

2022 Path to STEM Success Survey Results

Introduction:

Path to STEM Success is a four-day orientation for existing and new STEM students at San Diego Mesa College sponsored by STEM E3 Title III, part F grant. Pre- and post-surveys were conducted during the first iteration of Path to STEM Success to collect data that will inform future program improvements. The data collected included student feedback as well as measures of the program's expected outcomes: (1) increased student readiness to follow the STEM path, and (2) increased students' sense of belonging. Students were not required to attend all four days of orientation. The program activities are broken down by day in the table below.

Day 1 (9am-2pm)	Day 2 (9am-12pm or 12pm-3pm)	Day 3 (9am-2pm)	Day 4 (9am-2pm)
- Information about work-based learning and internships - Industry panel - Tour of Math and Natural Sciences building - Activities with faculty - Lunch provided	- STEM counseling general information - STEM transfer general information - Questions with counselors - Questions with Transfer - Activities with faculty - Lunch provided	- Getting ready for fall with math and science basics - Topics: dimensional analysis, translating problems to equations, relationships between variables, factoring, solving/balancing equations, basic trigonometry, how to use a calculator, and exploring the STEM Center manipulatives - Snacks provided	

Highlights:

- The pre- and post-surveys were completed by 78% and 63% of Path to STEM Success attendees, respectively.
- There was a good representation of HSI students in the pre- and post-surveys at 73% and 75% respectively.
- About a quarter of pre- and post-survey respondents identified as Latinx, compared to 38% across Mesa's general student population.
- The following activities ranked the highest in terms of the percent of students who found them quite or extremely helpful: STEM Transfer general information session, access to STEM counselor, access to transfer advice, activities with faculty, and tour of Mathematics & Natural Sciences.
- Among students who attended Day 3 or Day 4, 75% found the math and science preparations to be quite or extremely helpful.
- When asked about the most valuable aspect of the student's Path to STEM Success experience, the predominant themes that emerged out the students' responses centered around: (1) information about/access to counseling and transfer advice, and (2) meeting with faculty.

- The preparedness score (see competency section) was higher among pre-survey respondents than among post-survey respondents who attended preparation stations on Day 3 and Day 4. A potential explanation for this unexpected finding is that the students who responded to the pre-survey and received higher preparedness scores, might have decided not to attend the preparations stations. If that was the case, their absence from Day 3 and Day 4 would have deflated the post-survey preparation score.
- The sense of belonging score (see sense of belonging section) increased from 3.69 in the pre-survey to 3.94 in the post-survey. The increase was even larger among HSI students, from 3.66 in the pre-survey to 4.07 in the post survey.

Methodology:

The pre-survey was conducted on the first day of orientation (August 1, 2022). As the students checked-in, they were pointed to the survey's QR code and were asked to complete the pre-survey as they made their way to the event's classroom. Additionally, during the first break, students were reminded to complete the survey. A total of 32 students attended at least one day of the four days of Path to STEM Success activities and 25 of them attended the first day of the orientation. A total of 22 surveys were completed, representing 78% of all of the program participants.

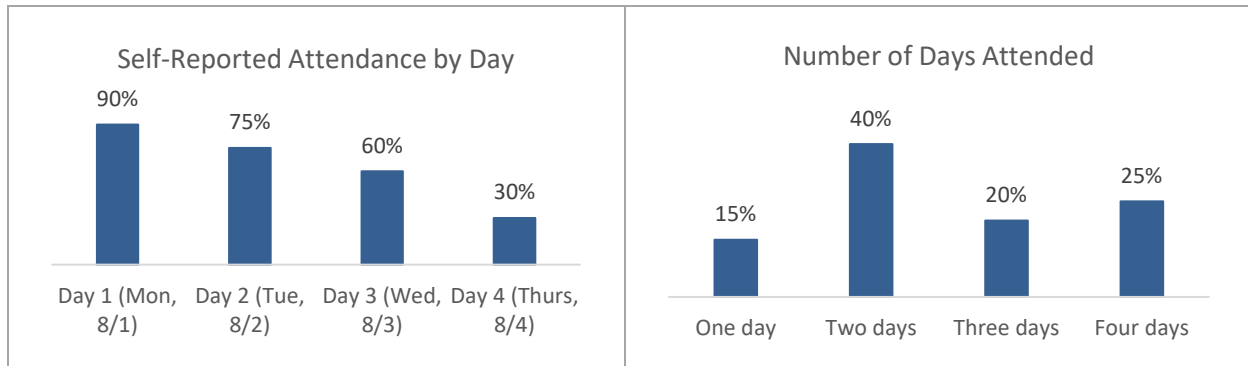
The post-survey was emailed at the conclusion of the fourth day of the orientation and it remained open for four subsequent days (August 4 through August 8, 2022). The survey was emailed via SurveyMonkey to students that attended at least one day of Path to STEM success. On August 8th, the HSI Director emailed attendees a list of links to resources and reminded them to complete the survey. On the same day, an email reminder was sent via SurveyMonkey to the students that had not yet completed the survey. A total of 20 surveys were completed, representing 63% of all of the program participants.

The data collection mechanisms did not allow for the students' pre- and post-survey individual responses to be matched. This means there is a possibility for the pre-survey to include responses from a different set of students than the post-survey. However, based on daily attendance records and self-reported attendance data in the post survey, we can estimate that between 15 to 18 students responded to both the pre and post surveys.

All demographic or special population variables used in this report are based on self-reported data collected in the pre- and post-surveys. To incentivize survey response, both the pre- and post-surveys mentioned the drawing of a \$25 Amazon gift card.

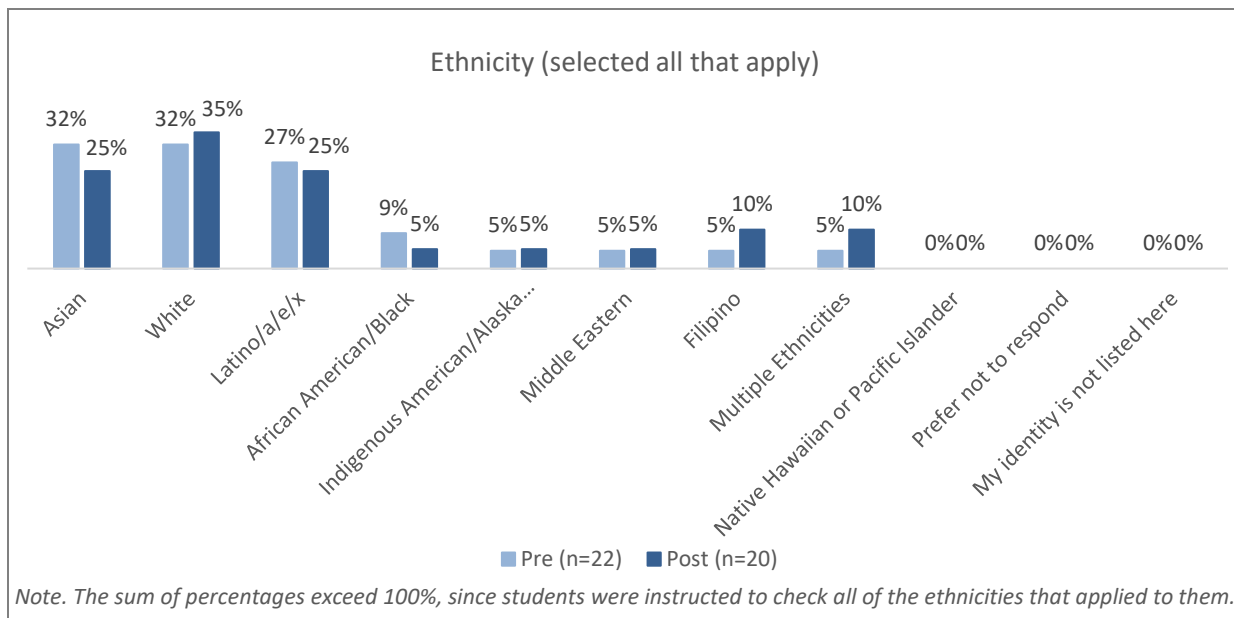
Student Profile (self-reported):

Attendance: Among post-survey respondents (n=20), 18 students attended Day 1, 15 students attended Day 2, 12 students attended Day 3, and 6 students attended Day 4. A total of 45% of post-survey respondents attended at least three days of the orientation. Forty percent attended only two days, and 15% only one day. The average attendance was 2.55 days.



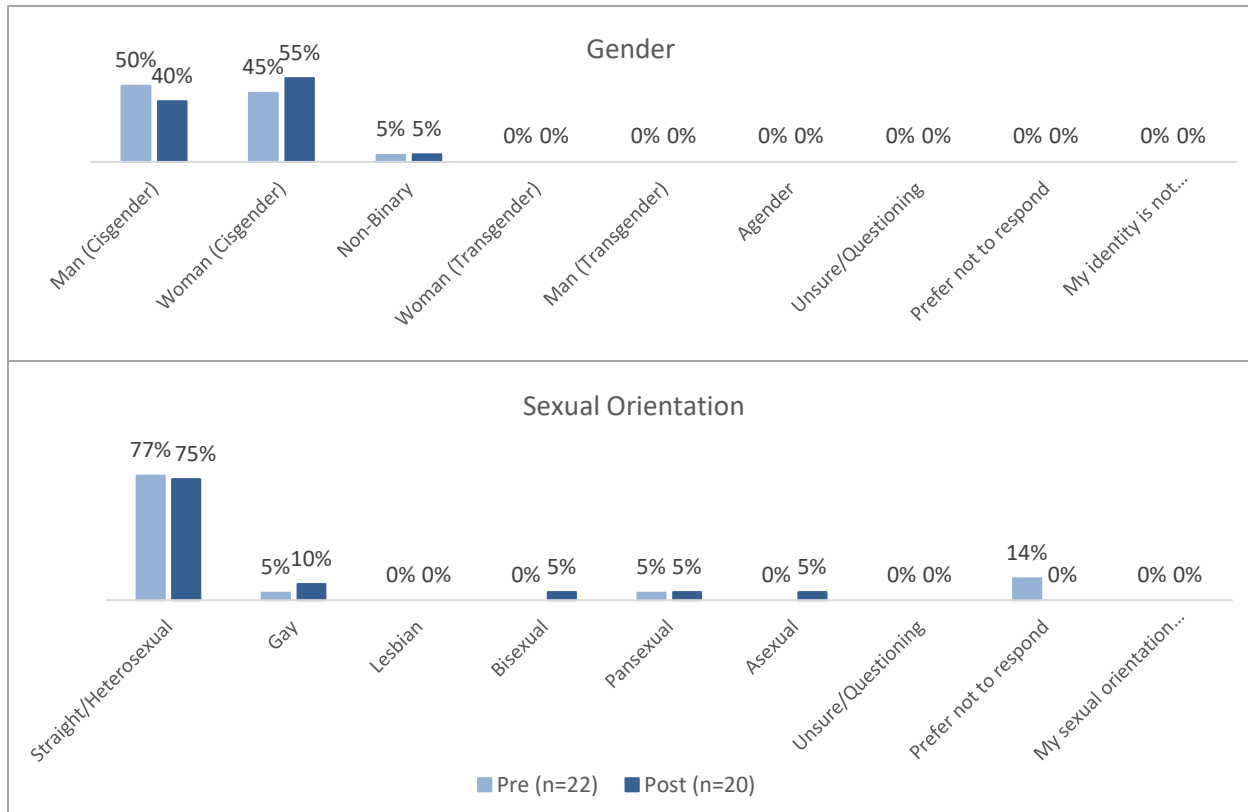
Ethnicity:

- Pre-survey: 32% of respondents identified as White, 32% as Asian, 27% as Latinx, 9% as African American/Black, 5% as Filipino, 5% as Indigenous American/Alaskan Native, 5% as Middle Eastern, and 5% as Multiple Ethnicities (n=22).
- Post-survey: 35% of respondents identified as White, 25% as Asian, 25% as Latinx, 5% as African American/Black, 10% as Filipino, 5% as Indigenous American/Alaskan Native, 5% as Middle Eastern, and 10% as Multiple Ethnicities (n=20).



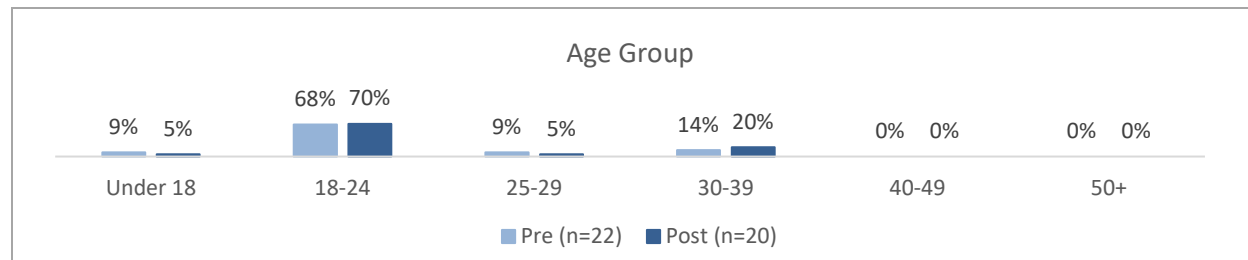
Gender & Sexual Orientation:

- Pre-survey: 50% of respondents identified as cisgender man, 45% as cisgender woman, and 5% as non-binary (n=22).
- Post-survey: 40% of respondents identified as cisgender man, 55% as cisgender woman, and 5% as non-binary (n=20).
- Pre-survey: 77% of respondents identified as straight/heterosexual, 14% preferred not to respond, 5% as gay, and 5% as pansexual (n=22).
- Post-survey: 75% of respondents identified as straight/heterosexual, 10% as gay, 5% as pansexual, 5% as bisexual, and 5% as asexual (n=20).



Age group:

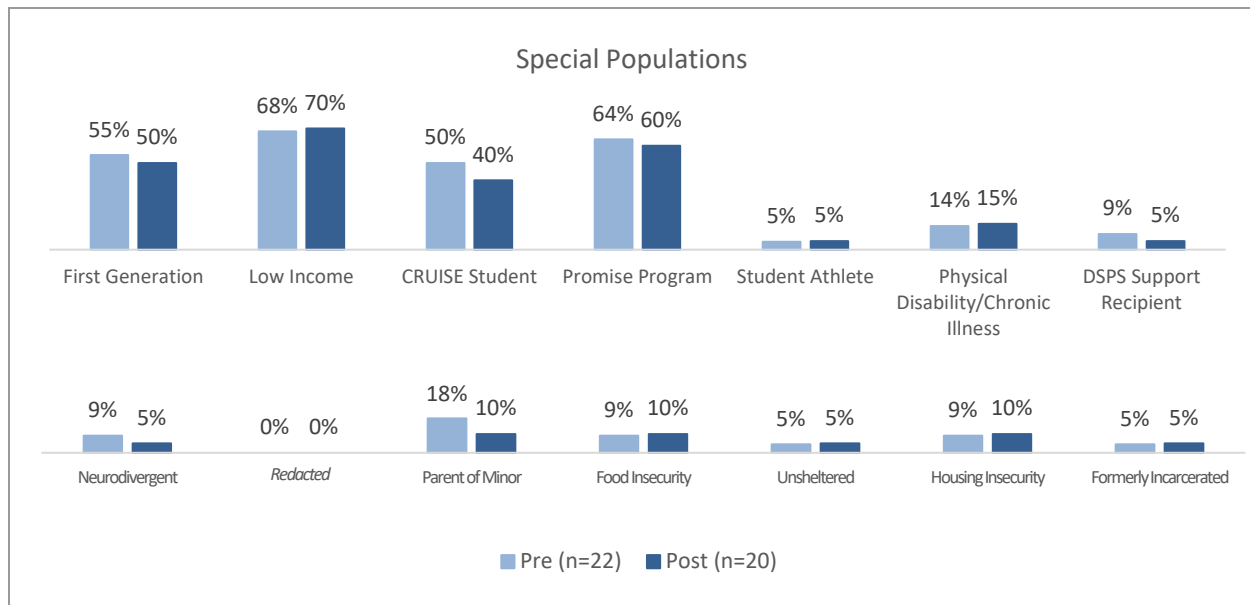
- Pre-survey: 68% of respondents were 18-24 years old, 14% were 30-39 years old, 9% were under 18, and 9% were 25-29 years old (n=22).
- Post-survey: 70% of respondents were 18-24 years old, 20% were 30-39 years old, 5% were under 18, and 5% were 25-29 years old (n=20).



Special Populations:

- Latinx or Low-Income students represented 73% of pre-survey respondents (n=22) and 75% of post-survey respondents (n=20).
- Low-income students represented 68% of pre-survey respondents (n=22) and 70% of post-survey respondents (n=20).
- First-generation students represented 55% of pre-survey respondents (n=22) and 50% of post-survey respondents (n=20).

- Promise students represented 64% of pre-survey respondents (n=22) and 60% of post-survey respondents (n=20).
- CRUISE students represented 50% of pre-survey respondents (n=22) and 40% of post-survey respondents (n=20).
- Parents of children under 18 years-old represented 18% of pre-survey respondents (n=22) and 10% on post-survey respondents (n=20).

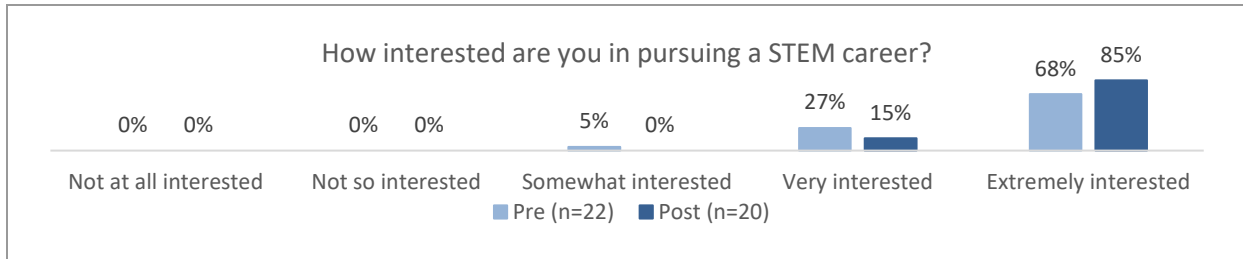


General Findings:

STEM Interest/Identity:

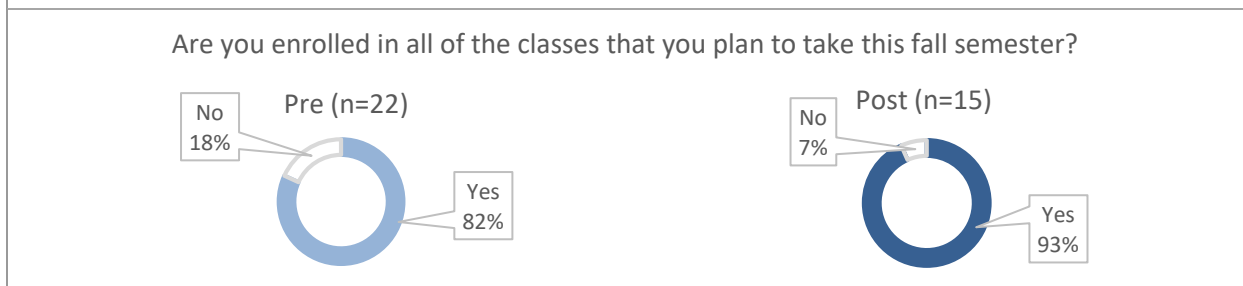
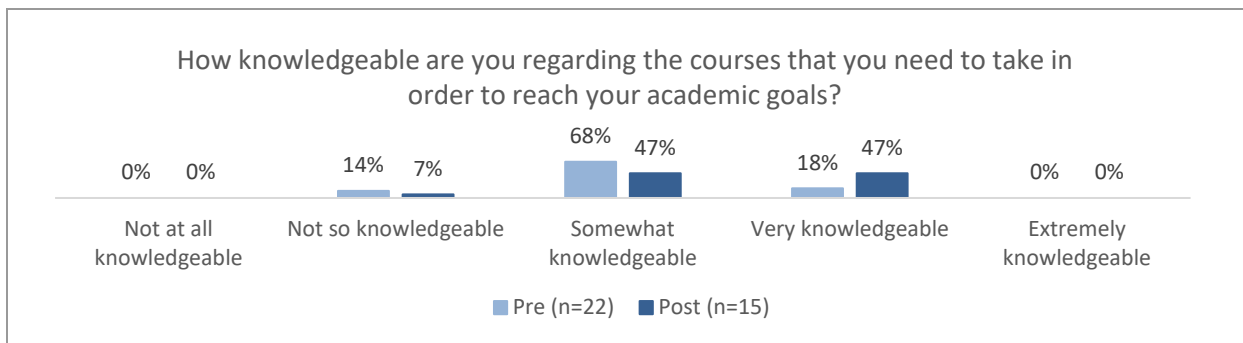
- Attending the orientation appears to have increased students' interest in pursuing a STEM career. A total of 68% of pre-survey respondents (n=22) reported they were "extremely interested" in pursuing a STEM career, compared to 85% of post-survey respondents (n=20).
- Respondents showed a somewhat strong STEM identity with a median score of four. Among HSI students, STEM identity was less strong, with a median score of 3.5.

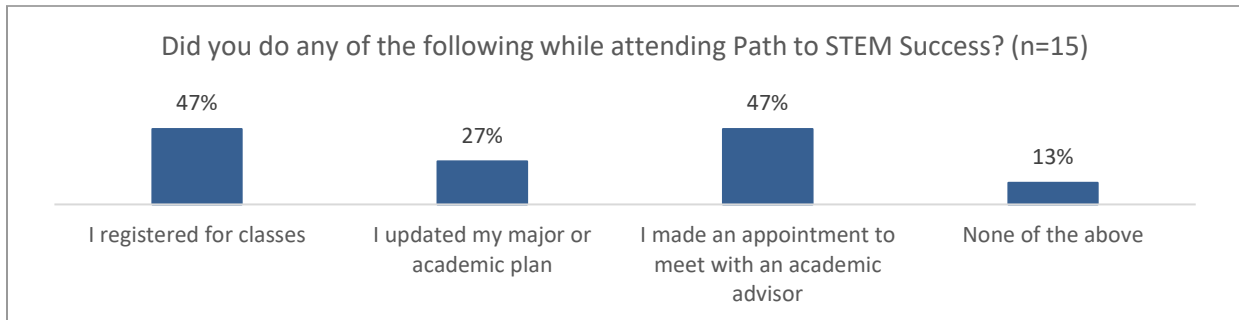
About STEM identity score: A score of one indicates the weakest STEM identity and a score of seven indicates the strongest STEM identity. STEM identity was measured in the pre-survey only, as it is not expected to change over a short period. A single item-measure of STEM identity developed by McDonald et al. (2019) was used to measure participants' STEM identity. This measure consists of presenting a set of circles with varying levels of overlap and asking respondents to identify one of seven pairs of overlapping circles that best describes the current overlap of the image they have of themselves and their image of what a STEM professional is.



Agency:

- Attending the orientation appears to have had a positive effect in how knowledgeable students are about the courses that they need to take in order to reach their academic goals. Among pre-survey respondents (n=22), only 18% of students reported being very knowledgeable, compared to 47% of respondents in the post-survey (n=15; includes only students who attended the second day of activities). Among HSI Students the corresponding percentages were 19% in the pre-survey (n=16) and 50% in the post-survey (n=12).
- In the post-survey, a larger proportion of students reported being enrolled in all of the classes that they plan to take this fall semester compared to the pre-survey. Among students who attended the second day of the orientation (the day when students received counseling advice), almost all (n=14, 93%) reported being enrolled in all of the classes that they planned to take this fall semester, compared to 82% of pre-survey respondents (n=22).
- Students completed important steps of their academic journey while attending the orientation. Among respondents who attended the second day of the orientation (n=15), 47% reported they registered for classes while attending Path to STEM Success, 47% percent made an appointment to meet with an academic advisor, and 27% updated their major/academic plan.

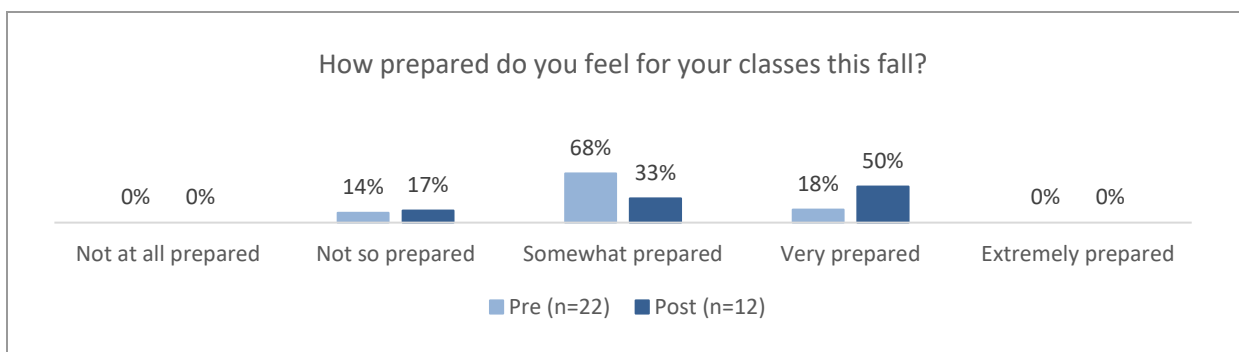




Competency:

- Students who attended either the third or fourth days of the orientation reported feeling more prepared for their classes this fall than respondents in the pre-survey. A total of 50% of post-survey respondents who attended the third or fourth days of the orientation (n=12) reported feeling very prepared for their classes this fall, compared to 18% of pre-survey respondents (n=22). Among post-survey respondents who attended the third or fourth days and who fit the definition of an HSI student (n=10), 40% reported feeling very prepared for their fall classes, compared to 13% in the pre-survey (n=16).
- Respondents who participated in Day 3 or Day 4 of the orientation scored lower (average score of 2.94; n=12) in preparedness than pre-survey respondents (average score of 3.19; n=22). A similar trend was observed among HSI students, with an average preparedness score of 3.11 among pre-survey respondents (n=16) and an average preparedness score of 2.86 among post-survey respondents who participated in Day 3 or Day 4 (n=10). This could mean that students with more knowledge in these topics decided not to attend Day 3 or Day 4 of the orientation or that students re-assessed their grasp of the topics covered after attending the preparation stations. The topics with the lowest scores were dimensional analysis and basic trigonometry. Note that the surveys did not ask students about their knowledge of STEM Center manipulatives.

*About the preparedness score: In both the pre- and post-surveys, students were asked how much they knew about seven topics covered on Day 3 and Day 4. The responses were scored from one to five for each topic (1-not much/nothing, 2-a little bit, 3-something, 4-quite a bit, 5-a tremendous amount). These scores were subsequently used to calculate an average score of preparedness that contained all seven topics.



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How much do you know about the following?		Pre		Post	
		Count	%	Count	%
Basic trigonometry	Not much/nothing	5	23%	5	42%
	A little bit	4	18%	2	17%
	Something	5	23%	4	33%
	Quite a bit	3	14%	1	8%
	A tremendous amount	5	23%	0	0%
	Total	22	100%	12	100%
Dimensional analysis	Not much/nothing	11	50%	6	50%
	A little bit	3	14%	4	33%
	Something	4	18%	1	8%
	Quite a bit	1	5%	1	8%
	A tremendous amount	3	14%	0	0%
	Total	22	100%	12	100%
Factoring	Not much/nothing	3	14%	0	0%
	A little bit	2	9%	0	0%
	Something	5	23%	6	50%
	Quite a bit	7	32%	6	50%
	A tremendous amount	5	23%	0	0%
	Total	22	100%	12	100%
Using a calculator	Not much/nothing	1	5%	0	0%
	A little bit	0	0%	2	17%
	Something	4	18%	5	42%
	Quite a bit	14	64%	5	42%
	A tremendous amount	3	14%	0	0%
	Total	22	100%	12	100%
Relationships between variables	Not much/nothing	0	0%	0	0%
	A little bit	4	18%	1	8%
	Something	7	32%	7	58%
	Quite a bit	8	36%	4	33%
	A tremendous amount	3	14%	0	0%
	Total	22	100%	12	100%
Solving/balancing equations	Not much/nothing	0	0%	0	0%
	A little bit	2	9%	0	0%
	Something	9	41%	6	50%
	Quite a bit	9	41%	6	50%
	A tremendous amount	2	9%	0	0%
	Total	22	100%	12	100%
Translating problems to equations	Not much/nothing	0	0%	0	0%
	A little bit	6	27%	1	8%
	Something	9	41%	7	58%
	Quite a bit	7	32%	4	33%
	A tremendous amount	0	0%	0	0%
	Total	22	100%	12	100%

Sense of Belonging:

- The pre- and post-surveys show an increase in sense of belonging, from an average sense of belonging score of 3.69 in the pre-survey (n=22) to an average sense of belonging score of 3.94 in the post-survey (n=20). The observed increase in sense of belonging was greater among the HSI Student population, from an average sense of belonging score of 3.66 in the pre-survey (n=16) to an average sense of belonging score of 4.07 in the post-survey (n=15).

About the sense of belonging score: The sense of belonging score consists of seven questions that measure various aspects of the sense of belonging construct. The responses from each question were scored from one to five, and a mean of means was subsequently calculated. The sense of belonging scale used in the survey is an adaptation of Imperial College London's Centre for Higher Education Research and Scholarship (n.d.) sense of belonging scale, which has been tested for reliability.

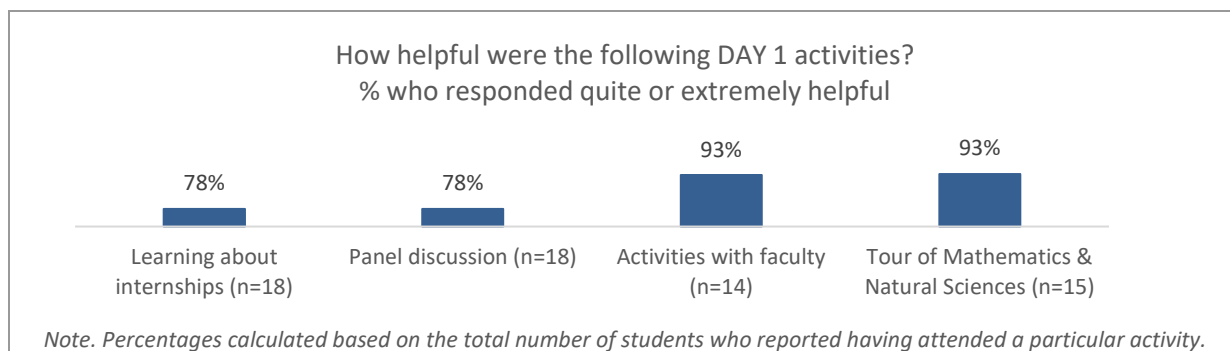
Sense of Belonging Construct		Pre		Post	
		Count	%	Count	%
How well do people at San Diego Mesa College understand you as a person?	Do not understand me at all	0	0%	0	0%
	Understand a little	5	23%	2	10%
	Understand somewhat	10	45%	7	35%
	Understand quite a bit	5	23%	8	40%
	Completely understand	2	9%	3	15%
	Total	22	100%	20	100%
How connected do you feel to the staff at San Diego Mesa College?	Not at all connected	1	5%	0	0%
	Slightly connected	6	27%	2	10%
	Somewhat connected	7	32%	4	20%
	Quite connected	6	27%	10	50%
	Extremely connected	2	9%	4	20%
	Total	22	100%	20	100%
How welcoming have you found San Diego Mesa College to be?	Not at all welcoming	0	0%	0	0%
	Slightly welcoming	1	5%	2	10%
	Somewhat welcoming	6	27%	1	5%
	Quite welcoming	5	23%	6	30%
	Extremely welcoming	10	45%	11	55%
	Total	22	100%	20	100%
How much respect do other students at San Diego Mesa College show toward you?	No respect at all	0	0%	0	0%
	A little bit of respect	1	5%	2	10%
	Some respect	8	36%	5	25%
	Quite a bit of respect	11	50%	8	40%
	A tremendous amount of respect	2	9%	5	25%
	Total	22	100%	20	100%

Institutional Research

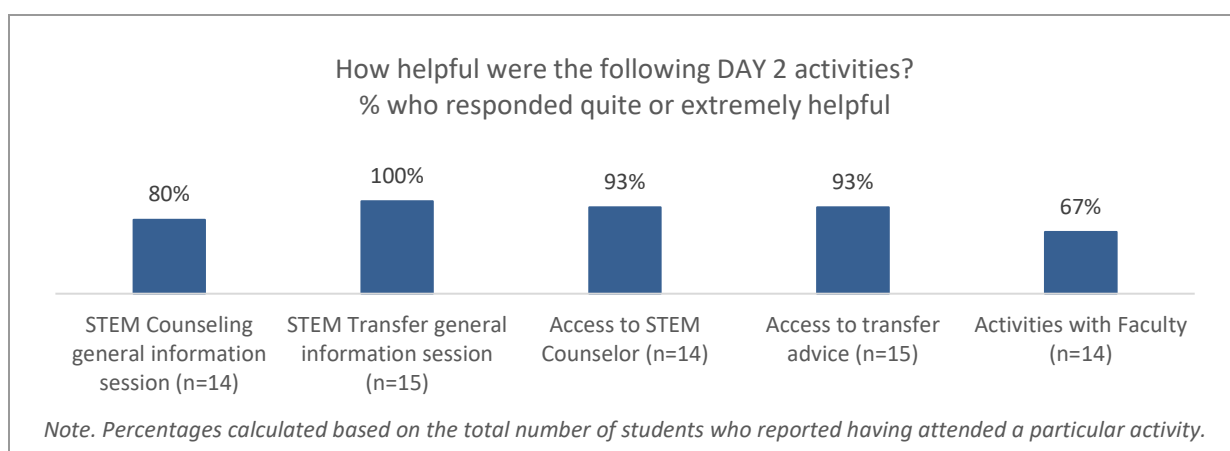
How much respect do members of staff at San Diego Mesa College show toward you?	No respect at all	0	0%	0	0%
	A little bit of respect	1	5%	2	10%
	Some respect	3	14%	3	15%
	Quite a bit of respect	10	45%	6	30%
	A tremendous amount of respect	8	36%	9	45%
	Total	22	100%	20	100%
How much do you matter to others at San Diego Mesa College?	Do not matter at all	0	0%	0	0%
	Matter a little bit	4	18%	3	15%
	Matter somewhat	9	41%	5	25%
	Matter quite a bit	8	36%	10	50%
	Matter a tremendous amount	1	5%	2	10%
	Total	22	100%	20	100%
How happy are you with your choice of attending San Diego Mesa College?	Not at all happy	0	0%	0	0%
	Slightly happy	0	0%	1	5%
	Somewhat happy	1	5%	3	15%
	Quite happy	10	45%	2	10%
	Extremely happy	11	50%	14	70%
	Total	22	100%	20	100%

Feedback:

- Day 1:
 - Among the respondents who attended the information session about work-based learning and internships, 78% found learning about internships quite or extremely helpful (n=18).
 - Among the respondents who attended the panel discussion, 78% found it quite or extremely helpful (n=18).
 - Among the respondents who participated in the activities with faculty, 93% found it quite or extremely helpful (n=14).
 - Among the respondents who participated in the tour of the Mathematics & Natural Sciences building, 93% found it quite or extremely helpful (n=15).
 - When asked about what was the most valuable aspect of the student's Path to STEM Success experience, the second most mentioned theme was meeting with faculty.
 - When asked about what suggestions respondents had for improving the orientation experience, one student said that they "want to see a little more internship stuff." Two other respondents gave recommendations for the panel, including stating what the panel will be talking about specifically, and having a more organized panel that only requires panelist to answer questions that are relevant to them. Another respondent said they would have liked to attend a small lecture to see an example of how professors teach.

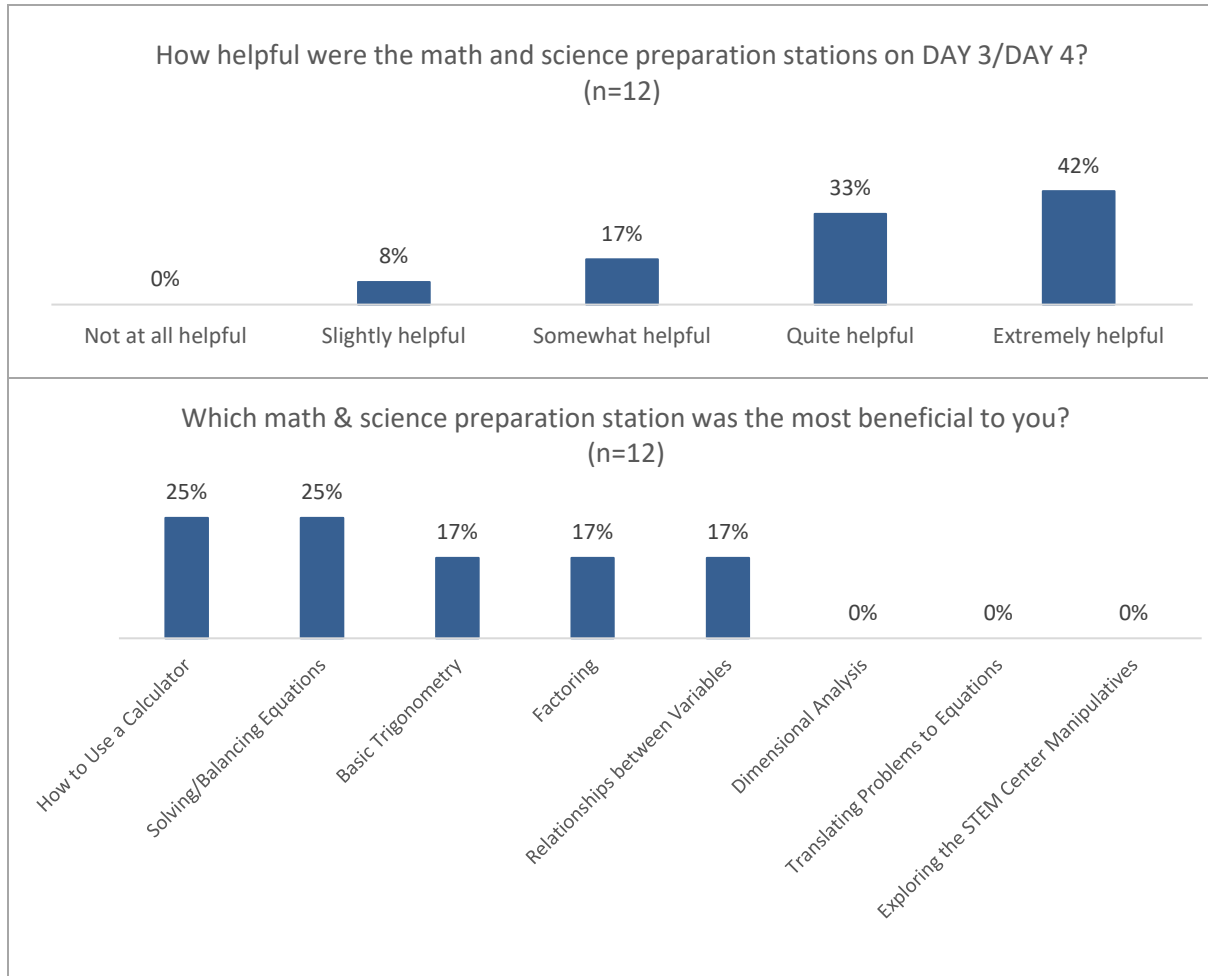


- Day 2:
 - Among the respondents who attended the STEM counseling general information session, 86% found it quite or extremely helpful (n=14).
 - Among the respondents who attended the STEM transfer general information session, 100% found it quite or extremely helpful (n=15).
 - Among the respondents who had access to a STEM Counselor, 100% found it quite or extremely helpful (n=14).
 - Among the respondents who had access to transfer advice, 93% found it quite or extremely helpful (n=15).
 - Among the respondents who participated in the activities with faculty, 71% found it quite or extremely helpful (n=14).
 - When asked about what was the most valuable aspect of the student's Path to STEM Success experience, the most mentioned theme centered around information about and access to counseling and transfer advice.
 - When asked about what suggestions respondents had for improving the orientation experience, one student suggested "having time to go to the counseling offices and schedule a 1hr appointment."



- Day 3 & Day 4:
 - Among the respondents that attended either Day 3 and Day 4 activities, 75% found the math and science preparation stations quite or extremely helpful (n=12).

- Among the respondents who attended either Day 3 and Day 4 activities, the preparation stations that they found the most beneficial were solving/balancing equations and how to use a calculator, both selected by 25% of respondents (n=12).
- When asked about what suggestions respondents had for improving the orientation experience, one student suggested more encouragement for students to rotate the stations. The same respondent also reported that people picked one station and would just talk among each other when they were done.



For Further Inquiry:

1. Overall, students who participated in Path to STEM Success felt more prepared for their fall classes, took important steps to follow the STEM path (e.g. make an appointment with an academic advisor or updated their academic plans), and increased their sense of belonging. How can the program reach a greater number of Latinx students in the future to reduce equity gaps?
2. Participation declined as each day passed. How can the program be restructured to ensure that the most valuable components of the program reach the largest number of students?

3. A large number of participants attended CRUISE or are part of the Promise program, were they likely also received information about different services and resources at Mesa College. What can the program do to also reach out to students who are less likely to be aware of services and resources at Mesa?

References:

- Center for Higher Education Research and Scholarship. (n.d.). *Sense of Belonging Scale*. Imperial College London. Retrieved on July 11, 2022, from <https://www.imperial.ac.uk/education-research/evaluation/what-can-i-evaluate/sense-of-belonging/tools-for-assessing-sense-of-belonging/sense-of-belonging-scale/>
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- McDonald, M.M., Zeighles-Hill, V., Vrabel, J.K. & Escobar, M. (2019). A Single-Item Measure for Assessing STEM Identity. *Frontiers in Education*, 4:78. doi: 10.3389/educ.2019.00078.

Open-Ended Questions

What was the most valuable aspect of your Path to STEM Success experience?	Count	Counseling /Transfer	Meeting faculty
All of it. It was great to meet an entire team of people that were so enthusiastic and supportive. The knowledge that I can utilize both this entire team and all the available resources changed my perspective on how attainable a major in any of these fields will be. I also really enjoyed getting to talk to the Professors about their varied fields of expertise. I also benefited greatly from the tutoring we were provided on day 3 and 4. I think this was an entertaining and truly helpful experience beginning to end.	1		1
Everything on day one and 2 was extremely helpful. I learned a lot about services and transfer that I knew nothing about. I loved getting to speak with different Professors and find who I mesh with best.	1	1	1
Getting to know a engineering professor and knowing exactly what classes I should be taking.	1		1
Getting to know the faculty, internships work study, and and transfer advice	1	1	1
Guest Speakers on Day 1	1		
I liked meeting students as well as getting to know the campus and the faculty. The best activity was talking in a small group with the two STEM counselors, Patti and Guillermo.	1	1	1
I think the small groups of different professors teaching these classes.	1		1
Learn new things that are available to the students at Mesa.	1		
Learning about all the transfer and counseling resources available	1	1	
Letting us have an opportunity to try and see how much help we need for these classes.	1		
Meeting faculty, helpful info regarding internships, transferring, and other career stuff, listening to the panelists' experiences	1	1	1
Talking to STEM counselors about what websites/programs to use for schools that you want to transfer to.	1	1	
The amount of resources that we had and could use at any given time.	1		
To learn about medicine career	1		
Transfer center	1	1	
transfer/class info from day 2	1	1	
No response	4		
Total	20	8	7

Institutional Research

What suggestions do you have for improving the Path to STEM Success Orientation experience? (For example: timing, structure, layout, content, etc.)	Count
Everything was great.	1
Having time to go to the counseling offices and schedule a 1 hr appointment	1
I think it all went well and I kinda want to see a little more internship stuff.	1
I was only disappointed on your behalf about the turnout of students. I think you all did an incredible job and I couldn't feel more excited about the upcoming time at Mesa. Thank you all for your effort and for organizing this, it benefited me in ways I didn't even expect (specifically in finding so much support in asking questions and getting help). This experience is completely different from the less personal, anonymous previous college experiences I've had and I really can't thank you all enough. Great job!	1
I would like to have a bit of an example on how our professor teaches. Maybe a small lecture	1
Maybe stating what the panel will be talking about specifically.	1
On day 3 and 4 it was difficult to know what we were doing at the stations. People kind of picked one station and if they were done just talked among each other. I think it would be better with an encouraged rotation of the stations.	1
The panel discussion in particular was an opportunity for growth in the program. It could have been more concise, and better organized. The questions were not directly applicable to all of the panelists, and so it wasted time to have all of the people answering all of the questions. I did like having recent alumni answering questions.	1
N/A or nothing	5
No response	7
Total	20