participant Demographics

This report focuses on data for the 91[i] students who participated in the Pima-UAZ STEM Bridge Program between 2020 and 2024. Among participants, 46% (n=42) identify as having a gender identity underrepresented in STEM (e.g., female, non-binary, trans, genderqueer); 55% (n=50) identify as part of a racial/ethnic minority group underrepresented in STEM (i.e., Black or African American, Hispanic or Latino, American Indian or Alaska Native);[ii] 67% (n=61) identify as a first-generation college student;[iii] and 22% (n=20) identify as a parent or caregiver.[iv]




Participants ranged in age from 19 to 45, with an average age of 28.



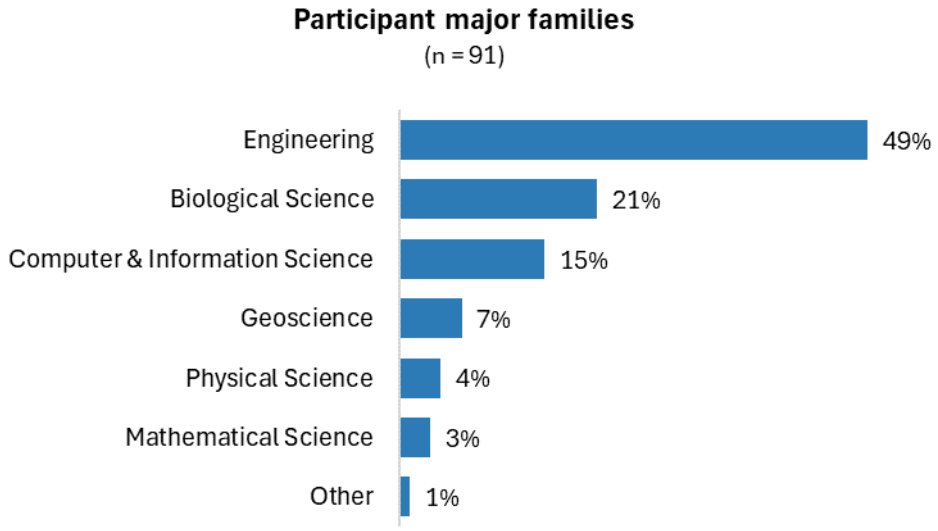

[i] One student passed away while still enrolled in the program; that student's data has been excluded throughout this report. An additional three students were recruited for cohort 3 after they had already transferred to UA; their data is also not included in this report.

[ii] According to NSF, individuals who are Black or African American, Hispanic or Latino, and American Indian or Alaska Native are underrepresented minority groups in science and engineering (National Science Foundation, National Center for Science and Engineering Statistics. 2019. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2019*. Special Report NSF 19-304. Alexandria, VA. Retrieved from https://www.nsf.gov/statistics/wmpd

[iii] First generation includes individuals who identify with any of the following: come from a home where neither parent/legal guardian has completed a four-year bachelor's degree; parent(s)/legal guardian(s) completed a bachelor's degree or equivalent in a country outside of the United States; separated or divorced parents and the parent with primary custody, or with whom the student lived with a majority of the time, does not have a bachelor's degree; was/is a homeless youth, in the foster care system, or a ward of the state.

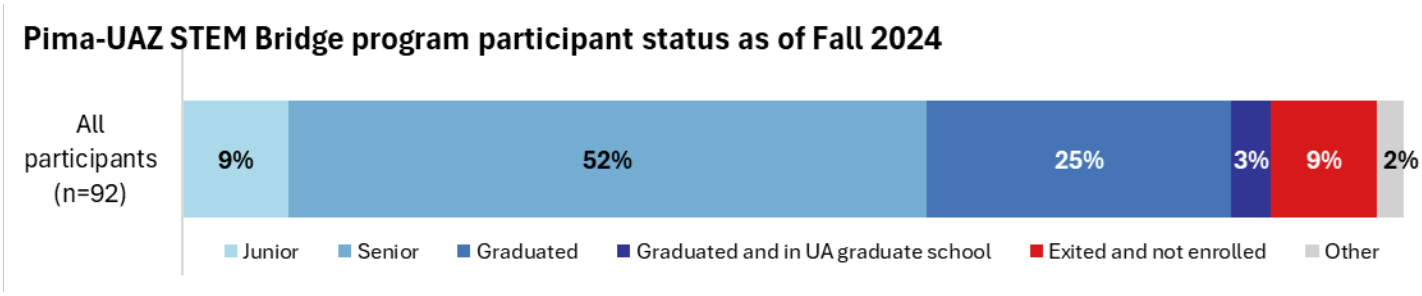
[iv] Parent/caregiver is defined as a primary caregiver (e.g., parent, guardian, foster parent, kinship caregiver) for any of the following: a child under the age of 18, someone 18 or older with special needs, or an elderly person.

Nearly half of participants (49%, n=45) were pursuing a major in engineering, while the remainder of the participants were pursuing a degree in biological science (21%, n=19), computer and informational science (15%, n=14), geoscience (7%, n=6), physical science (4%, n=4), mathematical science (3%, n=3), or another STEM major (1%, n=1).



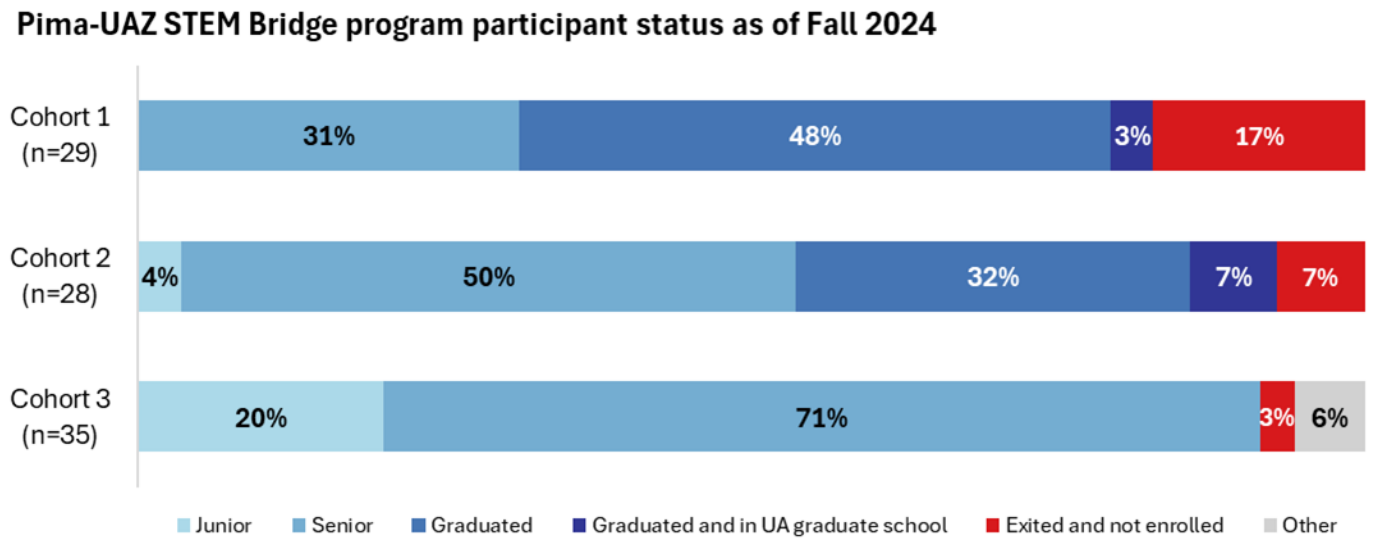

## Retention and Graduation

As of Fall 2024, 28% (n=26) of the Pima-UAZ STEM Bridge participants have graduated, including 3% (n=3) who completed their undergraduate degree and are currently enrolled in a graduate program at UA. A total of 8 participants (9%) exited the program and are not enrolled. Just over half (52%, n=48) currently have senior status, and the remaining 9% (n=8) have junior status at UA. One participant exited the program but is still enrolled in STEM at UA.[v]



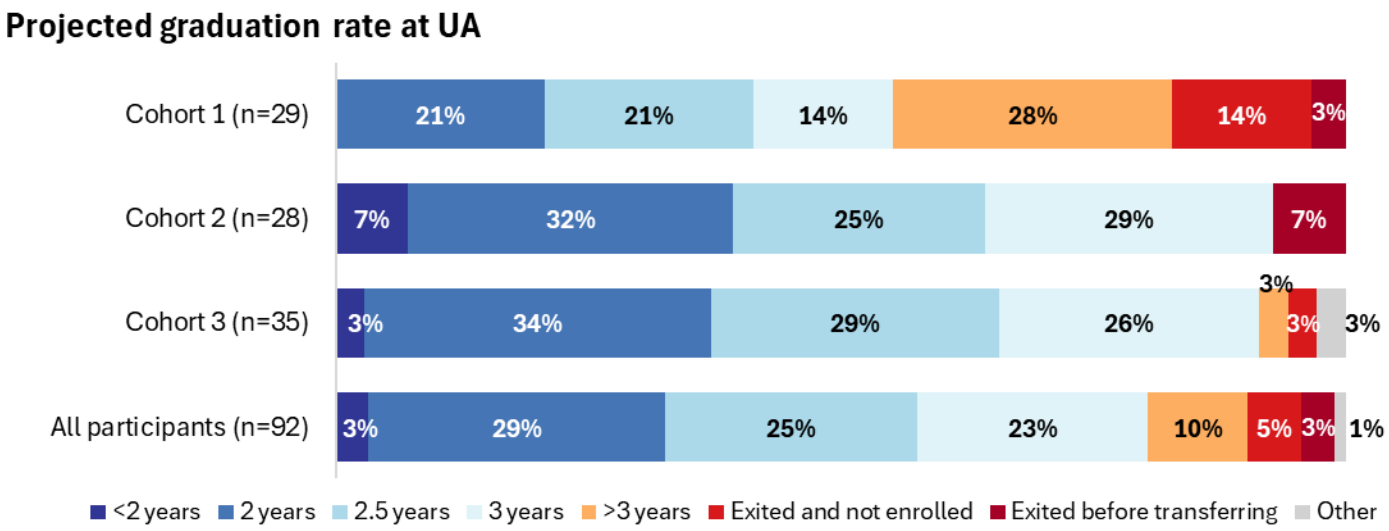

Over half of cohort 1 (51%) has successfully graduated from UA with a degree in STEM, along with more than a third of cohort 2 (39%). Given that cohort 3 just entered their second year at UA, it is unsurprising that none of them have graduated. The largest proportion of participants who exited the program were in cohort 1 (n=5; 17%), with smaller proportions in cohort 2 (n=2, 7%) and cohort 3 (n=1, 3%).

[v] The other student in the 'Other' category is the student who passed away while still enrolled in the program.

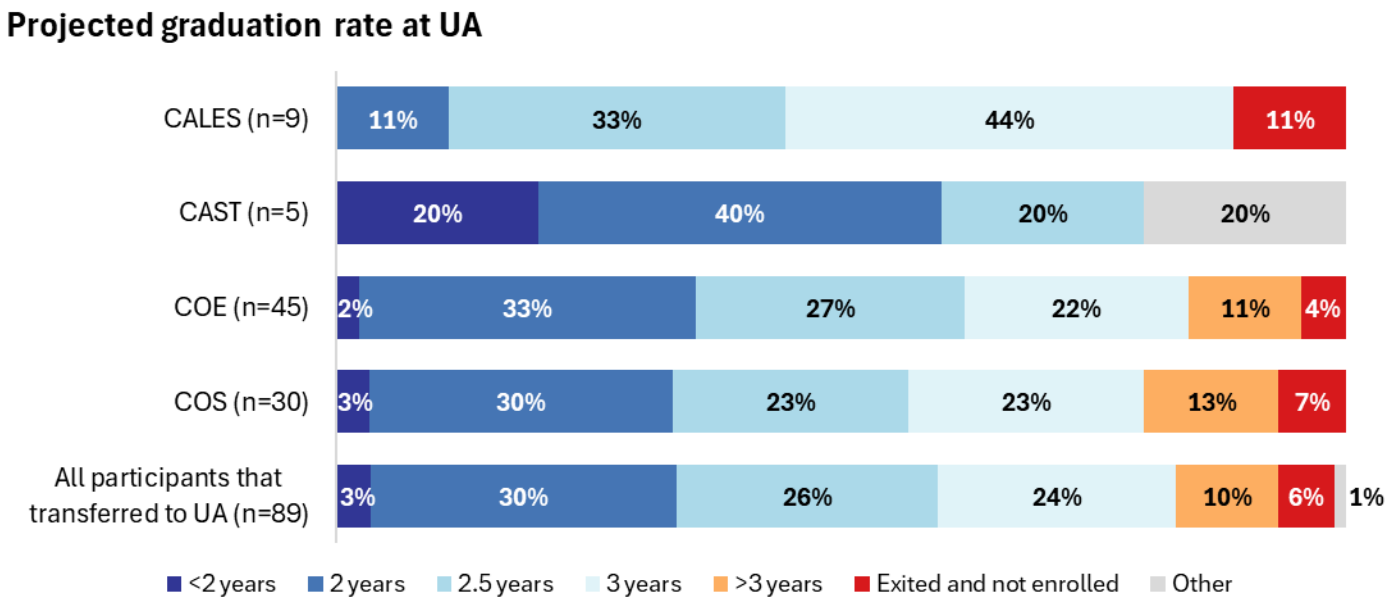



In addition to their academic standing, it is valuable to understand how many years it is taking participants to complete their undergraduate degree at UA and how they compare to their peers. Based on the most recent data available for UA transfer student retention and graduation (Fall 2020 cohort), full-time transfer students who transferred to UA from a 2-year school (i.e., community college) had a two-year graduation rate of 25.7% and a three-year graduation rate of 53.9%.[3] For community college transfer students who specifically transferred into the UA colleges participants are enrolled in (CALES, CAST, College of Engineering, College of Science), the two- and three-year graduation rates are slightly lower (23.9% and 53.5%). When further isolating community college transfer students in these UA colleges who were Pell eligible (i.e., low income), the two-year graduation rate drops slightly lower (22.5%) while the three-year graduation rate mirrors that of all community college transfer students (53.9%).

Looking at data for actual and projected graduation rates for all Pima-UAZ STEM Bridge participants (n=92), 32% are projected to complete their undergraduate degree in 2 years or less and 80% are projected to complete their undergraduate degree in 3 years or less, far surpassing the graduation rates of their community college transfer peers. This is particularly true for participants in cohorts 2 and 3; more than one in three participants in cohort 2 (39%) and cohort 3 (37%) are projected to complete their undergraduate degree in two years or less.



Viewed at the college level, the projected graduation rates of program participants are even more notable. The projected two-year graduation rate for participants in the College of Engineering (35%) is more than double that of their College of Engineering peers who transferred from a community college in Fall 2020 (14.5%); their three-year graduation rate is also markedly higher (84% versus 47.4%). Participants in the College of Science similarly have notably higher 2-year (33%) and three-year (79%) graduation rates than their community college transfer peers (23.3% and 53%).



## STU210-UA Transfer Course

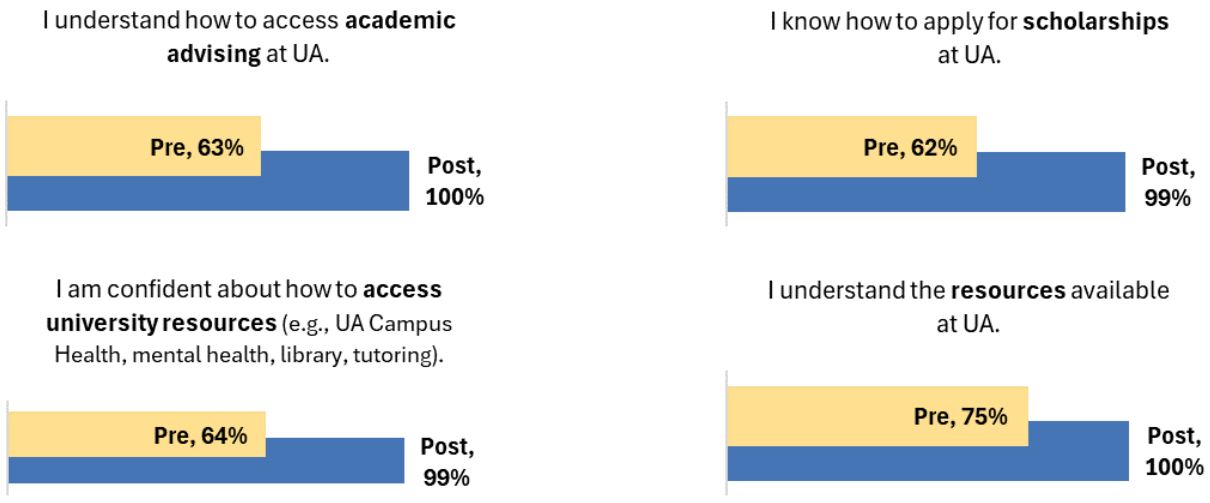
In their final semester at Pima, participants enrolled as a cohort in STU210-UA, a special section of the transfer readiness course offered at Pima that was adapted to meet the unique needs of program participants, focusing on transferring specifically into STEM at UA. Participants completed a survey at the beginning and end of the semester to understand changes in their transfer knowledge and study behaviors as a result of participating in the Pima STU210-UA transfer class.

Matched pre- and post-survey data was aggregated across all three cohorts and was available for 84 total participants. Demographics for this sample were comparable to the overall demographics for the 91 total program participants. An interactive Excel dashboard was created for program staff to better understand differences in results, with data filters for cohort, race/ethnicity underrepresented in STEM, gender identity underrepresented in STEM, first-generation status, and caregiver status. Highlights from the dashboard are also included, where possible.

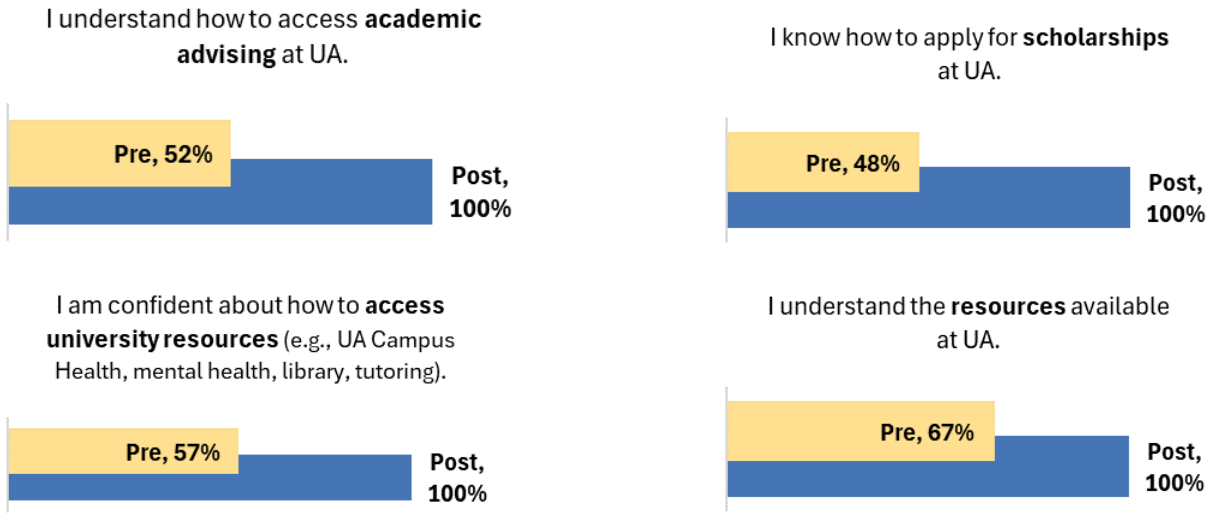
Participants were asked a series of questions about their knowledge and confidence in key topics addressed in the course. They rated their level of agreement on a 6-point Likert scale (strongly agree, agree, somewhat agree, somewhat disagree, disagree, strongly disagree). Responses were aggregated into 'agree' and 'disagree' to show changes in knowledge over time.

Overall, participants showed the largest increase in their understanding of **University of Arizona resources**, including academic advising, scholarships, physical and mental health services, library resources, and tutoring. This was particularly true for participants with both an **underrepresented gender and race/ethnicity in STEM**; while a smaller proportion of these students understood how to access these resources before the course, 100% understood at the end of the course.

**All Participants, % agreed (n=84)**

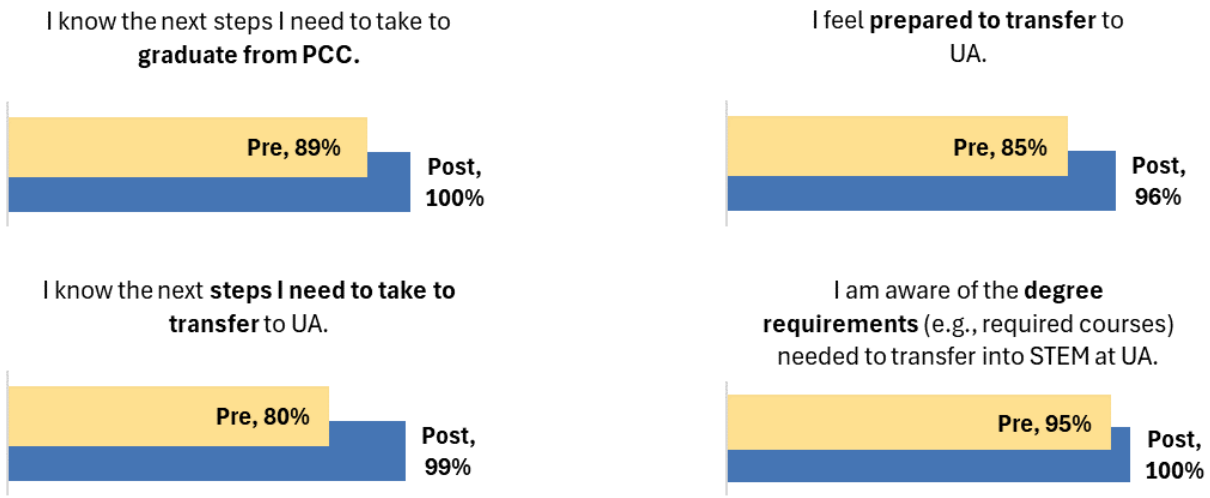


**Underrepresented Gender Identity and Race/Ethnicity, % agreed (n=21)**



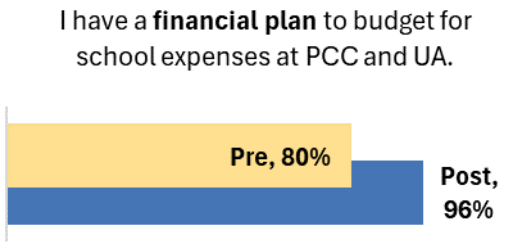

More participants felt prepared for the **transfer process**, including graduating from Pima (PCC), transferring to UA, and particularly navigating the degree requirements for transferring.

**All Participants, % agreed (n=84)**

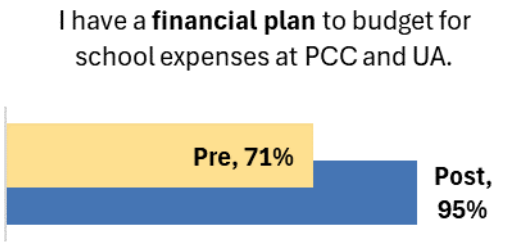


More participants had a **financial plan** for college following participation in the STU210-UA transfer class. This was particularly true for participants with an **underrepresented gender and race/ethnicity in STEM**.

**All Participants, % agreed (n=84)**

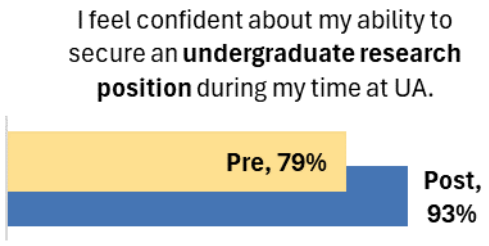


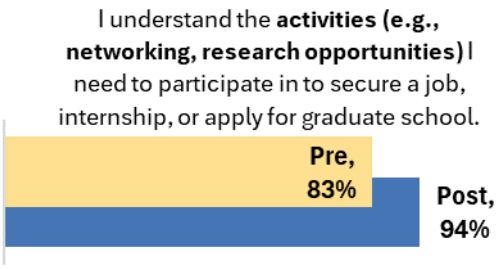

**Underrepresented Gender Identity and Race/Ethnicity, % agreed (n=21)**



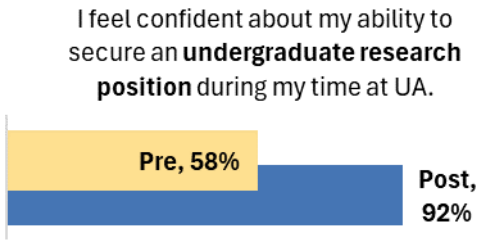

More participants also felt confident in and understood the value of seeking out opportunities for research and networking. This was particularly true for **female and non-binary caregivers**.

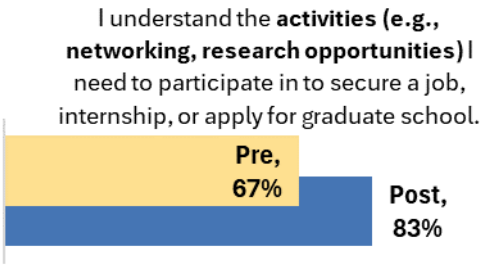
**All Participants, % agreed (n=84)**



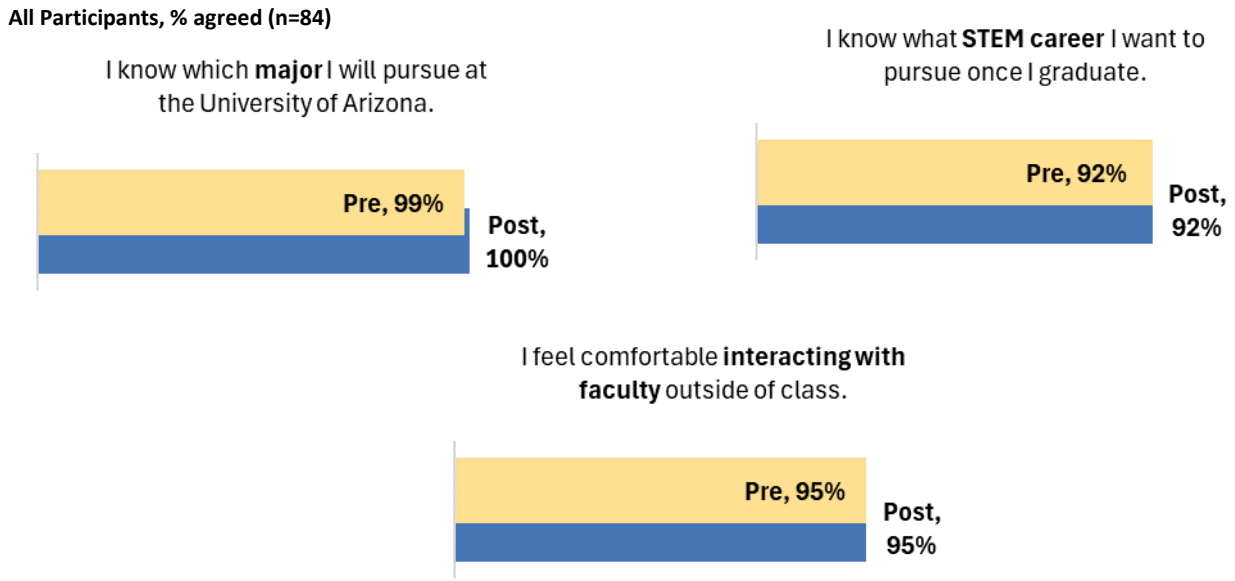




**Underrepresented Gender Identity and Caregiver, % agreed (n=12)**



Overall, participants started with a strong sense of their **STEM major** and **STEM career**, as well as comfort **interacting with faculty**.



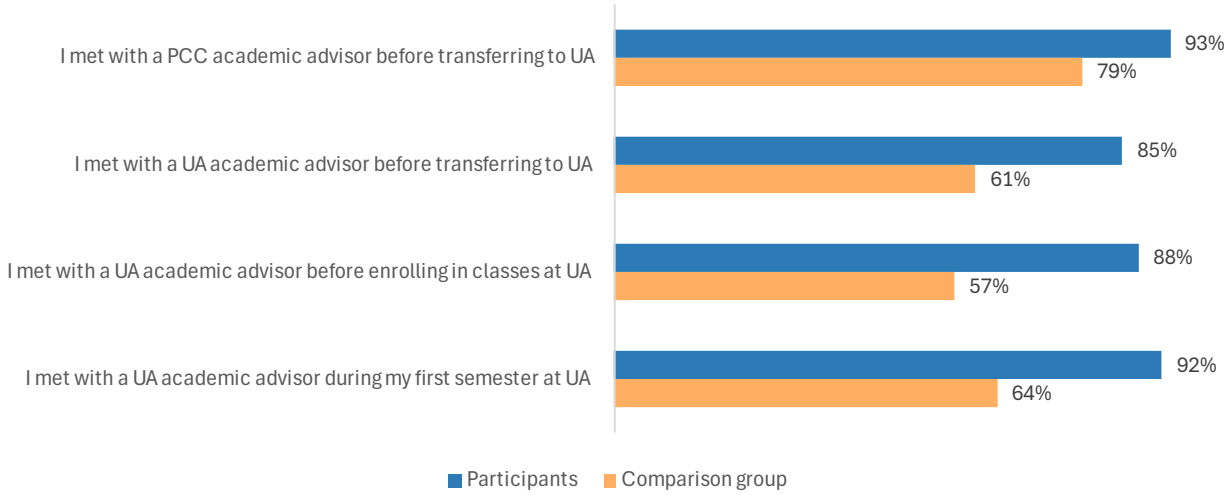

## Transfer Experience

The experience of transferring from a community college to a university has been heavily researched and shown to be challenging logistically, mentally, and emotionally for transfer students. In an effort to better understand the transfer experience of participants and comparison group members, a series of questions was asked about their experience of transferring from Pima to a four-year university based on relevant literature.[4,2] Transfer experience data was available for **75 participants (82%) and 28 comparison group members (17%)**. It is important to note that the smaller sample of comparison group members may influence results, and therefore comparing their responses to participants should be considered with some caution.

Research on best practices for successful transfer of engineering students point to better transfer outcomes for first generation students when they meet with **academic advisors** at three critical time points: **pre-transfer, pre-enrollment (at the new institution), and during the first term (at the new institution)**.[1,5]

**Participants reported higher levels of engagement with academic advising during their transition to the University of Arizona than their comparison group peers.** At least 85% of participants met with academic advisors at each of the critical time points, compared to 57-79% of their comparison group peers. This suggests that the program may be effectively promoting best practices for academic advising, which are crucial for a successful transition to a four-year university.

**Transfer Advisor Meeting Best Practices – Participants (n = 75) and Comparison Group (n = 28)**



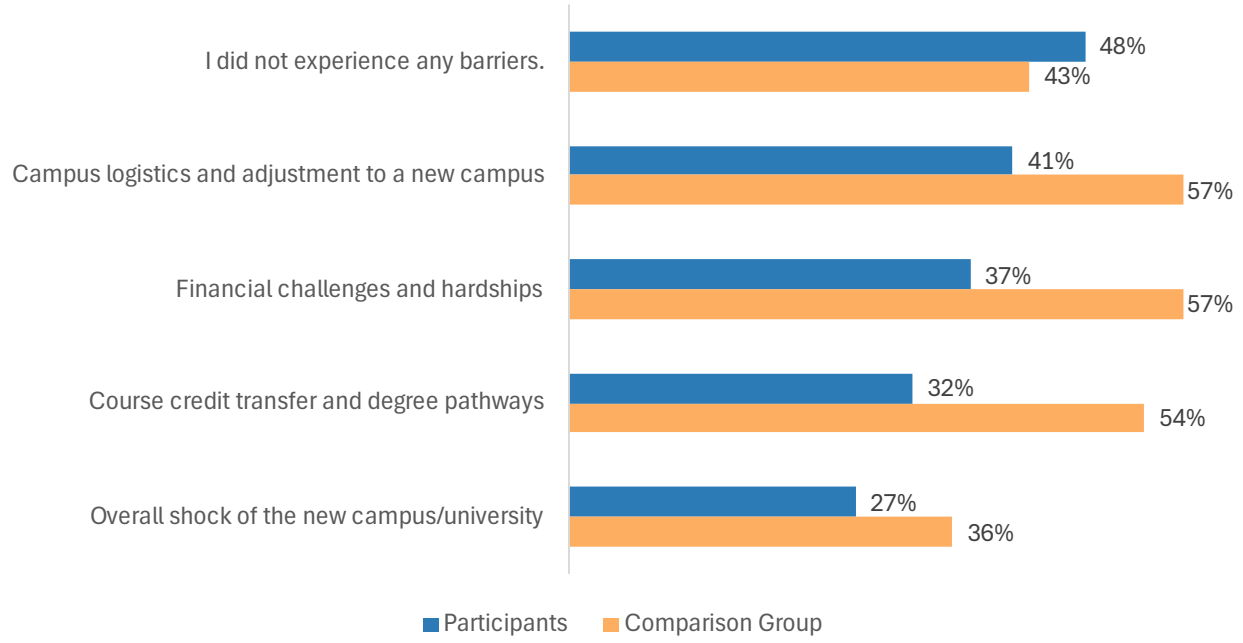

Participants were also asked a series of questions about the **barriers and strengths** of their transfer experience. The following items were initially asked as open-ended questions; we later coded responses into themes for multiple-choice versions of the questions. This summary integrates results from multiple years of data to capture students' responses in the year after they transferred to a four-year university, including both the coded qualitative results and multiple-choice results.

Students were first asked about the **barriers** they experienced during their transfer from Pima to a four-year university. A similar proportion of participants (48%) and comparison group members (43%) reported that they **did not experience any barriers in their transfer experience**. This indicates that a significant proportion of students felt adequately prepared for the transition, suggesting that both groups had a baseline level of support or readiness.

The most common barriers experienced by both participants and the comparison group were **campus logistics and adjustment to a new campus** (41% and 57%) and **financial challenges and hardships** (37% and 57%). More than half (57%) of comparison group members experienced challenges with **course credit transfer and degree pathways** compared to just a third (32%) of participants. While **overall shock of the new campus/university** was noted by the smallest proportion of students (27% and 36%), it is still worth noting that at least a quarter of participants and comparison group members experienced a meaningful transfer shock experience.

Overall, **participants reported experiencing fewer barriers to transfer** compared to their comparison group peers. This suggests that participants may have been better equipped to navigate the complexities of transferring to a four-year institution.

**Barriers in Transfer Experience – Participants and the Comparison Group**




Students were asked **what they wished they would have known** about the transfer experience from Pima to a four-year university. About one in five participants (21%) and 18% of comparison group members noted that there was nothing they misunderstood or wished they would have known, suggesting that a meaningful proportion of both groups felt adequately prepared to transfer.

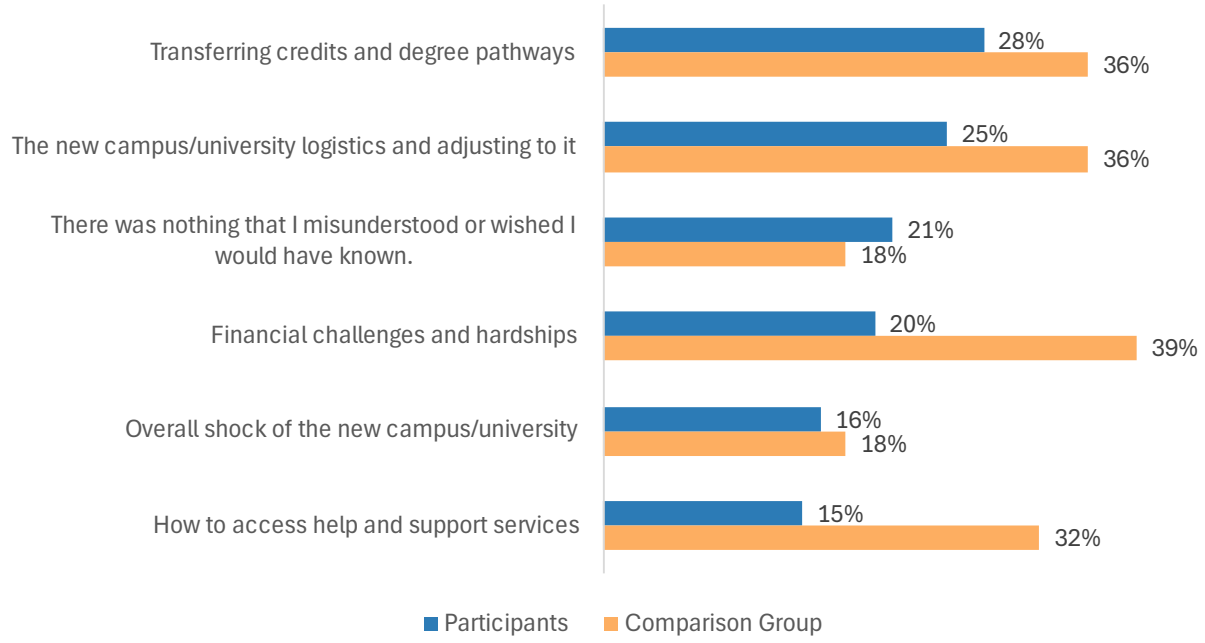
The most common responses for participants were **transferring credits and degree pathways** (28%) and **adjusting to new campus/university logistics** (25%). While these items were both top responses for the comparison group as well (both 36%), nearly twice as many comparison group members selected **financial challenges and hardships** compared to participants (39% vs 20%). The significant financial supports participants receive in the program likely played a role in this difference.

Similarly, twice the proportion of comparison group members (32%) wished they knew more about **how to access help and support services** compared to participants (15%). This is likely influenced by the bridged staff and faculty support participants receive, beginning when they're at Pima.

Again, while **overall shock of the new campus/university** was selected by a smaller proportion of participants (16%) and comparison group members (18%), it is still worth noting.

Overall, while both participants and the comparison group identified areas where they wished they had more information, the comparison group consistently reported higher percentages in most categories.

**What students wished they would have known about the transfer experience – Participants and Comparison Group**




Students were also asked about the **strengths** they experienced during their transfer from Pima to a four-year university. The most frequently mentioned strength for both groups was **utilizing campus resources** (participants, 45%; comparison group, 64%). While fewer participants selected utilizing campus resources, broadly, a notably larger proportion of participants selected **UA academic support programs (e.g., ASEMS)** (40% and 14%, respectively).

**Adapting and personal development** was the second most commonly identified strength for both participants (40%) and comparison group members (57%), indicating that personal growth is a potential outcome of the transfer experience for both groups.

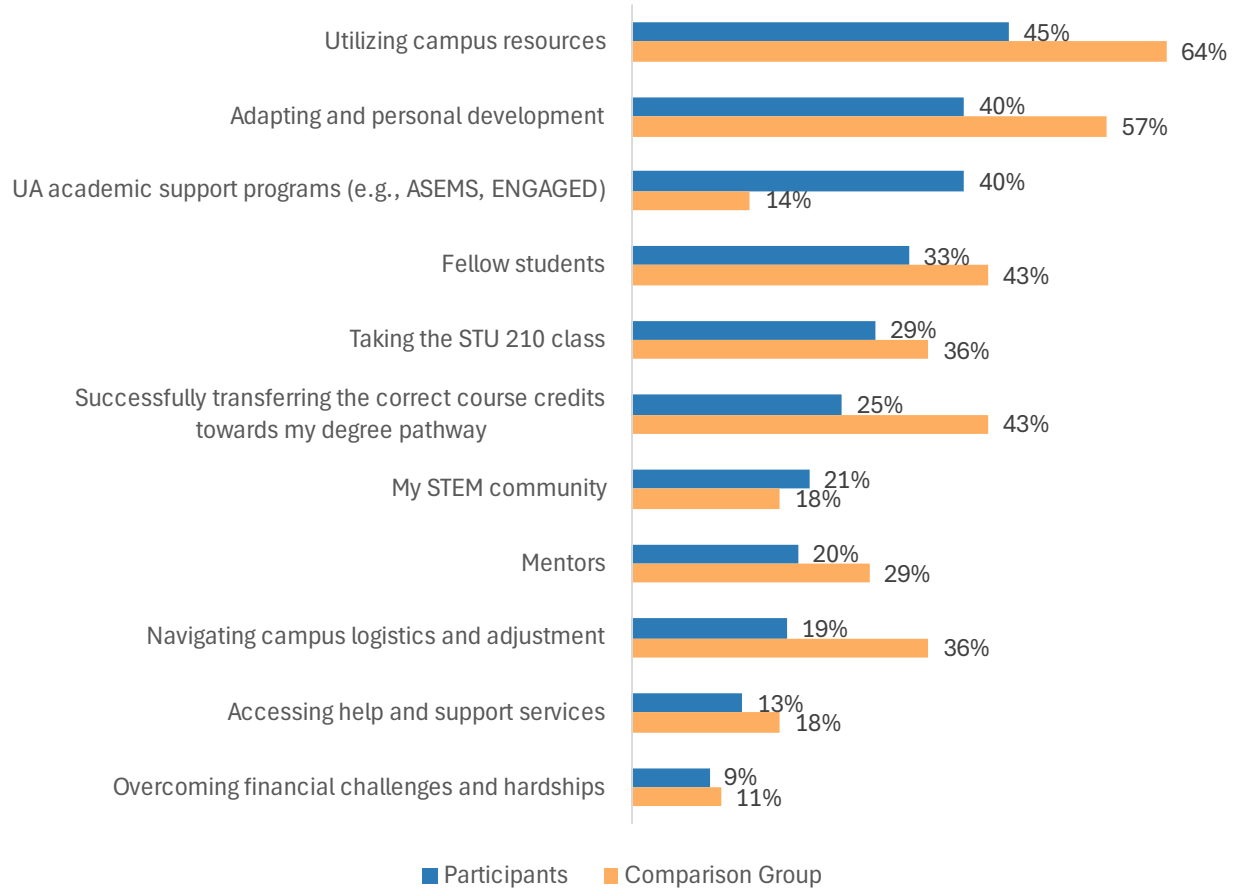
In terms of community and mentorship, **fellow students** were a valuable source of support, with 33% of participants and 43% of the comparison group recognizing their peers as important in their transition. Participants and comparison group members also found strength in their **STEM community** (21% and 18%) and **mentors** (20% and 29%).

The **STU 210 class** was considered a strength by 29% of participants and 36% of the comparison group, further emphasizing the importance of this particular course in aiding students through the transfer process.

Additional strengths included: successfully transferring the correct course credits towards their degree (25% and 43%), navigating campus logistics and adjustment (19% and 36%), accessing help and support services (13% and 18%), and overcoming financial challenges and hardships (9% and 11%).

Overall, both groups identified a variety of strengths, though participants especially noted the benefits of UA academic support programs, while the comparison group more frequently cited logistical and resource-related strengths.

**Strengths of their transfer experience - Participants and Comparison Group**



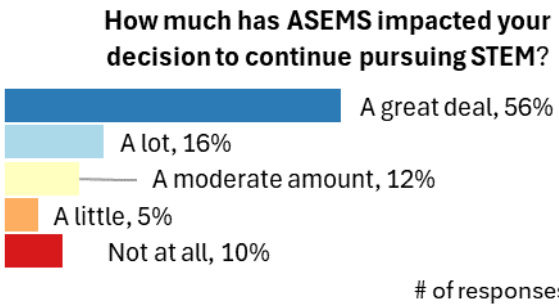
## Program Experience

As part of the annual survey, disseminated at the end of each academic year, participants were asked to provide feedback about their satisfaction with the different program components. For this summative report, participant responses were aggregated across multiple surveys to capture as many responses as possible, including participants who graduated or dropped out of the program early. Data was available for 80 participants, including 23 who graduated, 53 who are still active in the program, and 4 who exited the program. However, because participants were able to skip some questions, response counts vary by item.

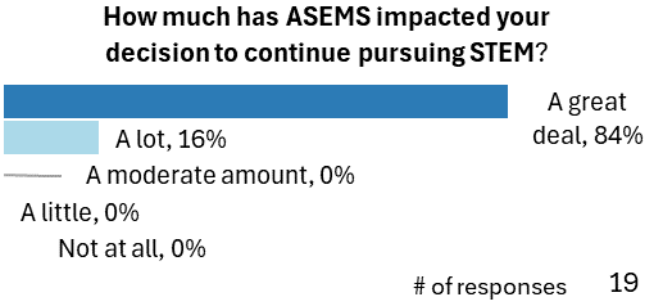
Demographics for this sample were comparable to the overall demographics for the 91 total program participants. An interactive Excel dashboard was created for program staff to better understand differences in results, with data filters for cohort, race/ethnicity underrepresented in STEM, gender identity underrepresented in STEM, first-generation status, caregiver status, UA college, and pre-survey sense of belonging quartile.[vi] Highlights from the dashboard are also included, where possible.

Overall, 72% of participants agreed that ASEMS[vii] impacted their decision to **continue pursuing STEM** 'a lot' or 'a great deal.' This was particularly true for participants with an **underrepresented gender identity and race/ethnicity in STEM** (100%) and for participants who entered the program with the **lowest baseline sense of belonging** scores (89%).

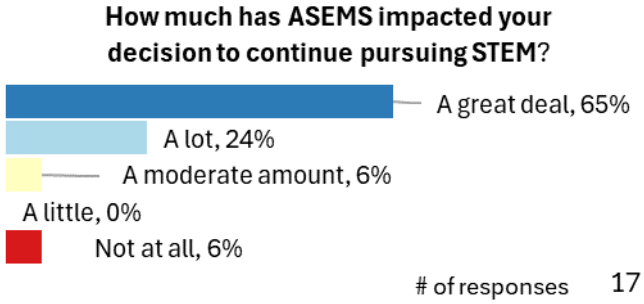
**All Participants (n=73)**




**Underrepresented Gender Identity and Race/Ethnicity (n=19)**




**Participants in lowest pre-survey sense of belonging quartile (n=17)**



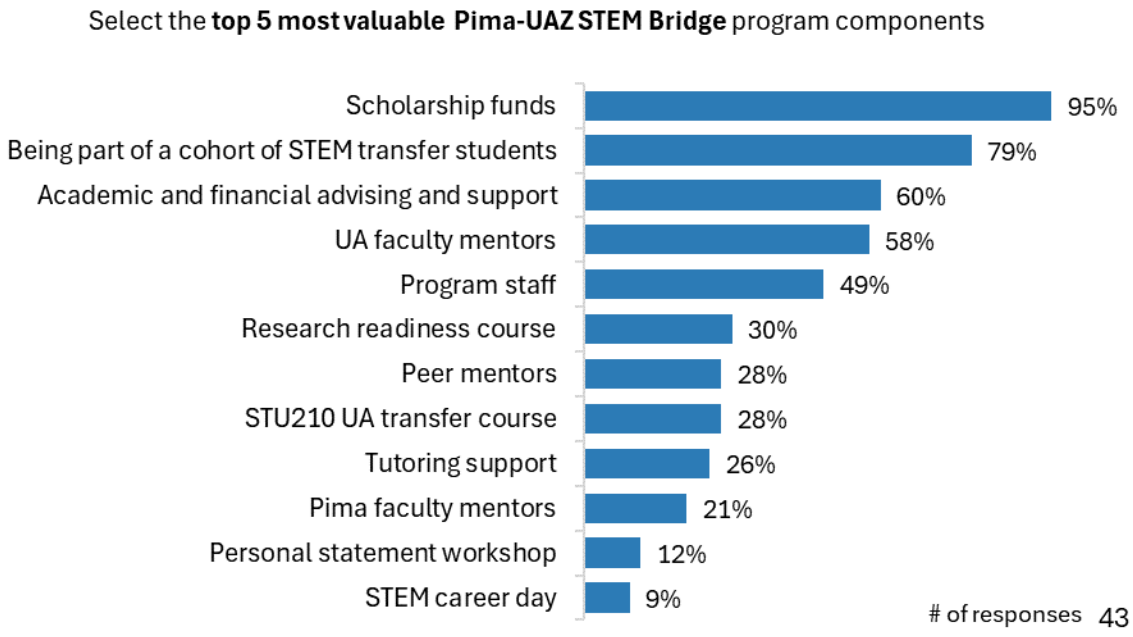

[vi] Participants' sense of belonging score in their pre-survey, taken prior to participating in the program, was used to assign them to pre-sense of belonging quartiles, with quartile 1 (Q1) associated with the lowest quartile of scores and quartile 4 (Q4) associated with the highest quartile of scores). Scores can range from 1 to 4, with higher scores reflecting greater sense of belonging in STEM. The participant quartiles have the following ranges: Q1 (2.3-2.8), Q2 (2.9-3.09), Q3 (3.1-3.4), Q4 (3.5-4).

[vii] Pima-UAZ STEM Bridge is part of Arizona's Science, Engineering, and Math Scholars program (ASEMS). ASEMS provides services and support to students pursuing STEM majors at the University of Arizona, with a specific focus on first generation, low-income, and transfer students.

Participants answered two different sets of questions that asked them to rank the **most valuable components** of their program experience, in the Pima-UAZ STEM Bridge Program and in ASEMS more broadly.

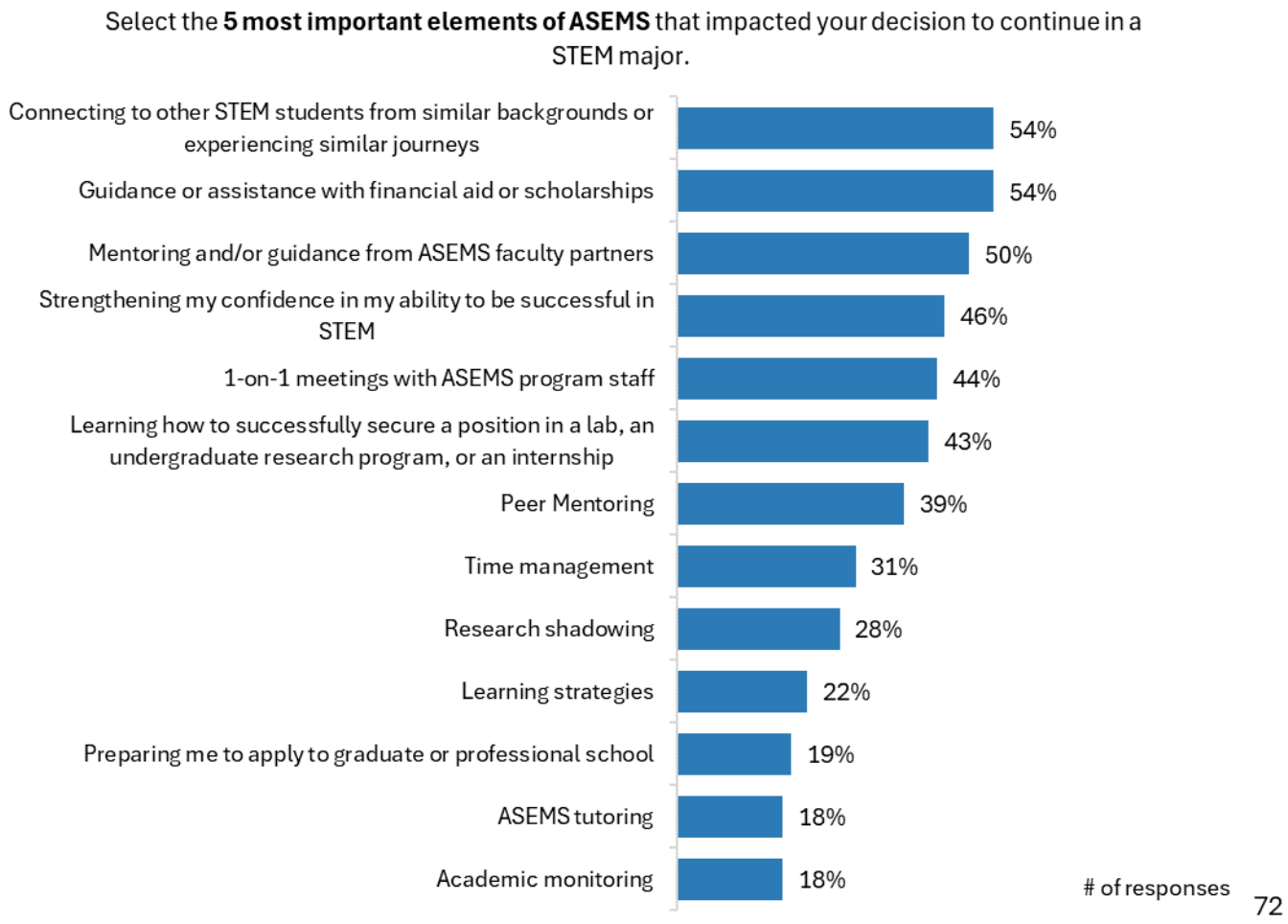
In the most recent annual survey, disseminated in spring 2024, participants were asked to rank the top 5 most valuable components of the **Pima-UAZ STEM Bridge** program. Nearly all (95%) of the 43 participants who answered the question selected **scholarship funds**. The other top 5 program components included – being part of a cohort of STEM transfer students (79%), academic and financial advising and support (60%), UA faculty mentors (58%), and program staff (49%). There were no notable differences in the top 5 choices by demographic characteristics.

**All Participants (n=43)**




Participants were also asked to select the 5 most important elements of **ASEMS** that impacted their decision to continue in a STEM major. A larger number of participants answered this question (n=72) and their choices mirrored responses to the Pima-UAZ question; their top choices included – **connecting with STEM students from similar backgrounds** (54%), **guidance and assistance with financial aid and scholarships** (54%), mentoring and/or guidance from ASEMS faculty partners (50%), strengthening my confidence in my ability to be successful in STEM (46%), and 1-on-1 meetings with ASEMS program staff (44%). Again, these top items were comparable across students with different demographic characteristics.

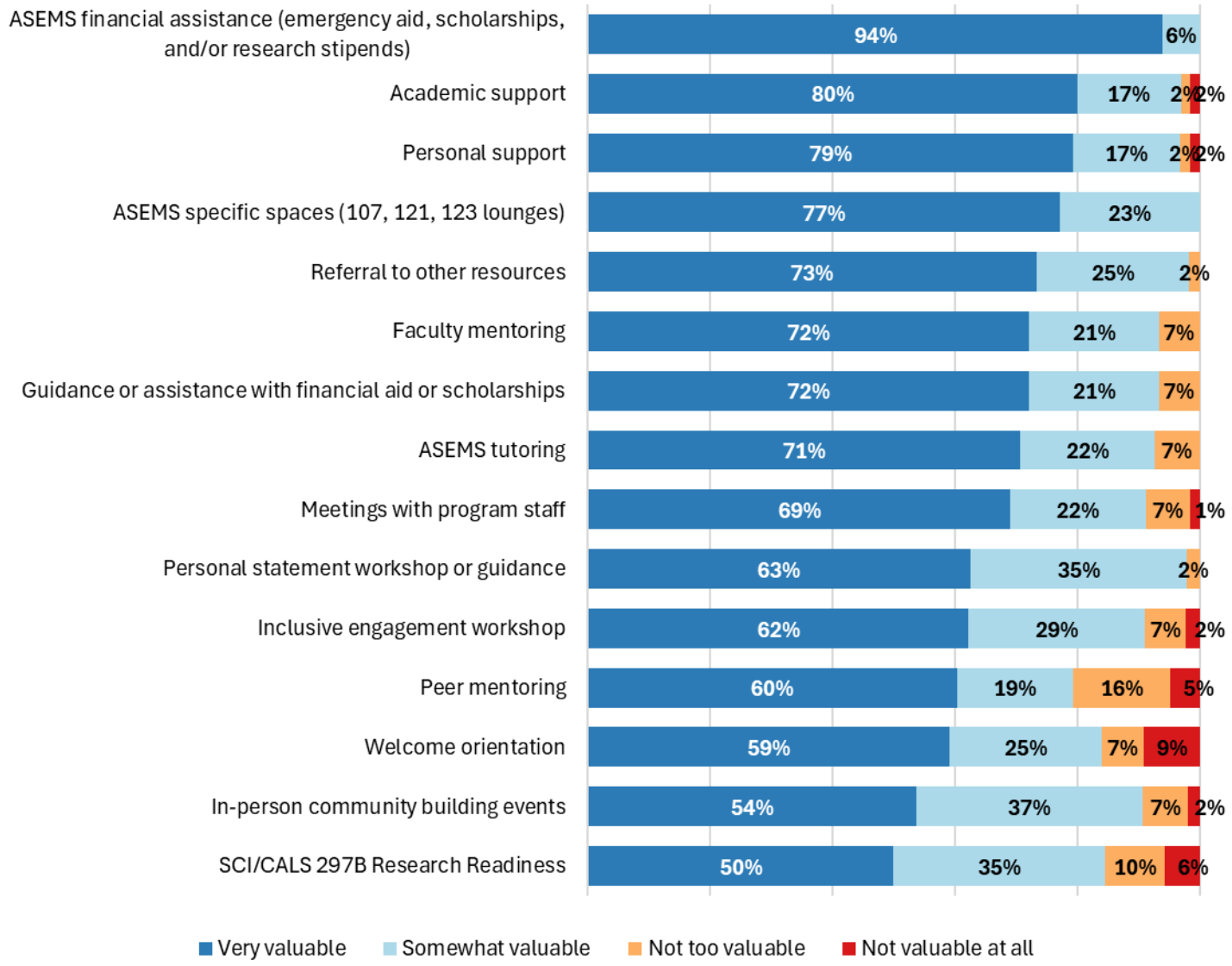
**All Participants (n=72)**



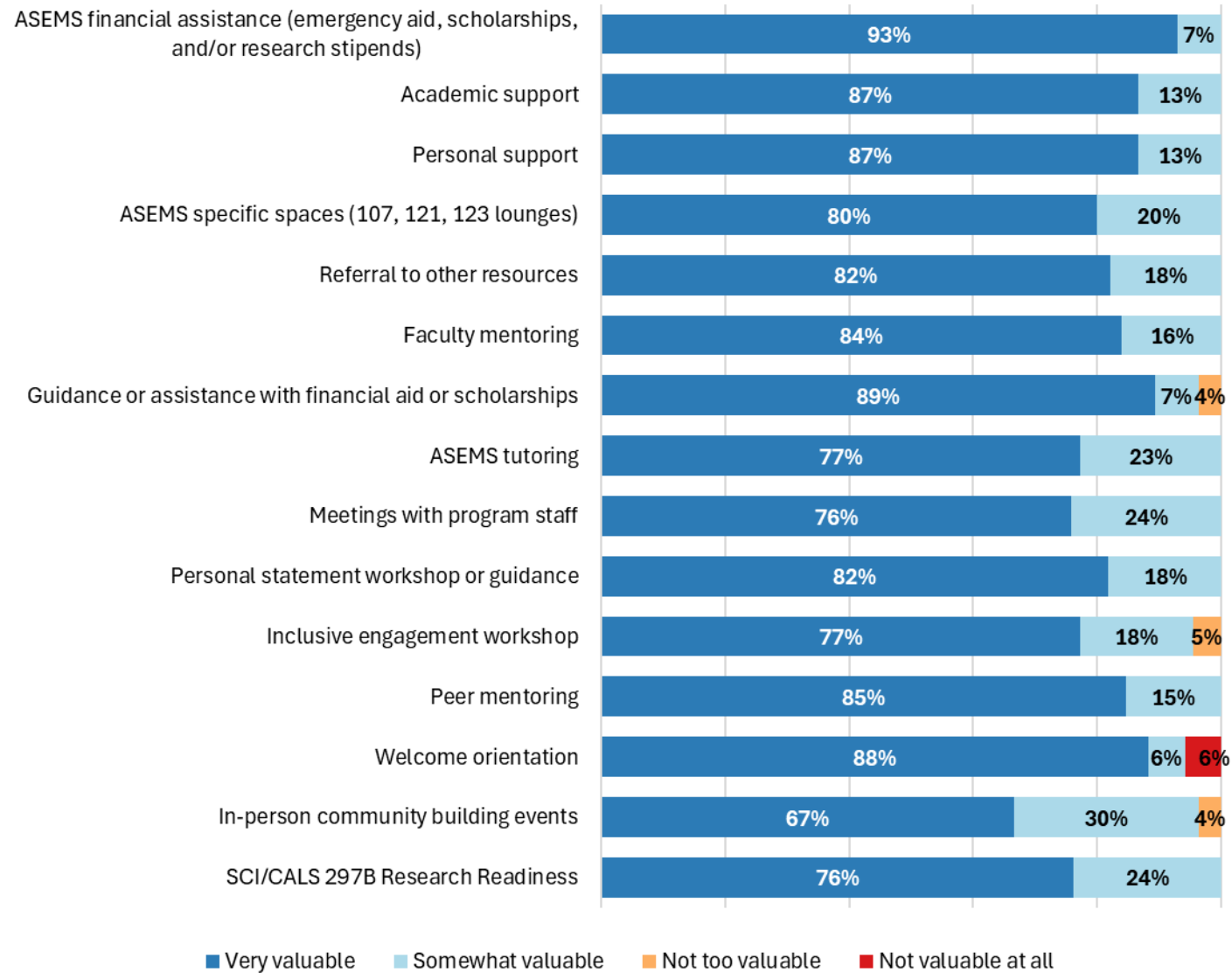

Participants were also asked to rate how **valuable** they found different ASEMS program services and resources. Because participants were only asked to rate how valuable a service or resource was if they actively used it, response counts varied (between 35 and 67 responses). Across the board, at least two-thirds of respondents rated all of the services as somewhat or very valuable, showing that there aren't any services participants, broadly, saw as unvaluable. Consistent with other questions, **ASEMS financial assistance** (emergency aid, scholarships, and/or research stipends) was rated as most valuable, with 94% of the 67 respondents rating it 'very valuable.' Other top services included academic support (80%; 65 responses), personal support (79%; 63 responses), and referral to other resources (73%; 60 responses). ASEMS specific spaces were also highly rated (77%), though only 35 respondents rated them.

Participants with a **gender identity and race/ethnicity underrepresented in STEM** (response range: 11-20) expressed higher ratings of value across the ASEMS services, particularly the workshops and program events, peer mentoring, and Research Readiness course.

**All Participants (response range: 35-67)**



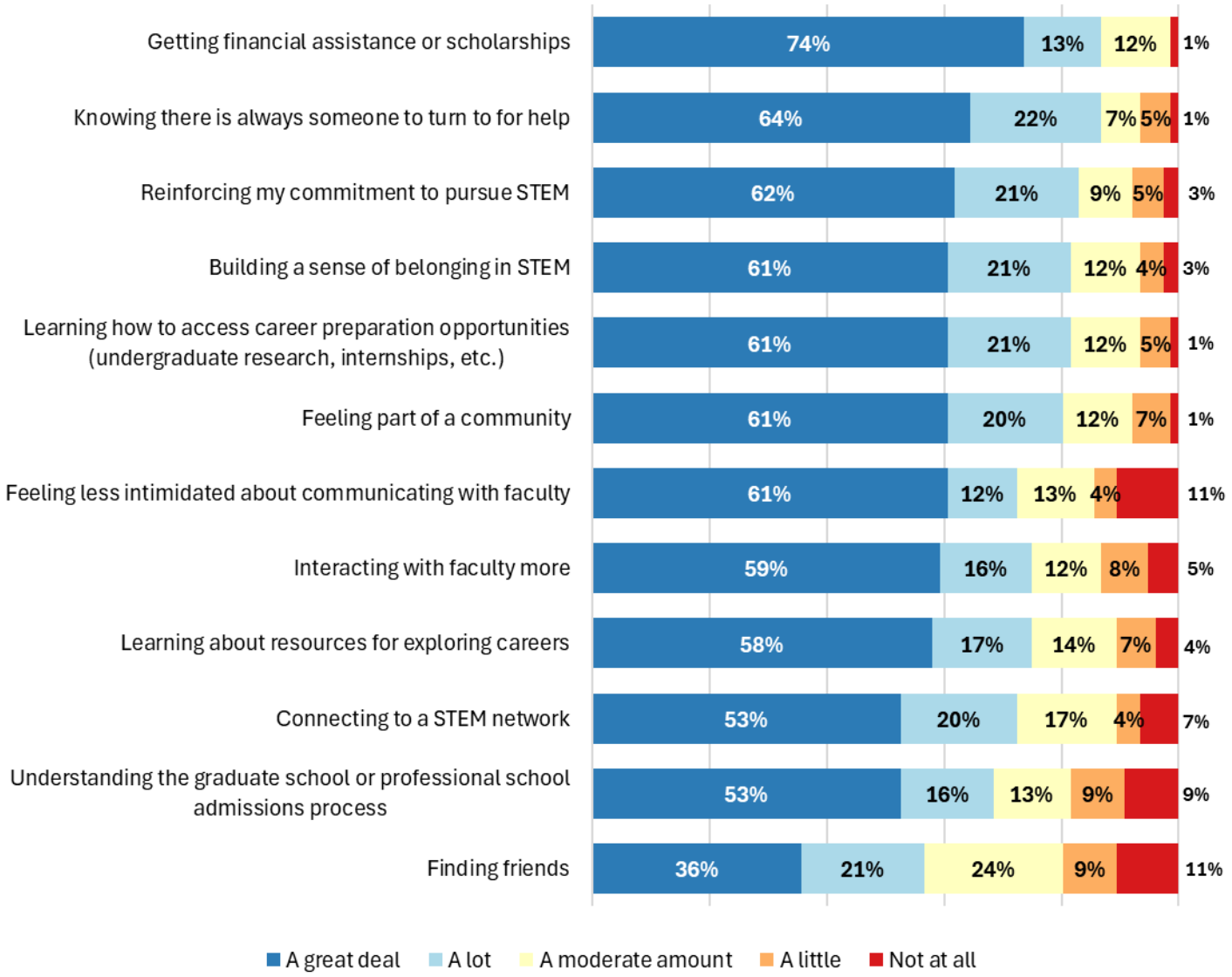
**Gender identity and race/ethnicity underrepresented in STEM (response range: 11-20)**



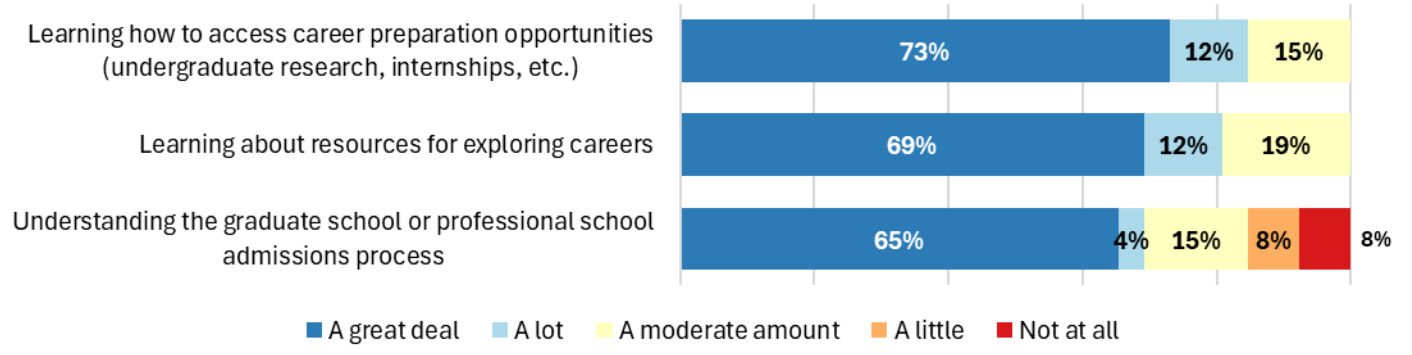

Participants were also asked to rate how much ASEMS **helped** them with a variety of outcomes on a scale from 'not at all' to 'a great deal' (n=76). Items were sorted by the percentage of participants that selected 'a great deal.' Unsurprisingly, the top-rated item was **getting financial assistance or scholarships** (74%). Other top items included – knowing there is always someone to turn to for help (64%), reinforcing my commitment to pursue STEM (62%), building a sense of belonging in STEM (61%), and learning how to access career preparation opportunities (61%). The lowest-rated item, and the only item where less than half of participants selected 'a great deal,' was **finding friends** (36%).

There were some interesting differences by demographic characteristics. Participants in the **College of Science** (n=26) expressed higher ratings on how much ASEMS helped them with career exploration and graduate and professional school. Participants who identified as a **parent or caregiver** (n=19) expressed higher ratings on how much ASEMS helped them develop community, belonging, and friends, as well as interact more with faculty.

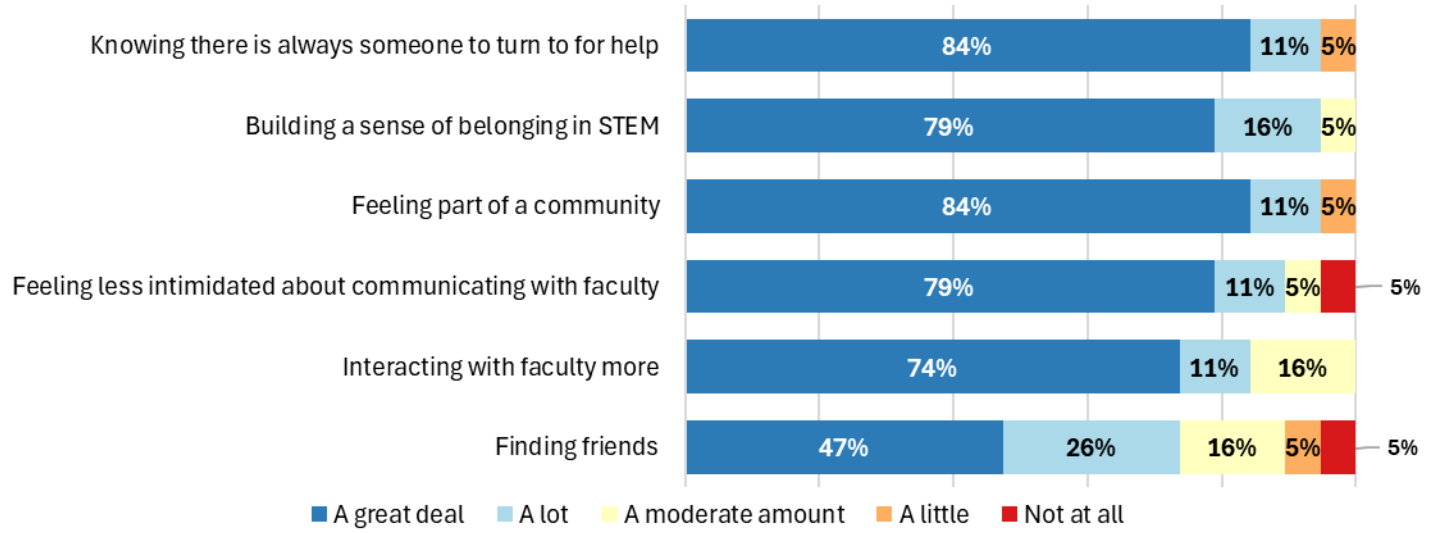
**All Participants (n=76)**




**College of Science (n=26)**



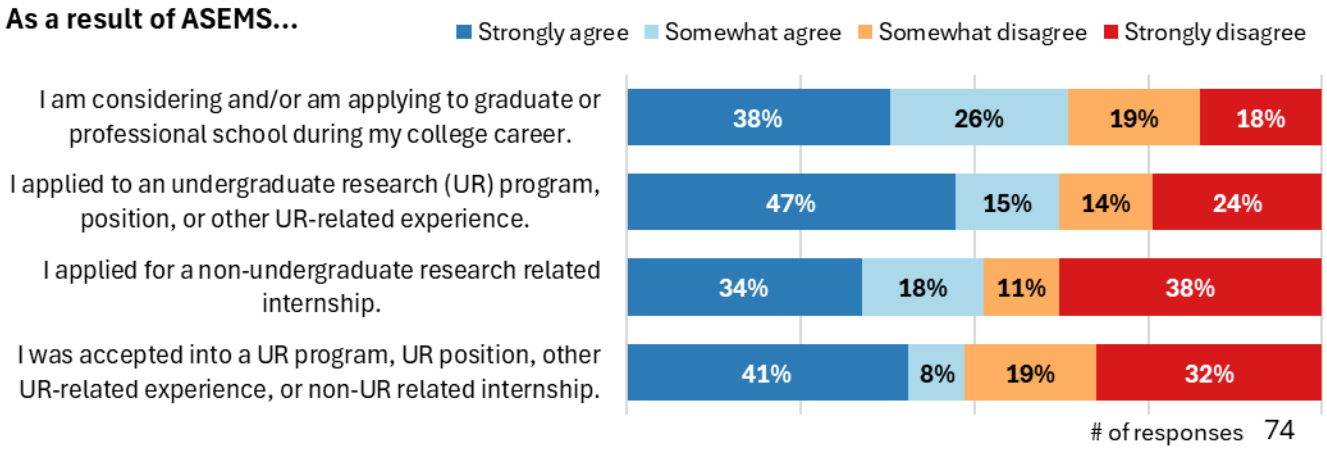
**Parent or caregiver (n=19)**



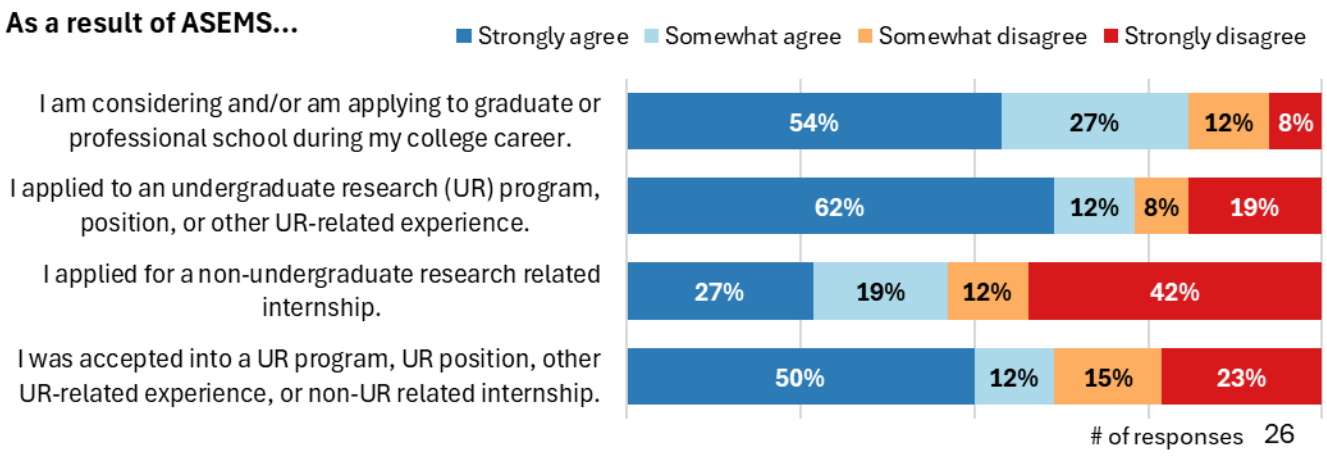

Participants shared how much ASEMS impacted their decision to participate in **research and internships** and apply to **graduate or professional school** (n=74). More than half of participants agreed that ASEMS impacted their decision to apply for graduate or professional school (64%), apply to an undergraduate research program, position, or experience (63%), and apply for a non-research related internship (52%). Just under half agreed that as a result of ASEMS they were accepted into an undergraduate research program or non-research internship (49%).

A larger proportion of participants from the **College of Science** (n=26) agreed that ASEMS impacted their choice to apply for undergraduate research (81%) and graduate or professional school (74%), and a larger proportion were accepted into a research program or non-research internship (62%). Participants who identified as **parents and caregivers** (n=19) were also more likely to consider applying for graduate or professional school because of ASEMS (79%).

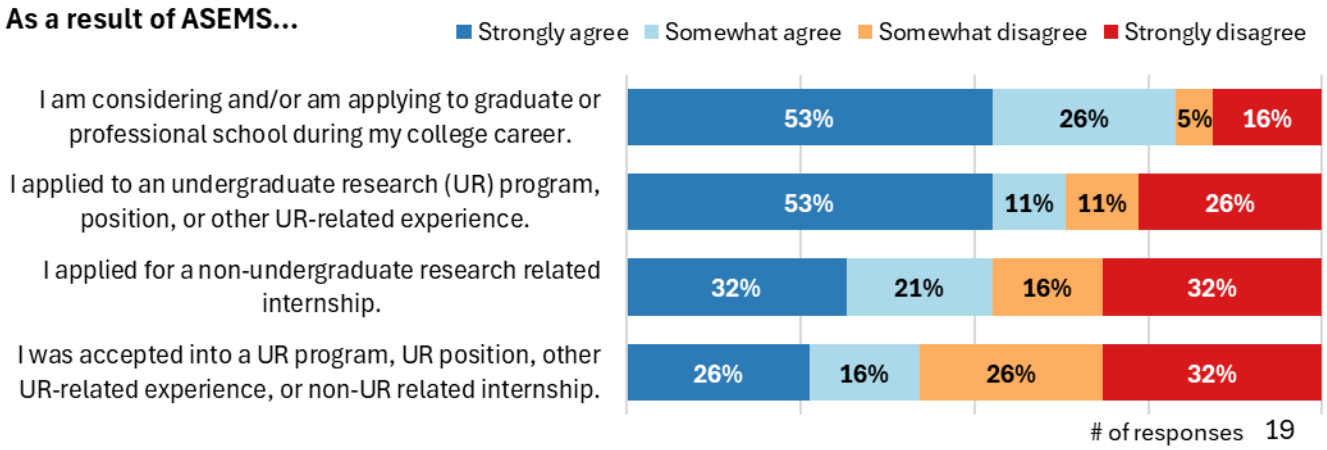
**All Participants (n=76)**



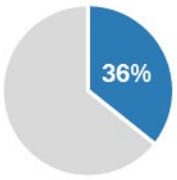
**College of Science (n=26)**




**Parent or Caregiver (n=26)**

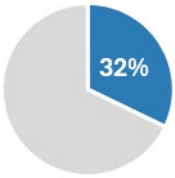
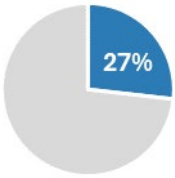
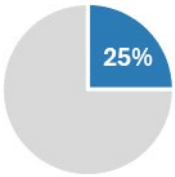
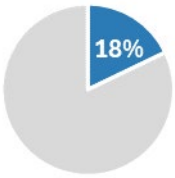



Participants were also asked a series of open-ended questions about their experience with the program. First, they were asked to describe the impact that ASEMS had on them; a total of 56 participants provided substantive responses. Most frequently, participants described the **community and sense of belonging** they experienced (36%, n=20), the ways that the program impacted their **persistence in STEM** (32%, n=18), the support and mentoring they received from staff and faculty (27%, n=15), the financial support and guidance (25%, n=14), and the academic support (18%, n=10). A smaller number of participants discussed the value of the dedicated ASEMS space (n=5) and how the program increased their sense of confidence (n=3). The following quotes highlight how participants discussed these key themes.




**Community and sense of belonging**

*"ASEMS has helped me get to know other engineering students in my classes which has made me feel much more connected and encouraged to continue with the degree. It has also been helpful to have someone like Elena to ask general questions and her be interested to connect me with relevant resources. These things often feel overwhelming when done alone but she was very easy to talk to and helpful."*

| | | |
|---|---|---|
|  | **STEM identity and persistence** | *"Being an ASEMS participant has kept me feeling grounded in my pursuit of a STEM degree. I think if it wasn't for ASEMS, I would probably change my major to something non-STEM related."* |
|  | **Mentoring and support from staff and faculty** | *"Working with Jenni on my financial situation regarding my tuition was HUGE to me this semester. She was there every step of the way and helped to assuage my concerns and solve problems with me. It was a great learning experience. Also my peer and faculty mentors were great throughout."* |
|  | **Financial support and guidance** | *"I feel that it has really helped me find my footing transitioning from PCC. Having staff and community to help explain things has been really helpful. The scholarship from the UA-Bridge program has really lifted the financial burden of university tuition and has helped me focus on my studies."* |
|  | **Academic support** | *"This Academic year has been extremely rough for me for various reasons. The ASEMS staff, especially Jenni, all were extremely helpful in being supportive and helping me get my academics back on track."* |

Participants were also asked to provide suggestions for improving the program; a total of 32 provided suggestions. The most common suggestions were –

- More social opportunities (25%, n=8)
- More tutoring support (19%, n=6)
- Fewer required meetings, particularly with faculty mentors (19%, n=6)
- Improved program organization and communication (16%, n=5)

Additional suggestions provided by one or two participants included –

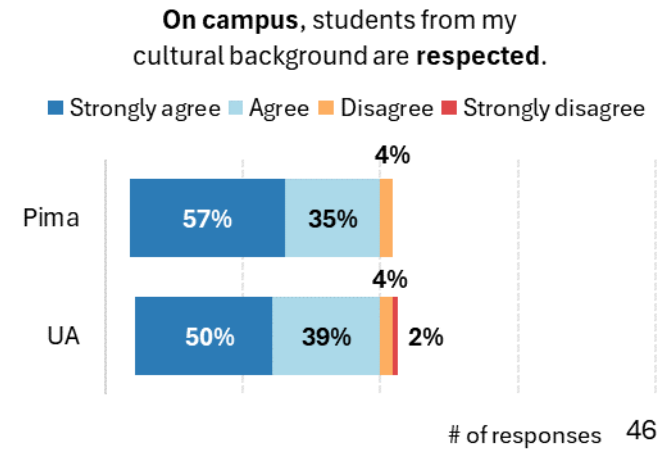
- Continued program support beyond their second year
- Improved faculty mentor communication
- More major and career exploration opportunities
- More support funding undergraduate research experiences
- Assistance with basic needs (e.g., food, parking)
- More engineering faculty mentors

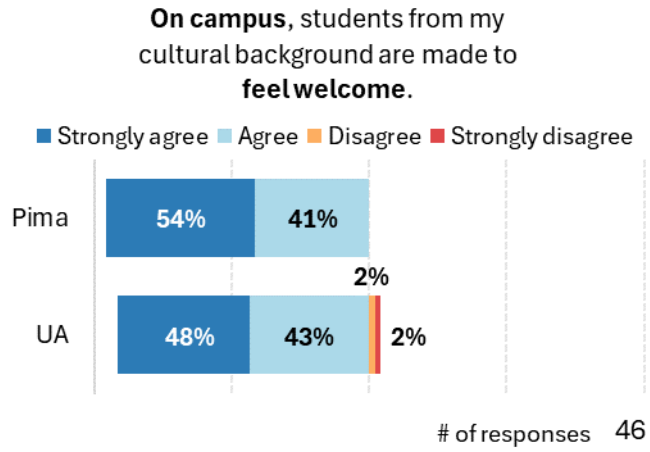
## Broader Campus Experience

Recognizing that participants' experience in the program is only one factor influencing their sense of belonging and STEM identity, additional survey questions were included in the 2024 annual survey to understand their broader campus experiences at Pima and UA (n=46).

First, participants were asked about their level of agreement with a series of statements about the Pima and UA campuses. The vast majority of participants agreed that students from their cultural background are **respected and made to feel welcome on campus** at Pima (92% and 95%) and UA (89% and 91%).[viii]

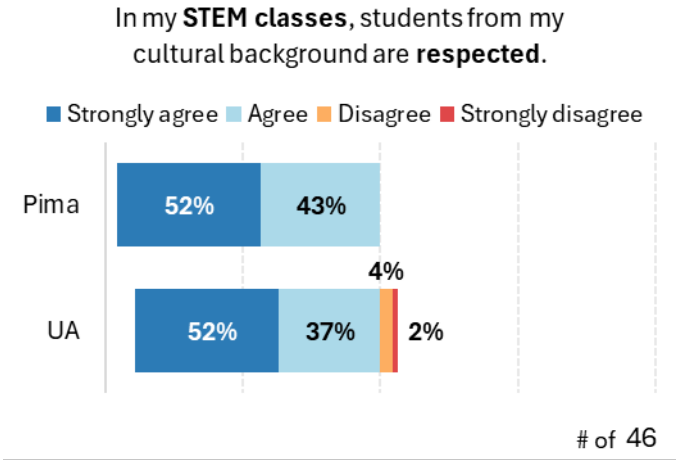
**All Participants (n=46)**

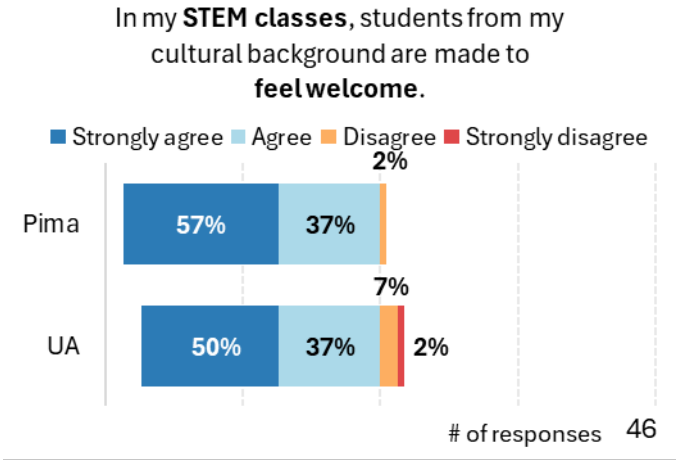



Similarly, the majority of participants agreed that students from their cultural background are respected and made to feel welcome in their **STEM classes** at Pima (95% and 94%) and UA (89% and 87%).

**All Participants (n=46)**

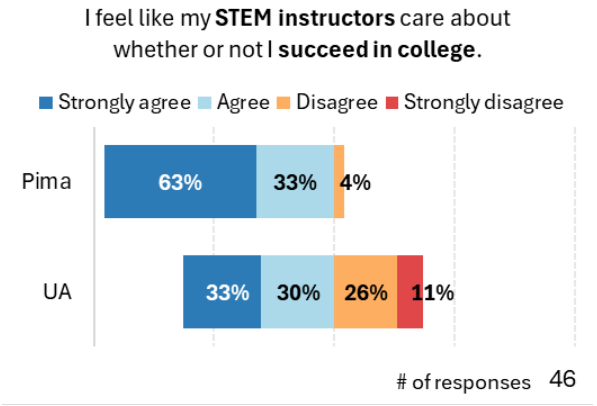


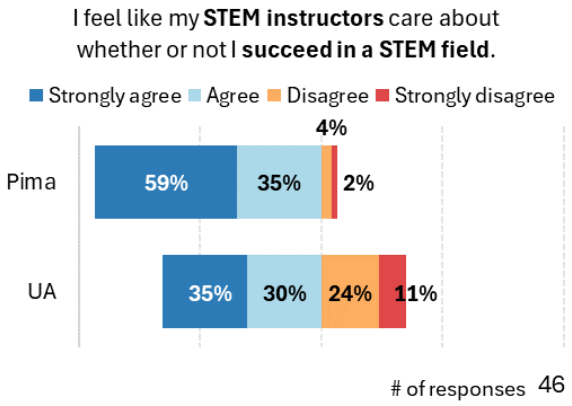



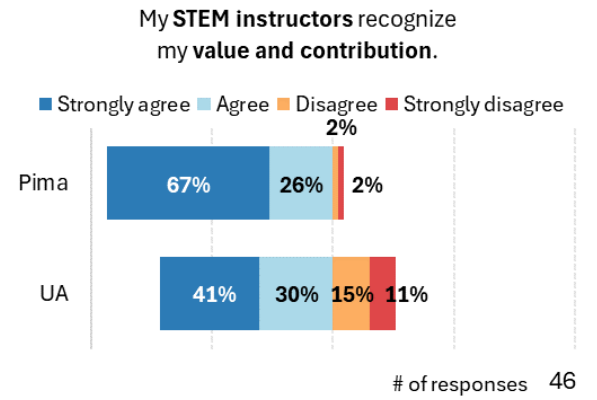

[viii] Some figures may not total to 100% because students were able to select 'Prefer not to answer.

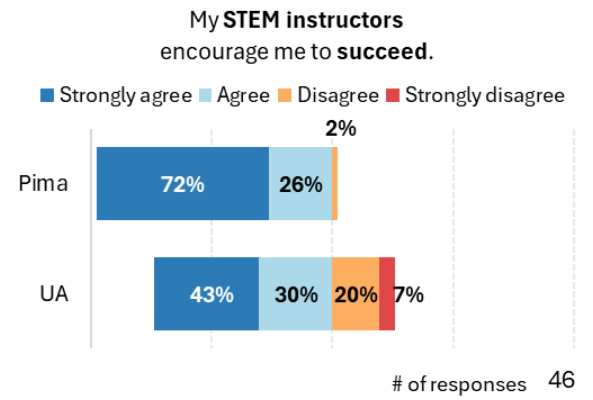
When asked specifically about their experiences with **STEM instructors**, participants had notably lower ratings of their experiences with instructors at UA and notably higher ratings of their instructors at Pima. More than one in three participants disagreed when asked whether their **UA STEM instructors** cared about whether they succeeded in college (37% disagree) or in a STEM field (35% disagree). More than one in four disagreed when asked whether their UA STEM instructors recognize their value and contribution (26% disagree) and encourage them to succeed (27% disagree). This is in particularly stark contrast to the overall positive ratings of **Pima STEM instructors**, with nearly all participants agreeing that they care whether they succeed in college (96%), succeed in a STEM field (94%), recognize their value and contribution (93%), and encourage them to succeed (98%). Responses were slightly more comparable when asked whether their Pima and UA STEM instructors emphasized how STEM can benefit society and the communities they're interested in helping.

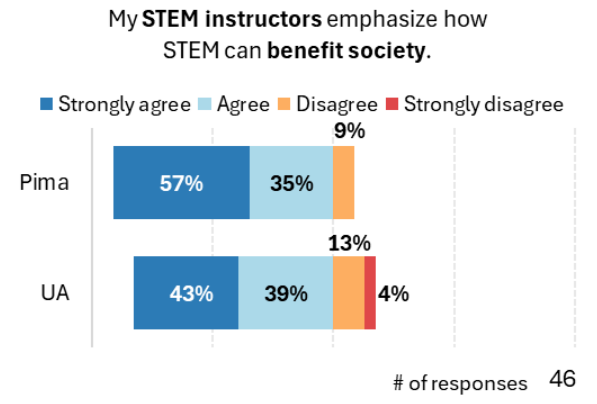
**All Participants (n=46)**

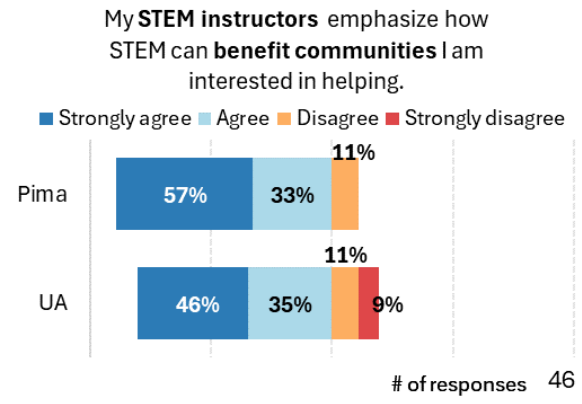


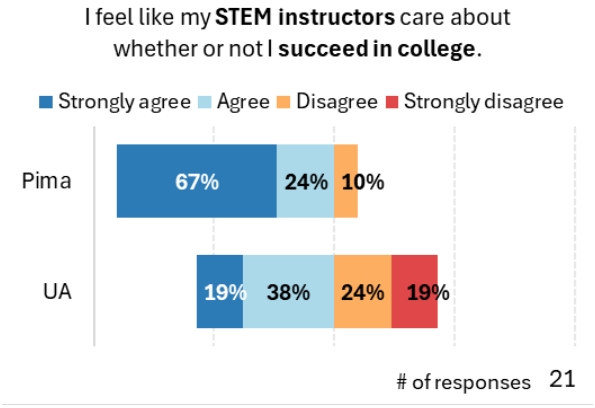



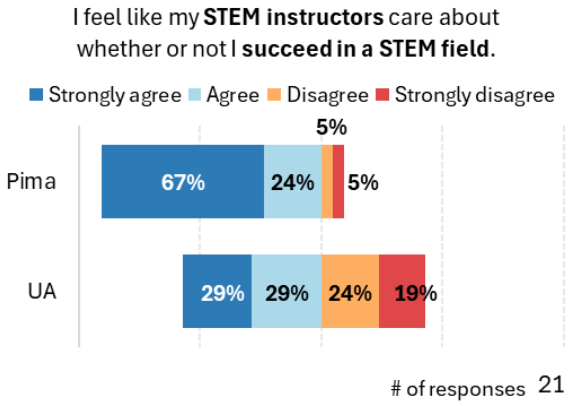



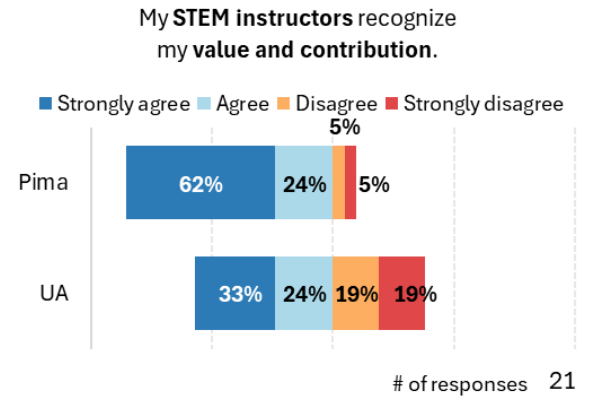

At the college level, participants in the **College of Engineering** and **College of Science** were more likely to disagree with statements about their UA STEM instructors caring whether they succeed in college, succeed in STEM, recognize their

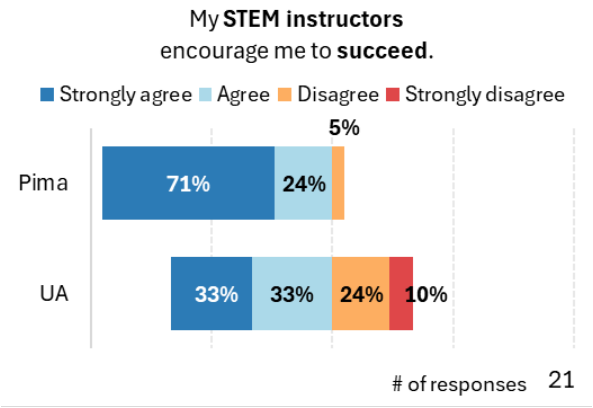
value and contribution, and encourage them to succeed. In contrast, participants in the **College of Agriculture, Life and Environmental Sciences (CALES)** and the **College of Applied Science and Technology (CAST)** (n=9) had 100% agreement with the statements about their STEM instructors at UA.

**College of Engineering (n=21)**

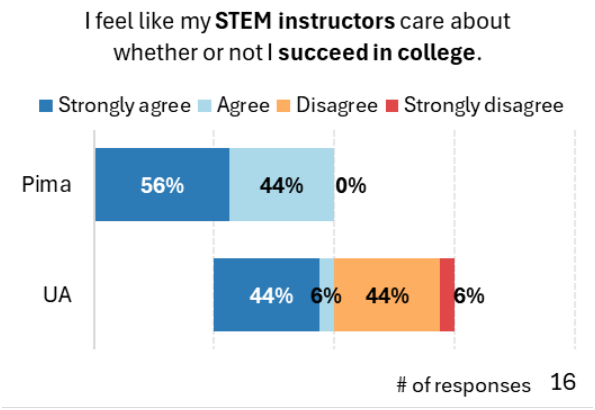


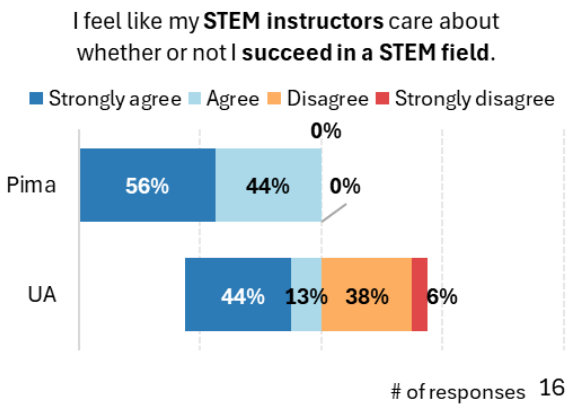



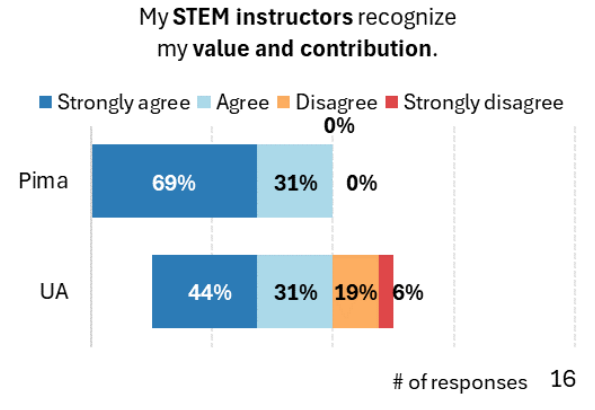



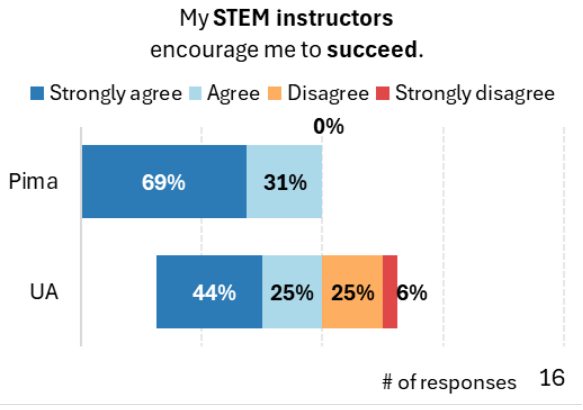



**College of Science (n=16)**

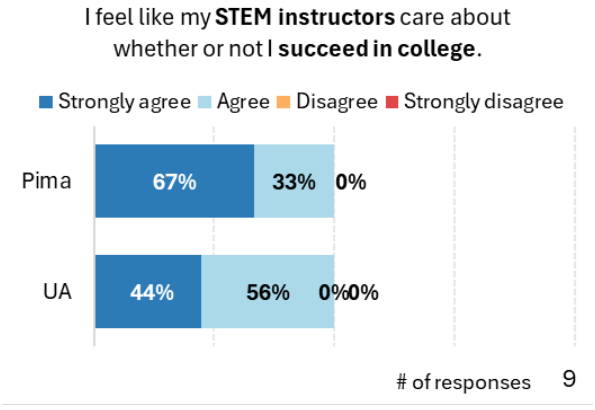


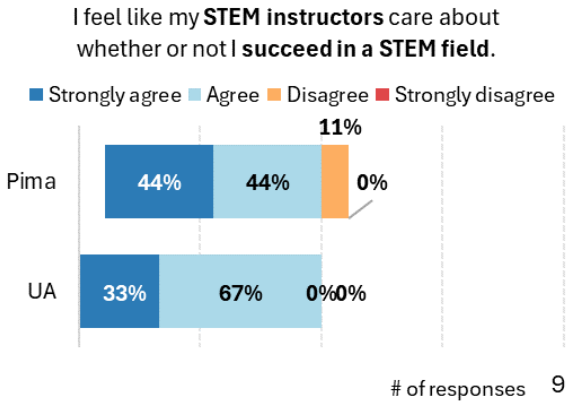



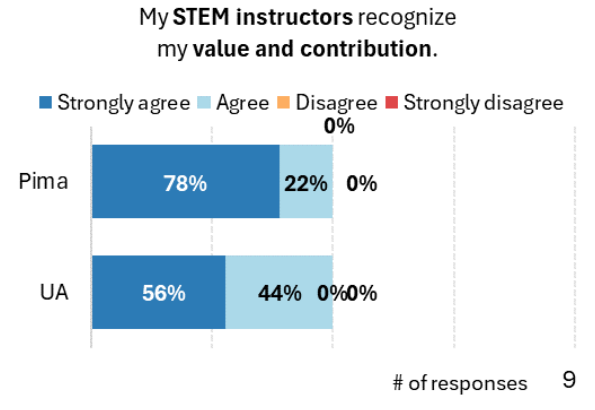



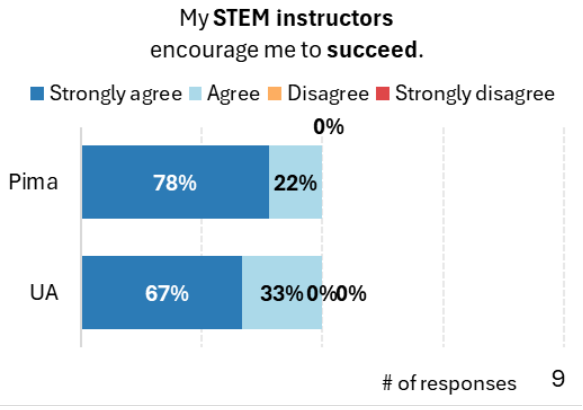




**CALES and CAST (n=9)**



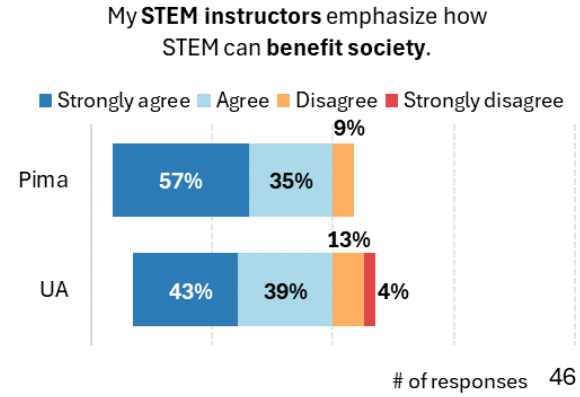



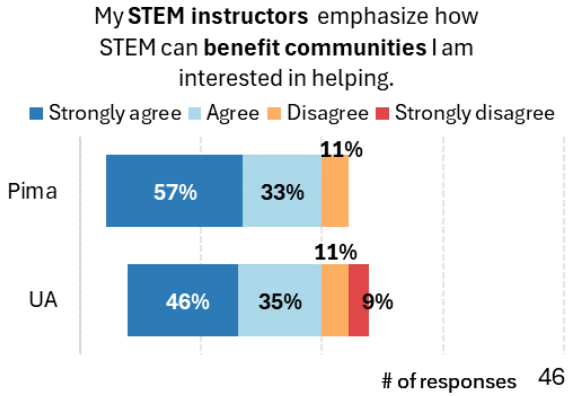



When asked whether their **STEM instructors** emphasize how STEM can benefit society and the communities participants are interested in helping, participants' responses were more comparable between Pima and UA, with the majority agreeing that both Pima and UA STEM instructors emphasize how STEM can benefit society and the communities they are interested in helping.

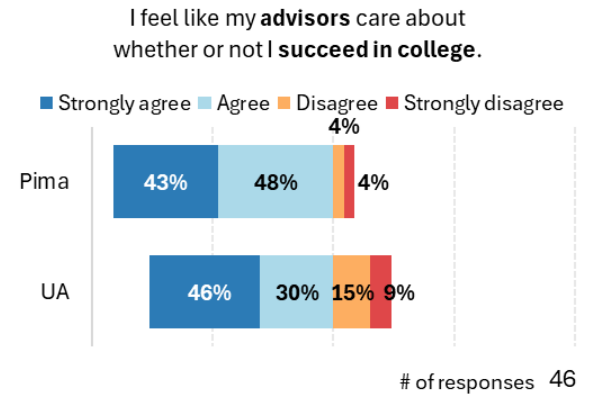
**All Participants (n=46)**

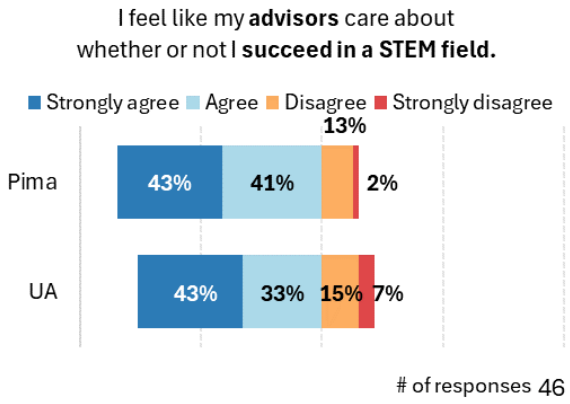


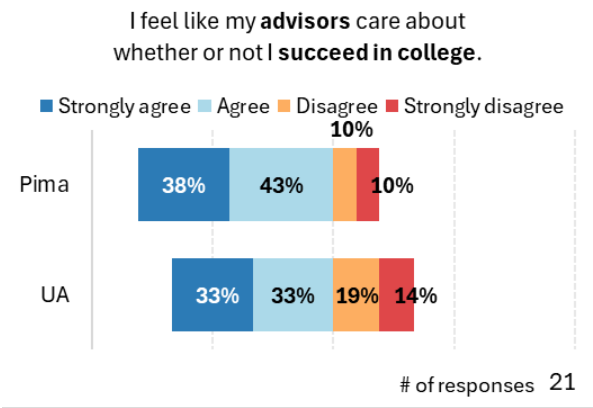

Participants' experiences with **advisors** were similar to their experiences with STEM instructors. Participants were more likely to disagree with feeling like their advisors cared about whether they succeeded in college and in STEM at UA (24% and 22% disagreed) compared to Pima (8% and 15% disagreed). As with STEM instructors, participants in the **College of Engineering** and **College of Science** were more likely to express disagreement compared to participants in CALES and CAST.

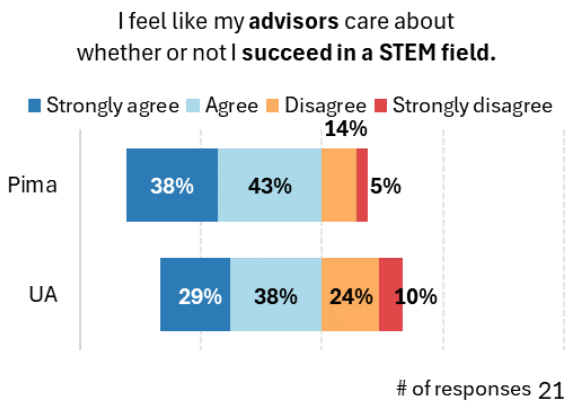
**All Participants (n=46)**



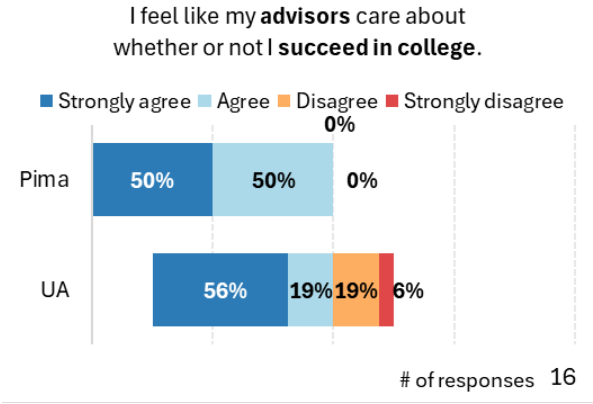



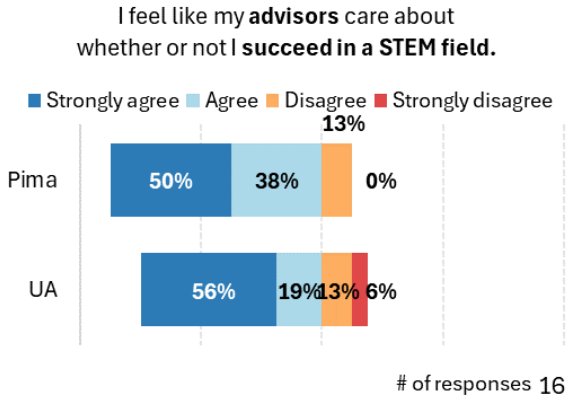
**College of Engineering (n=21)**



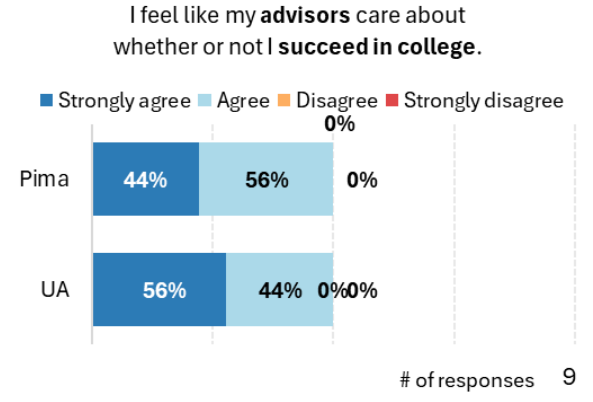



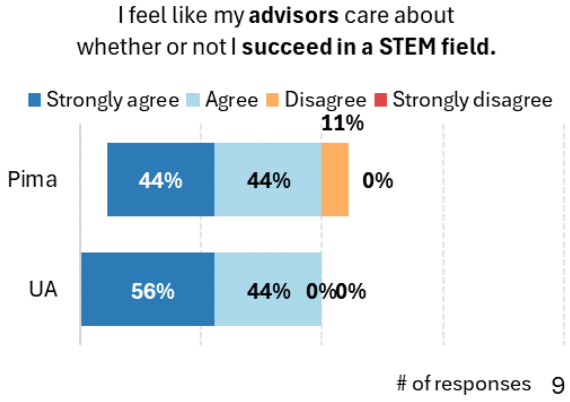

**College of Science (n=16)**




**CALES and CAST (n=9)**

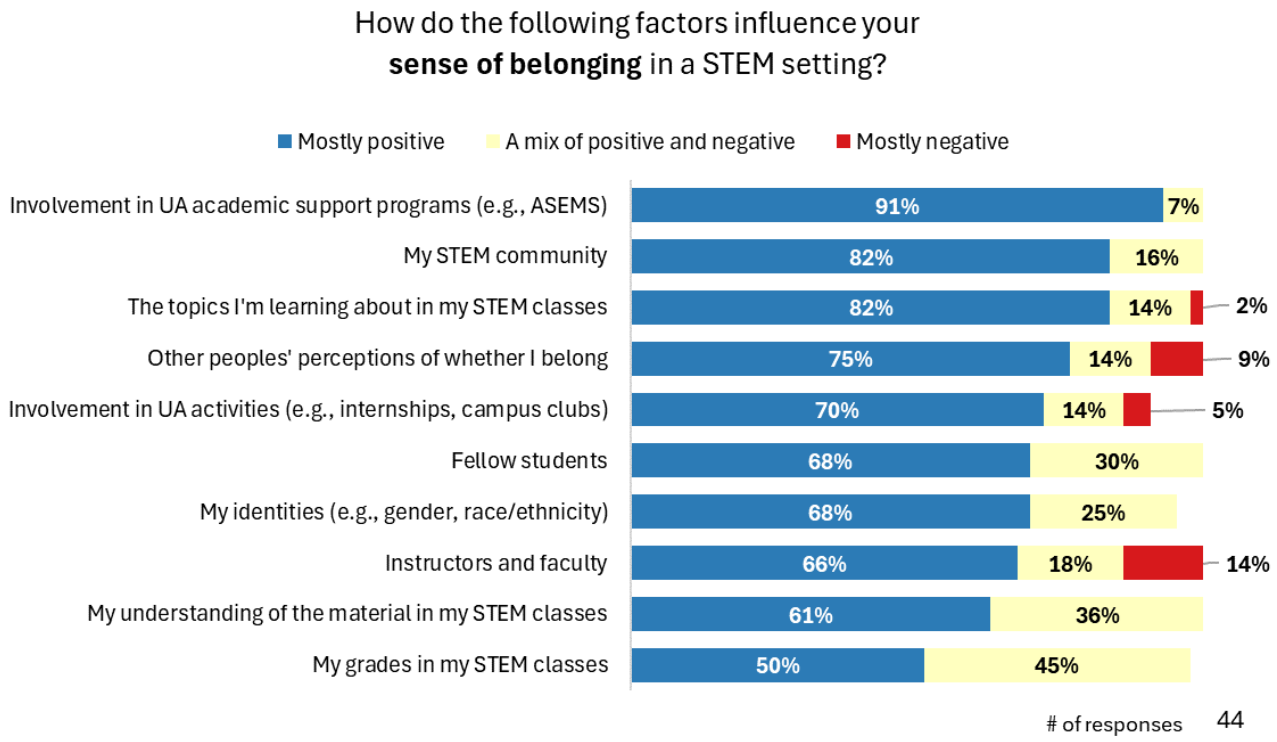


To better understand their **sense of belonging** scale scores, addressed in the Analysis of Program Variables of Interest section of the report, participants were asked what factors influence their sense of belonging in a STEM setting. In previous years, this was asked as an open-ended question. In 2024, the most common open-ended themes were turned into a Likert scale-type question, which asked participants to rate how 10 different factors influenced their sense of belonging in a STEM setting – mostly positive, a mix of positive and negative, or mostly negative (n=44).[ix]

Involvement in **UA academic support programs, like ASEMS**, was rated as mostly positive by nearly all participants (91%). Other top positive factors included the participant's STEM community (82%), the topics they're learning in their STEM classes (82%), other peoples' perceptions of whether they belong (75%), and involvement in UA activities (70%). While two-thirds (66%) of participants rated **instructors and faculty** as mostly positive, 14% rated them as mostly negative. Others' perceptions of whether they belong was also rated as mostly negative by 9% of participants. More than a third of participants rated their understanding of the material in their STEM classes (36%) and grades in STEM classes (45%) as a mixture of positive and negative.

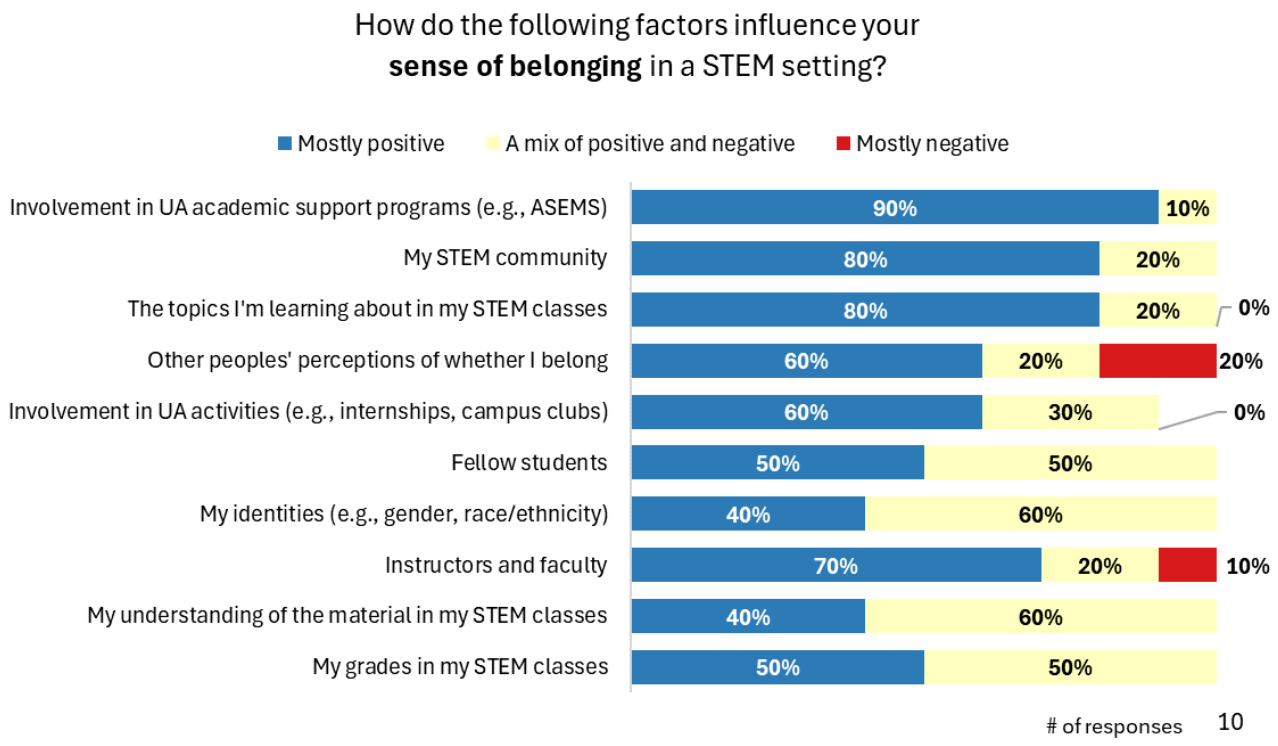
**All Participants (n=44)**



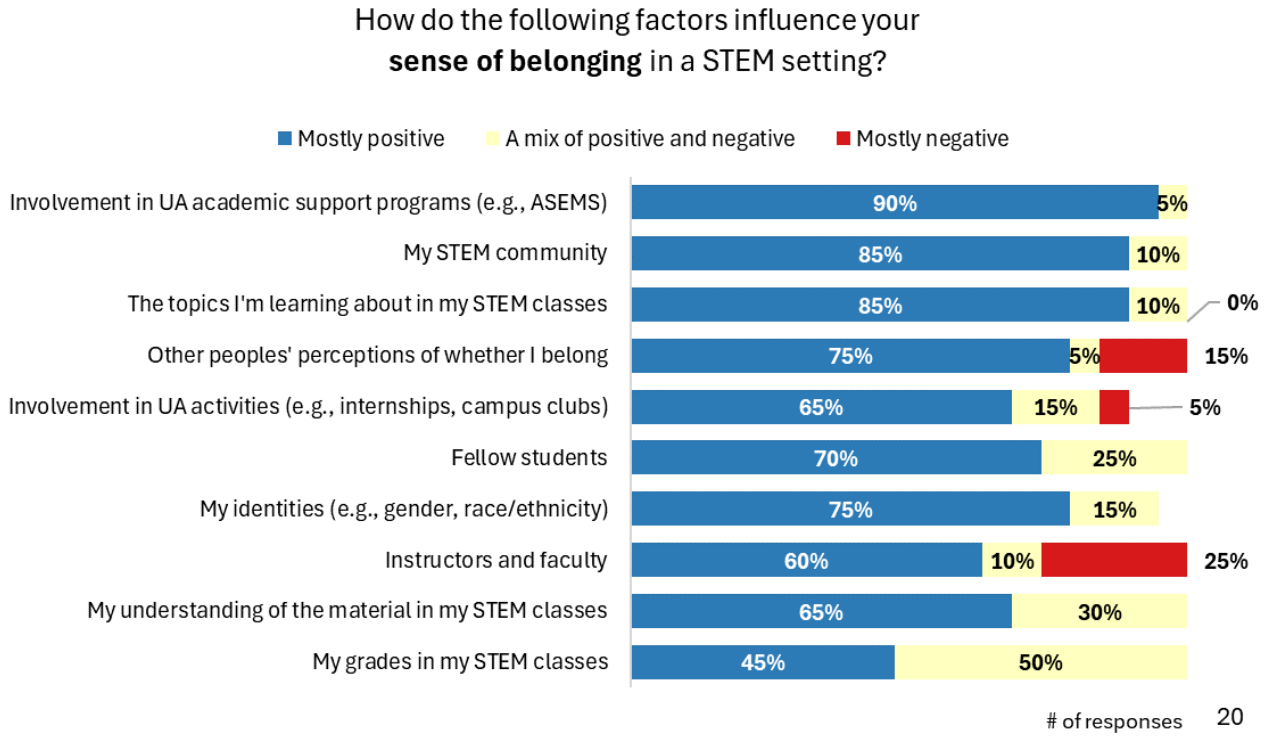

Participants with an **underrepresented gender and race/ethnicity in STEM** expressed more mixed experiences, with a larger proportion experiencing factors like fellow students, their identities, and their understanding of the material and grades in STEM classes as a mixture of positive and negative. One in four (25%) **College of Engineering** participants considered instructors and faculty a negative influence on their sense of belonging in STEM.

[ix] Some figures may not total to 100% because participants were able to select 'Prefer not to answer.'

**Underrepresented Gender and Race/Ethnicity in STEM (n=10)**

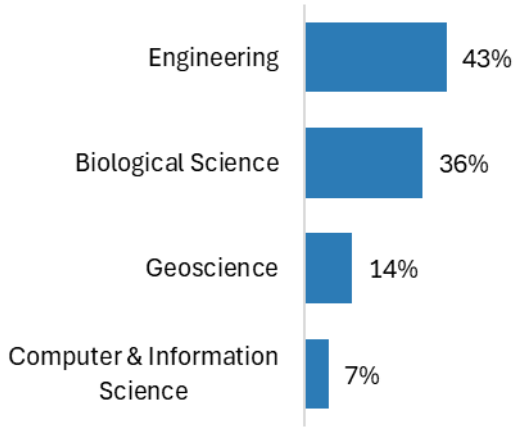


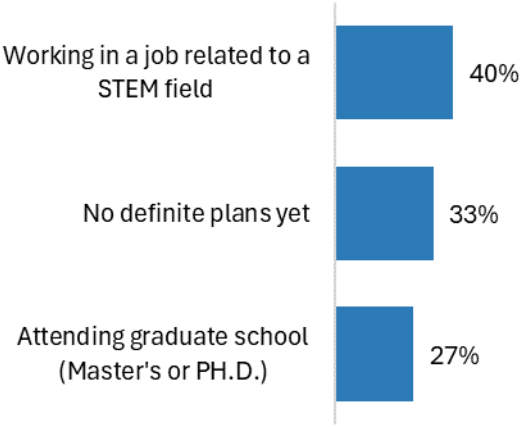

**College of Engineering (n=20)**



## Graduating Participants

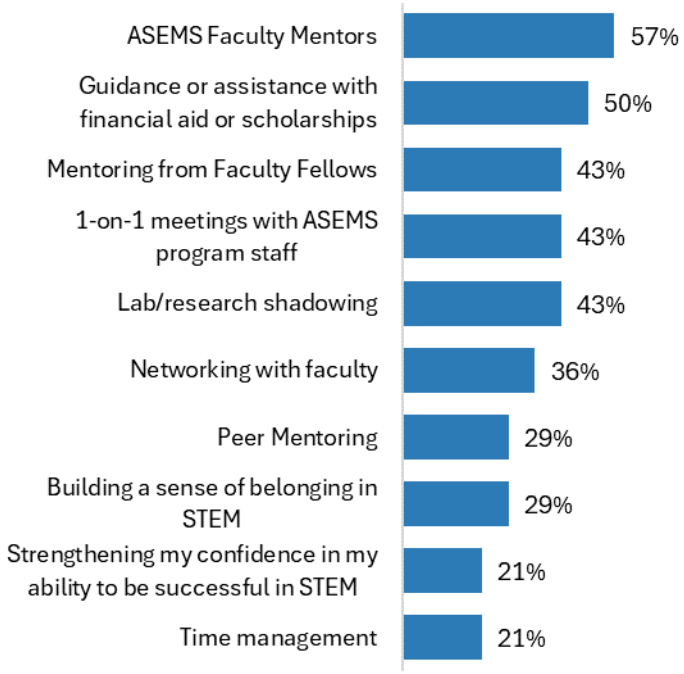
As of September 2024, a total of 25 Pima-UAZ STEM Bridge participants have graduated with their undergraduate degree in STEM. Participants are asked to complete a survey at graduation, which asks them to reflect on their experience and share their plans for the future. A total of 14 participants completed the graduation survey. The largest percentage graduated with a degree in engineering (43%), followed by biological science (36%), geoscience (14%), and computer and information science (7%).




Forty percent intended to pursue a STEM-related job after graduation, 27% planned to attend graduate school, and 33% did not yet have definite plans.

Graduating participants were asked about the particular aspects of the ASEMS Program that helped them stay enrolled in STEM at UA. Top choices included ASEMS faculty mentors (57%) and faculty fellows (43%), guidance and assistance with financial aid and scholarships (50%), 1-on-1 meetings with ASEMS program staff (43%), and lab and research shadowing (43%).



Participants were asked to describe the impact ASEMS had on their educational career at the University of Arizona. These were some of their responses.

"ASEMS at the University of Arizona made a significant impact on my educational journey in STEM. The program's financial aid support was crucial, easing the burden of tuition expenses and allowing me to focus on academics. Beyond financial help, ASEMS provided valuable guidance, mentorship, and a supportive community within the STEM field. It facilitated connections with peers, faculty, and professionals, opening doors to networking and potential career opportunities. Through workshops and interactions, the program equipped me with skills beyond academics, fostering resilience, problem-solving, and emphasizing the importance of community in STEM disciplines."

"ASEMS helped me in everything! It helped me fund my education, keep up with school, and make connections within STEM. It helped me broaden my career options in science, and most of everything, it made me feel belong in STEM. Thank you very much."

"ASEMS was super helpful in providing support from peers and an environment of people that are in similar situations as me to know that other people are dealing with the same troubles"

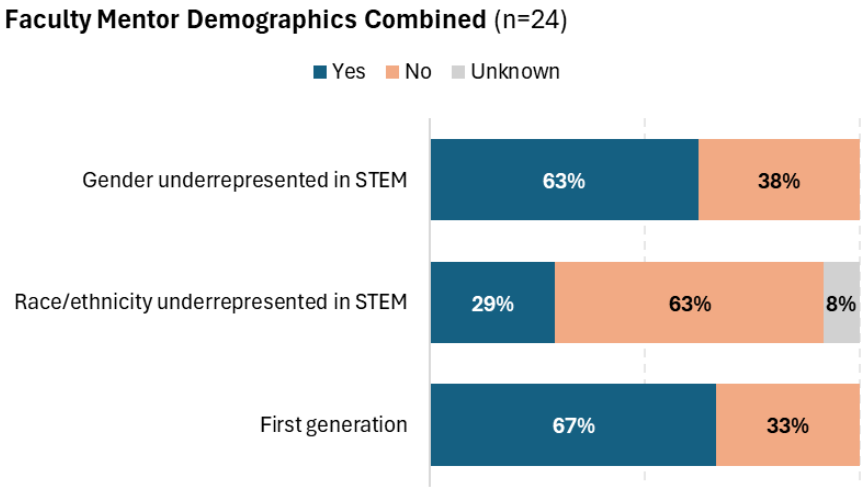
"Being a part of a community within this program has made me grow as a person. I have became more confident person in the educational environment. I felt comfortable talking to my mentors and they have helped me with all my questions. ASEMS helped me network and get to know more students in stem related majors."

"The Pima-UAz STEM Bridge Program has been invaluable and has meant everything to me. Without the dedicated staff and mentors, I wouldn't have made it this far. I cannot fathom attempting to navigate the transfer from Pima Community College without the program, nor can I imagine being where I am today without it. There were numerous occasions that I know, without a doubt, I would have quit. The Pima-UAz STEM Bridge Program came through for me every time. Words cannot express how much this program has meant to me. In this program, I learned to reach out for help when I needed it, and how to be an advocate for myself, I learned how to network, and I learned my worth. Those skills are going to stay with me for the rest of my life, and I can already see those skills impacting my daughter in way you could never believe. The unwavering support I received in every aspect of my life - not just academic and financial but also emotional and physical - is the reason I'm graduating. I cannot express enough, that I would not be here if I didn't have the program helping me every step of the way!"

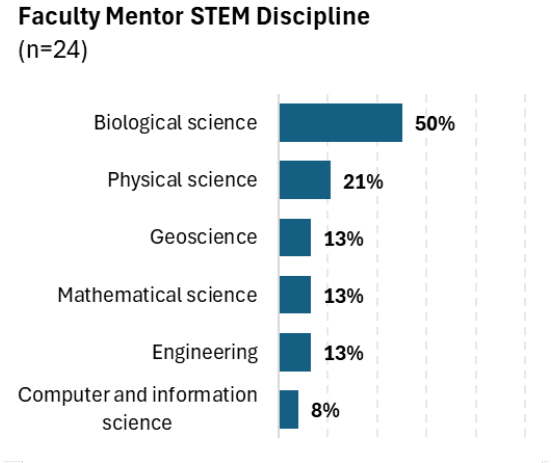
# Faculty Mentors

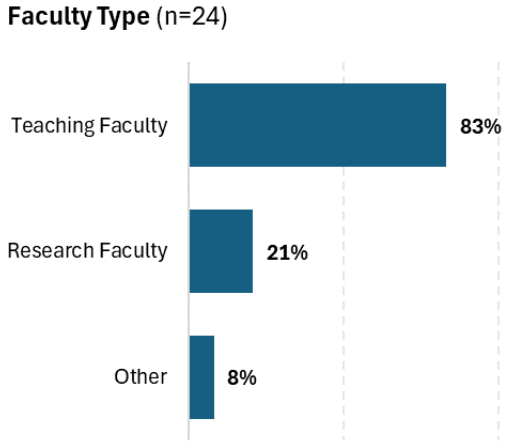
## Faculty Mentor Demographics

A total of 24 faculty mentors were recruited to support program participants in the Pima-UAZ STEM Bridge program; 4 mentors from Pima and 4 mentors from UA were recruited to support each of the 3 cohorts of participants.




Among faculty mentors, 63% (n=15) identified as having a gender identity underrepresented in STEM, 29% (n=7) identified as part of a racial/ethnic minority group underrepresented in STEM, and 67% (n=16) identified as a first-generation college student.[x] Faculty mentors worked across the STEM disciplines, with the majority in biological science (50%, n=12) and smaller proportions in physical science (21%, n=5), engineering (13%, n=3), geoscience (13%, n=3), mathematical science (13%, n=3), and computer and information science (8%, n=2). The majority of faculty mentors were teaching faculty (83%, n=24), with a smaller proportion considered research faculty (21%, n=5) and other classifications (e.g., post-doc; 8%, n=2).[xi]




[x] Gender identities underrepresented in STEM included female, non-binary, trans, and genderqueer. Racial and ethnic minority groups underrepresented in STEM, as defined by NSF, include individuals who are Black or African American, Hispanic or Latino, and American Indian or Alaska Native. First generation includes individuals who identify with any of the following: come from a home where neither parent/legal guardian has completed a four-year bachelor's degree; parent(s)/legal guardian(s) completed a bachelor's degree or equivalent in a country outside of the United States; separated or divorced parents and the parent with primary custody, or with whom the student lived with a majority of the time, does not have a bachelor's degree; was/is a homeless youth, in the foster care system, or a ward of the state.

[xi] Respondents could select multiple categories for STEM discipline and faculty type, so values will not add up to 100%.

## Faculty Mentor Evaluation

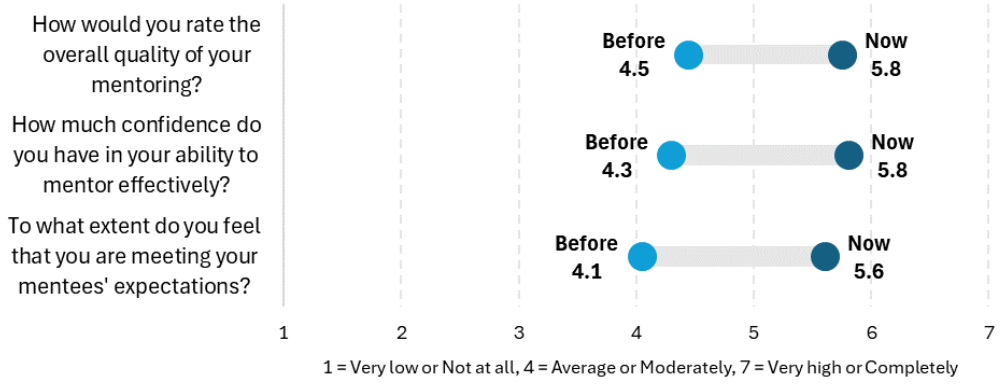
The evaluation team worked with program staff to develop instruments to measure faculty knowledge and behavior changes, as well as overall satisfaction and engagement with the culturally-responsive mentor training program and monthly Culturally Responsive Community of Practice (CRCP) meetings. While this report focuses on results from the annual follow-up survey, additional evaluation results can be found in previous formative evaluation reports.

Faculty mentors completed an annual follow-up survey with retrospective pre-post items measuring culturally responsive mentoring skills. This included items from the Center for Improvement of Mentored Experiences in Research (CIMER) Mentor Training Post-Evaluation Survey, created by Pfund, et al., 2014[6] and Branchaw, et al., 2019,[7] and adapted with permission from W.H. Freeman/Macmillian Learning.

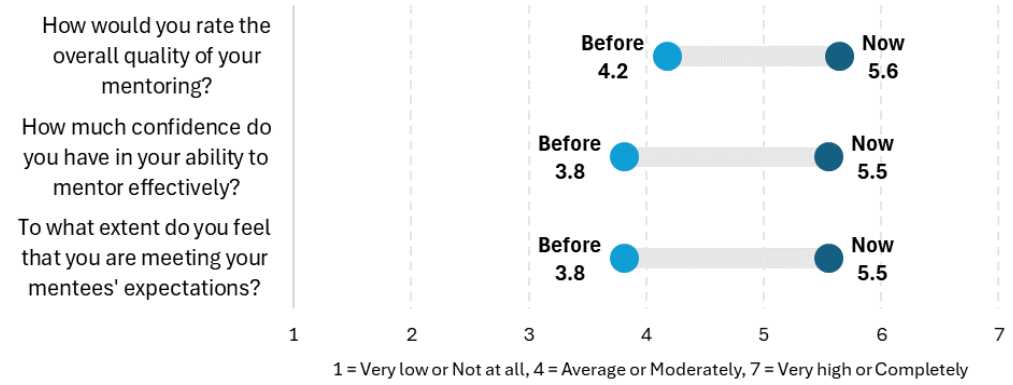
Results from all three cohorts were compiled to understand the overall changes in culturally responsive mentoring for mentors after their first year with the program. Data were available for 20 mentors, including 11 Pima mentors and 9 UA mentors. Demographics for this sample were comparable to the overall demographics for the 24 total mentors described in the previous section. An interactive Excel dashboard was created for program staff to better understand differences in annual survey results, with data filters for campus, cohort, race/ethnicity underrepresented in STEM, gender identity underrepresented in STEM, and first-generation status. Highlights from the dashboard are also included, where possible.

Faculty mentors reported increases in their **overall mentoring quality**, **confidence** in their ability to mentor effectively, and ability to **meet their mentees' expectations**. On average, mentors increased from an above-average or moderate rating of their abilities (means of 4.1-4.5 out of 7) to a relatively high rating of their abilities after one year (means of 5.6-5.8 out of 7). Interestingly, while **Pima mentors** rated themselves lower than UA mentors before participating, they showed greater average increases in their confidence and ability to meet mentees' expectations. This was a trend seen across the survey results, with Pima mentors having lower pre-program scores but often catching up with UA mentors by the end of the first year.

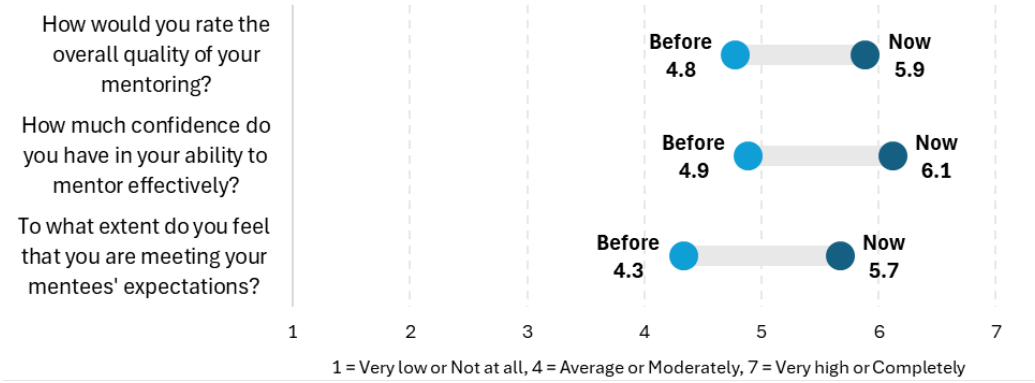
**All Faculty Mentors, mean scores (n=20)**




**Pima Mentors, mean scores (n=11)**



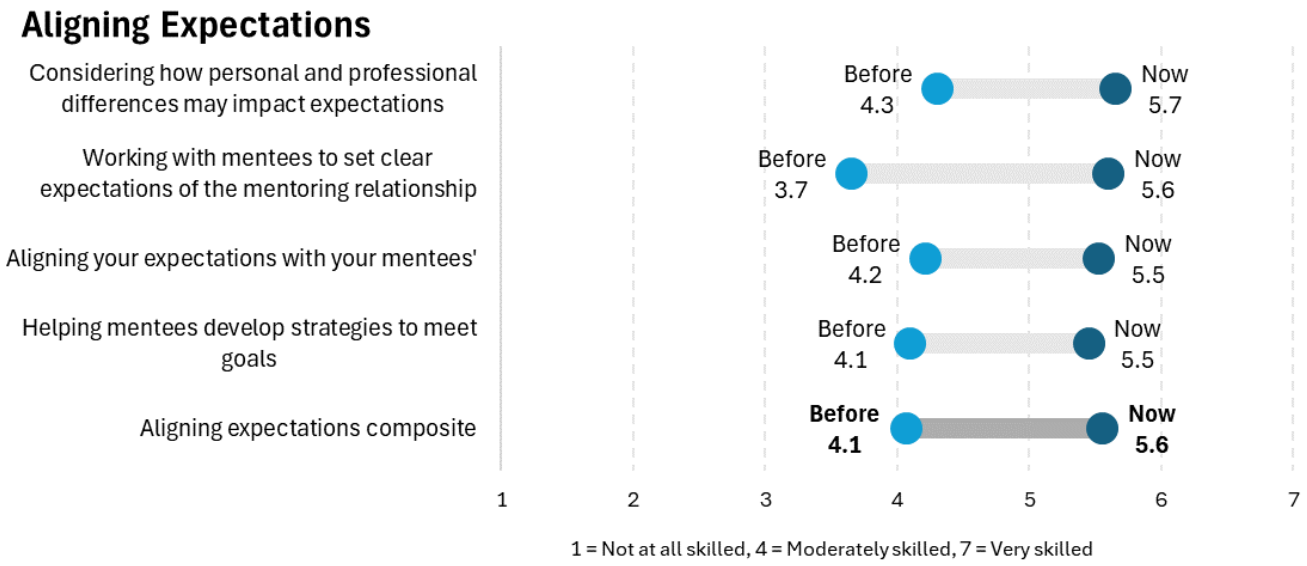

**UA Mentors, mean scores (n=9)**




Mentors also rated changes in their level of skill in four key areas - aligning expectations, addressing equity and inclusion, maintaining effective communication, and promoting professional development.

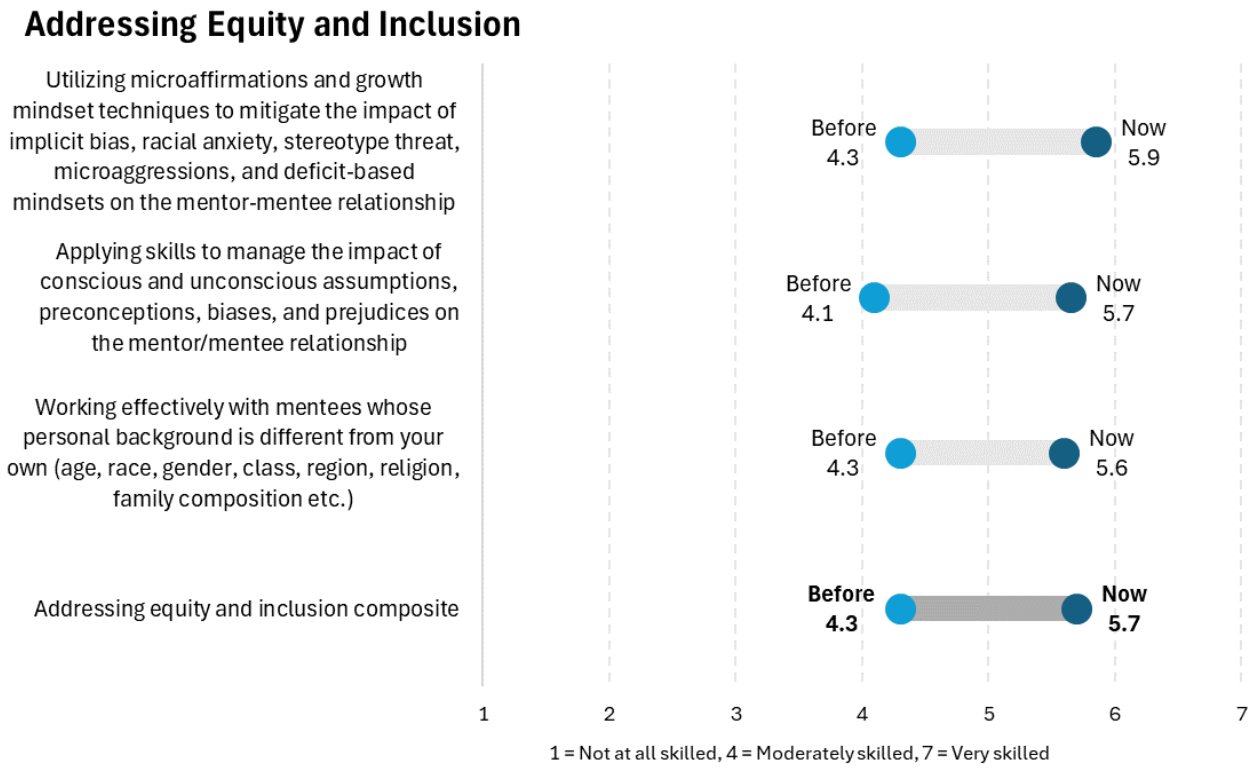
Mentors showed the greatest increases in their self-ratings of **aligning expectations** in their mentoring relationship. Of particular note is the increase in their ability to work with mentees to set clear expectations of the mentoring relationship, increasing from a mean of 3.7 to 5.6, a mean difference (md) of 1.9.

**All Faculty Mentors, mean scores (n=20)**



Mentors showed the second-greatest increases in their skills related to **addressing equity and inclusion**,[xii] with notable increases in their ability to use microaffirmations and growth mindset techniques (md=1.6), manage conscious and unconscious bias (md=1.6), and work with mentees from different backgrounds (md=1.3). Using microaffirmations and growth mindset techniques was also one of the highest rated skills one year after the training (mean=5.9).

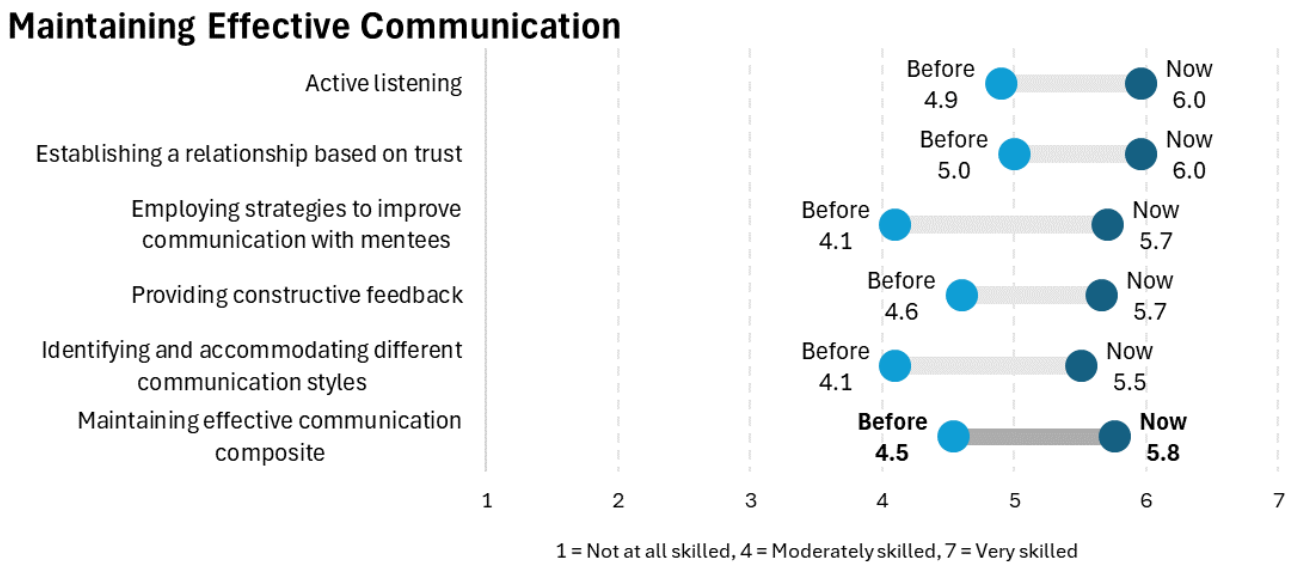
**All Faculty Mentors, mean scores (n=20)**




In terms of **maintaining effective communication**, mentors showed the greatest increases in their ability to employ strategies to improve communication with their mentees (md=1.6) and identify and accommodate different communication styles (md=1.4). Across all of the skills addressed in the survey, mentors rated themselves the highest on active listening and establishing a relationship based on trust (both means of 6.0) one year after the training.

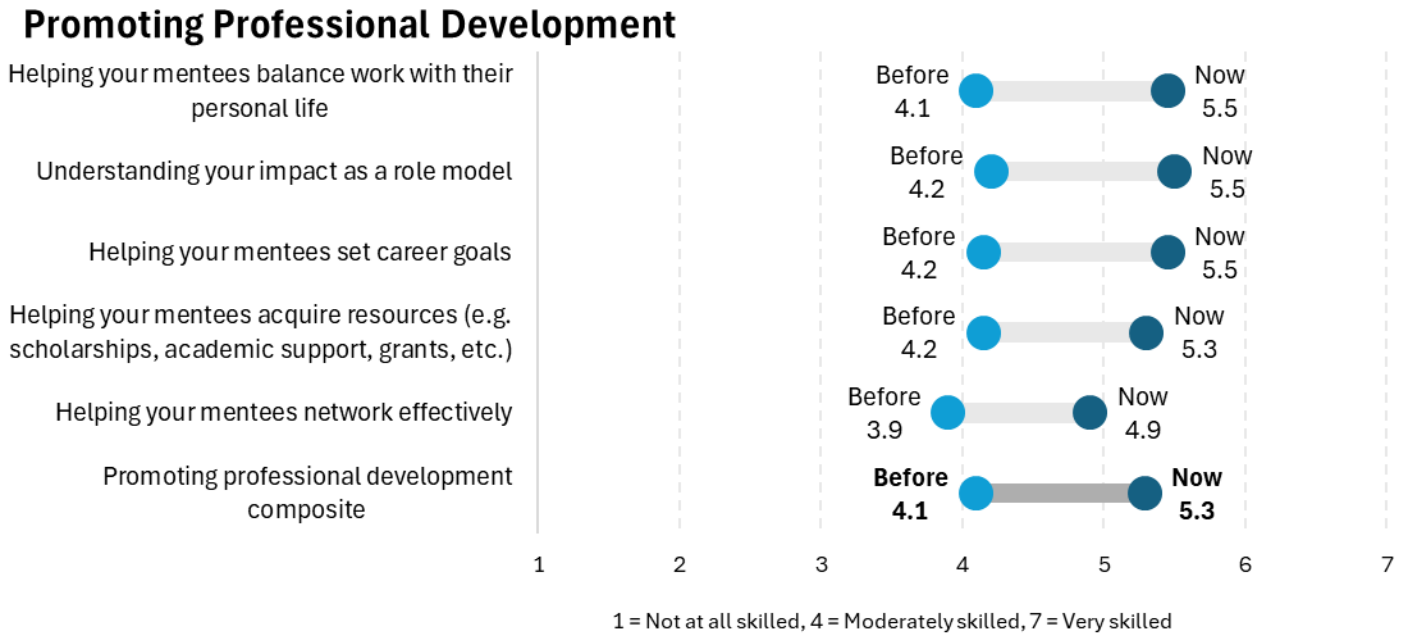
[xii] Items related to equity and inclusion were adapted by program faculty to better align with the culturally responsive mentor practices emphasized in the training.

**All Faculty Mentors, mean scores (n=20)**

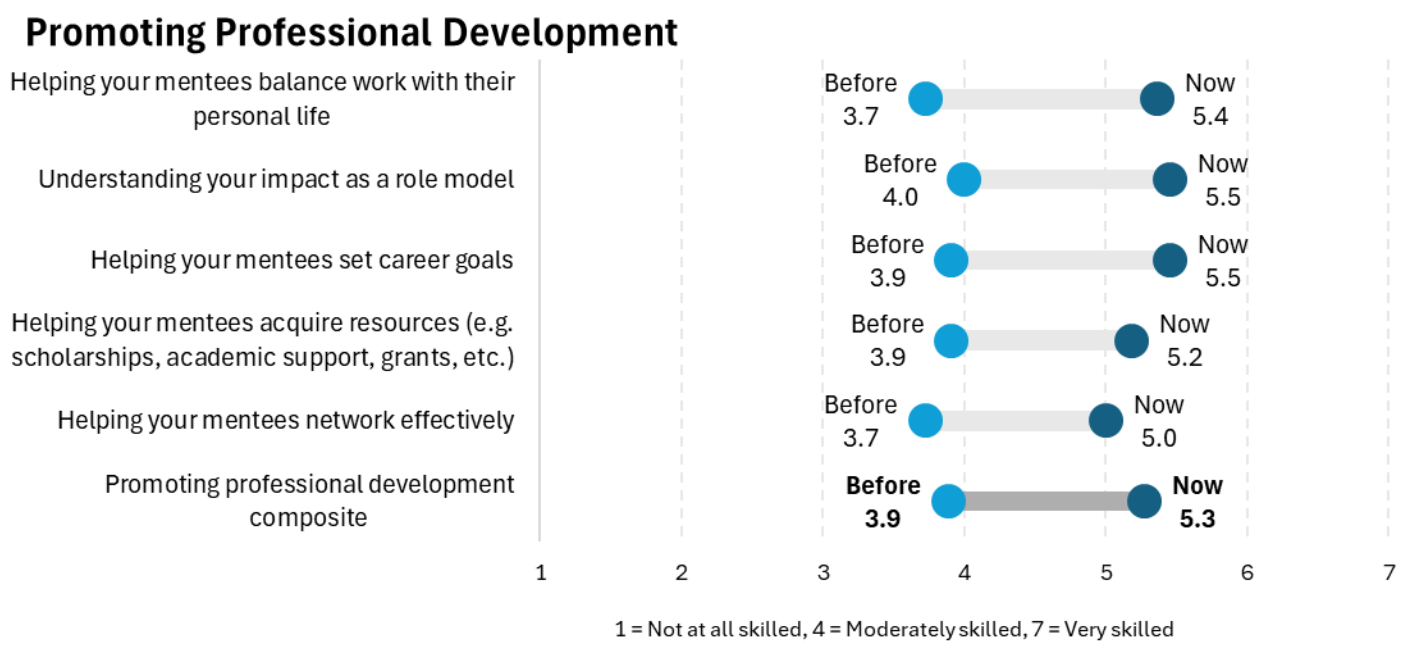



While faculty mentors showed the smallest gains in their skills related to **promoting professional development**, their growth was still notable and not dramatically different from the growth they showed in the other areas. **Pima mentors**, in particular, showed greater increases in their professional development skills than UA mentors. This was also an area where folks with **identities underrepresented in STEM** (i.e., underrepresented race/ethnicity, underrepresented gender identity, first generation) also showed greater increases in skills, particularly in helping mentees balance work with personal life and set career goals.

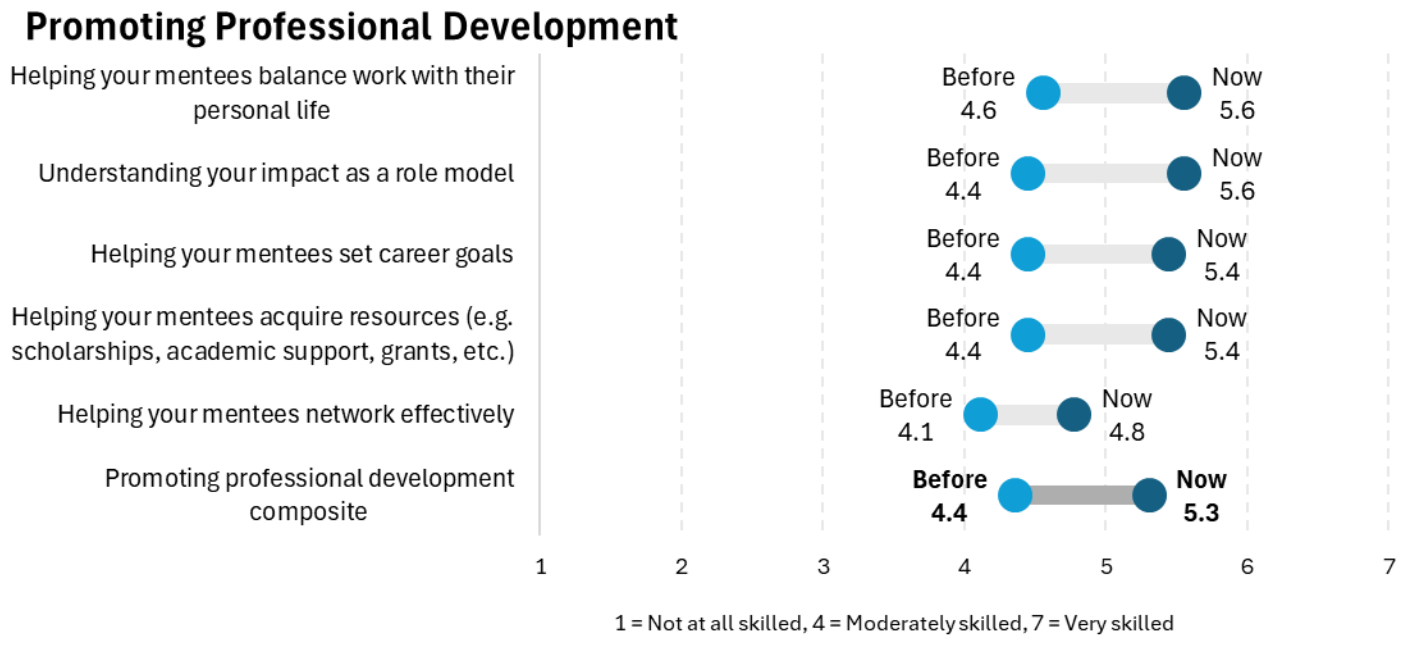
**All Faculty Mentors, mean scores (n=20)**



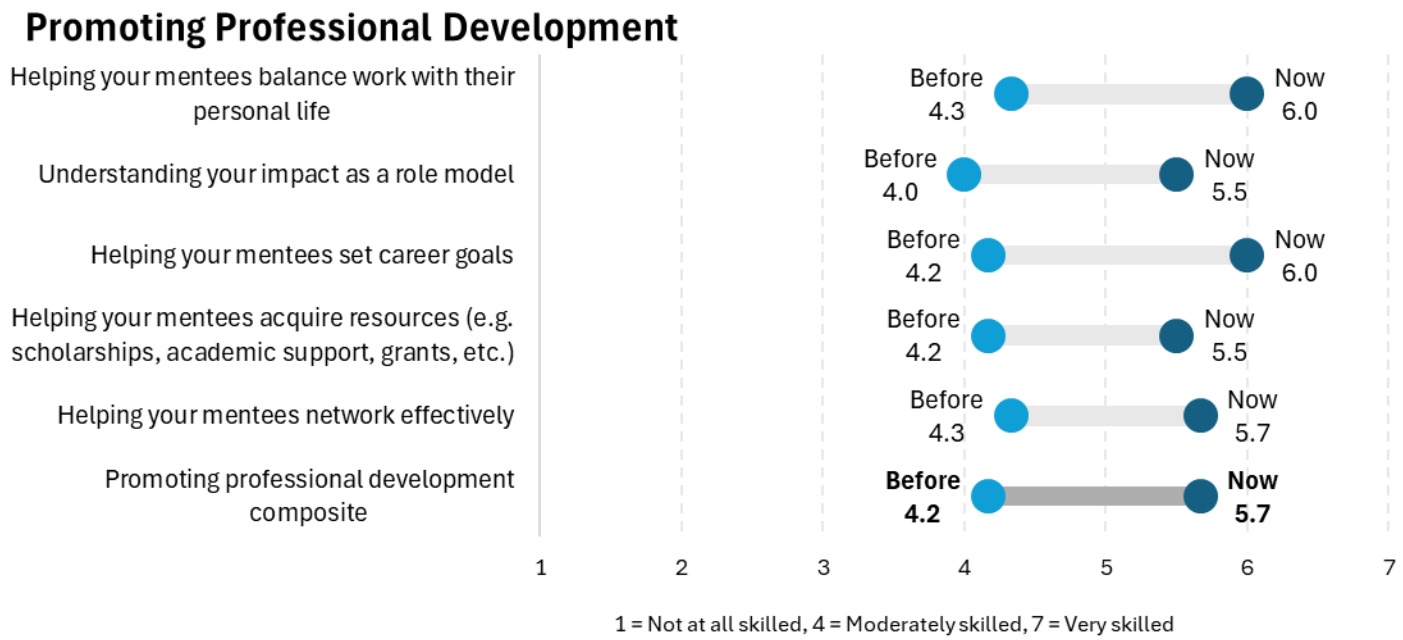
**Pima Mentors, mean scores (n=11)**



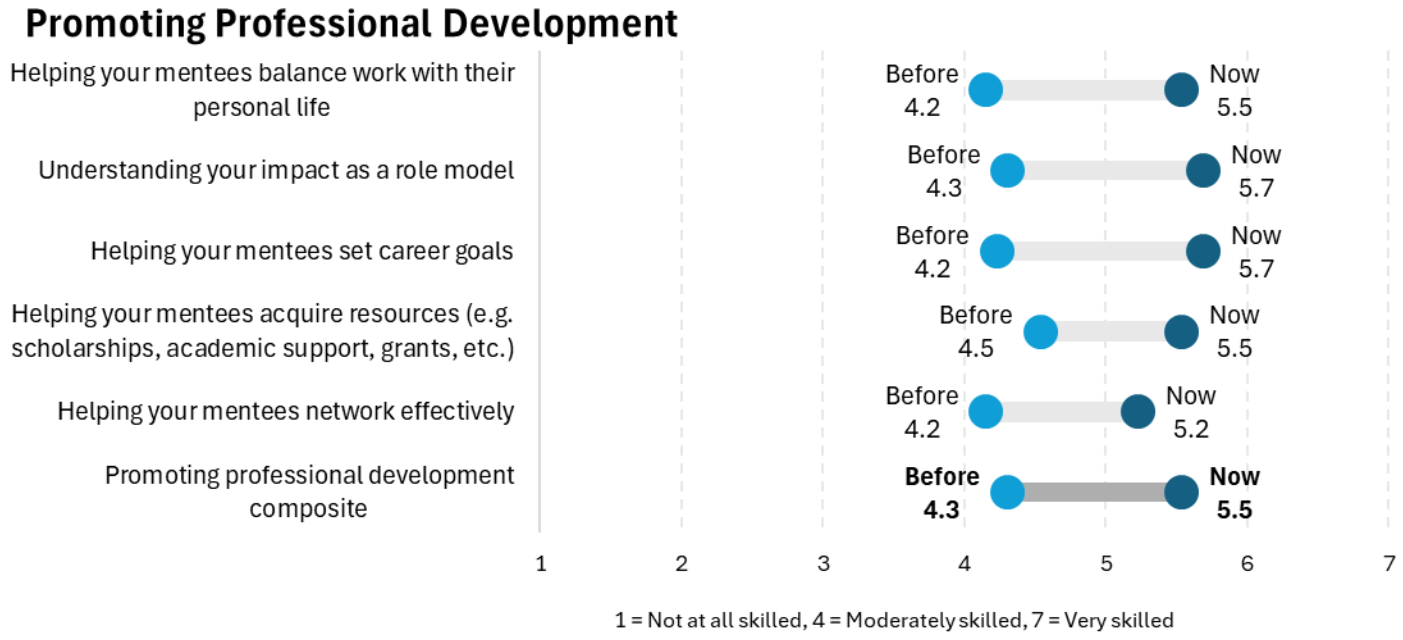

**UA Mentors, mean scores (n=9)**



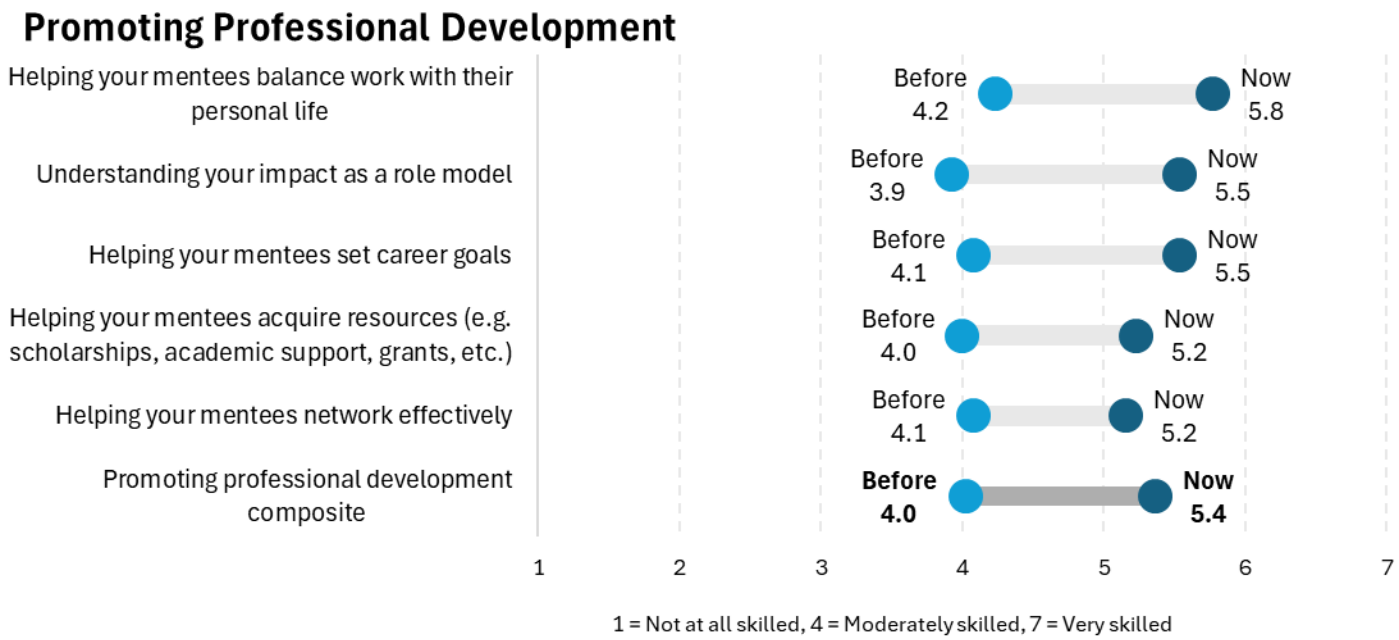
**Race/ethnicity underrepresented in STEM, mean scores (n=6)**




**Gender identity underrepresented in STEM, mean scores (n=13)**



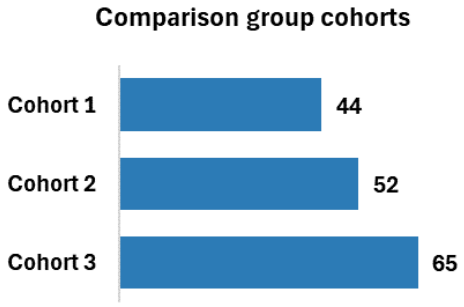
**First generation college student, mean scores (n=13)**

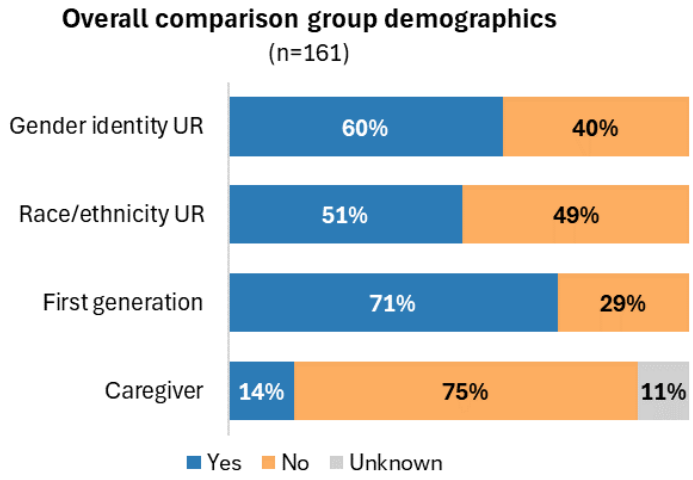


# Comparison Group

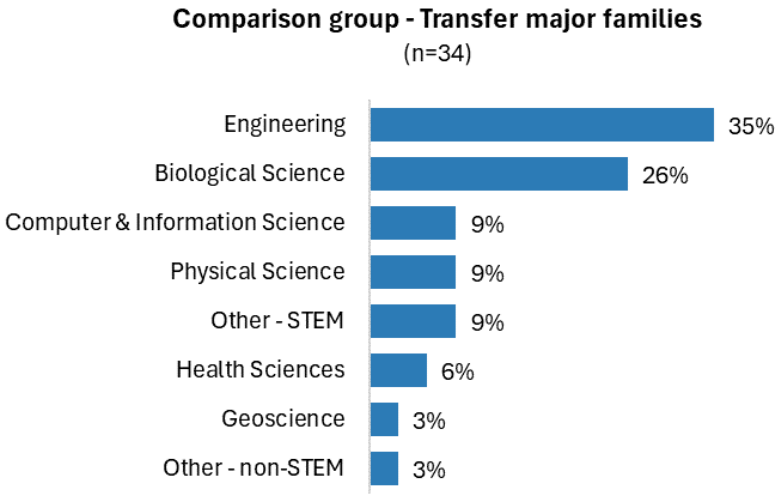
## Comparison Group Demographics

A total of 169 students were recruited into the comparison group across the three cohorts. Eight of those students later joined the Pima-UAZ STEM Bridge Program as participants, leaving a total of 161 comparison group students. Among comparison group members, 60% (n=96) identify as having a gender identity underrepresented in STEM (e.g., female, non-binary, trans, genderqueer); 51% (n=82) identify as part of a racial/ethnic minority group underrepresented in STEM (i.e., Black or African American, Hispanic or Latino, American Indian or Alaska Native); 71% (n=115) identify as a first-generation college student; and 14% (n=23) identify as a parent or caregiver. Comparison group students ranged in age from 20 to 55, with an average age of 27.



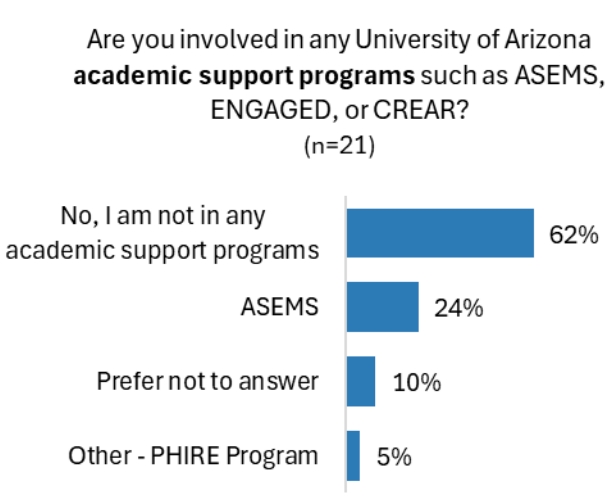

Of the 161 total comparison group students, transfer and STEM retention status is known for 78 (48% response rate). Of those 78 students, 34 (44%) transferred to a four-year university between Fall 2021 and Spring 2024. The majority of those students who successfully transferred went to the University of Arizona (n=28, 82%), while other students attended Arizona State University (n=1), Northern Arizona University (n=1), Park University (n=1), Saint Martin University (n=1), Washington State University (n=1), and Illinois Institute of Technology (n=1). The demographics of the students who successfully transferred were slightly different from the overall comparison group, with a larger proportion of students who identified with an underrepresented gender (65%, n=22) or underrepresented race/ethnicity (59%, n=20) in STEM and as a first-generation college student (74%, n=25). As with participants, the largest proportion of comparison group students who successfully transferred were pursuing a major in engineering (35%, n=12), with another large proportion pursuing biological science (26%, n=9). A smaller number of students were pursuing computer and information science (9%, n=3), physical science (9%, n=3), or geoscience (3%, n=1). Comparison group members were also pursuing other STEM majors (9%, n=3), health sciences (6%, n=2), and other non-STEM majors (3%, n=1).



## Comparison Group Campus Experience

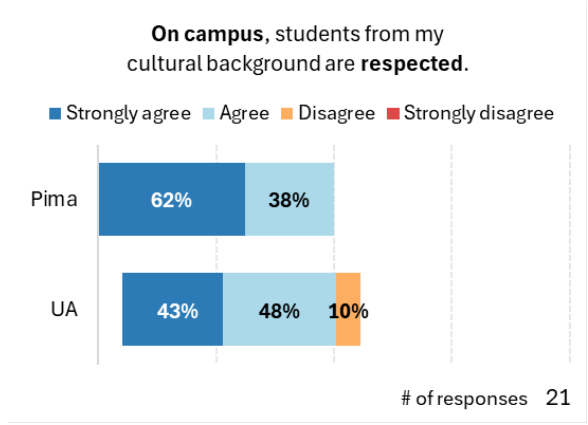
In addition to the sense of belonging and STEM identity scales addressed in the next section, comparison group students who successfully transferred to UA were asked questions about their campus experience at PCC and UA that mirrored the questions asked of program participants.

First, comparison group students were asked if they're involved in any UA academic support programs. Over half (62%) were not in any programs, while nearly one in four (24%) were involved in another ASEMS program.

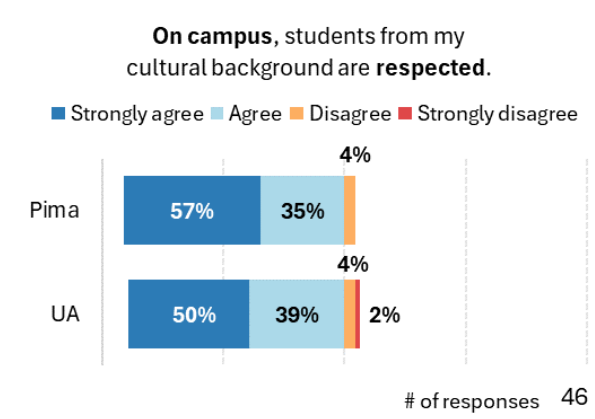



As was true for participants, the majority of comparison group members agreed that students from their cultural background are respected and made to feel welcome on campus at Pima (both 100%) and UA (both 91%). [xiii]

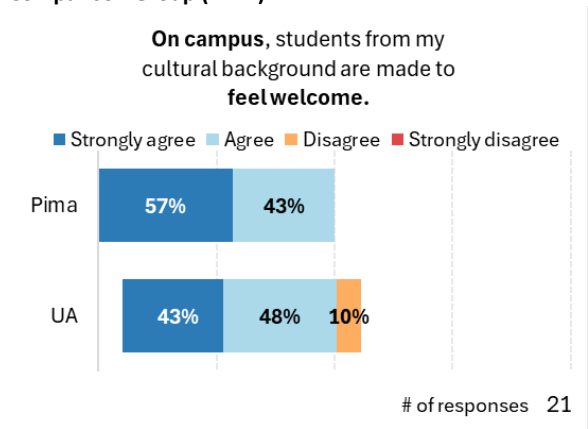
**Comparison Group (n=21)**



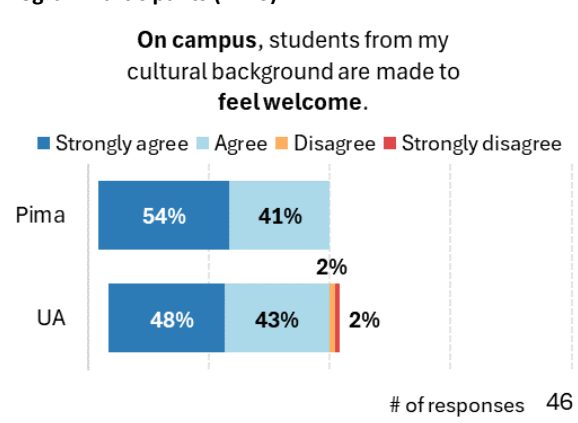

**Program Participants (n=46)**




**Comparison Group (n=21)**



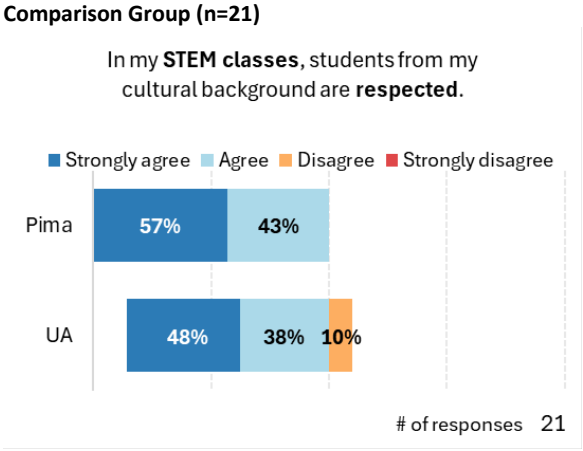

**Program Participants (n=46)**



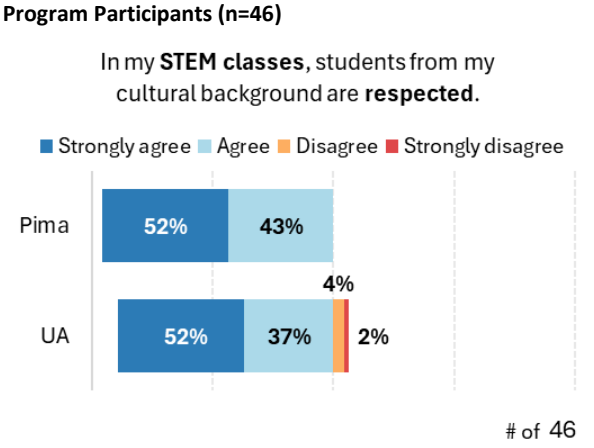

[xiii] Some figures may not total to 100% because students were able to select 'Prefer not to answer' and due to rounding.

Similarly, the majority of comparison group members agreed that students from their cultural background are respected and made to feel welcome in their **STEM classes** at Pima (both 100%) and UA (86% and 91%).

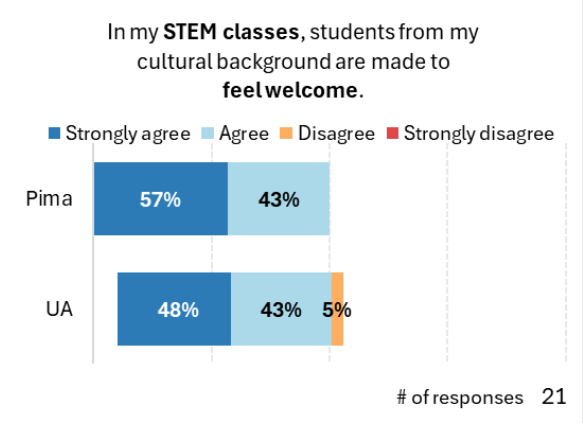
**Comparison Group (n=21)**



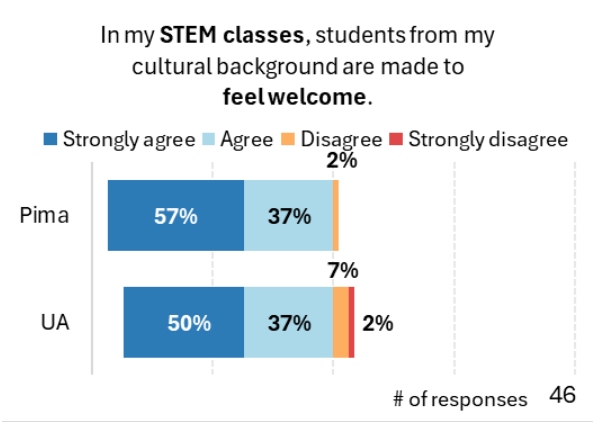

**Program Participants (n=46)**




**Comparison Group (n=21)**

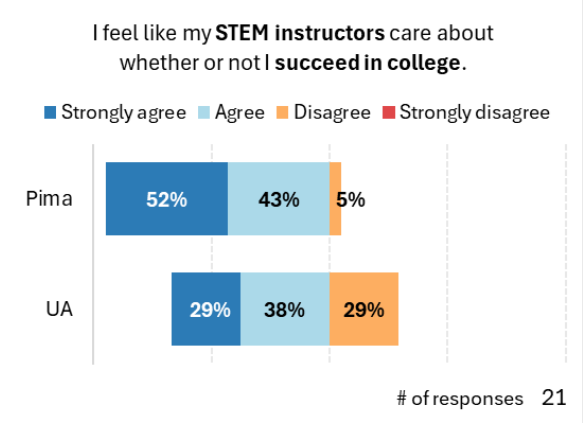



**Program Participants (n=46)**

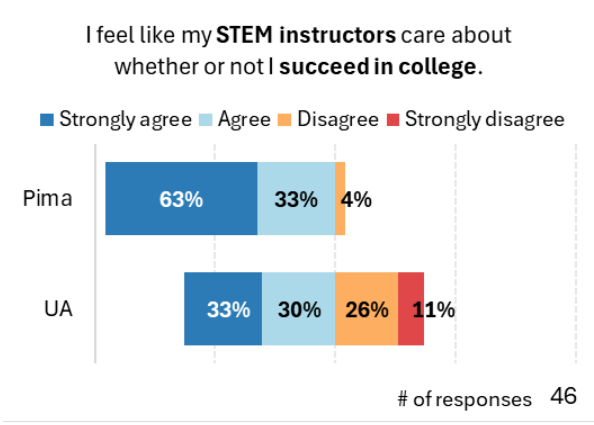



When asked specifically about their experiences with **STEM instructors**, comparison group members similarly had lower ratings of their experiences with instructors at UA and notably higher ratings of their instructors at Pima. Nearly all comparison group members agreed with all statements about their Pima instructors. In contrast to participants, a larger proportion of comparison group members agreed that their UA STEM instructors cared about whether or not they succeeded in a STEM field (81% versus 65%).

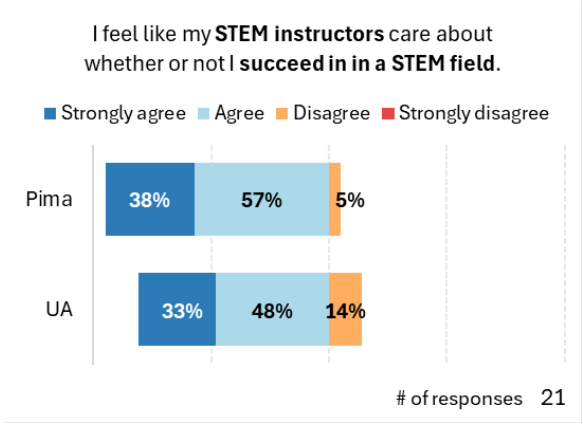
**Comparison Group (n=21)**



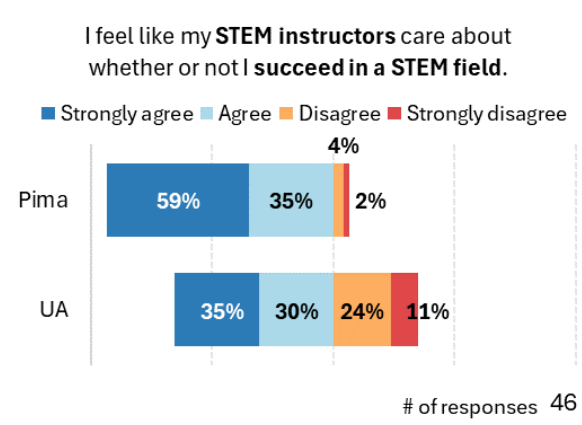

**Program Participants (n=46)**



**Comparison Group (n=21)**

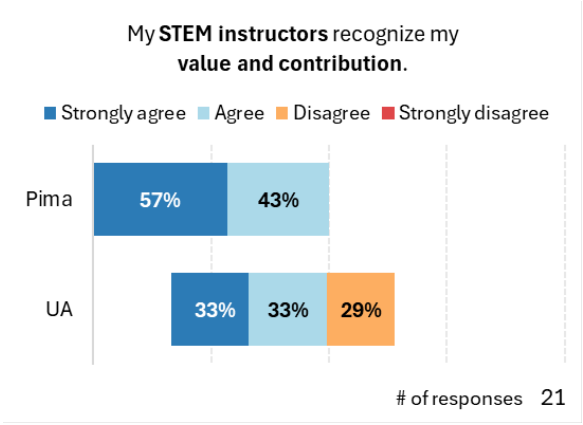



**Program Participants (n=46)**

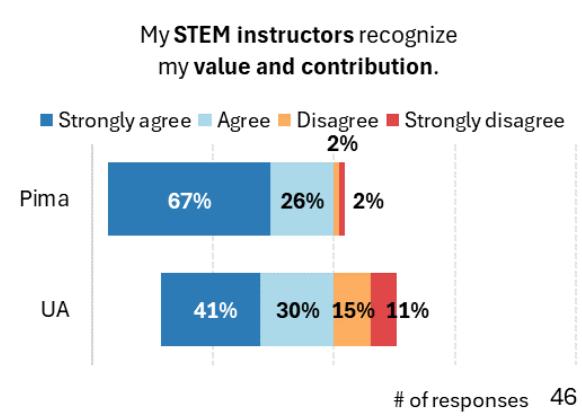



As was true with participants, more than one in four comparison group members disagreed when asked whether their **UA STEM instructors** recognize their value and contribution (29% disagreed), and 19% disagreed when asked whether their UA STEM instructors encouraged them to succeed.

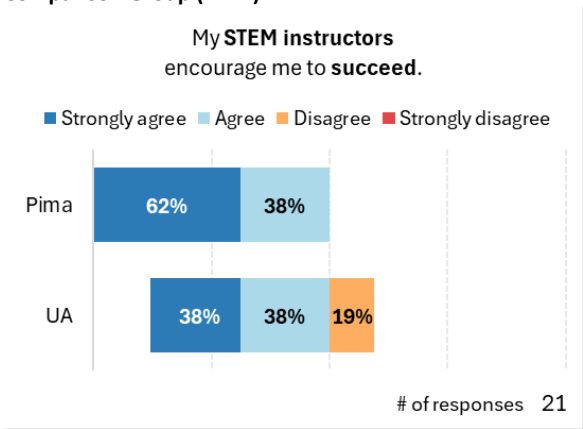
**Comparison Group (n=21)**



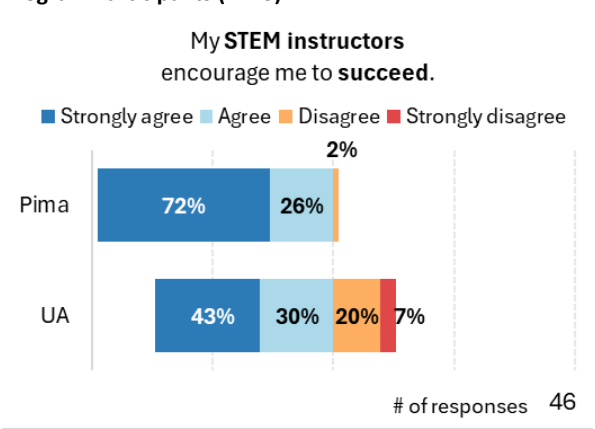

**Program Participants (n=46)**




**Comparison Group (n=21)**

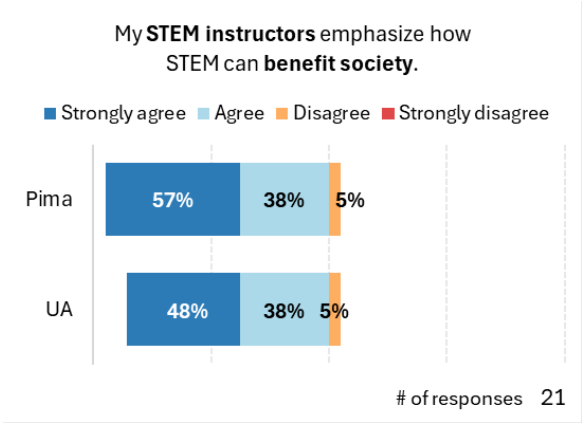



**Program Participants (n=46)**

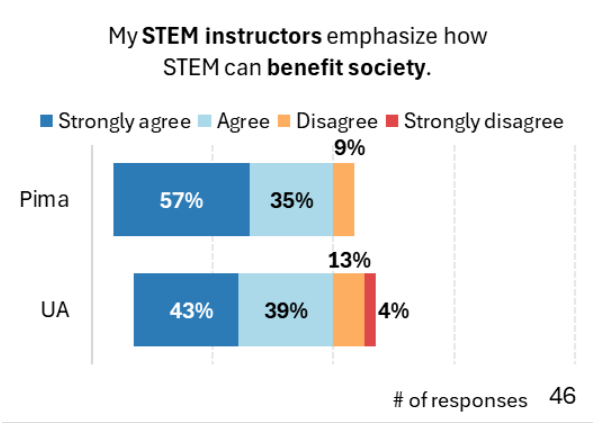



Nearly all comparison group members agreed that both their Pima and UA STEM instructors emphasized how STEM can benefit society (95%), though nearly one in five (19%) disagreed when asked whether their STEM instructors emphasized how STEM can benefit communities they are interested in helping.

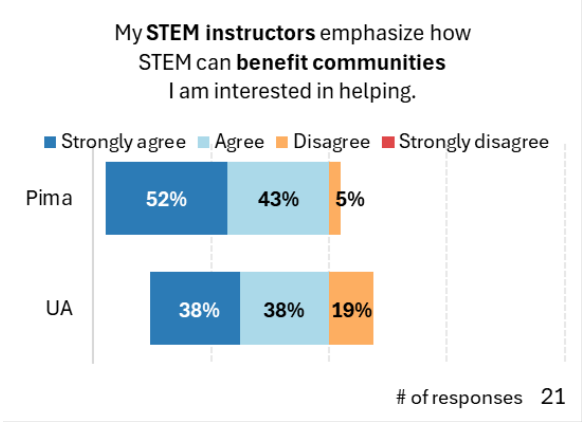
**Comparison Group (n=21)**



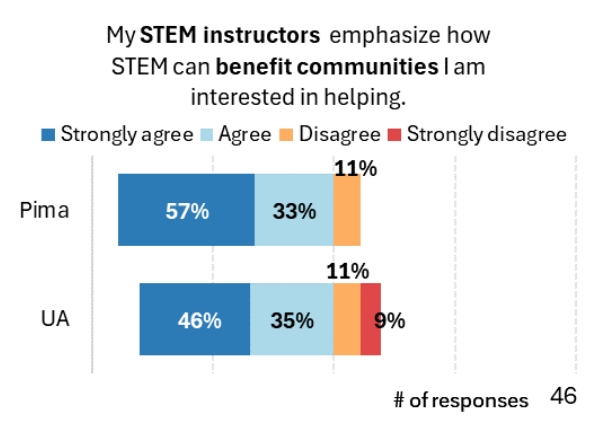

**Program Participants (n=46)**




**Comparison Group (n=21)**

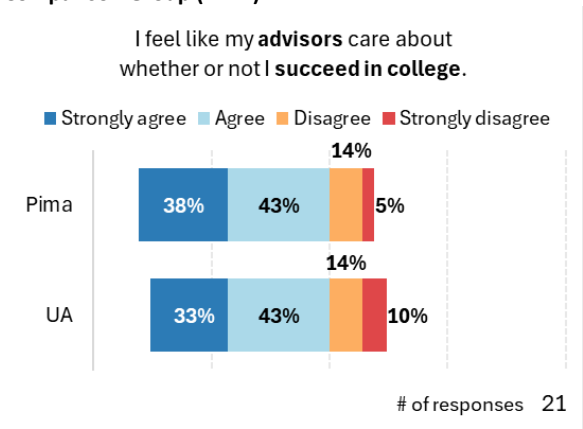



**Program Participants (n=46)**

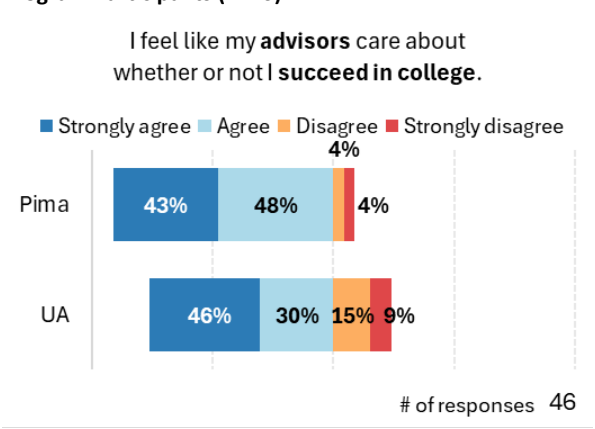



Comparison group members' experiences with **advisors** were similar to their experiences with STEM instructors. They were more likely to disagree with feeling like their advisors cared about whether they succeeded in college and in STEM at UA (24% and 20%) compared to Pima (19% and 19%).

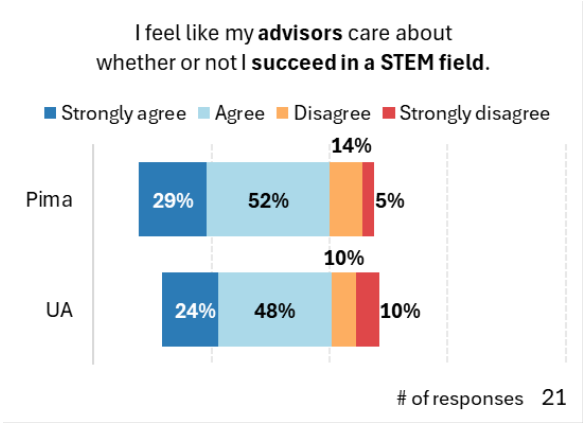
**Comparison Group (n=21)**



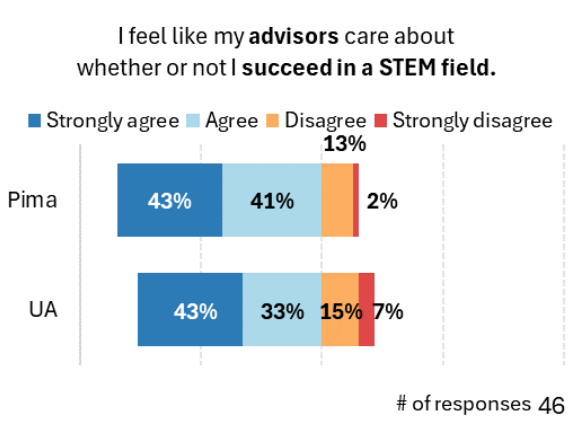

**Program Participants (n=46)**



**Comparison Group (n=21)**



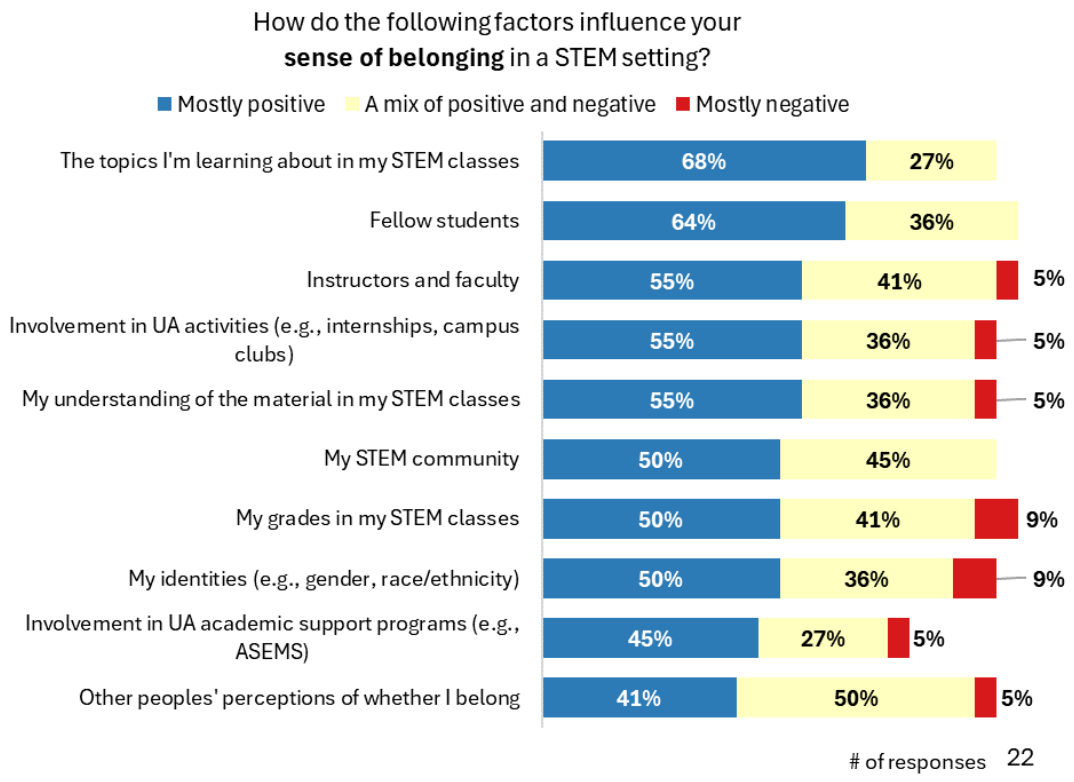

**Program Participants (n=46)**



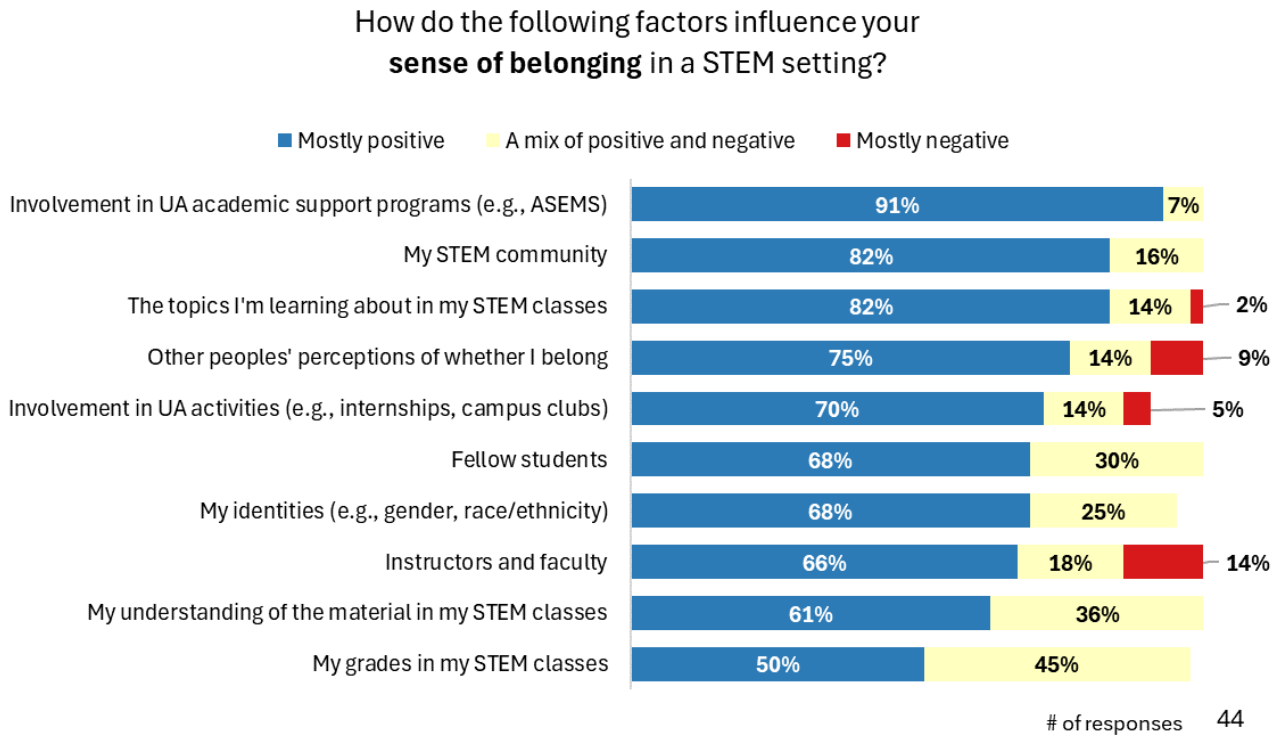

To better understand their **sense of belonging** scale scores, addressed in the Analysis of Program Variables of Interest section of the report, comparison group members were also asked what factors influence their sense of belonging in a STEM setting. Top factors considered mostly positive my comparison group members included the topics they're learning in their STEM classes (68%), fellow students (64%), instructors and faculty (55%), involvement in UA activities (55%), and their understanding of the material in their STEM classes (55%).

Comparison group students had more mixed positive and negative experiences than program participants, particularly when it came to others' perceptions of whether they belong (50%), their STEM community (45%), involvement in UA activities (36%), and their identities (36%). Unsurprisingly, given that 62% noted that they aren't involved in any academic support programs, nearly a quarter (23%) of comparison group students preferred not to answer the item about academic support programs.

**Comparison Group (n=22)**




**Program Participants (n=44)**



# Analysis of Program Variables of Interest

As was addressed in the *Evaluation Approach* section of the report, participants in the Pima-UAZ STEM Bridge program were surveyed at baseline and then annually at the end of each academic year to track the primary objectives of the program - STEM sense of belonging, STEM identity, and academic achievement (i.e., persistence in STEM). For each participant cohort, a comparison group of students with similar academic and demographic backgrounds and trajectories was recruited and also surveyed at baseline and annually.

## Evaluation Questions

In this summative report, we aim to answer the following questions using these data:

**Participant experiences in STEM**

1. Did sense of belonging and STEM identity meaningfully change for participants from baseline to one year after transferring to UA?

2. Were there any meaningful differences in participants' changes in sense of belonging and STEM identity pre-survey to post-transfer based on key demographics of interest – pre-survey sense of belonging, gender identity, race/ethnicity, first generation status, college major family (i.e., engineering, biological science, computer and information science, other STEM, other non-STEM?

3. Did sense of belonging and STEM identity meaningfully change for participants from one year after transferring to UA to their final survey?

4. Were there any meaningful differences in participants' persistence in STEM based on key demographics of interest – pre-survey sense of belonging, gender identity, race/ethnicity, first generation status?

**Effects of the program on sense of belonging, STEM identity, and STEM persistence**

1. Did sense of belonging and STEM identity meaningfully change for participants versus comparison group students from baseline to one year after transferring to UA?

2. Did participation in the program mitigate the effects of key demographics of interest -- pre-survey sense of belonging, gender identity, race/ethnicity, first generation status, UA college -- on sense of belonging and STEM identity?

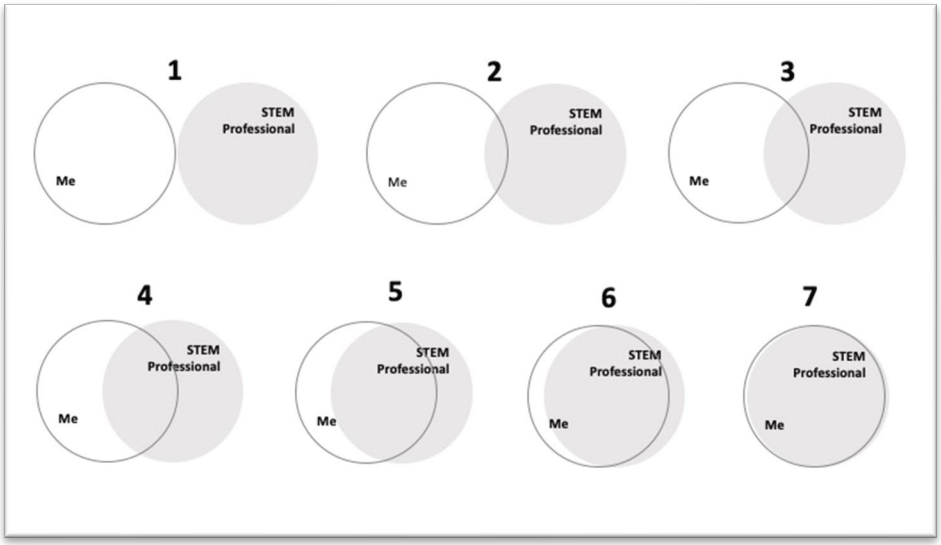
3. Is participation in the program improving participants' persistence in STEM?

4. Is participation in the program mitigating the effects of key demographics of interest -- pre-survey sense of belonging, gender identity, race/ethnicity, first generation status, college major family -- on persistence in STEM?

## Measures

To measure **STEM sense of belonging**, students were asked to consider their experiences as members of a STEM academic community and rate their level of agreement with 30 four-point Likert scale statements adapted from the Math Sense of Belonging Scale.[8] Sense of belonging is comprised of five sub-scales: membership, acceptance, affect, trust, and desire to fade (reverse-coded). Scores were calculated by summing and averaging the items for each subscale and calculating a grand mean for overall sense of belonging. Scores could range from 1 to 4, with higher scores reflecting greater sense of belonging.

**STEM identity** was measured using two different scales – the STEM explicit identity index and the single-item measure of STEM identity. The STEM explicit identity index[9] includes five Likert-scale questions and was adapted to measure participants' identification with being a STEM student, including whether being a STEM student is important to their sense of what kind of person they are. Scores were determined by taking the average of the five items, ranging from 1 to 4. Higher scores reflect greater identification with being a STEM student. Students were also asked a single-item measure of STEM identity that focused on STEM identity typicality (as a complement to the STEM identity centrality captured by the other index).[10] They were shown the image below and provided with the following prompt – 'STEM professionals are individuals whose professional activities relate to the STEM fields (Science, Technology, Engineering, or Mathematics). Select the picture that best describes the current overlap of the image you have of yourself and your image of what a STEM professional is.' As shown, scores could range from 1 to 7, with higher scores reflecting greater identification with being a STEM professional.




Participant **persistence in STEM** was measured using administrative data provided by program staff. Participant persistence was tracked for multiple variables – persistence in the program, transfer to UA, persistence in a STEM degree at UA, graduation with a STEM degree from UA. Comparison group persistence in STEM was measured using self-report data from the annual follow-up survey. Comparison group students were asked whether and where they were enrolled in school during the previous year (to track whether they had successfully transferred to UA or another 4-year university), whether they were enrolled in a STEM degree, and whether they graduated with a STEM degree from UA or another 4-year university.

## Analyses

To assess the changes in measures over time for participants and the association of socio-demographic variables with these changes, we used several methods of analysis.

### Participant experiences in STEM

Analyses were only conducted on participants with matched data across the different time points. The following table details the demographics of the participants included in analyses.

1. First, we used paired-sample t-tests to assess the aggregate difference in participant scores at key timepoints. We compared scores at baseline to scores from the survey completed at the end of each participant's transfer year to capture the effects of transfer shock and changes in institutional environment on sense of belonging and STEM identity.

   We also know that participants had highly variable trajectories in terms of sense of belonging, STEM identity, and experience of the transfer process, so we also calculated participant-level reliable change indices for sense of belonging and STEM identity, again comparing baseline to transfer year scores and transfer year to final survey scores. A Reliable Change Index (RCI) assesses whether an individual's change in scores over time is greater or less than the variability expected due to random measurement error.[11] To calculate the RCI for sense of belonging, we used the Cronbach alpha of 0.84 published in Good et al. as our reliability term.[12] For RCI calculations for STEM identity, we used the test-retest reliability of 0.75 published in McDonald et al. for the single-item STEM identity measure as our reliability term.[13]

2. To examine the association of participant's demographic characteristics with changes in sense of belonging and STEM identity from baseline to post-transfer, we ran a series of multivariate linear regressions with overall sense of belonging, each sense of belonging sub-scale, and STEM identity as outcome variables. We included the following variables as co-variates: underrepresented gender identity, underrepresented race/ethnicity, first generation status, and college major family.

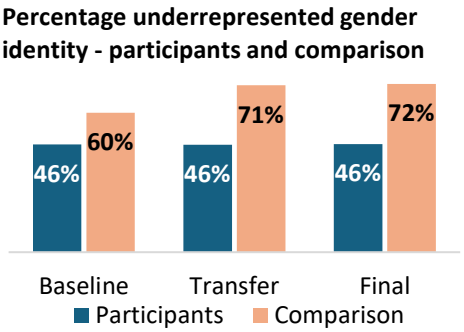
3. We then used paired-sample t-tests to examine changes between transfer year surveys and the final survey completed by each participant to assess any changes that occurred while participants were at UA. For some participants, but not all, their final survey was completed at graduation.

4. To examine differences in persistence in STEM based on participant's demographic characteristics, we also ran a series of chi-square tests using the demographic variables of interest -- underrepresented gender identity, underrepresented race/ethnicity, and first generation status.

## Effects of the program on sense of belonging, STEM identity, and STEM persistence

1. To explore the potential effects of the program on changes in sense of belonging and STEM identity from baseline to one year after transfer, we again examined reliable change indices to determine whether there was a difference between participants and comparison group students in their score changes. We used a chi-square test to determine if the distribution of reliable positive changes, stable scores, or reliable negative changes differed between these two groups.

   For these analyses, we only included comparison group students who successfully transferred to a four-year university. Because the comparison group students were on different transfer trajectories when they were initially recruited, their transfer year survey varied. It is important to note that while the comparison group was fairly well-matched to the participant group at recruitment, the students in the comparison group who continued to complete surveys and who successfully transferred to UA were disproportionately female or non-binary compared to the participants. At baseline, 60% of students in the comparison group were of underrepresented gender identities, and this increased to 71% at transfer. By contrast, 46% of participants were of underrepresented gender identities at all time points. A chi-square test comparing the proportion of students of underrepresented gender identities in each group in the transfer year survey showed that these proportions significantly differed ($\chi^2$ (1, N = 104) = 4.3186, p =0.0377). The participant and comparison groups were well-matched in terms of underrepresented race/ethnicity and first-generation status across all time points.




2. We then conducted a series of multivariate linear regressions to determine if program participation mitigated some of the effects of demographic factors on sense of belonging and STEM identity seen in analyses of program participant data alone. We fit generalized linear models with the outcome variable of STEM identity or sense of belonging and the following co-variates: underrepresented gender identity, underrepresented race/ethnicity, first generation status, college major family, and group membership (participant or comparison group).

3. We examined the effects of program participation on persistence in STEM using Fisher's exact test[14] to calculate the relative risk ratio for participants as compared to the comparison group as well as specific sub-groups of interest, such as underrepresented gender identities, racial and ethnic minorities, and first-generation students. The resulting relative risk ratios indicate whether program participation was associated with an increased or decreased likelihood of persisting in STEM.

4. To explore the relative strength of relationships between program participation, participant demographics, and persistence in STEM, we finally conducted a logistic regression with persistence in a STEM major as the primary outcome variable. We again used the following co-variates: underrepresented gender identity, underrepresented race/ethnicity, first generation status, college major family, and group membership (participant or comparison group). We also included a covariate that captured whether a student had a sense of belonging in the lowest quartile at baseline to examine whether program participation helped to mitigate low sense of belonging for these students.

## Results

Descriptive statistics for the following results can be found in Analysis Results – Descriptive Statistics.

**Results Quick Reference**

 Statistically significant at $p < 0.05$

 Not statistically significant at $p < 0.1$

 Minorly statistically significant at $p < 0.1$, worth watching

 Statistically significant AND meets the Bonferroni threshold for the number of tests in this series ($p = 0.05 / 8 = 0.00625$)

### Participant experiences in STEM

#### *1. Did sense of belonging and STEM identity meaningfully change for participants from baseline to one year after transferring to UA?*

Paired-samples t-tests were conducted to determine if there were significant differences between participants' baseline and post-transfer scores for sense of belonging and STEM identity.

**Participants showed statistically significant changes in their overall sense of belonging in STEM and several sense of belonging subscales from baseline to post-transfer.**

Participants' **overall sense of belonging** score significantly **decreased** from pre-survey (mean=3.18, SD=0.43) to post-transfer survey (mean=3.01, SD=0.52), reflecting a **general reduction in participants' sense of belonging in STEM environments after transferring from Pima to UA.**

**Affect** showed a statistically significant **decrease** from pre-survey (mean=2.95, SD=0.54) to post-transfer survey (mean=2.77, SD=0.63), suggesting that participants felt **less comfortable in their STEM environments after transferring to UA**. Example items include – 'When I am in a STEM setting, I feel anxious (reverse-coded)' and 'When I'm in a STEM setting, I feel comfortable.'

**Trust** showed a statistically significant **decrease** from pre-survey (mean=3.20, SD=0.50) to post-transfer survey (mean=2.83, SD=0.70). This suggests that participants experienced **a decline in their trust in STEM instructors and course materials from Pima to UA.** An example item is - 'When I am in a STEM setting, I trust my instructors to be committed to helping me learn.'

**Desire to fade (reverse-coded)** showed a statistically significant **increase** from pre-survey (mean=3.22, SD=0.54) to post-transfer survey (mean=3.07, SD=0.71), suggesting that participants were **more likely to actively participate and less likely to fade into the background once they transferred to UA**. An example item is – 'When I'm in a STEM setting, I wish I could fade into the background and not be noticed.'

**Paired Samples T-tests (Participants only) for Pre-Survey to Transfer Year – All Participants**

| Variable of interest | Equation output | Sym. |
|---|---|---|
| **Membership** – Sense of Belonging subscale (1-4) | t(103) = 0.85, p = 0.40, 95% CI [-0.08, 0.19] | ✗ |
| **Acceptance** – Sense of Belonging subscale (1-4) | t(103) =0.99, p = 0.32, 95% CI [-0.06, 0.18] | ✗ |
| **Affect** – Sense of Belonging subscale (1-4) | t(103) = 2.72, **p = 0.008**, 95% CI [0.05, 0.32] | ✓ |
| **Desire to fade** – Sense of Belonging subscale (1-4) | t(103) = 2.02, **p = 0.047**, 95% CI [0.002, 0.32] | ✓ |
| **Trust** – Sense of Belonging subscale (1-4) | t(103) = 4.69, **p < 0.001**, 95% CI [0.21, 0.52 | 🏅 |
| **Overall Sense of Belonging** (1-4) | t(103) = 3.01, **p = 0.003**, 95% CI [0.06, 0.27] | 🏅 |
| **Single-item STEM Identity** (1 -7) | t(103) = -0.47, p = 0.64, 95% CI [-0.48, 0.29] | ✗ |
| **Explicit STEM Identity** (1-4) | t(103) = 0.26, p = 0.79, 95% CI [-0.12, 0.16] | ✗ |

Reliable Change Indices (RCI) showed that the largest proportion of participants (46%, n=35) showed a negative change, or decline, in their sense of belonging from baseline to post-transfer. This mirrors the general reduction in participants' **sense of belonging** in STEM environments after transferring from Pima to UA seen in the paired-samples t-test. Positively, one in four participants (25%, n=19) experienced a positive change in their sense of belonging in STEM, while 29% (n=22) reported no change.

The demographic profile of the participants who showed a meaningful decline in sense of belonging mirrored the overall demographic profile of participants. Of those that showed a **meaningful increase in sense of belonging** after transferring, there was an overrepresentation of participants with an **underrepresented race or ethnicity in STEM** (79%, n=15) and **first-generation students** (74%, n=14) compared to the overall participant demographics (55% and 67%, respectively). Nearly half of participants with a meaningful increase in sense of belonging (47%, n=9) entered the program with the **lowest baseline sense of belonging** scores.

**Overall Sense of Belonging (Mean score for all subscales) from Pre-Survey to Transfer Year – All Participants (n = 76)**


For **STEM identity**, no participants showed any meaningful change from baseline to post-transfer, implying that their STEM identity remained relatively stable.

**Single-item STEM Identity (Scale 1 -7) – All Participants (n = 76)**

*2. Were there any meaningful differences in participants' changes in sense of belonging and STEM identity pre-survey to post-transfer based on key demographics of interest – pre-survey sense of belonging, gender identity, race/ethnicity, first generation status, college major family?*

Participants majoring in **computer and information science** experienced a significant **decline in their overall sense of belonging** upon transferring to UA, declining from a mean of 3.31 (SD=0.45) at baseline to 2.8 (SD=0.58) post-transfer. In particular, they showed significant declines in their sense of belonging on the acceptance (baseline: mean=3.37, SD=0.48; post-transfer: mean=2.87, SD= 0.55) and desire to fade (baseline: mean=3.25, SD=0.57; post-transfer: mean=3.14, SD=0.67) sub-scales, suggesting that they **felt less accepted and respected and felt more inclined to say as little as possible and fade into the background** in STEM environments at UA. They also experienced a significant **decline in their STEM identity**, from a baseline mean of 4.53 (SD=1.592) to 4.73 (SD=1.39) post-transfer.

Participants with an **underrepresented gender identity in STEM** (e.g., female, non-binary), experienced significant declines on the affect and trust sense of belonging sub-scales. Their affect scores declined from a mean of 2.9 (SD=0.55) to 2.67 (SD: 0.58), suggesting they **felt more anxious, nervous, or tense** in STEM environments at UA. Their trust scores declined from a mean of 3.19 (SD=0.50) to 2.74 (SD=0.64), suggesting they experienced **a decline in their trust in STEM instructors and course materials from Pima to UA.**

Participants with an **underrepresented race/ethnicity** in STEM also experienced significant declines in **trust** post-transfer (baseline: mean=3.19, SD=0.52; post-transfer: mean=2.99, SD=0.70).

Positively, participants who identified as **first-generation** college students experienced a **significant increase in their STEM identity post-transfer** (baseline: mean=4.53, SD = 1.59; post-transfer, mean=4.73, SD=1.39).

| Variable of interest | Significance | Beta (if significant) | 95% CI | Sym. |
|---|---|---|---|---|
| **Acceptance –** Sense of Belonging subscale (1-4) | p = 0.00872 | -0.51792 (Major Family: Computer & Information Science) | [-0.917, -0.0005] | ✓ |
| **Affect –** Sense of Belonging subscale (1-4) | p = 0.0116 | -0.290462 (Underrepresented gender identity) | [-0.631, 0.051] | ✓ |
| **Desire to fade –** Sense of Belonging subscale (1-4) | p = 0.03558 | -0.640489 (Major Family: Computer & Information Science) | [-1.021, -0.045] | ✓ |
| **Trust –** Sense of Belonging subscale (1-4) | p = 0.0232 | -0.30041 (Underrepresented gender identity) | [-0.673, 0.008] | ✓ |
| | p = 0.010459 | 0.40962 (Underrepresented race/ethnicity) | [0.086, 0.733] | ✓ |
| **Overall Sense of Belonging** (1-7) | p = 0.0251 | -0.370200 (Major Family: Computer & Information Science) | [-0.805, 0.002] | ✓ |
| **Single-item STEM Identity** (Scale 1 -7) | p = 0.0062 | 0.2915 (First generation) | [0.088, 0.495] | ✓ |
| | p = 0.0311 | -1.2948 (Major Family: Computer & Information Science) | [-2.133, -0.068] | ✓ |

### *3. Did sense of belonging and STEM identity meaningfully change for participants from one year after transferring to UA to their final survey?*

Based on paired-sample t-tests, there were no significant differences between transfer year and final survey scores on any items, which suggests that once students transferred to UA, **their sense of belonging and STEM identity remained stable.** While the transfer process was associated with a decrease in overall sense of belonging, once established at UA, overall sense of belonging scores did not show substantial changes in the aggregate.

**Paired Samples T-tests (Participants only) for Transfer Year to Final Survey – All Participants**

| Variable of interest | Equation output | Sym. |
|---|---|---|
| **Membership** – Sense of Belonging subscale (1-4) | t(78) = 0.64, p = 0.6410, 95% CI [-0.17, 0.27] | ✗ |
| **Acceptance** – Sense of Belonging subscale (1-4) | t(78) = 1.00, p = 1.0000, 95% CI [-0.12, 0.12] | ✗ |
| **Affect** – Sense of Belonging subscale (1-4) | t(78) = 1.12, p = 0.1190, 95% CI [-0.02, 0.17] | ✗ |
| **Desire to fade** – Sense of Belonging subscale (1-4) | t(78) = 1.25, p = 0.2535, 95% CI [-0.05, 0.19] | ✗ |
| **Trust** – Sense of Belonging subscale (1-4) | t(78) = 0.95, p = 0.9531, 95% CI [-0.11, 0.10] | ✗ |
| **Overall Sense of Belonging** (1-7) | t(78) = 1.08, p = 0.4608, 95% CI [-0.05, 0.12] | ✗ |
| **Single-item STEM Identity** (1 -7) | t(78) = 0.68, p = 0.6843, 95% CI [-0.21, 0.14] | ✗ |
| **Explicit STEM Identity** (1-4) | t(78) = 0.59, p = 0.5905, 95% CI [-0.10, 0.07] | ✗ |

Reliable change indices showed that **from transfer year to final survey, 69% (n=37) of participants showed no change in their overall sense of belonging in STEM**. Seventeen percent (n=9) experienced an increase in their sense of belonging during this time, while 15% (n=8) experienced a decrease in sense of belonging. As was seen from baseline to transfer, a notable majority of the participants who experienced a meaningful increase in sense of belonging from transfer to final year had an **underrepresented race or ethnicity in STEM** (78%, n=7) and/or were **first generation** students (78%, n=7).

**Overall Sense of Belonging (Mean score for all subscales) from Transfer Year to Last Year – All Participants (n = 54)**


For **STEM identity**, no participants showed any meaningful change from transfer year to final survey, implying that their STEM identity remained relatively stable.

**Single-item STEM Identity (Scale 1 -7) from Transfer Year to Last Year – All Participants (n = 54)**

*4. Were there any meaningful differences in participants' persistence in STEM based on key demographics of interest – pre-survey sense of belonging, gender identity, race/ethnicity, first generation status, college major family?*

There were meaningful differences in participants' persistence in STEM based on two demographic variables – gender identity and pre-survey sense of belonging. Participants with **underrepresented gender identities in STEM** and participants that had the **lowest pre-survey sense of belonging** scores were significantly **more likely to persist in STEM**.

**Differences in persistence in STEM by demographic variables of interest – All Participants**

| Variable in interest | Significance | Chi-square Statistic | Degrees of freedom | Symbol |
|---|---|---|---|---|
| **Underrepresented Gender Identity** | p = 1.000 | p < .001 | 1 | ✅ |
| **Underrepresented Race/Ethnicity** | p = 0.784 | 0.0753 | 1 | ❌ |
| **First Generation** | p = 0.690 | 0.1585 | 1 | ❌ |
| **Lowest pre-survey sense of belonging in STEM quartile** | p = 1.000 | p < .001 | 1 | ✅ |

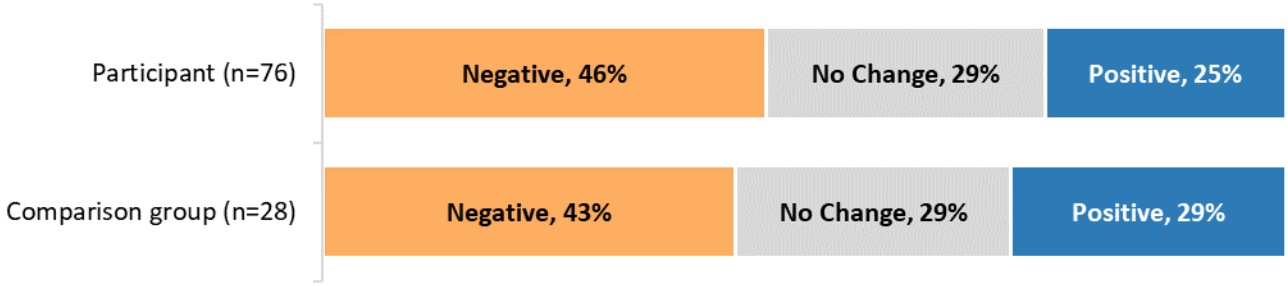
## Effects of the program on sense of belonging, STEM identity, and STEM persistence

*1. Did sense of belonging and STEM identity meaningfully change for participants versus comparison group students from baseline to one year after transferring to UA?*

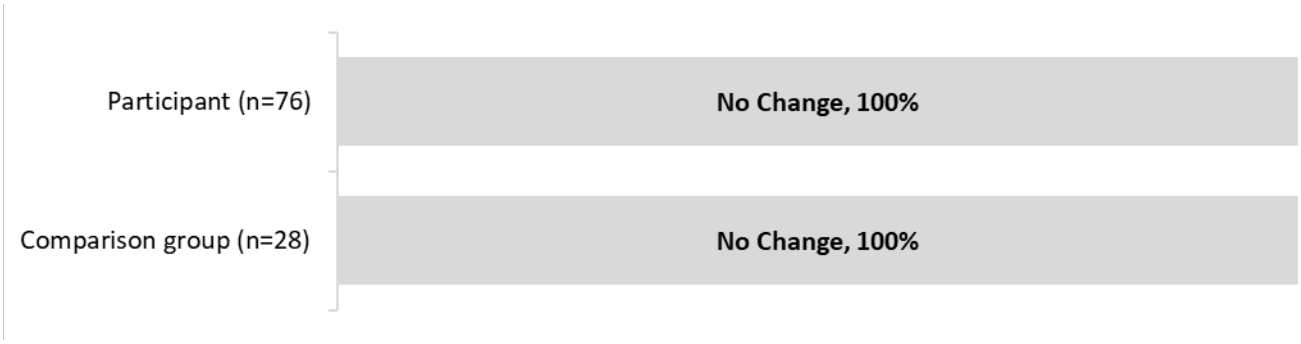
In terms of **overall sense of belonging**, there was no significant difference in change in sense of belonging from baseline to transfer based on program participation ($\chi^2(2) = 0.15,\ p = 0.93$). Similar proportions of comparison group members showed meaningful decreases (43%) and meaningful increases (29%) in overall sense of belonging upon transferring to a four-year university compared to program participants (46% and 25%, respectively).

Neither participants nor comparison group members showed any meaningful change in their **STEM identity** upon transferring to a four-year university. Because there was no variation in this item, a chi-squared test was not appropriate to assess variance.

**Overall Sense of Belonging (Mean score for all subscales) from Pre-Survey to Transfer Year – All Participants and Comparison Group Members**




**Single-item STEM Identity (Scale 1 -7) from Pre-Survey to Transfer Year – Participants and Comparison Group Members**




*2. Did participation in the program mitigate the effects of key demographics of interest -- pre-survey sense of belonging, gender identity, race/ethnicity, first generation status -- on sense of belonging and STEM identity?*

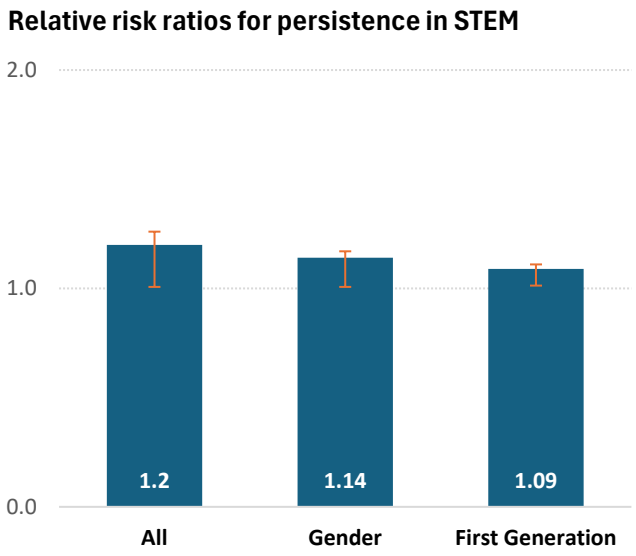
Results of multivariate linear regressions examining the association of program participation and demographic covariates with sense of belonging and STEM identity showed that program participation did not have a significant association with sense of belonging or STEM identity following transfer. Similar to the results seen among participants, majoring in **computer and information science** was associated with a significant decline in sense of belonging for both participants and comparison group members. This suggests that participation in the program was not enough to offset the other factors driving this decline in sense of belonging for computer and information science students.

Overall, results of the regression analyses, taken with the RCI results reported above, suggest that this program is not currently having a measurable effect on the trajectory of students' sense of belonging or STEM identity. The sense of belonging scores for both participants and comparison group students follow highly similar trajectories, defined by a sharp drop following transfer, suggesting that sense of belonging is much more influenced by the overall transfer experience and that participation in the program is not mitigating the decline in belonging induced in this process. Similarly, STEM identity trajectories were highly similar for both participant and comparison group students, with no reliable changes seen between baseline and transfer scores.

### *3. Is participation in the program improving participants' persistence in STEM?*

Based on results from the Fisher's exact test, **participants in the program are 20% more likely (RR = 1.2) to persist in STEM** than their peers in the comparison group (p=0.022).

When we examined specific sub-groups of students, we found that **students with underrepresented gender identities** (RR =1.14; p=0.021) and **first-generation students** (RR=1.09; p=0.016) were particularly more likely to persist in STEM as participants in the program compared to their comparison group peers. Students from underrepresented racial or ethnic backgrounds were as likely to persist in STEM in the program as in the comparison group.




Participants who had the lowest baseline scores for sense of belonging were significantly more likely to persist in STEM compared to the comparison group (p = 0.021); **while nearly half of the students with the lowest quartile sense of belonging did not persist in STEM in the comparison group (44%), all of the students in the bottom quartile for sense of belonging in the participant group persisted in STEM**. The perfect retention rate for low-belonging students in the participant group means that we are unable to calculate a relative risk ratio.

Taken together, these results suggest that participation in the program is associated with increased retention in STEM, particularly for students with initially low sense of belonging in STEM.

### *4. Is participation in the program mitigating the effects of key demographics of interest -- pre-survey sense of belonging, gender identity, race/ethnicity, first generation status, college major family -- on persistence in STEM?*

While we intended to run a logistic regression to explore the relationships between program participation and demographic covariates and persistence in STEM, we found that the relative rarity of students exiting STEM majors, with only 10 students across both groups not persisting in STEM, meant that we did not have enough statistical power to run a multivariate analysis. A general rule in logistic regressions is that one needs at least 10 'events' (in our case, non-persistence) to reliably estimate each coefficient in a logistic regression, which meant that our current sample only allowed us to examine univariate relationships, addressed in the previous section.[15]

It is also important to note that while program participants enrolled in the Pima-UAZ STEM Bridge program were slated to transfer to the University of Arizona in their second year, comparison group members could transfer to any four-year institution on a more varied timeline. We have limited data on where many of the comparison group students ended up. The missing information for non-respondents introduces uncertainty when assessing the impact of key demographics on persistence in STEM. To better understand differences in persistence in STEM based on demographics of interest, it is recommended that future analyses include propensity score matching that compares program participants at UA with an institutional comparison group using data provided by UA University Analytics and Institutional Research (UAIR). This would allow for more robust analysis of multiple variables of interest, including semesters to graduate, retention in STEM, and graduation with a STEM degree. The evaluation team was working with UAIR to generate a dataset that would allow for these types of comparisons, but the dataset was not finalized in time for the submission of this report.

# Appendix

## Analysis Results – Descriptive Statistics

**Participant and Comparison group sense of belonging mean scores, all cohorts (Four timepoints)**

| | | Pre-Survey | | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| **Overall Sense of Belonging** | Participants | 3.17 | 0.43 | 3.04 | 0.42 | 2.89 | 0.56 | 3.06 | 0.51 | 3.13 | 0.54 |
| | Comparison group | 3 | 0.44 | 2.96 | 0.56 | 2.92 | 0.35 | 2.74 | 0.4 | 3 | 0.51 |
| ***Membership*** | Participants | 3.32 | 0.55 | 3.21 | 0.56 | 3.15 | 0.57 | 3.35 | 0.5 | 3.37 | 0.69 |
| | Comparison group | 3.1 | 0.6 | 2.99 | 0.77 | 2.95 | 0.62 | 2.77 | 0.59 | 3.14 | 0.69 |
| ***Acceptance*** | Participants | 3.17 | 0.49 | 3.17 | 0.48 | 3.01 | 0.56 | 3.07 | 0.61 | 3.21 | 0.64 |
| | Comparison group | 3.05 | 0.51 | 3.05 | 0.6 | 3.07 | 0.39 | 2.75 | 0.53 | 3.05 | 0.6 |
| ***Affect*** | Participants | 2.92 | 0.55 | 2.81 | 0.5 | 2.64 | 0.66 | 2.96 | 0.59 | 2.89 | 0.61 |
| | Comparison group | 2.8 | 0.54 | 2.76 | 0.67 | 2.74 | 0.54 | 2.59 | 0.54 | 2.76 | 0.63 |
| ***Desire to fade (reverse-coded)*** | Participants | 3.26 | 0.52 | 3.03 | 0.57 | 2.94 | 0.75 | 3.13 | 0.54 | 3.14 | 0.63 |
| | Comparison group | 3.04 | 0.62 | 3.01 | 0.62 | 2.91 | 0.64 | 3.06 | 0.72 | 3.08 | 0.65 |
| ***Trust*** | Participants | 3.18 | 0.5 | 3 | 0.57 | 2.73 | 0.75 | 2.79 | 0.75 | 2.95 | 0.69 |
| | Comparison group | 3.04 | 0.55 | 2.97 | 0.58 | 2.94 | 0.42 | 2.54 | 0.66 | 2.99 | 0.56 |

Participants (n = 90)

Comparison group (n = 161)

**Participant and Comparison group STEM explicit identity mean scores, all cohorts (Four timepoints)**

| | | Pre-Survey | | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| **Single-item STEM Identity (1-7)** | Participants | 4.47 | 1.57 | 4.05 | 1.5 | 4.49 | 1.54 | 5.41 | 0.94 | 4.45 | 1.39 |
| | Comparison group | 3.96 | 1.64 | 4.05 | 1.61 | 4.19 | 1.92 | 3.83 | 1.53 | 4.02 | 1.74 |

Participants (n = 89)

Comparison group (n = 160)

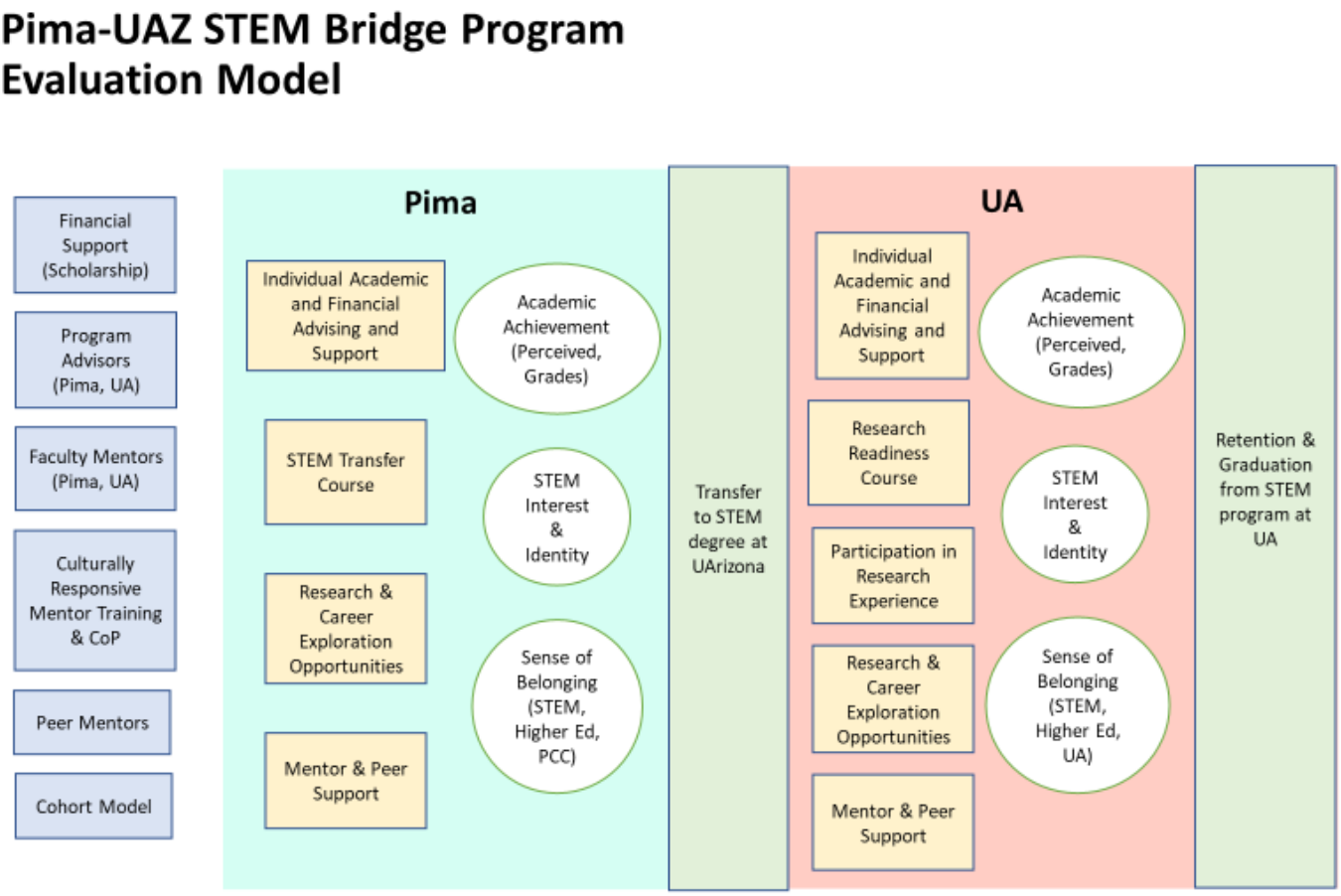
**Participant and Comparison group single-item STEM identity mean scores (Four timepoints)**

| | | Pre-Survey | | Year 1 | | Year 2 | | Year 3 | | Year 4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| **Explicit STEM Identity (1-4)** | Participants | 3.2 | 0.47 | 3.17 | 0.49 | 3.2 | 0.49 | 3.29 | 0.4 | 3.09 | 0.55 |
| | Comparison group | 2.92 | 0.63 | 2.86 | 0.71 | 2.85 | 0.74 | 2.75 | 0.42 | 3.05 | 0.62 |

Participants (n = 90)

Comparison group (n = 160)

## Evaluation Approach Details



| **Program Participants** | Year 1 | | | Year 2 | | Year 3 | | Year 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | Fall | Spring | Summer | Fall | Spring | Fall | Spring | Fall | Spring |
| School | Pima | Pima | | UA | UA | UA | UA | UA | UA |
| Events of interest | Recruited into program | Graduate from Pima | | Transfer to UA in a STEM major | | Graduate from UA with a STEM degree (Target graduation semester - Year 3 Spring) | | | |
| Programmatic components | • Program Kick-Off event<br>• STEM Career Day<br>• Personal Statement Workshop | • STU210 UA Transfer course | • Cohort 1 only - participate in summer research experience | • Research Readiness course | | | | | |
| Ongoing programmatic components | Scholarship funds, program staff support (academic, financial, personal), faculty mentoring (optional in years 3 and 4), peer mentors, tutoring support | | | | | | | | |
| Evaluation data collection | • Application (demographics)<br>• Pre-survey (including sense of belonging and STEM identity)<br>• Program Kick-Off post-survey<br>• STEM Career Day post-survey<br>• Personal Statement Workshop post-survey | • STU210 UA pre-survey<br>• STU210 UA post-survey<br>• Annual follow-up survey (including program feedback, sense of belonging, and STEM identity) | • Summer research experience post-survey | • Research Readiness pre-survey<br>• Research Readiness post-survey | • Annual follow-up survey (including transfer experience, program feedback, sense of belonging, and STEM identity) | • Grad survey | • Annual follow-up survey (including program feedback, sense of belonging, and STEM identity)<br>• Grad survey | • Grad survey | • Annual follow-up survey (including program feedback, sense of belonging, and STEM identity)<br>• Grad survey |

| **Comparison Group** | Year 1 | | | Year 2 | | Year 3 | | Year 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | Fall | Spring | Summer | Fall | Spring | Fall | Spring | Fall | Spring |
| School | Pima | Pima | | Multiple possibilities: Pima, another two-year college, UA, another four-year university, not in school | | | | | |
| Events of interest | | Recruited into comparison group | | Graduate from Pima, transfer to UA or another four-year university in a STEM major, graduate from four-year university with a STEM degree (Target semesters based on pre-survey self-reported timeline) | | | | | |
| Evaluation data collection | | • Pre-survey (including demographics, sense of belonging and STEM identity)<br>• Annual follow-up survey (including sense of belonging, and STEM identity) | | | • Annual follow-up survey (including transfer experience, sense of belonging, and STEM identity) | | • Annual follow-up survey (including transfer experience, sense of belonging, and STEM identity) | | • Annual follow-up survey (including transfer experience, sense of belonging, and STEM identity) |

**Faculty Mentors**

| | | Year 1 | | | Year 2 | |
|---|---|---|---|---|---|---|
| | Spring | Summer | Fall | Spring | Fall | Spring |
| Programmatic components | • Recruited into mentoring program | • Culturally responsive mentor training (5 sessions) | • Program Kick-Off<br>• 1:1 meetings with mentees<br>• Culturally Responsive Community of Practice (CRCP) meetings | • 1:1 meetings with mentees<br>• Culturally Responsive Community of Practice (CRCP) meetings | • 1:1 meetings with mentees<br>• Culturally Responsive Community of Practice (CRCP) meetings | • 1:1 meetings with mentees<br>• Culturally Responsive Community of Practice (CRCP) meetings |
| Evaluation data collection | • Application (demographic data) | • Pre-training cultural responsiveness survey<br>• Post-session brief feedback surveys (for each individual training session)<br>• Post-training survey focused on knowledge gained and satisfaction with training | | • Annual follow-up survey (retrospective pre-post survey of culturally responsive mentoring behaviors, feedback on CRCP) | | • Annual follow-up survey (retrospective pre-post survey of culturally responsive mentoring behaviors, feedback on CRCP) |

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