STUDENT SUCCESS AND TRANSFER ARTICULATION THROUGH RESEARCH AND SUPPORT SERVICES (STARS)

California State Polytechnic University, Pomona (CPP)

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YEAR 1 EVALUATION REPORT

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Submitted by
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ABOUT THE AUTHORS

This report was written by Cobblestone Applied Research & Evaluation, Inc. (*Cobblestone*) for the DoE Title III funded Student Success and Transfer Articulation Through Research and Support Services (STARS) at Cal Poly Pomona (CPP). *Cobblestone* specializes in designing and conducting program evaluation and applied research studies in the education field. For more information, visit www.cobblestoneeval.com.

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TABLE OF CONTENTS

TABLES & FIGURES

EXECUTIVE SUMMARY

Funded by the Department of Education (DoE; # P031C210068), the **Student Success and Transfer Articulation through Research and Support Services (STARS) project at Cal Poly Pomona (CPP)** aims to increase the institutional capacity of CPP, Citrus College (Citrus), and Mount San Antonio College (Mt. SAC) to engage Hispanic and other low-income students in STEM disciplines through undergraduate research and related wrap-around services, and propel them through the STEM curriculum more quickly and effectively. Cobblestone Applied Research & Evaluation, Inc. (*Cobblestone*) is conducting the external evaluation of the STARS project. This formative evaluation report provides a summary and analysis of the first year of program implementation (October 1, 2021 to September 30, 2022).

Program Activities

To achieve program goals, the STARS project implements six activities:

Activity 1
Offer a STARS Cohort Experience

Activity 2
Create a Library of Student Success Workshops

Activity 3
Prepare Current and Future Faculty

Activity 4
Establish a Faculty Learning Community (FLC)

Activity 5
Develop Transfer Pathways

Activity 6
Establish a STEM Industry Advisory Board

Difference Education RCT

In addition to the above program activities, STARS will implement a randomized-control trial (RCT) experiment assessing the effectiveness of Stephens et al (2014) difference-education (DE) intervention beginning in Year 2.

Year 1 Key Findings & Recommendations

 **STARS Cohort Experience**	The STARS cohort experience was implemented in spring and summer 2022. Due to the early stage of program implementation, participation requirements were adapted. Scholars reported welcoming research environments but noted a need for better communication between the research mentors and the program. Both STARS Scholars and faculty mentors reported significant increases in Scholars' research skills.
 **Student Success Workshops Library**	Three new academic/STEM skills workshops were developed and uploaded to the Student Success Workshops Library: Introduction to Data Science, Mastering Excel Data Processing, and Data and Research Ethics.
 **Current and Future Faculty Preparation**	The first PLUTO faculty fellow mentored students and ran workshops in summer 2022 but was unable to teach a course due to the timing of their commitment.
 **Faculty Learning Community (FLC)**	The first FLC was held over two days in summer 2022 to align engineering courses across Citrus, Mt. SAC, and CPP. The group expects to meet again in the fall 2022 and spring 2023 semesters.
 **Transfer Pathways Development**	CPP will award an admissions advantage to Citrus and Mt. SAC transfer applicants who complete designated course sequences; engineering certificates were approved at Mt. SAC and submitted for approval at Citrus. In fall 2022, no Citrus or Mt. SAC transfer applicants completed the course sequences required to receive the admission bonus.
 **STEM Advisory Board**	The STARS team contacted industry partners to recruit for the advisory board in Year 1, however, no formal commitments were made.

Recommendations and Next Steps for Year 2:

- ☐ Ensure STARS program requirements are communicated to Scholars clearly and consistently
- ☐ Ensure STARS faculty mentors are aware of program requirements
- ☐ Implement the DE intervention
- ☐ Begin recruitment early for PLUTO fellows
- ☐ Communicate transfer pathways to students
- ☐ Recruit industry members for the advisory board

INTRODUCTION

Science, technology, engineering, and mathematics (STEM) occupations are predicted to grow faster than any other industry in the next decade (United States Bureau of Labor Statistics, 2021), and more STEM workers are needed to maintain the nation's economic prominence (Achieving the Promise of a Diverse STEM Workforce, 2021). While Hispanic/Latino workers constitute 17% of total employment, they only account for 8% of STEM workers (Pew Research Center, 2021). The low percentage of Hispanic/Latino individuals in the STEM workforce represents an opportunity to attract more Hispanic/Latino undergraduate students interested in pursuing STEM careers.

The underrepresentation of Hispanic/Latino individuals in the STEM workforce mirrors their low representation in the STEM higher-education system. Despite having similar interest in STEM fields, Hispanic/Latino students who begin college as STEM majors are more likely to switch fields or drop out of college entirely, compared to their White peers (Riegle-Crumb et al., 2019). While the percentage of Hispanic/Latino students earning a STEM bachelor's degree has increased in the last decade, Hispanic/Latino adults are underrepresented among STEM degree recipients and remain less likely to earn a college degree than White, Asian, and Black adults (Pew Research Center, 2021).

Hispanic/Latino STEM students are also more likely to be enrolled in community colleges (CCs) than in 4-year institutions (National Academies of Sciences, Engineering, and Medicine [NASEM], 2016), with many aiming to transfer from the CC to public universities to obtain a high-quality, STEM education (Community College Research Center, 2021). However, STEM students at CCs are less likely to be enrolled full time, and more likely to take more developmental courses, switch out of STEM majors, and drop-out than STEM students enrolled in 4-year institutions (NASEM, 2016). Supporting Hispanic/Latino CC students has become of vital importance given COVID-19's impact on transfer pathways. For Hispanic/Latino students, upward transfer from community colleges to 4-year institutions has declined by 6%, and persistence rates dropped by 1%, almost double that of other racial and ethnic groups (National Student Clearinghouse Research Center, 2022). These facts highlight the importance of implementing evidence-based strategies that provide undergraduate students with opportunities to successfully transfer and/or complete their STEM degree.

To address these concerns, the Department of Education's (DoE) Hispanic Serving Institution (HSI) STEM and Articulation Program awards grants to eligible HSIs that develop and carry out activities to increase the number of Hispanic/Latino and low-income students attaining degrees in STEM fields. The Title-III funded **Student Success and Transfer Articulation through Research and Support Services (STARS)** project at **California State Polytechnic University, Pomona (CPP)** in partnership with Citrus College (Citrus), and Mount San Antonio College (Mt. SAC) aims to increase Hispanic/Latino and low-income STEM student success and diversify the community of STEM scientists. Cobblestone Applied Research & Evaluation, Inc.

(*Cobblestone*) is conducting the external evaluation of the STARS project. This formative evaluation report provides a summary of the first year of program implementation (October 1, 2021 to September 30, 2022). Evaluation of the program will continue for the duration of the five-year grant ending in September 2026.

Program Description

The STARS project aims to achieve two primary goals: (a) develop the institutional capacity of CPP and the partnering CCs to engage Hispanic and other low-income students in STEM disciplines through undergraduate research and related wrap-around services, and (b) enhance institutional capacity to propel students through the STEM curriculum more quickly and effectively via the development of Transfer Pathways and courses for articulation. STARS implements six activities to meet these goals.

Goal 1: Undergraduate Research and Wrap-Around Services

A STARS Cohort experience. Undergraduate research experiences have been shown to increase retention and graduation rates among students from underrepresented groups (e.g., Toven-Lindsey et al., 2015) and sense of belonging can support student motivation and success (e.g., Pittman & Richmond, 2007). Given these favorable outcomes, STARS implements a cohort experience that includes faculty-mentored undergraduate research activities as well as offers social activities to build students' sense of belonging and peer network.

Student Success Workshops Library. Student success workshops have been documented to effectively support Hispanic STEM students' career major decisions, long-term goals, and overall knowledge of the STEM field (Casey et al., 2019). As such, STARS develops workshops on STEM skills, professional and career development, and equity and inclusion in STEM, requiring STARS cohort students to attend at least four workshops per year. Of particular focus in Year 1 is the development of data science workshops to guide students on data collection, analysis, and utilization across diverse STEM research domains. Given that data science skills are highly employable and the field is expected to grow more than almost any other field until 2029 (Bureau of Labor Statistics, 2022), such workshops can enhance STARS students' professional opportunities.

Prepare Current and Future Faculty. Research indicates that faculty mentoring for ethnic minority students is perceived as successful and satisfying for both mentees and mentors when the latter possess the necessary commitment and multicultural competencies, such as addressing students' context (Chan et al., 2015). As such, all faculty members mentoring STARS students will receive training to provide a safe space for students from diverse backgrounds and create a sense of belonging. In addition, STARS supports Postdoctoral Leadership of Underrepresented minorities for Teacher-scholar Occupations

(PLUTO) fellows, recent STEM doctorate recipients from Hispanic and low-income backgrounds who serve as mentors, teachers, and researchers at CPP.

Goal 2. Transfer Pathways and Articulation Agreements

California State University (CSU) data indicates that the two-year graduation rate for transfer students dropped from 44% in 2020 and 2021 to 40% in 2022, due to Covid-19's impact on students, especially those from historically marginalized groups (California State University, 2022). In accordance, CPP data from recent years shows that most STEM transfer students, many of whom are Hispanic and/or low income, take four years to graduate as opposed to two years (Cal Poly Pomona, 2022). The untimely graduation of STEM transfer students at CPP and other CSU institutions stems in part from the unavailability of many lower-division STEM courses at the CCs, although they are required for upper-division courses enrollment. Thus, transfer students often spend one or two years completing lower-division STEM course requirements after transferring, which significantly lengthens their time to degree. STARS applies two strategies to address this problem.

A Faculty Learning Community. STARS increases transfer students' access to lower-division STEM courses at the CCs by bringing CPP, Citrus, and Mt. SAC faculty members together to: develop lower-division courses at the CCs, work on articulation agreements, and develop learning modules that address content gaps.

Transfer Pathways Development. STARS develops agreements between CPP and the partnering CCs that encourage students to take lower-division STEM courses prior to transferring. This is also in line with research suggesting that encouraging underrepresented minority (URM) students to take more STEM credits, even if they are starting their math trajectory below college level, increases their likelihood of successfully transferring to a 4-year institution (Sansing-Helton et al., 2021).

Addresses both Goals 1 and 2

STEM Industry Advisory Board. STEM students' understanding of how the STEM industry works (i.e., commercial awareness) is a key factor for post-graduation job application success (Wilkinson & Aspinall 2007, as cited in Pugh & Grove, 2014). The most effective way to develop such awareness among students is by exposing them to STEM industry experts, who can also help STEM faculties develop curricula that help students attain skills that meet employers' needs (Pugh & Grove, 2014). Thus, STARS will assemble a STEM Industry Advisory Board that will provide experts to guide students professionally (e.g., through career preparedness workshops and internship opportunities) and advise faculty on constructing up-to-date, industry-relevant curricula.

Difference Education Intervention

STARS will implement Stephens and colleagues' (2014) "Difference-Education Intervention" given its previous success in improving students' college transition and first-

generation students' academic performance. The intervention is designed to help students understand how their diverse backgrounds can shape their college experience and help them overcome obstacles to success. The intervention is implemented with the STARS cohort students at the beginning of their program experience. Outcomes are assessed after one year of program participation.

EVALUATION OVERVIEW

Evaluation Design

Cobblestone is evaluating the STARS project using a mixed-methods design in which a combination of qualitative and quantitative indicators are used to answer implementation and outcome evaluation questions. The evaluation is based on the theory of change represented in a logic model that links STARS program inputs and activities to specific, measurable outputs and short/long-term outcomes (see **Appendix A**. STARS Logic Model). The *formative evaluation* is occurring during the first few years to determine the extent to which STARS activities are implemented with fidelity and high quality, assess initial outcomes, and provide stakeholders with ongoing performance feedback. A *summative evaluation* in will occur in the last year of the grant to help determine (a) overall program merit; (b) the extent to which STARS objectives, performance measures, and whether the difference-education intervention (promising evidence) outcomes were achieved; (c) sustainability of project activities; and (d) the conditions that need to be met by both the intervention and institution for successful replication (e.g., staff capacity, implementation infrastructure). The evaluation was designed to answer evaluation questions related to both program implementation and outcomes.

RCT Experiment

The STARS project includes an RCT experiment to assess the effectiveness of the Stephens et al (2014) difference-education intervention (promising evidence) on student outcomes (e.g., tendency to seek college resources, perceived ability to succeed in college, and academic performance) that is designed to produce evidence about the project's effectiveness that would meet the WWC Evidence Standards without reservations. Scholars in the treatment condition will watch a video of a student panel in which demographically diverse upperclassmen discuss how they adjusted to and found success in college while emphasizing *differences in their background*. Scholars in the control condition will watch a video of an alternative panel in which students discuss how they adjusted to and found success in college while emphasizing their *diverse interests*. Outcomes assessed at the conclusion of the STARS cohort experience will be: academic engagement; perceived ability to succeed in college; resource seeking behaviors; psychological adjustment; social engagement; intergroup understanding; and cumulative GPA.

Evaluation Questions

The following questions guided the evaluation design and corresponding activities.

Implementation-Focused Evaluation Questions

1. To what extent are the project activities implemented with fidelity and high quality?
    a. To what extent are outputs achieved for each program activity?
    b. To what extent is the difference-education intervention (promising evidence) implementation criteria met?[1]
    c. To what extent are participants' needs being met?
    d. What intended or unintended side effects occurred at CPP as a result of the implementation of the project?[2]

Outcome-Focused Evaluation Questions

2. What is the effect of the difference-education intervention on treatment Scholar outcomes?
3. What is the effect of project activities on Scholar and faculty outcomes[3]?
4. To what extent have key criteria been established to sustain project activities beyond the duration of the grant?
5. Which aspects of project generated most favorable outcomes suitable for replication or testing in other settings?

Evaluation Methods

In Year 1, the evaluation used a variety of methods to measure implementation and preliminary outcomes. See **Table 1** for a list of Year 1 evaluation methods and timelines, **Appendix B**. Program Implementation Outputs for outputs to be assessed across all five years of the project, and **Appendix C.** Performance Measures and Statusfor performance measures, baselines for which were established in Year 1.

Table 1. Year 1 Evaluation Methods and Timelines

Evaluation Activity	Timeline
Monthly meetings	Ongoing
Document and artifact analysis	Ongoing
Scholar pretest and posttest survey	SP22 Cohort: January & May; SUM22 Cohort: June & August
Faculty survey	May
Student focus group	May
Institutional research data request	September

[1] To be answered beginning Year 2.
[2] Will be answered in future years.
[3] Faculty outcomes will vary depending on faculty group – research mentor, PLUTO faculty, or FLC participant.

EVALUATION FINDINGS: PROGRAM IMPLEMENTATION

The following section describes the first year of the STARS project implementation findings (October 1, 2021 to September 30, 2022).

EVALUATION QUESTION 1: TO WHAT EXTENT ARE THE PROJECT ACTIVITIES IMPLEMENTED WITH FIDELITY AND HIGH QUALITY?

- TO WHAT EXTENT ARE OUTPUTS ACHIEVED FOR EACH PROGRAM ACTIVITY?

Main Findings: The STARS cohort experience was implemented in spring and summer 2022. Due to the early stage of program implementation, participation requirements were adapted. Three new academic/STEM skills workshops were developed and uploaded to the Student Success Workshops Library. The first PLUTO faculty fellow mentored students and ran workshops in summer 2022 but was unable to teach a course due to the timing of their commitment. The first FLC was held over two days in summer 2022 to align engineering courses across Citrus, Mt. SAC, and CPP. The group expects to meet again in the fall 2022 and spring 2023 semesters. CPP will award an admissions advantage to Citrus and Mt. SAC transfer applicants who complete designated course sequences; engineering certificates were approved at Mt. SAC and submitted for approval at Citrus. The STARS team contacted industry partners to recruit for the advisory board in Year 1, however, no formal commitments were made.

Activity 1: Offer a STARS Cohort Experience

In Year 1, the STARS cohort experience was offered in spring 2022 and summer 2022. A total of 44 Scholars participated in spring and 25 Scholars participated in summer, for a total of 60 Scholars in Year 1 (note that nine Scholars participated in both spring and summer). Most Scholars were from CPP (63%), male (57%), first-generation college students (50%), Asian (36%) or Hispanic/Latino (35%), and low-income (60%; see **Appendix D**. STARS Scholars' Demographic Information for detailed Scholar demographic information).

Participation requirements for the program are noted in **Figure 1**. Students could submit make-up assignments for requirements they did not complete with the exception of the final research paper or poster. In spring, 22 of the 44 Scholars (50%) met all participation requirements and in summer 2022, 6 of 25 Scholars (24%) met all the requirements. Stipend disbursements in Year 1 were based only on submission of the final research paper or poster.

Figure 1. STARS Cohort Participation Requirements, Year 1

Spring 2022 Participation Requirements

- Attend 3 workshops
- Attend one culturally relevant Cohort activity
- Meet 4 times with assigned peer mentor
- Meet once with a program advisor
- Attend the Research, Scholarship, and Creative Activities (RSCA) conference
- Submit a final research paper or poster

Summer 2022 Participation Requirements

- Attend 7 seminars (held weekly)
- Attend weekly virtual check-ins with program advisors
- Submit a preliminary research report
- Attend 4 culturally relevant Cohort activities
- Meet twice with program advisors
- Present at the Creative Activities and Research Symposium (CARS)
- Submit a final research paper

In preparation for the implementation of the DE intervention with the fall 2022 cohort, two panel videos were recorded in summer 2022. The panel participants were four senior peer mentors with the CPP Achieve Scholars program. All four students participated in both panels. Questions in the treatment panel focused on how students' different *backgrounds* influenced their experience in college. Questions in the control panel focused on how students' different *interests* affected their college experience. See **Appendix E**. Difference Education Treatment and Control Panel Questionsfor a complete script of panel instructions and questions. See **Table 2** for all outputs related to the STARS cohort experience.

Table 2. STARS Cohort Experience Outputs and Year 1 Status

Activity 1: STARS Cohort Experience	Year 1 Status
1. 40-60 students recruited to participate in the STARS program per year (i.e, Scholars; PM F)	60 unique students participated in the spring 2022 and summer 2022 cohorts; 44 in spring, 25 in summer, 9 in both.
2. 75% of Scholars meet *all* STARS participation requirements per year	41% of Scholars (28/69) met all the STARS participation requirements in Year 1.
3. # of Scholars who meet with PLUTO faculty 3 times per semester	There was no PLUTO faculty member in spring 2022. In summer 2022, four STARS Scholars were directly mentored by the PLUTO fellow.

Activity 1: STARS Cohort Experience	Year 1 Status
4. # of Scholars who attend 4 student success workshops per year	In spring 2022, attendance was only required at 3 workshops. A total of 37 Scholars attended at least 3 workshops in spring 2022. In summer 2022, attendance was required at 7 workshops. A total of 14 Scholars attended at least 7 workshops in summer 2022. Scholars were able to complete assignments to make up for missed workshops.
5. 2 cohort activities held during the academic year; 1 activity held during winter break; and 1 activity held during summer break	Two cohort activities were held in spring 2022. In summer 2022, four cohort activities were held: one at CPP, one at the Claremont Botanic Garden, and two virtually.
6. # of Scholars who attend cohort-building activities	In spring 2022, 29 Scholars attended at least one cohort activity. In summer 2022, 16 Scholars attended at least one cohort activity.
7. # of Scholars who submit their research papers to Bronco ScholarWorks	In spring 2022, 39 Scholars submitted a final research paper or poster. In summer 2022, 23 Scholars submitted a final research paper.
8. # of Scholars who present their research results at a local/ regional conference	In spring 2022, 28 Scholars attended the RSCA conference. In summer 20022, 21 Scholars presented at CARS.
9. Intervention panels created	Both treatment and control panels were recorded in summer 2022.

Activity 2: Create a Library of Student Success Workshops

In spring 2022, STARS Scholars were informed of relevant workshops hosted by other campus programs and offices (e.g., LSAMP, Office of Undergraduate Research, McNair Scholars). No new workshops were developed specifically for the STARS program. In summer 2022, three new workshops were developed and offered: Introduction to Data Science (virtual), Mastering Excel Data Processing (virtual) and Data and Research Ethics (hybrid). See **Table 3** for all outputs related to the Student Success Workshops Library.

Table 3. Student Success Workshops Library Outputs and Year 1 Status

Activity 2: Student Success Workshops Library	Year 1 Status
1. 6 student success workshops developed per year (2 academic/STEM skills, 2 essential skills, 2 professional & career development, and 2 equity and inclusion in STEM); topics	3 new academic/STEM skills workshops developed in Year 1 (Introduction to Data Science, Mastering Excel Data Processing, Data and Research Ethics)

Activity 2: Student Success Workshops Library	Year 1 Status
2. # of workshops held in person/ virtually	Ten workshops were held in summer 2022 (5 writing workshops, GRE workshop, best practices for poster and oral presentations, Introduction to Data Science, Mastering Excel Data Processing, Data and Research Ethics)
3. # of workshops recorded/ uploaded to database	The three new workshops were uploaded to the online Student Success Workshops Library
4. # of workshop views	Introduction to Data Science: 30 views Mastering Excel Data Processing: 7 views Data and Research Ethics: 7 views

Activity 3: Prepare Current and Future Faculty

In Year 1, the first PLUTO faculty fellow participated from June to August 2022. The PLUTO fellow received mentorship training from one of the STARS co-PIs. The fellow held two workshops for STARS Scholars (STEM Literature Review and Analyzing and Writing a STEM Research Abstract) and mentored four Scholars outside of the research lab. Because the fellow only participated in the summer, they were unable to teach a course. In Year 2, it is expected that the PLUTO fellow will participate in both the fall and spring semesters, implementing activities as planned. See **Table 4**Table 3 for all outputs related to faculty preparation.

Table 4. Current and Future Faculty Preparation Outputs and Year 1 Status

Activity 3: Current and Future Faculty Preparation	Year 1 Status
1. 2 STEM doctorate recipients recruited to serve as PLUTO fellows per year	One PLUTO fellow in summer 2022
2. PLUTO fellows teach one course per year	Pluto fellow only participated in the summer and therefore did not teach a course
3. PLUTO fellow hold at least 2 workshops each year for STARS Scholars; workshop topics	The PLUTO fellow held 2 workshops (STEM Literature Review and Analyzing and Writing a STEM Research Abstract) in summer 2022
4. PLUTO fellows meet with each Scholar 3 times per semester	In both spring and summer 2022, STARS Scholars were required to meet twice with a program advisor of their choice.
5. PLUTO fellows receive mentor training	Yes – received training from STARS Co-PI
6. # of mentor trainings provided; topics covered	Participated in two teaching training workshops and one research training workshop
7. # of faculty who attend mentor trainings	Faculty mentor trainings will begin in Year 2

Activity 4: Establish a Faculty Learning Community (FLC)

STARS project summer 2022 FLC participants and facilitators

The first STARS FLC was held over two days in summer 2022 (one day in person at CPP and one day virtually). The goals of the FLC were to create a community of faculty support, share best practices on course material, and articulate courses wherever possible. The two courses of focus for articulation were CPP's ME 2191: Mechanics of Materials and CE 2021: Infrastructure Economics and Public Policy. Citrus worked on developing a course to align to ME 2191 while Mt. SAC worked to revise the content of an existing course (i.e., ENGR 42 Mechanics of Materials) that aligns to ME 2191. Mt. SAC is also working on developing a new course to align to CE 2021. The FLC facilitators were the STARS PI, a STARS co-PI, and a Mechanical Engineering professor from CPP. Participants included the CPP Articulation Officer, Mt. SAC Physics and Engineering faculty, and a Citrus College Automotive Technology instructor. There are plans for the Year 1 FLC group to meet twice during Year 2, once in the fall semester and once in the spring semester. It is expected that in future years the FLC will develop learning modules that can be integrated into relevant courses. See **Table 5** for all outputs related to the FLC Establishment.

Table 5. FLC Establishment Outputs and Year 1 Status

Activity 4: FLC Establishment	Year 1 Status
1. 6-9 faculty participate in FLC per year	Four faculty participated in summer 2022
2. # of faculty who participate in FLC and meet participation requirements per year (attend 2-day summer institute and attend 2 meetings per year)	Four faculty participated in summer 2022 and academic year meetings have yet to begin

Activity 5: Develop Transfer Pathways

CPP will award an admissions advantage to Citrus and Mt. SAC transfer applicants who complete designated course sequences that comprise certificates at their community college. In Year 1, certificates for engineering were identified. At Mt. SAC, 12 engineering certificates and 6 Associate's degrees have been approved that align to all 11 CPP engineering majors. At Citrus, an Engineering Fundamentals certificate and an A.S. degree in Pre-Engineering have been submitted for approval (see **Appendix F**. Mt. SAC and Citrus Engineering Certificates for details of both Citrus and Mt. SAC certificates and degrees). At Citrus, a student completing either of

these pathways is prepared to enroll in Civil Engineering, Mechanical Engineering, or Electrical Engineering at CPP. See **Table 6** for all outputs related to Transfer Pathways Development.

Table 6. Transfer Pathways Development Outputs and Year 1 Status

Activity 5: Transfer Pathways Development	Year 1 Status
1. Lower-division STEM courses required to transfer to CPP are identified (e.g., course name, major)	Engineering courses identified at Citrus and Mt. SAC
2. # of learning modules developed by FLC; topics (e.g., content gaps addressed)	To occur in future years
3. Transfer Pathways are created for 5 majors at Citrus and Mt. SAC by Year 5 (10 by Year 5; Civil Engineering in Year 1)	Engineering pathway in progress in Year 1
4. 50 CC students complete pathway and receive admission "bonus points" to CPP by Year 5	In fall 2022, no Citrus or Mt. SAC transfer applicants had completed the course sequences required to receive the admission bonus.

Activity 6: Establish a STEM Industry Advisory Board

The STARS team contacted industry partners to recruit for the advisory board in Year 1, however, no formal commitments were made. It is expected that formal relationships with industry partners will be established in Year 2 and that members will begin to hold talks and provide feedback on STARS program activities in future years. See **Table 7** for all outputs related to the STEM Industry Advisory Board Establishment.

Table 7. STEM Industry Advisory Board Establishment Outputs and Year 1 Status

Activity 5: STEM Industry Advisory Board Establishment	Year 1 Status
5. # of advisory board members recruited (industry representation)	No members recruited yet
6. 2 advisory board meetings per year	To occur in future years
7. # of members who attend meetings	To occur in future years
8. Advisory board feedback provided on curriculum	To occur in future years
9. Advisory board feedback provided on learning modules	To occur in future years
10. Advisory board feedback provided on student research projects	To occur in future years
11. # of STEM seminars held with advisory board experts	To occur in future years
12. # of people who attend STEM seminars	To occur in future years

EVALUATION QUESTION 1: TO WHAT EXTENT ARE THE PROJECT ACTIVITIES IMPLEMENTED WITH FIDELITY AND HIGH QUALITY?

- TO WHAT EXTENT ARE PARTICIPANTS' NEEDS BEING MET?

Main Findings: Scholars reported welcoming research environments but noted a need for better communication between the research mentors and the program. They also requested more opportunities to bond with program peers. Faculty research mentors were generally satisfied with the Scholars placed in their laboratories; however, they did report some instances where Scholars were unable to fulfill commitments and requested the opportunity for a replacement student in these situations.

STARS Scholars

STARS Scholars completed surveys and some participated in a focus group interview in Year 1. A summary of those data is provided next (see also **Appendix G** and **Appendix H**). Scholars decided to participate in the program because they wanted to conduct research and expand their knowledge and skillsets. As one Scholar explained, "*It was an opportunity for me to work on a project that I've been really wanting to work on*." They found that their faculty research mentors created welcoming environments and that "*the STARS program did really well in terms of pairing students up, at least from my experience*." This allowed Scholars to gain research skills, make connections within their field, and learn about graduate school and career opportunities. However, students noted a need for better communication between the program and faculty mentors, clarity of program requirements, and requested more opportunities to bond with peers in their cohort. One student described a miscommunication with their faculty mentor: "*At some point, he was told that I was going to be there for a year… I don't know where that [information] came from, but I definitely think communication and providing resources to the faculty mentors… would be a lot more helpful.*" Another student noted that the requirements for participation were not always clear to Scholars: "*There seemed to be confusion/missing emails that would create panic in us from not knowing what is needed to complete*." In addition, the benefits of additional social opportunities was noted: "*The STARS Program would benefit from having more of a social aspect where students can meet each other and continue to grow*." Scholars requested workshops on discipline-specific topics, public speaking, and learning about the graduate school application process and different career paths.

Faculty Mentors

Faculty mentors were generally satisfied with the Scholars placed in their laboratories. As one faculty mentor shared, "*[STARS Scholar] is a pleasure to work with. [STARS Scholar] interacts maturely with his team members as well as other group members*." However, they did

report some instances of students who were part of the program but did not contribute to the lab or participate fully in research. Faculty mentors' suggestions for improving the mentoring experience included replacing students who are not participating sufficiently with others who can meet program requirements and guaranteeing spots for continuing students who make good progress. Faculty mentors also provided suggestions for training or workshops that Scholars should receive before working in their labs. Their suggestions included in-person safety training, time management and balancing responsibilities workshops, and trainings on literature reviews and report writing. For the complete summary of the faculty mentor survey see **Appendix I**. STARS Faculty Mentor Spring 2022 Survey S.

EVALUATION FINDINGS: PROGRAM OUTCOMES

Assessment of student outcomes for STARS included student surveys, faculty surveys and a student focus group. Assessment of faculty outcomes will occur in later years of the grant, and will include outcomes for FLC participants, PLUTO fellows, and faculty mentors.

EVALUATION QUESTION 2: WHAT IS THE EFFECT OF THE DIFFERENCE-EDUCATION INTERVENTION ON TREATMENT SCHOLAR OUTCOMES?

Main Findings: The difference education intervention will be implemented for the first time with the fall 2022 cohort of STARS Scholars (Year 2). Students will be randomly assigned to view a treatment or control panel video at the beginning of fall 2022. Affective and academic measures for both groups will be assessed at the end of the spring 2023 semester.

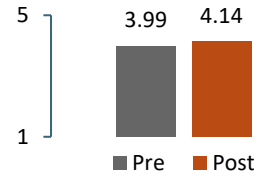
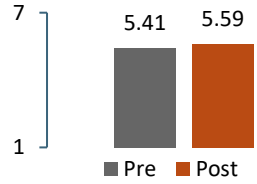
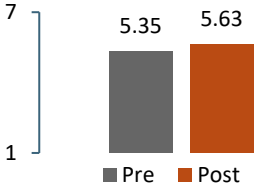
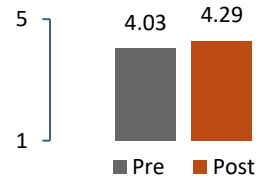
EVALUATION QUESTION 3: WHAT IS THE EFFECT OF PROJECT ACTIVITIES ON SCHOLAR AND FACULTY OUTCOMES?

Main Findings: In Year 1, both STARS Scholars and faculty mentors reported significant increases in Scholar's research skills. While there were no statistically significant gains in Scholars' academic self-efficacy, many Scholars qualitatively reported improving their confidence as a researcher. Similarly, there were no significant increases in sense of belonging, however several Scholars noted that connection with faculty and peers were the best aspects of the program. Scholars also requested additional opportunities to connect with their program peers. Assessment of faculty outcomes will occur in later years of the grant, and will include outcomes for FLC participants, PLUTO fellows, and faculty mentors.

Scholar Outcomes

Forty-seven STARS Scholars from the spring 2022 and summer 2022 cohorts completed pretest and posttest surveys measuring their growth in outcome areas (see **Appendix H**. STARS Scholars 2022 Survey S for the complete student survey summary). At the conclusion of the Spring 2022 semester, a small subset of Scholars participated in a focus group where they also described the outcomes of program participation (see **Appendix G**. STARS Scholars Focus Group Summary for the complete focus group summary). In addition, 12 faculty mentors completed a survey rating their mentees at the conclusion of the term (see **Appendix I**. STARS Faculty Mentor Spring 2022 Survey S for a complete summary of the faculty mentor survey). See **Table 8** for changes in outcomes for STARS Scholars during Year 1.

Table 8. Changes in Outcomes for STARS Scholars, Year 1

Construct	Pretest to Posttest	Change	Quote
Sense of Belonging (Walton & Cohen, 2007)		X *No significant difference*	*"The STARS Program would benefit from having more of a social aspect where students can meet each other and continue to grow."*
Academic Self-Efficacy (Solberg at al., 1993)		X *No significant difference*	*"Being in the lab and being trusted to carry out different experimental procedures has really helped me feel independent and competent enough to trust my knowledge and abilities in the lab"*
Academic Self-Efficacy (Pintrich & DeGroot, 1990)		X *No significant difference*	
Research Skills (Kardash, 2000)		↑ *(p < .01, Cohen's d = 0.50)*	*"The STARS experience taught me how to apply articles from my major into real life application by introducing me to the concept of a "gap" when it comes to research… I also learned how to observe and collect data."*

n = 47

Sense of Belonging

Scholars' sense of belonging did not significantly increase from pretest to posttest (see **Table 8**). However, many Scholars believed that the opportunity to build connections with faculty advisors and peers was the greatest benefit of the program. For example, a Scholar from the focus group described the importance of connecting with others in their field: "*I think connection in your field is super important since it's most likely a small world and whatever you're doing, everybody knows everybody*." Moreover, survey respondents perceived creating connections with peers as a program benefit, although Scholars requested more opportunities to connect and socialize with others in the program. One Scholar described: "*I have enjoyed connecting with my peers very much. They've taught me a lot through sharing their own research and academic experiences. As a person whose networks outside of school, both at home and at work, are fully disconnected with the academic world, I experience most of my academic pursuits alone. So, the community aspect is something I am very appreciative of*."

Academic Self-Efficacy

Scholars' academic self-efficacy did not significantly increase from pretest to posttest (see **Table 8**). However, some Scholars did describe that participating in research increased their confidence. On the posttest survey, Scholars also rated their gains regarding their ability to perform different aspects of the research process independently and confidently on a scale from 1 = "No Gain" to 5 = "Great Gain"[4]. On average, Scholars reported a "Good Gain" in their researcher confidence and independence. The areas in which Scholars reported the highest gains were determining the next steps in their research projects and working on them independently. Conversely, Scholars reported the lowest gains in their confidence in conducting research.

> *"[STARS Scholar] is a pleasure to work with… They demonstrate great potential in conducting research and have developed a comprehensive understanding of their project."*
>
> *- STARS Faculty Mentor*

Faculty Mentors also rated STARS Scholars' researcher confidence and independence, and similarly to Scholars' ratings, reported an overall "Good Gain" in Scholars' confidence and independence in performing various research-related tasks. According to Faculty Mentors, Scholars mostly gained confidence in completing their research training, an area which about two thirds of the Scholars reported having "Good Gain" or "Great Gain." Scholars' lowest gain, according to Faculty Mentor ratings, was in their ability to investigate problems when they arise in their research, although about two thirds of the Scholars reported "Good Gain" or "Great Gain" in this area.

[4] Butz & Branchaw, 2020

Research Skills

Scholars' perceived ability to perform a variety of research skills significantly increased after one term of program participation with a medium effect size (see **Table 8**). The research skills Scholars reported experiencing the most growth in were the ability to understand contemporary concepts in their field, observe and collect data, and make use of the primary scientific research literature in their field. At posttest, Scholars reported on the gains in their ability to perform various research-related tasks as a result of their STARS research experience on a scale from 1 = "No Gain" to 5 = "Great Gain". More than half of the Scholars reported a "Good gain" or a "Great Gain" in their ability to connect their research experience to what they had learned in courses, tailor their research communications for different audiences, and defend their research. However, about half of the students reported "No Gain" to only "Moderate Gain" in their ability to prepare a research results presentation poster. This is possibly due to some Scholars' lack of experience in poster preparation, as Scholars could choose between preparing a poster or writing a paper.

Faculty mentors retroactively rated Scholars' research skills at the beginning of their STARS experience and at the end. *Faculty mentors indicated that STARS Scholars' ability to perform all seventeen research skills significantly increased from the beginning of participation the end of participation with a large effect size for each skill.* The research skills with the highest effect sizes were Scholar's ability to understand the importance of "controls" in research and design an experiment or theoretical test of the hypothesis.

Scholars who participated in the spring 2022 focus groups reported gaining various skills throughout the CPP STARS program. A Scholar who engaged in research for the first time discussed their increased understanding of the research process: "*I think the most important thing that I got was learning to digest a lot of academic literature in a short amount of time…The other thing is learning about the research process, particularly revisions to your work. Normally in school, you have a very definitive set of guidelines…I think that iterative process of research is so much more interesting*." Another Scholar increased their understanding of data analysis and "*how to combine all of those things into a solid project*." One Scholar provided examples of field-relevant skills they gained: "*I got to learn how to work with the Twitter API and pull tweets…Navigating file systems and running programs from the command line was super fun*."

> *"Without STARS, there is little chance that I would have had an opportunity to experience and fall in love with the research process prior to transfer."*
>
> *- STARS 2022 Scholar*

CONCLUSIONS

In Year 1, the STARS project began implementation of most activities with fidelity to original plans, although the evaluation team and project staff should coordinate more closely in future years to ensure accurate and timely data collection processes are in place. The STARS cohort experience was implemented in both spring 2022 and summer 2022. Due to the early stage of program implementation, some aspects of the cohort experience (e.g., PLUTO faculty mentoring) were not yet in place, therefore program participation requirements were modified slightly for the Year 1 participants. The difference education panel videos were created in preparation for implementation of the intervention with the fall 2022 cohort of Scholars (Year 2). Three new academic/STEM skills workshops were created and uploaded to the Student Success Workshop Library. The first PLUTO fellow participated in summer 2022 engaging in student research mentoring and held two workshops. However, the fellow was unable to continue into fall 2022 and was therefore unable to teach a course. The first FLC was held across two days in summer 2022 with participants from CPP, Citrus, and Mt. SAC. The focus was on alignment of engineering courses across campuses. In addition, engineering transfer pathways were identified at both Citrus and Mt. SAC. The Mt. SAC certificates and degrees have already been approved while the Citrus certificates and degrees have been submitted for approval. Students will receive an admissions advantage at CPP for completing these pathways, even prior to their approval. However, no CPP transfer applicants completed any of the pathways as of the fall 2022 admissions cycle. Industry partners were contacted regarding advisory board participation, however no formal commitments were made. Baseline rates and percentages were established for performance measures.

STARS Scholars and faculty mentors were largely satisfied with program activities. Scholars appreciated the opportunity to conduct research and reported improving their research skills. Faculty mentors were mostly satisfied with the quality of their STARS mentees. Scholars noted that additional communication between faculty mentors and the STARS program is needed. They also requested additional opportunities to socialize with their cohort.

Preliminary outcomes were assessed for Scholars who participated in spring 2022 and summer 2022. Both Scholars and faculty research mentors reported statistically significant growth in Scholars' research skills. There were no statistically significant changes in Scholars' sense of belonging or academic self-efficacy. Notably, most Year 1 Scholars only participated for a single term (i.e., spring or summer). In future years, outcomes will be assessed for an entire year (i.e., both fall and spring semesters) of program participation.

Next Steps

STARS will continue implementation in Year 2, implementing year-long activities for the first time. Implementation of the difference education intervention will occur for the first time with the Year 2 STARS Scholars. Cobblestone will continue to track program implementation,

performance measure status, and outcomes throughout the entire grant, ending in September 30, 2027.

Recommendations for Year 2

STARS Cohort Experience

- ☐ **Ensure program requirements are communicated to students clearly and consistently:** Students noted challenges with understanding program requirements and a perception that the requirements changed over time. Ensuring early, clear, and consistent communication of program requirements will set students up for success in the program.
- ☐ **Ensure faculty mentors are aware of program requirements:** STARS Scholars noted that their faculty mentors were unaware of program requirements and events. Providing additional information about the STARS program to faculty mentors would be beneficial.
- ☐ **Implement the difference education intervention:** Implement the difference education intervention for the first time with the fall 2022 cohort of STARS Scholars.

Student Success Workshops Library

- **Continue to develop workshops for the Student Success Workshop Library:** Three new workshops were developed in Year 1. Continue to develop workshops in Year 2 with a target of six total workshops.

Current and Future Faculty Preparation

- ☐ **Begin recruitment early for PLUTO fellows:** Due to other commitments postdoctoral students pursue, recruit PLUTO fellows as early as possible to ensure their availability.

Faculty Learning Community (FLC)

- ☐ **Meet with the first FLC group during the academic year:** Hold two follow-up meetings with the summer 2022 FLC participants in fall 2022 and spring 2023.
- ☐ **Hold a second FLC focusing on a new major:** Hold a second FLC focusing on alignment for a new STEM major.

Transfer Pathways Development

- ☐ **Communicate transfer pathways to students:** Ensuring students are aware of the admissions bonus associated with the transfer pathways is the first step in increasing student completion of the pathways.
- ☐ **Develop transfer pathways for additional majors:** Select a new STEM major to focus on alignment of transfer pathways for Year 2.

STEM Advisory Board

- ☐ **Recruit industry members for the advisory board:** In Year 1, no advisory board members were recruited. It is recommended that Year 2 focus on the recruitment of advisory board members so they can provide guidance to students, faculty members, and grant personnel.

General

- ☐ **Work with the evaluation team to clarify data collection processes:** The STARS staff and evaluation team should work more closely to establish systematic data collection processes and procedures to document participation in program activities.

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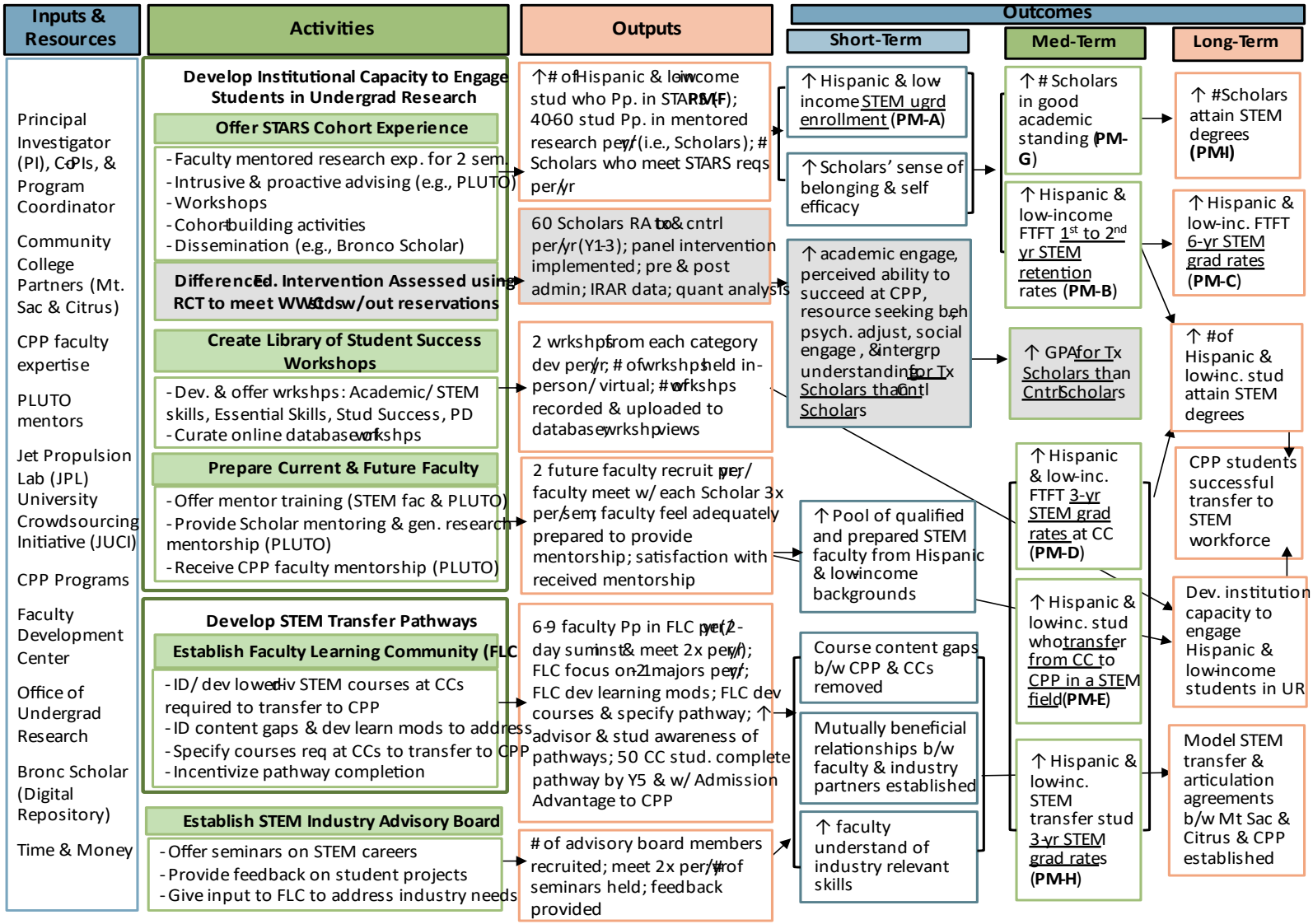
APPENDIX A. STARS LOGIC MODEL



APPENDIX B. PROGRAM IMPLEMENTATION OUTPUTS

Activity 1: Offer STARS Cohort Experience
1. 40-60 students recruited to participate in the STARS program per year (i.e, Scholars; PM F)
2. 75% of Scholars meet *all* STARS participation requirements per year
3. # of Scholars who meet with PLUTO faculty 3 times per semester
4. # of Scholars who attend 4 student success workshops per year
5. 2 cohort activities held during the academic year; 1 activity held during winter break; and 1 activity held during summer break
6. # of Scholars who attend cohort-building activities
7. # of Scholars who submit their research papers to Bronco ScholarWorks
8. # of Scholars who present their research results at a local/ regional conference
9. Intervention panels created
Activity 2: Create Library of Student Success Workshops
1. 6 student success workshops developed per year (2 academic/STEM skills, 2 essential skills, 2 professional & career development, and 2 equity and inclusion in STEM); topics
2. # of workshops held in person/ virtually
3. # of workshops recorded/ uploaded to database
4. # of workshop views
Activity 3: Prepare Current and Future Faculty[5]
1. 2 STEM doctorate recipients recruited to serve as PLUTO fellows per year
2. PLUTO fellows teach one course per year
3. PLUTO fellow hold at least 2 workshops each year for STARS Scholars; workshop topics
4. PLUTO fellows meet with each Scholar 3 times per semester
5. PLUTO fellows receive mentor training
6. # of mentor trainings provided; topics covered
7. # of faculty who attend mentor trainings
Activity 4: Establish Faculty Learning Community
1. 6-9 faculty participate in FLC per year
2. # of faculty who participate in FLC and meet participation requirements per year (attend 2-day summer institute and attend 2 meetings per year)
Activity 5: Develop Transfer Pathways
1. Lower-division STEM courses required to transfer to CPP are identified (e.g., course name, major)
2. # of learning modules developed by FLC; topics (e.g., content gaps addressed)
3. Transfer Pathways are created for 5 majors at Citrus and Mt. SAC by Year 5 (10 by Year 5; Civil Engineering in Year 1)
4. 50 CC students complete pathway and receive admission "bonus points" to CPP by Year 5
Activity 6: Establish STEM Industry Advisory Board
1. # of advisory board members recruited (industry representation)
2. 2 advisory board meetings per year
3. # of members who attend meetings
4. Advisory board feedback provided on curriculum
5. Advisory board feedback provided on learning modules

[5] Cobblestone and the PI will meet to discuss specifics with regard to the PLUTO mentor to student ratio, frequency of meetings and workshops. Specific output targets may be modified based on these discussions.

6. Advisory board feedback provided on student research projects
7. # of STEM seminars held with advisory board experts
8. # of people who attend STEM seminars
Dissemination of Best Practices
1. Think Tank in CSU established by STEM-NET; CPP STARS joins as member (attend annual 2 day summit & share best practices)
2. # of presentations given at conferences and other meetings (Engineering liaison Council ECL; ARI partner meetings)

APPENDIX C. PERFORMANCE MEASURES AND STATUS

Objective Number	Performance Measure	5-Year Target	Year 1 Actual	Year 1 Status	Year 1 Description
1.1	Increase the number of Hispanic and low-income students participating in grant funded student support programs or services from 0 to 200 by the end of Year 5 (**PM F**)	200	60	On Schedule	In Year 1, 60 unique Scholars participated, with nine participating in both spring and summer 2022. A total of 45 of the 60 unique STARS Scholars were Hispanic and/or low-income.
1.2	75% of Scholars meet STARS program participation requirements each year	75%	41% (28/69)	On Schedule	In spring, 22 of the 44 Scholars (50%) met all participation requirements and in summer 2022, 6 of 25 Scholars (24%) met all the requirements. Students could submit make-up assignments for requirements they did not complete with the exception of the final research paper or poster. Stipend disbursements in Year 1 were based only on submission of the final research paper or poster.
1.3	6 Student Success Workshops (1-2 from each category) developed each year	30	3	On Schedule	Three new academic/STEM skills workshops were developed and uploaded to the Student Success Workshops Library: Introduction to Data Science, Mastering Excel Data Processing, and Data and Research Ethics.
1.4	2 future faculty members recruited to serve as PLUTO mentors each year	10	1	On Schedule	In summer 2022, one postdoctoral student served as a PLUTO fellow.

Objective Number	Performance Measure	5-Year Target	Year 1 Actual	Year 1 Status	Year 1 Description
1.5	Scholars' *sense of belonging* will significantly increase from pretest to posttest at the end of one year	1	0	On Schedule	STARS Scholars' sense of belonging increased from pretest (M = 3.99, SD = 0.95) to posttest (M = 4.14, SD = 0.93), however the difference was not statistically significant, t = 1.05, p > 0.05. Scholars only participated for one term (i.e., spring or summer) in Year 1. In future years, Scholars will participate for an entire academic year (i.e., fall and spring).
1.6	Scholars' *self-efficacy* will significantly increase from pretest to posttest at the end of one year	1	0	On Schedule	STARS Scholars' academic self-efficacy increased from pretest (M = 5.35, SD = 1.38) to posttest (M = 5.63, SD = 1.15), however the difference was not statistically significant, t = 1.53, p > 0.05. Scholars only participated for one term (i.e., spring or summer) in Year 1. In future years, Scholars will participate for an entire academic year (i.e., fall and spring).
1.7	Increase the number of Hispanic and low-income students who participated in grant-supported services or programs in good academic standing from 0 to 200 by the end of Year 5 (**PM G**)	200	N/A (999)	On Schedule	As the STARS cohort experience was only one semester in Year 1, assessment of Scholars in good standing will begin in Year 2 and focus on those who complete a year-long cohort experience.
1.8	RCT Specific: There will be significantly greater academic engagement for the treatment than for the control students at the end of one year	1	N/A (999)	On Schedule	Implementation of the RCT will begin in Year 2. Academic engagement will be assessed via pretest and posttest surveys at the beginning and end of the year-long STARS cohort experience.
1.9	RCT Specific: There will be significantly greater perceived ability to succeed in college for the treatment than for the control students at the end of one year	1	N/A (999)	On Schedule	Implementation of the RCT will begin in Year 2. Perceived ability to succeed in college will be assessed via pretest and posttest surveys at the beginning and end of the year-long STARS cohort experience.

Objective Number	Performance Measure	5-Year Target	Year 1 Actual	Year 1 Status	Year 1 Description
1.10	RCT Specific: There will be significantly greater resource seeking behaviors for the treatment than for the control students at the end of one year	1	N/A (999)	On Schedule	Implementation of the RCT will begin in Year 2. Resource seeking behaviors will be assessed via pretest and posttest surveys at the beginning and end of the year-long STARS cohort experience.
1.11	RCT Specific: There will be significantly greater *psychological adjustment* for the treatment than for the control students at the end of one year	1	N/A (999)	On Schedule	Implementation of the RCT will begin in Year 2. Psychological adjustment will be assessed via pretest and posttest surveys at the beginning and end of the year-long STARS cohort experience.
1.12	RCT Specific: There will be significantly greater *social engagement* for the treatment than for the control students at the end of one year	1	N/A (999)	On Schedule	Implementation of the RCT will begin in Year 2. Social engagement will be assessed via pretest and posttest surveys at the beginning and end of the year-long STARS cohort experience.
1.13	RCT Specific: There will be significantly greater *intergroup understanding* for the treatment than for the control students at the end of one year	1	N/A (999)	On Schedule	Implementation of the RCT will begin in Year 2. Intergroup understanding will be assessed via pretest and posttest surveys at the beginning and end of the year-long STARS cohort experience.
1.14	RCT Specific: There will be significantly higher *GPA* for the treatment than for the control students at the end of one year	1	N/A (999)	On Schedule	Implementation of the RCT will begin in Year 2. GPA will be assessed via institutional data at the beginning and end of the year-long STARS cohort experience.
1.15	Increase the percentage Hispanic and low-income full-time STEM field degree-seeking undergraduate students enrolled at CPP by 10% from baseline by the end of Year 5 (**PM A**)	6,510	5,918	On Schedule	Baseline was established as 5,918 students enrolled in fall 2021. The five-year goal is a 10% increase from baseline, 6,510.

Objective Number	Performance Measure	5-Year Target	Year 1 Actual	Year 1 Status	Year 1 Description
1.16	Increase the percentage of Hispanic and low-income first-time, full-time STEM field degree-seeking undergraduate students who were in their first year of postsecondary enrollment in the previous year and are enrolled in the current year who remain in a STEM by 5% from baseline by the end of Year 5 (**PM B**)	88% (859/974)	84% (181/974)	On Schedule	Baseline was established using the fall 2021 cohort's retention into fall 2022. A total of 974 Hispanic and/or low income FTF matriculated in STEM in fall 2021. Of those, 818 were still enrolled in STEM in fall 2022 (84%).
1.17	Increase the percentage of Hispanic and low-income first-time, full-time degree-seeking undergraduate students enrolled at four-year HSIs graduating within six years of enrollment with a STEM field degree by 7% from baseline by the end of Year 5 (**PM C**)	55.2% (622/1127)	51.6% (581/1127)	On Schedule	Baseline was established using the fall 2016 cohort's rate of graduation by spring 2022. In fall 2016, 1127 Hispanic and/or low income FTF STEM students matriculated at CPP. By spring 2022, 581 of those students had graduated in STEM (51.6%).
1.18	Increase the number of Hispanic and low-income students who participated in grant-supported services or programs and completed a degree or credential from 0 to 80 by the end of Year 5 (**PM I**)	80	4	On Schedule	Two Hispanic and/or low-income STARS Scholars graduated in spring or summer 2022.
2.1	Transfer Pathways are created for 5 majors at Citrus and Mt Sac by Year 5	5	1	On Schedule	In Year 1, engineering certificates and degrees at Citrus and Mt. SAC were identified. Transfer applicants completing these pathways will receive an admissions advantage to CPP. As of fall 2022, no applicants had completed any of the pathways.

Objective Number	Performance Measure	5-Year Target	Year 1 Actual	Year 1 Status	Year 1 Description
2.2	50 Citrus and Mt Sac students complete the Transfer Pathway and receive admission "bonus points" to CPP by Year 5	50	0	On Schedule	In fall 2022, no Citrus or Mt. SAC transfer applicants had completed the course sequences required to receive the admission bonus.
2.3	Increase the percentage of Hispanic and low-income first-time, full-time degree-seeking undergraduate students enrolled at two-year HSIs graduating within three years of enrollment with a STEM field degree/ credential by 7% from baseline by the end of Year 5 (**PM D**)	9% (70/789)	8% (65/789)	On Schedule	Baseline was established with the fall 2019 cohort. At Citrus college, 156 Hispanic and/or low-income full-time students matriculated in a STEM program in fall 2019. By spring 2022, 19 of these students had graduated with an associate's degree in STEM (12%). At Mt. SAC, 633 Hispanic and/or low-income full-time students matriculated in a STEM program in fall 2019. By spring 2022, 46 of these students had graduated with an associate's degree in STEM (7%). Across both Citrus and Mt. SAC, the weighted graduation rate was 8% (65/789).
2.4	Increase the number of Hispanic and low-income students transferring successfully to a four-year institution from a two-year institution and retained in a STEM field major from 350 to 450 (**PM E**)	162	129	On Schedule	Baseline was established with the fall 2021 cohort. A total of 62 Hispanic and/or low-income students from Citrus and 67 Hispanic and/or low-income students from Mt. SAC matriculated in a STEM major at CPP in fall 2021, for a total of 129 students.
2.5	Increase the percentage of Hispanic and low-income STEM field major transfer students on track to complete a STEM field degree within three years from their transfer date by 8% from baseline by the end of Year 5 (**PM H**)	58% (100/171)	54% (93/171)	On Schedule	Baseline was established with the fall 2019 cohort. A total of 171 Hispanic and/or low-income STEM transfer students from Citrus and Mt. SAC matriculated at CPP in fall 2019. Of those, 93 had graduated with a STEM degree by spring 2022 (54%).

APPENDIX D. STARS SCHOLARS' DEMOGRAPHIC INFORMATION

	Spring 2022 (*n* = 44)	Summer 2022 (*n* = 25)	Total (*n* = 60)
CPP	**57%**	**64%**	**63%**
Citrus	2%	12%	7%
Mt SAC	41%	24%	30%
Male	**57%**	**60%**	**57%**
Female	43%	40%	43%
First Generation	**48%**	**56%**	**50%**
Not First Generation	48%	40%	45%
Unknown	4%	4%	5%
Hispanic/Latino	**34%**	**36%**	**35%**
Asian	**39%**	**36%**	**36%**
Black/African American	4%	0%	3%
White	14%	12%	23%
Two or more races	2%	8%	5%
Unknown	7%	8%	8%
Pell Recipient	**59%**	**68%**	**60%**
Non-Pell Recipient	41%	32%	12%

APPENDIX E. DIFFERENCE EDUCATION TREATMENT AND CONTROL PANEL QUESTIONS

Moderator instructions for both panels: Welcome everyone and welcome to CPP, we appreciate your participation in the CPP STARS Program, and hope that today's experience will be valuable for your success in college. In this session, you will get to hear the stories and experiences of your peers. They look forward to sharing their perspective with you. There will be six questions addressed to the student panel today. Each of the speakers has prepared some thoughts and remarks to share with you. First, the speakers will go around and introduce themselves. Then, they will answer a series of questions about their experiences at CPP. Now it's time for the panelists to introduce themselves. They will start by saying their name, year, major, and where they are from.

Treatment Panel

Moderator Instructions: The speakers are excited to share their stories with you. Students come from very different *backgrounds* before arriving at CPP. These differences make CPP an amazing place to be.

3. People come to college for many different reasons. What did coming to college mean to you?
4. Students can have a wide variety of experiences when they transition to college from many different backgrounds. Thinking back, what was the transition to CPP like for you?
5. Now we'd like you to share some specific challenges about coming to college. Can you provide an example of an obstacle that you faced when you came to CPP and how you resolved it?
6. Did your decision to attend CPP affect your relationships with family and friends at home? If yes, how?
7. What would you advise other students to do with backgrounds similar to your own?
8. What experiences that you had prior to CPP prepared you to excel in ways that you wouldn't have anticipated at the time?

Control Panel

Moderator Instructions: The speakers are excited to share their stories with you. Students' *interests* span a wide range of topics and areas of study. These differences make CPP an amazing place to be.

1. Trace your path for finding your major.
2. What were some of the experiences that led you to your major and what were some challenges?
3. What has been your favorite class and least favorite so far and why?

4. What do you do to be successful in your classes? For example, how do you plan your courses and what are some strategies for being successful in those courses?
5. How do you study for midterms and final exams? What are some challenges that you encounter?
6. What are some options that you are considering as a future career path? How did you come to recognize those options? What are the advantages and/or disadvantages of the different paths you are considering?

APPENDIX F. MT. SAC AND CITRUS ENGINEERING CERTIFICATES

Mt. SAC Certificates

Table a. Mt. SAC Engineering Fundamentals Certificate

ENGINEERING FUNDAMENTALS (Certificate N0846)		
ENGR 1	Introduction to Engineering	2
ENGR 1C	Engineering Critical Thinking	3
ENGL 1A	Freshman Composition	4
or ENGL 1AH	Freshman Composition - Honors	
or ENGL 1AM	College Composition for Non-Native English Speakers	
or AMLA 1A	College Composition for Non-Native English Speakers	
MATH 150	Trigonometry	3
or MATH 160	Precalculus Mathematics	
or MATH 180	Calculus and Analytic Geometry	
PHYS 2AG	General Physics	4
	Total Units	**16-17**

Table b. Mt. SAC Engineering with Emphasis in Electrical Engineering Applications

ENGINEERING WITH EMPHASIS IN ELECTRICAL ENGINEERING APPLICATIONS		
Level 1 (Certificate T0836)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework:		**12.5-13**
CHEM 50	General Chemistry I	5
or CHEM 50H	General Chemistry I - Honors	
or CHEM 55	Chemistry for Engineers	
SPCH 1A	Public Speaking	4
or SPCH 1AH	Public Speaking - Honors	
CSCI 110	Fundamentals of Computer Science	3.5
or ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	
	Total Units	**28.5-30**
AS Degree (S0835)		
Required Core:		
ENGR 1	Introduction to Engineering	2
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
ENGR 16	Introduction to Digital Electronics with FPGA Programming	4
ENGR 44	Electrical Engineering	4
ENGR 285	Differential Equations and Linear Algebra for Engineers	4
MATH 180	Calculus and Analytic Geometry	4
MATH 181	Calculus and Analytic Geometry	4
MATH 280	Calculus and Analytic Geometry	5
PHYS 4A	Engineering Physics	5
PHYS 4B	Engineering Physics	5
	Total Units	**41**

Table c. Mt. SAC Engineering with Emphasis in Chemical & Material Engineering Applications

ENGINEERING WITH EMPHASIS IN CHEMICAL AND MATERIAL ENGINEERING APPLICATIONS		
Level 1 (Certificate T0830)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework:		**13**
CHEM 50	General Chemistry I	5
or CHEM 50H	General Chemistry I - Honors	
or CHEM 55	Chemistry for Engineers	
ENGR 8	Properties of Materials	4
SPCH 1A	Public Speaking	4
or SPCH 1AH	Public Speaking - Honors	
	Total Units	**29-30**
Level 2 (Certificate T0831)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework		**13**
Level 2 Coursework:		**8**
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
or ENGR 7	Programming Applications for Engineers	
MATH 181	Calculus and Analytic Geometry	4
	Total Units	**37-38**
AS Degree (S0829)		
Required Core:		**18**
ENGR 1	Introduction to Engineering	2
ENGR 1C	Engineering Critical Thinking	3
MATH 160	Precalculus Mathematics	4
or MATH 180	Calculus and Analytic Geometry	
PHYS 2AG	General Physics	4-5
or PHYS 4A	Engineering Physics	
CHEM 50	General Chemistry I	5
or CHEM 50H	General Chemistry I - Honors	
or CHEM 55	Chemistry for Engineers	
ENGR 8	Properties of Materials	4
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
or ENGR 7	Programming Applications for Engineers	
Required Electives (a minimum of 12 units):		**12+**
CHEM 51	General Chemistry II	
or CHEM 51H	General Chemistry II - Honors	
CHEM 80	Organic Chemistry I	
CHEM 81	Organic Chemistry II	
ENGR 40	Statics	
ENGR 40T	Applied Statics	
ENGR 50A	Robotics Team Project Development	
ENGR 50B	Intermediate Robotics Team Project Development	
ENGR 285	Differential Equations and Linear Algebra for Engineers	
PHYS 2BG	General Physics	
PHYS 4B	Engineering Physics	
	Total Units	**30-45**

Table d. Mt. SAC Engineering with Emphasis in Civil Engineering Applications

ENGINEERING WITH EMPHASIS IN CIVIL ENGINEERING APPLICATIONS		
Level 1 (Certificate T0833)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework:		**15**
CHEM 50	General Chemistry I	5
or CHEM 50H	General Chemistry I - Honors	
or CHEM 55	Chemistry for Engineers	
SPCH 1A	Public Speaking	4
or SPCH 1AH	Public Speaking - Honors	
SURV 1A	Surveying	3
SURV 1B	Surveying	
or ENGR 18	Introduction to Engineering Graphics	
	Total Units	**31-32**
Level 2 (Certificate T0834)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework		**15**
Level 2 Coursework:		**16**
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
or ENGR 7	Programming Applications for Engineers	
ENGR 8	Properties of Materials	4
ENGR 24	Engineering Graphics	4
MATH 181	Calculus and Analytic Geometry	4
	Total Units	**47-48**
AS Degree		
Required Core:		
ENGR 1	Introduction to Engineering	2
ENGR 1C	Engineering Critical Thinking	3
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
or ENGR 7	Programming Applications for Engineers	
ENGR 8	Properties of Materials	4
ENGR 24	Engineering Graphics	4
CHEM 50	General Chemistry I	5
or CHEM 50H	General Chemistry I - Honors	
MATH 180	Calculus and Analytic Geometry	4
or MATH 181	Calculus and Analytic Geometry	
PHYS 2AG	General Physics	4
or PHYS 4A	Engineering Physics	
SURV 1A	Surveying	3
SURV 1B	Surveying	3
Required Electives (a minimum of 10 units):		**10+**
ENGR 18	Introduction to Engineering Graphics	
ENGR 40	Statics	
ENGR 40T	Applied Statics	
ENGR 41	Dynamics	
ENGR 42	Mechanics of Materials	
ENGR 50A	Robotics Team Project Development	

ENGR 50B	Intermediate Robotics Team Project Development	
ENGR 285	Differential Equations and Linear Algebra for Engineers	
PHYS 2BG	General Physics	
PHYS 4B	Engineering Physics	
	Total Units	**36-37**

Table e. Mt. SAC Engineering with Emphasis in Software Engineering Applications

ENGINEERING WITH EMPHASIS IN SOFTWARE ENGINEERING APPLICATIONS		
Level 1 (Certificate T0842)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework:		**15.5**
SPCH 1A	Public Speaking	4
or SPCH 1AH	Public Speaking - Honors	
CSCI 110	Fundamentals of Computer Science	3.5
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
CSCI 190	Discrete Mathematics Applied to Computer Science	4
	Total Units	**31.5-32.5**
Level 2 (Certificate T0843)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework		**15.5**
Level 2 Coursework:		**11.5-13**
MATH 181	Calculus and Analytic Geometry	4
CSCI 140	C++ Language and Object Development	4
or CSCI 220	Data Structures I	
or CSCI 240	Data Structures and Algorithms	
ENGR 16	Introduction to Digital Electronics with FPGA Programming	4
	Total Units	**43-45.5**
AS Degree (S0841)		
ENGR 1	Introduction to Engineering	2
ENGR 1C	Engineering Critical Thinking	3
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
ENGR 16	Introduction to Digital Electronics with FPGA Programming	4
CSCI 110	Fundamentals of Computer Science	3.5
CSCI 150	Assembly Language/Machine Architecture	3.5
CSCI 220	Data Structures I	3.5
or CSCI 240	Data Structures and Algorithms	
MATH 160	Precalculus Mathematics	4
or MATH 180	Calculus and Analytic Geometry	
	Total Units	**27.5-29**

Table f. Mt. SAC Engineering with Emphasis in Mechanical Engineering Applications

ENGINEERING WITH EMPHASIS IN MECHANICAL ENGINEERING APPLICATIONS		
Level 1 (Certificate T0839)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework:		**12-13**
CHEM 50	General Chemistry I	5
or CHEM 50H	General Chemistry I - Honors	
or CHEM 55	Chemistry for Engineers	
SPCH 1A	Public Speaking	4
or SPCH 1AH	Public Speaking - Honors	
ENGR 8	Properties of Materials	4
or ENGR 18	Introduction to Engineering Graphics	
	Total Units	**28-30**
Level 2 (Certificate T0840)		
Engineering Fundamentals Coursework		**16-17**
Level 1 Coursework		**12-13**
Level 2 Coursework:		**12**
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
or ENGR 7	Programming Applications for Engineers	
ENGR 24	Engineering Graphics	4
MATH 181	Calculus and Analytic Geometry	4
	Total Units	**40-42**
AS Degree		
Required Core:		
ENGR 1	Introduction to Engineering	2
ENGR 1C	Engineering Critical Thinking	3
ENGR 6	Introduction to Engineering Programming Concepts and Methodologies	4
or ENGR 7	Programming Applications for Engineers	
ENGR 8	Properties of Materials	4
ENGR 18	Introduction to Engineering Graphics	3
ENGR 24	Engineering Graphics	4
CHEM 50	General Chemistry I	5
or CHEM 50H	General Chemistry I - Honors	
or CHEM 55	Chemistry for Engineers	
PHYS 2AG	General Physics	4
or PHYS 4A	Engineering Physics	
Required Electives (a minimum of 7 units):		**7+**
ENGR 40	Statics	
ENGR 40T	Applied Statics	
ENGR 41	Dynamics	
ENGR 42	Mechanics of Materials	
ENGR 44	Electrical Engineering	
ENGR 50A	Robotics Team Project Development	
ENGR 50B	Intermediate Robotics Team Project Development	
PHYS 2BG	General Physics	
PHYS 4B	Engineering Physics	
	Total Units	**36-37**

Table g. Mt. SAC Technical Sales Certificate

TECHNICAL SALES (CERTIFICATE N0856)		
ENGL 1A	Freshman Composition	4
or ENGL 1AH	Freshman Composition - Honors	
or ENGL 1AM	College Composition for Non-Native English Speakers	
or AMLA 1A	College Composition for Non-Native English Speakers	
MATH 150	Trigonometry	3
or MATH 160	Precalculus Mathematics	
or MATH 180	Calculus and Analytic Geometry	
SPCH 1A	Public Speaking	4
or SPCH 1AH	Public Speaking - Honors	
SPCH 8	Professional and Organizational Speaking	4
or SPCH 8H	Professional and Organizational Speaking - Honors	
ENGT 10A	Foundations of Technical Sales	2
ENGT 10B	Technical Sales Strategies	2
	Total Units	**17-19**

Table h. Mt. SAC Surveying Technology Certificate

SURVEYING TECHNOLOGY		
ENGL 1	Introduction to Engineering	2
ENGR 18	Introduction to Engineering Graphics	3
ENGR 24	Engineering Graphics	4
MATH 150	Trigonometry	3
or MATH 160	Precalculus Mathematics	
or MATH 180	Calculus and Analytic Geometry	
SURV 1A	Surveying	3
SURV 1B	Surveying	3
	Total Units	**18-19**

Table i. Mt. SAC Sales Engineering AS Degree

SALES ENGINEERING (AS DEGREE S0852)		
Sales Engineering Coursework:		**4**
ENGT 10A	Foundations of Technical Sales	2
ENGT 10B	Technical Sales Strategies	2
And completion of an AS Engineering with Emphasis in Engineering Applications AS:		
Engineering with Emphasis in Mechanical Engineering Applications AS		36-37
or Engineering with Emphasis in Software Engineering Applications AS		27.5-29
or Engineering with Emphasis in Civil Engineering Applications AS		36-37
or Engineering with Emphasis in Electrical Engineering Applications AS		41
or Engineering with Emphasis in Chemical and Materials Engineering Applications AS		30-45
	Total Units	**31.5-49**

Citrus Certificates

Table j. Citrus Engineering Fundamentals Certificate

ENGINEERING FUNDAMENTALS		
ENGR 101	Introduction to Engineering	3
ENGR 135	Engineering Mechanics: Statics	3
ENGR 138	Computer Programming and Numerical Methods for Engineers	4
ENGR 140	Mechanics of Materials	4
MATH 190	Calculus I	5
or MATH 191	Calculus II	
or MATH 210	Calculus III	
	Total Units	**19**

Table k. Citrus AS in Pre-Engineering

PRE-ENGINEERING (AS DEGREE)		
ENGR 130	Engineering Graphics	4
ENGR 138	Computer Programming and Numerical Methods for Engineers	4
ENGR 132	Introduction to Surveying	3
ENGR 140	Mechanics of Materials	4
	Additional Courses	**45**
	Total Units	**60**

APPENDIX G. STARS SCHOLARS FOCUS GROUP SUMMARY

Two focus group interviews were conducted with a sample of STARS Scholars in the first CPP STARS Cohort in spring 2022.

Decision to Participate in STARS Program

Several Scholars cited the opportunity to engage in research for the first time as the reason they joined the STARS program. As one Scholar noted, "*This was a great opportunity to primarily learn about research and the research process…but also gain relevant programming experience and computer science experience*." Other Scholars joined for the opportunity to expand existing knowledge and skill sets. One Scholar with previous research experience noted, "*It was an opportunity for me to work on a project that I've been really wanting to work on. As a background, I was working on rocketry at Mt. SAC for three years now. This year we had an opportunity to work on a different kind of motor*." Another shared, "*There were parts of [the program] that were very similar to the last program I did, but there was an option to do ecology, which is my favorite thing. It was in a lab that I really wanted to get into and work with*."

Faculty Mentor Experience

While one Scholar described the environment created by their faculty mentor as "*neutral*," many reported working in welcoming environments. One Scholar explained, "*It was a really welcoming experience. I think the STARS program did really well in terms of pairing students up, at least from my experience*." Another Scholar described their team as "*incredibly welcoming*" and said the experience was like "*looking over their shoulder and watching them*" conduct research. A Scholar who worked with a professor who previously taught them said their team was "*a little family*." The Scholar continued, "*That was one of the big things I was looking for was a group of people that I can be friends with who are also in my field… It was very easy to befriend everyone, ask questions, and learn from everybody*." One faculty mentor was noted as being inviting, flexible, and willing to work with student needs. The Scholar describing this faculty mentor shared that when they were sick, the professor encouraged them to recover and focus on their presentation once they felt better.

While some Scholars worked closely with their mentors and research teams, other Scholars indicated that they primarily worked independently and provided project updates to their faculty mentors. One Scholar stated, "*I felt welcomed. My project was more independent, but I would send updates to him each week, and [he] gave positive feedback*." Another Scholar's group met with their faculty mentor once a week to have project-focused discussions: "*We would meet weekly during my faculty advisor's senior project meetings. For the most part, we would only discuss with him issues we may have had and tell him about the progress we had throughout the project*."

Connecting with Peers

Scholars in both focus groups noted a lack of connection with program peers. A Scholar who worked alone stated, "*I was the only person in my project, so I didn't interact with others in the program*." Another who attended a hike with cohort members shared, "*I really enjoy being able to interact with other students that are in this [program], and that was probably the only opportunity*." After noticing the lack of connection between program participants, a Scholar obtained an email list for program participants and created a Discord channel: "*I realized that there wasn't anything set up for us to find out who else is in this [program] or to just keep each other in check…I made a Discord for everybody. I got everybody's email from [program staff]. That ended up working okay*." Scholars' suggestions regarding this issue are provided in the "Suggestions for Improvement" section below.

Gains in Skills and Knowledge

Scholars gained various skills throughout the CPP STARS program. A Scholar who engaged in research for the first time discussed their increased understanding of the research process: "*I think the most important thing that I got was learning to digest a lot of academic literature in a short amount of time…The other thing is learning about the research process, particularly revisions to your work. Normally in school, you have a very definitive set of guidelines…I think that iterative process of research is so much more interesting*." Another Scholar increased their understanding of data analysis and "*how to combine all of those things into a solid project*." One Scholar provided examples of field-relevant skills they gained: "*I got to learn how to work with the Twitter API and pull tweets…Navigating file systems and running programs from the command line was super fun*."

Greatest Benefits of Participation

Scholars also shared what they identified as the greatest benefit of participating in the STARS Program. Several Scholars believed that the opportunity to build connections was the greatest benefit of the program. One Scholar discussed the importance of connecting with others in their field: "*I think connection in your field is super important since it's most likely a small world and whatever you're doing, everybody knows everybody... Just because they do research doesn't mean they don't know the botanists, Fish and Wildlife, or something like that*."

Other Scholars reported that learning more about their area of interest and relevant technical skills was the greatest program benefit. One Scholar stated, "*[The greatest] benefit of the program was being able to learn from people that know more than me who were able to teach me about the aerospace field.*" A Scholar interested in manufacturing technology shared

that "*getting more time operating 3D printers and doing upgrades and repairs on them*" was most beneficial.

Some Scholars discussed the growth of their interests and perspectives as the greatest benefit. One Scholar shared that they have "*fallen in love with the research process*" through the STARS program. The Scholar continued, "*I was on the fence about pursuing graduate school before because I wanted to go out and start doing things. I feel like research gives me an opportunity to make an impact in a way that I thought only industry could*." A different Scholar highlighted a program activity, stating, "*I was part of a lot of experiences that expanded my horizons. For example, something like the cultural activity. I didn't love having to do it at first, but when I left, I was fully inspired*." Other reported benefits included funding for project supplies, feeling more prepared for their senior project, and getting paid to do what they enjoy doing.

Suggestions for Improvement

While Scholars indicated satisfaction with their program experience, they did offer a few suggestions for improvement. The most frequently proposed improvement was creating more opportunities for Scholars to connect with others in the program. One Scholar noted that in addition to networking, these opportunities would allow participants to compare problem-solving strategies with others. A Scholar who was able to connect with STARS members outside their team suggested a cohort hub for program participants: "*We did have other STARS program members in our same facility…One thing we benefited from by mingling [with] each other is just double checking each other…It would be helpful to have a hub for all the cohort to check up on each other on deadlines and stuff like that*." The Scholar who created the Discord channel suggested that the program prepare a channel for the next cohort or host monthly Zoom meetings for participants. Another Scholar who worked with a team at CPP suggested opportunities for community college students to work with their team on CPP's campus.

Scholars also noted a need for clarification on program requirements and improved communication throughout the program. A Scholar transferring after the Spring 2022 semester did not work on their own project due to misinformation relayed to their faculty mentor: "*At some point, he was told that I was going to be there for a year. So, he decided to push back the generation of my own project until the summer…I got a lot of experience and learned a lot of things from the program, but that was kind of something I wish I would've had. I don't know where that [information] came from, but I definitely think communication and providing resources to the faculty mentors, at least [from] my perspective, would be a lot more helpful*." One Scholar suggested providing peer mentors with more information about the program. Similarly, another Scholar noted that their mentor was often unsure about program aspects and requirements because they were not receiving information from the STARS staff. The same Scholar also mentioned a lack of clarity regarding poster and research paper requirements: "*Toward the end, there was a toss-up. 'Do we need a poster and a research paper? Do we need*

one or the other?' For a while, we needed both. I think a lot of us did both. Then just last week, they said all they needed was either one." Scholars also mentioned the need to clarify which workshops were mandatory.

Two Scholars indicated a need for additional opportunities to meet the program's presentation requirement. One Scholar noted that CPP's CARS Symposium is not a viable option for community college students transferring to other universities before the symposium takes place in August. Other suggestions included more opportunities to meet the culturally relevant activity requirement and emails reminding students of upcoming deadlines and program requirements.

APPENDIX H. STARS SCHOLARS 2022 SURVEY SUMMARY

Pretest and posttest surveys were administered to spring 2022 and summer 2022 STARS Scholars. Students who participated in spring and continued into summer completed a second posttest at the end of the summer, however this summary only includes results from their first posttest. The surveys examined Scholars' perceived abilities prior to the start of the program and their gains at the end of the program. Scholars also reflected on their program experience and provided suggestions for improvement.

Self-Reported Growth of STARS Scholars

The pretest and posttest surveys examined Scholars' growth across three constructs: sense of belonging, academic self-efficacy, and research skills. Two instruments were used to examine to examine Scholars' academic self-efficacy. All scales had acceptable internal reliabilities (see **Table l**).

Table l. Construct Inter-Item Correlation

Scale Construct	Pretest α	Posttest α
Sense of Belonging	.96	.96
Academic Self-Efficacy (Motivated Strategies for Learning)	.97	.95
Academic Self-Efficacy	.95	.93
Research Skills	.96	.94

Across both the spring 2022 and summer 2022 cohorts, 47 STARS Scholars completed both a pretest and posttest survey. For Scholars who participated in both cohorts, spring data were used in analyses. Construct composites were calculated for pretest and posttest. Paired samples t-tests were used to assess changes in Scholars' perceived growth across one term of program participation (see **Table m**).

Table m. Scholars' Ratings of Growth in Outcome Areas

Construct	Response Scale	Pretest M (SD)	Posttest M (SD)	Mean Difference	*t*	Cohen's *d*
Sense of Belonging	1 = "Strongly Disagree" to 5 = "Strongly Agree"	3.99 (0.95)	4.14 (0.93)	0.15	1.05	0.16
Academic Self-Efficacy (MSLQ)	1 = "Not at all true" to 7 = "Very true of me"	5.35 (1.38)	5.63 (1.15)	0.28	1.53	0.23
Academic Self-Efficacy	1 = "Not at all confident" to 7 = "Extremely confident"	5.41 (1.20)	5.59 (1.03)	0.18	1.84	0.27
Research Skills	1 = "Not at all" to 5 = "A great deal"	4.03 (0.75)	4.29 (0.65)	0.26**	3.30	0.50

*n = 44-46; Note: *p < .05, **p < .01*

Sense of Belonging

STARS Scholars rated the extent to which they agreed or disagreed with twelve statements regarding sense of belonging[6] on a scale from 1 = "Strongly Disagree" to 5 = "Strongly Agree." The scale included statements such as "I feel comfortable with other people (e.g., faculty, students) in my major at [current institution]." *Though there was an increase from pretest to posttest, it was not statistically significant* (see **Table m**). The "STARS Scholar Experience" section below includes additional insight into the relationships that Scholars built.

Academic Self-Efficacy

Two scales were used to examine Scholars' academic self-efficacy. Scholars rated the extent to which statements on the Motivated Strategies for Learning Questionnaire (MSLQ)[7] were true of them on a scale from 1 = "Not at all true of me" to 7 = "Very true of me." Examples of scale statements include "Compared with other students in my major at [current institution], I expect to do well" and "I think I will receive a good grade in my major courses at my [current institution]." Scholars also completed the and the College Self-Efficacy Instrument[8] and rated how confident they were in their ability to successfully complete fourteen tasks on a scale from 1 = "Not at all confident" to 7 = "Extremely confident." The scale included items such as "Write a course paper" and "Ask a professor a question outside of class." *The increase in mean rating from pretest to posttest was not statistically significant for either scale* (see **Table m**).

Research Skills

STARS Scholars completed an undergraduate research experience scale[9], rating their ability to perform fourteen research skills (e.g., "Observe and collect data" and "Think independently") at the beginning and end of the term on a scale from 1 = "Not at all" to 5 = "A great deal." *Scholars' perceived ability to perform a variety of research skills significantly increased from pretest to posttest with a medium effect size* (see **Table n**).

At the end of the program, Scholars were asked to select the three research skills they experienced the most growth in throughout the STARS experience. Of the 47 scholars who completed a posttest, 17 (36%) selected the ability to understand contemporary concepts in their field, making it the most frequently selected skill. A Scholar who selected this skill stated, "*The majority of the tasks which I was assigned involved digesting primary scientific literature and creating presentations of the material which were simpler, easier to follow summations of these papers.*" The second and third most selected skills were the abilities to "observe and

[6] Walton, G. M., & Cohen, G. L. (2007). A question of belonging: race, social fit, and achievement. Journal of personality and social psychology, 92(1), 82.
[7] Motivated Strategies for Learning Questionnaire, Self-Efficacy subscale (Pintrich & DeGroot, 1990).
[8] Solberg, V. S., O'Brien, K., Villareal, P., Kennel, R., & Davis, B. (1993). Self-efficacy and Hispanic college students: Validation of the college self-efficacy instrument. *Hispanic journal of behavioral sciences*, *15*(1), 80-95.
[9] Kardash, C.M. (2000). Evaluation of an undergraduate research experience: Perceptions of undergraduate interns and their faculty mentors. *Journal of Educational Psychology (92, 1), 191-201.*

collect data" and "make use of the primary scientific research literature" in their field. One Scholar who selected both skills explained how the program helped their growth: "*The STARS experience taught me how to apply articles from my major into real life application by introducing me to the concept of a "gap" when it comes to research… I also learned how to observe and collect data from my mentor, who showed me important websites for data collection*." The ability to reformulate an original hypothesis was the least frequently selected skill, with just three Scholars (6%) indicating that this was one of the top three areas where they experienced growth.

Table n. Scholars' Top Research Skills

Research Skill	Frequency
Understand contemporary concepts in my field	17
Observe and collect data	14
Make use of the primary scientific research literature in my field (e.g., journal articles)	13
Design an experiment or theoretical test of the hypothesis	12
Identify a specific question for investigation based on the research in my field	12
Relate results to the "bigger picture" in your field	12
Statistically analyze data	10
Think independently	10
Orally communicate the results of my research project	9
Formulate a research hypothesis based on a specific question	8
Write a research paper for publication	8
Interpret data by relating results to the original hypothesis	7
Understand the importance of "controls" in research	6
Reformulate my original research hypothesis (as appropriate)	3

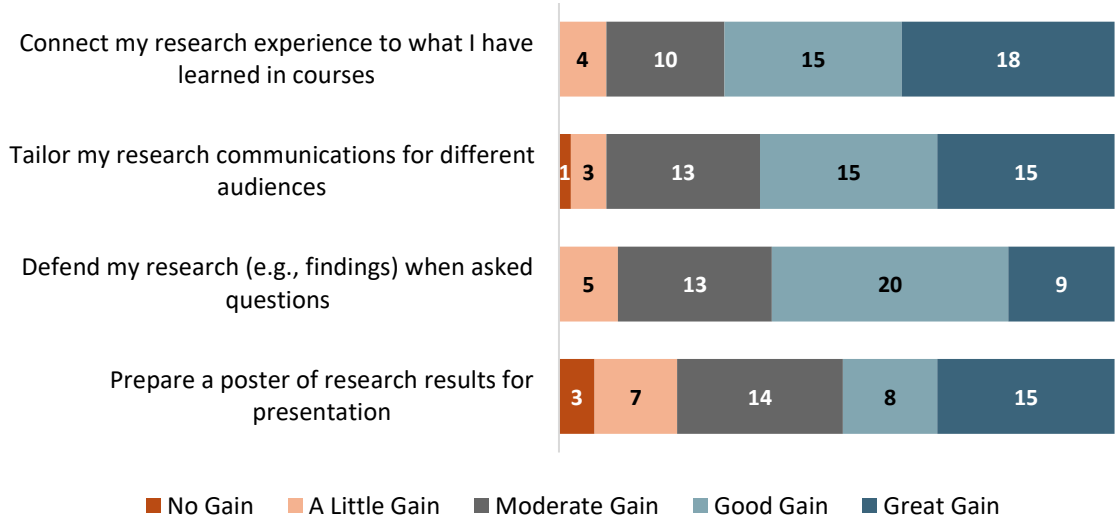
n = 47

Gains in Abilities

At posttest, Scholars completed a four-item section that examined how much they gained in their ability to do different tasks as a result of their STARS research experience. They rated their perceived gains on a scale from 1 = "No Gain" to 5 = "Great Gain" (see **Figure a**). Thirty-three Scholars (70%) reported making a "Good Gain" or "Great Gain" in the ability to connect their research experience to what they have learned in courses. One Scholar reported that being able to relate research ideas to what they learned in class was one of the greatest benefits of participating in the program. While one Scholar reported "No Gain" in their ability to tailor their research communications for different audiences, thirty Scholars (64%) reported a "Good Gain" or "Great Gain" in this skill. A Scholar who discussed this skill while reflecting on their growth stated, "*I had to practice explaining my project to individuals from a wide array of backgrounds that may not have any prior knowledge of the field. Needing to present to multiple people has helped me with my presentation abilities, so I can effectively communicate my results to a large audience*."

The ability to "prepare a poster of research results for presentation" had the most varied ratings. While twenty-three Scholars reported a "Good Gain" or "Great Gain" in this skill, ten Scholars reported "No Gain" or "A Little Gain." According to Scholar responses, they had the option to write a paper or complete a poster. The variation in responses may be due to Scholars who did not prepare a poster.

Figure a. Scholars' Gains in Ability



n = 47

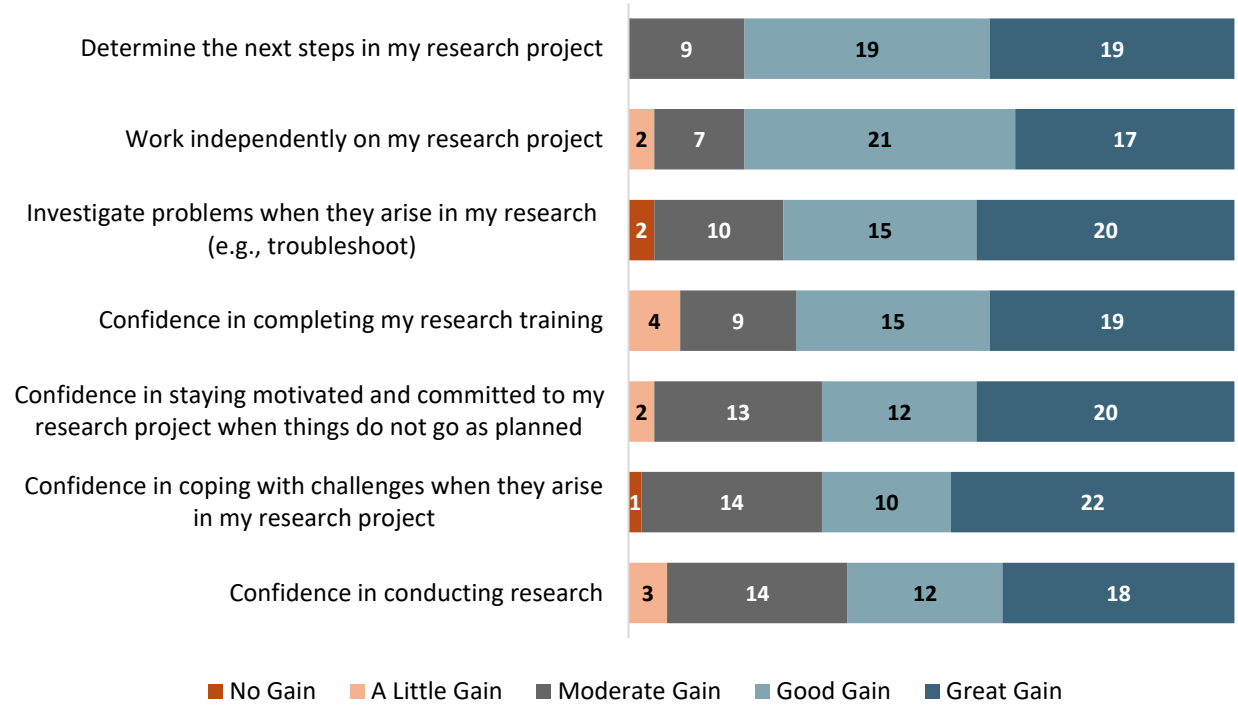
Confidence and Independence

Scholars also completed a seven-items about gains in researcher confidence and independence[10]. They rated their perceived gains on a scale from 1 = "No Gain" to 5 = "Great Gain" (see **Figure a**). Thirty-eight Scholars (81%) reported making a "Good Gain" or "Great Gain" in the ability to determine the next steps in their research project. The remaining nine Scholars reported a "Moderate Gain." The mean score for this item was the highest across all items (*M* = 4.21; see **Table o**). Thirty-eight Scholars also reported a "Good Gain" or "Great Gain" in their ability to work independently on their research project (*M* = 4.13). One Scholar describing their growth in this area noted, "*Being in the lab and being trusted to carry out different experimental procedures has really helped me feel independent and competent enough to trust my knowledge and abilities in the lab*." Another Scholar stated, "*The greatest benefit for me is that I get to do the research independently, so it forces me to think outside the box and learn it [in] my own way*." Scholars rated gains in the "confidence in conducting research" the lowest of the seven items. While thirty Scholars (64%) reported a "Good Gain" or

[10] Butz, A. R., & Branchaw, J. L. (2020). Entering research learning assessment (ERLA): Validity evidence for an instrument to measure undergraduate and graduate research trainee development. *CBE Life Sciences Education*, *19*(2), 18. https://doi.org/10.1187/cbe.19-07-0146.

"Great Gain" in their confidence to conduct research, fourteen reported a "Moderate Gain" and three reported "A Little Gain" in their ability (M = 3.96).

Figure b. Scholars' Confidence and Independence



n = 47

Table o. Scholars' Confidence and Independence

Item	M (SD)
Determine the next steps in my research project	4.21 (0.75)
Work independently on my research project	4.13 (0.82)
Confidence in coping with challenges when they arise in my research project	4.11 (0.98)
Investigate problems when they arise in my research (e.g., troubleshoot)	4.09 (1.02)
Confidence in staying motivated and committed to my research project when things do not go as planned	4.06 (0.94)
Confidence in completing my research training	4.04 (0.98)
Confidence in conducting research	3.96 (0.98)

n = 47

STARS Scholar Experience

STARS Scholars also shared the greatest benefits of participating in the program. Scholars indicated that the opportunity to be involved in research was one of the greatest benefits of program participation, especially for Mt. SAC and Citrus students. As one Scholar stated, "*Oftentimes, due to being in a community college, we are unable to get any financial support to be able to do research. The best benefit for me was being able to do a project at all*."

Another Scholar noted that "*opportunities for undergraduate research are hard to come by*" for students at community colleges.

Scholars also named connecting with faculty advisors and professors as one of the greatest program benefits. One Scholar described how their faculty advisor offered support beyond project feedback: *"Connecting with my advisor has been one of the greatest rewards. He has been of great help in my academic career. He has taught me so much about research and writing, and he has offered guidance and mentorship in my career and educational endeavors. I am so grateful for having this connection. I don't usually know how to reach out to my professors and advisors, so having been directly assigned to work with [Professor] has been very helpful to me*." Others mentioned the benefit of working alongside faculty. One Scholar stated, "*One of the greatest benefits was having a faculty mentor who invested time into teaching me the theory and application of the project*."

Creating connections with peers was also mentioned as a program benefit. One Scholar discussed learning from their peers and building relationships in academia: "*I have enjoyed connecting with my peers very much. They've taught me a lot through sharing their own research and academic experiences. As a person whose networks outside of school, both at home and at work, are fully disconnected with the academic world, I experience most of my academic pursuits alone. So, the community aspect is something I am very appreciative of*." Additional benefits were shared, including increased knowledge of project-relevant information, greater understanding of the research process, working independently, program support, and connecting with peer mentors.

Enhancing The STARS Scholar Experience

At the end of the program, Scholars provided insight and suggestions that could enhance the experience for future STARS Scholars. They shared ideas regarding additional program components, new workshop topics, and aspects of the program that they would change.

Additional Components

Some Scholars recommended including additional opportunities to socialize with fellow Scholars. As one scholar stated, "*The STARS Program would benefit from having more of a social aspect where students can meet each other and continue to grow*." Another Scholar believed that more opportunities to socialize could "*help students feel better during presentations*." Similarly, Scholars suggested implementing opportunities to learn about their peers' work throughout the program. One Scholar discussed limited opportunities to hear from other teams: "*Besides the times in meetings where we explained our projects while giving elevator pitches and such, it felt like CARS was really the first time I was able to interact with other people's projects. Getting the opportunity to collaborate more with other projects would have been a nice feature to have*." Another Scholar suggested opportunities to meet peer

researchers and *"visit the labs of each project*." Other suggestions for additional components included graduate school information sessions, a platform to communicate with peers, opportunities to hear from or collaborate with industry and field experts, conference visits guided by faculty mentors, and providing designated work areas for each team.

Workshop Topics

Some workshop suggestions were field-specific topics, including biological pathogens, aerospace engineering, energy systems, data science, and hybrid rockets. One Scholar who suggested workshops geared towards engineering also mentioned "*the inclusion of [workshops] from Cal Poly engineering professors*." In addition, workshops for Excel and Google Sheets, Python, and Matlab were requested.

There were also suggestions for workshops that provide general insight into research. As one Scholar shared, "*I think workshops that help better understand research in general… For those that feel really out of place in labs, I think a workshop revolving around that would be really good*." There were also suggestions for various research aspects, including writing papers, creating posters, project management, the publication process, and writing and submitting grant proposals.

Scholars suggested workshops that focus on public speaking and presenting skills. Workshops that allow Scholars to practice these skills were also mentioned. A scholar described the creation of an event "*with mock judges for [a] question answering experience*." Another Scholar suggested that research teams "*host a zoom presentation discussing their research progress*." The Scholar continued, "*This will expand the attendees' knowledge of the topic at hand while providing a platform for the presenters to practice communicating their research both in general and to an audience*."

Scholars also listed workshops related to different aspects of the graduate school process, including writing personal statements, resume building, and the experiences of graduate school students. Similarly, there were requests for workshops that discussed connecting their research experience to potential higher education or career paths. Finally, responses indicate a need for workshops focusing on well-being, specifically mental health, stress management, and imposter syndrome.

Suggestions for Improvement

The most frequent suggestions for improvement were clearly defining program requirements and deadlines and improving the communication of this information to Scholars. One Scholar described "*frustrating miscommunications*" regarding requirements that were unclear to them: "*I was told that having a poster is great, but a paper is what is needed. I spent several hours putting one together, just to find out last week that it was indeed either or. I could have spent that time working on other things… It seemed like every time I had a question, no one knew what I was talking about*." Another Scholar described the need for more defined

requirements saying, "*There seemed to be confusion/missing emails that would create panic in us from not knowing what is needed to complete*." Ideas for improving communication between program and Scholars included better utilization of Canvas and the creation of a STARS program calendar.

Similarly, Scholars noted the need to increase the involvement of faculty advisors. One Scholar shared that their advisor would have liked emails regarding events or requirements because they "*felt out of the loop*." Another Scholar stated, "*I think the faculty advisors could be a little more involved. Although they were excellent in helping us through issues, when it came to asking questions about the STARS program, they lacked the information needed for us*." Scholars discussed scheduling conflicts and suggested more opportunities to attend events and workshops. One Scholar explained, "*Adding more opportunities for events would be nice since some events conflict with people's schedules. Only having one opportunity or a couple can make it difficult to schedule*." A second Scholar stated, "*I would say [probably] have workshops at different various session times may be a lot more flexible to join*." Another Scholar suggested extending the length of social events so those with conflicting schedules may be able to join. Some Scholars who attend one of the community colleges requested more "*inter-school events*" and "*better accommodations made for the community colleges in the program*."

Scholars also provided ideas for ways to track their requirement progress. The recommendations included a website that enables Scholars to track their progress, progress check-ins with advisors, some form of progress updates throughout the semester, and an attendance tracking system.

While noting their appreciation for some meetings, a few Scholars also noted that some were not helpful. One Scholar did not find the two required meetings with their STARS advisor helpful, and another did not find "*research mentor*" meetings useful because they met with their "*research professor*" weekly. Finally, an older and "*much more experienced*" Scholar suggested fewer "*student-peer requirements*" as they were paired with a younger mentor who had less coursework completed than they did.

APPENDIX I. STARS FACULTY MENTOR SPRING 2022 SURVEY SUMMARY

In spring 2022, a survey was administered to all STARS faculty mentors. The survey examined gains in the research capabilities of 23 STARS Scholars during their program participation as perceived by the 12 faculty members who mentored them. Faculty mentors also reflected on their mentoring experience and provided suggestions for improvement.

Growth of STARS Scholars

STARS Scholars' Research Skills

At the end of the spring and summer terms, faculty mentors completed a modified version of Kardash's (2000)[11] Research Skills survey, retroactively rating STARS Scholars' ability to perform seventeen research skills at the beginning of the semester and end of the semester on a scale from 1 = "Poor" to 5 = "Excellent." *Faculty Mentors indicated that STARS Scholars' ability to perform all seventeen research skills significantly increased from the beginning of participation the end of participation with a large effect size for each skill* (see **Table p**)[12]. Note that due to "Not Applicable" responses, the number of paired ratings varies by skill, resulting in lower statistical power for some comparisons.

Table p. Faculty Mentors' Ratings of STEM Scholars' Growth in Research Skills

Item	Item n	Beginning of Semester M (SD)	End of Semester M (SD)	Mean Difference	Cohen's d
Scholar's ability to understand the importance of "controls" in research	14	2.00 (1.04)	3.36 (1.00)	1.36***	1.61
Scholar's ability to design an experiment or theoretical test of the hypothesis	14	2.43 (1.34)	3.50 (0.94)	1.07***	1.47
Scholar's ability to make use of the primary scientific research literature in their field (e.g., journal articles)	18	2.11 (0.96)	3.22 (0.81)	1.11***	1.34
Scholar's ability to think independently	21	2.33 (1.16)	3.38 (1.20)	1.05***	1.30
Scholar's ability to interpret data by relating results to the original hypothesis	14	2.43 (1.22)	3.50 (1.02)	1.07***	1.29
Scholar's ability to prepare a poster of research results for presentation	8	2.75 (1.67)	4.25 (0.89)	1.50*	1.15
Scholar's ability to reformulate their original research hypothesis (as appropriate)	13	2.54 (1.56)	3.31 (1.25)	0.77**	1.06

[11] Kardash, C.M. (2000). Evaluation of an undergraduate research experience: Perceptions of undergraduate interns and their faculty mentors. *Journal of Educational Psychology (92, 1)*, 191-201.
[12] The scale used for this instrument differs from the Kardash (2000) scale (1= "Not at All"-5=" A Great Deal").

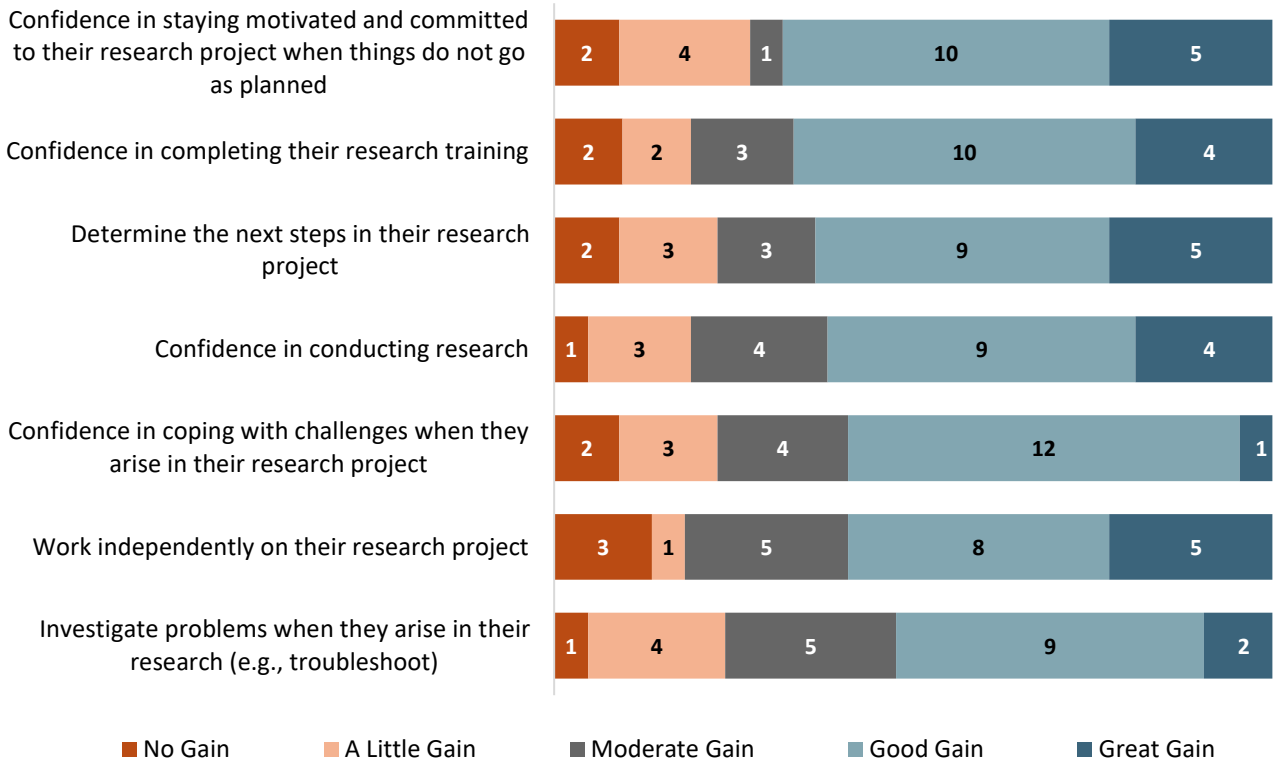
Item	Item n	Beginning of Semester M (SD)	End of Semester M (SD)	Mean Difference	Cohen's d
Scholar's ability to identify a specific question for investigation based on the research in their field	18	2.28 (1.27)	3.28 (1.07)	1.00***	1.03
Scholar's ability to statistically analyze data	11	2.55 (1.57)	3.55 (1.37)	1.00**	1.00
Scholar's ability to defend their research (e.g., findings) when asked questions	13	2.46 (1.27)	3.46 (0.78)	1.00**	1.00
Scholar's ability to write a research paper for publication	9	2.11 (1.27)	3.11 (1.27)	1.00*	1.00
Scholar's ability to tailor their research communications for different audiences	9	2.67 (1.58)	3.78 (1.30)	1.11*	0.95
Scholar's ability to orally communicate the results of research projects	16	2.50 (1.10)	3.44 (0.89)	0.94**	0.94
Scholar's ability to formulate a research hypothesis based on a specific question	15	2.20 (1.32)	3.00 (1.00)	0.80**	0.93
Scholar's ability to observe and collect data	13	2.38 (1.33)	3.77 (1.36)	1.39**	0.92
Scholar's ability to understand contemporary concepts in their field	20	2.60 (0.99)	3.40 (0.82)	0.80***	0.89
Scholar's ability to relate results to the "bigger picture" in their field	19	2.63 (1.38)	3.63 (1.07)	1.00**	0.78

*n = 8-21; * p < .05; **p < 0.01; ***p < 0.001*

STARS Scholars' Confidence and Independence

Faculty mentors also rated STARS Scholars' learning gains regarding their ability to perform different aspects of the research process independently and confidently as a result of their experience on a scale from 1 = "No Gain" to 5 = "Great Gain" (see **Figure c**). Faculty mentors indicated that around two-thirds (*n* = 15) of the STARS Scholars made a "Good Gain" or "Great Gain" in their "confidence in staying motivated and committed to their research project when things did not go as planned."

Figure c. STARS Scholars' Confidence and Independence



n = 21-22

Mentee Progress

Most faculty mentors indicated that their mentees made great strides as researchers. One professor noted both of their STARS Scholars made "*excellent progress*." Another faculty mentor stated, "*[STARS Scholar] is a pleasure to work with. [STARS Scholar] interacts maturely with his team members as well as other group members. They demonstrate great potential in conducting research and have developed a comprehensive understanding of their project*." One STARS Scholar was described as setting "*a good example for other students*" and being an "*effective group lead*." Multiple faculty mentors also noted STARS Scholars' enthusiasm as researchers (*n* = 4). One faculty mentor shared, "*[STARS Scholar]'s curiosity and positive attitude towards understanding and contributing will help her grow*." Faculty mentors also noted STARS Scholars' confidence (*n* = 1), curiosity (*n* = 1), flexibility (*n* = 1), initiative (*n* = 1), and communicativeness (*n* = 1).

Faculty Mentor Experience

Creating Inclusive Research Environments

Faculty mentors described how they created an inclusive and welcoming research environment for all students. Four faculty mentors noted that they fostered mutual student

support. As one faculty mentor stated, "*I introduce the student to other members of the group to share and learn from each other*." Three faculty mentors had open door policies for their STARS Scholars. One shared that they "*try to be as available as possible for questions*." Holding progress meetings was mentioned by four faculty mentors. One faculty mentor explained, "*[I] regularly meet with students and check in to see how they are doing. Specifically ask what questions they have*." Two faculty mentors mentioned being welcoming, and two mentioned creating collaborative environments. As one faculty mentor shared, "*I make sure that students feel supported and there is a collaborative environment in the research lab*." Two faculty mentors also included valuing student experiences, with one stating, "*First, I learn the student by letting the student share her knowledge and experience*." Other descriptions included seeking out questions from STARS Scholars (*n* = 1), providing options to document progress (*n* = 1), and engaging in parallel work to build STARS Scholars' confidence in performing lab work (*n* = 1).

General Reflections on the Faculty Mentor Experience

One faculty mentor who reflected on the differences between mentoring first-time freshmen and transfer students stated: "*Maturity level of true sophomores vs. CC transfer students is very different and a little surprising! I have learned a lot about how to mentor younger students*." Another shared, "*Research projects must be tailored to interests and capabilities of each student. Objectives must be revised so that students feel accomplished based on the timeline*." One faculty mentor provided feedback on instrument administration sharing, "*It would have been helpful to have the end of semester survey questions at the beginning to know what was going to be measured*." A few faculty mentors further discussed the STARS Scholars they mentored, describing them as talented, motivated to learn, or possessing a "*great capability to conduct research*."

Suggestions for Improvement

Faculty mentors provided suggestions for training or workshops that STARS Scholars should receive before working with a faculty mentor. One faculty mentor shared, "*In-person safety training before working in the lab would have been a better start. But it is understandable at this current COVID situation we opted for a remote safety training*." Three faculty mentors suggested workshops or training on time management or balancing responsibilities. One of the faculty mentors stated, "*Maybe a time management or some kind of workshop on what it means to conduct research in the lab and the time commitment that is involved*." Other suggestions included literature review training (*n* = 1), report writing training (*n* = 1), and "*how to ask questions to the faculty mentor as we need to understand their challenges*" (*n* = 1).

Faculty mentors also provided suggestions to improve the mentoring experience. One faculty mentor suggested, "*Students that are not participating in the program should be*

followed up to be disqualified and replaced by others that are willing to perform research and use the program resources." Another faculty mentor shared, "*I believe the OUR (Office of Undergraduate Research) hosts a couple of workshops for [students], but it would be great if the OUR shares their presentation materials with the advisor so that we can tie our objectives/activities with the workshop*." One faculty member suggested guaranteeing spots for continuing students stating, "*[It] would be nice if existing students from during year were guaranteed summer spots if they make good progress and advisor agrees. [This] would minimize amount of applications and challenge of picking one to continue if funding is more limited. Or connect to a different funding source-maybe LSAMP?*" Additional suggestions included opportunities for the STARS Scholars to gather regularly to form a cohort, feedback from student peer mentors, and additional funding.

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