Future GR.A.D.S. (Graduate & Advanced Degree Students); A Mentoring Program to Support Undergraduate Hispanic Seniors through the Graduate School Application Process.

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Susan Arnold Christian currently serves the Society of Hispanic Professional Engineers as a Manager for the Research & Innovation office. She helps lead the MentorSHPE and InternSHPE programs in this role. In her former roles she has served as the Assistant Director for the Center for the Enhancement of Engineering Diversity (CEED) at Virginia Tech in Blacksburg, VA from 2010-2020. Prior to joining Virginia Tech in September of 2010, she served as the Outreach Program Coordinator for the Women in Engineering & Science Program at Kansas State University from 2000-2010. She began her work in STEM outreach and student support at Girls to Women, a private not for profit in Kansas City, in the late 90's. She has also served on the board for WEPAN from 2012-2014. She earned her M.S. in Youth Development from the University of Nebraska and her B.S. in Family Studies at Kansas State University.

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Dr. Dayna L. Martínez currently serves as a Director of Research & Innovation at SHPE. In this role, she oversees the Equipando Padres program, pre-college programming, graduate programming, faculty development, as well as different aspects of research and data analysis.

An industrial engineer by training, before joining SHPE, Dayna was a faculty member in the Mechanical and Industrial Engineering Department at Northeastern University in Boston, MA after working at their Healthcare Systems Engineering Institute (HSyE) as a post-doctoral research fellow.

Native from San Juan, Puerto Rico, Dayna graduated with a bachelor's degree in industrial engineering from the University of Puerto Rico, Mayagüez Campus and then she completed a master's and PhD degree in Industrial Engineering from the University of South Florida in Tampa.

Being Hispanic and an engineer herself, Dayna has a passion for increasing Hispanic representation in STEM. She currently lives with her husband Andrés, their two sons David and Sebastián, and their miniature schnauzer Lucca in Winter Garden, Florida.

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Upon completion of her Bachelor of Arts degree in International Development Studies at UCLA, she began a successful career in banking and finance at Bank of America, Merrill Lynch. Driven to pursue a career in public service, she completed her MPA at California State Polytechnic University, Pomona, and MBA at Cornell Tech. She was a leadership fellow in the Southern California Leadership Network's Leadership LA program and recently completed her Diversity and Inclusion Certificate from eCornell. Currently, she is completing her doctoral studies at the USC Price School of Public Policy where she is a PhD Candidate.

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Andrea D. Beattie is a graduate from Texas A&M International University in Laredo, Texas, where she earned a Bachelor of Arts and Master of Arts in Political Science in 2011 and 2012, respectively. Currently she serves as a Manager, Research and Innovation at SHPE. In this role, she assists the organization with research, program evaluation, and data analytics.

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Ashleigh currently serves as a Director of Research & Innovation at SHPE. In this role, she leads the MentorSHPE, InternSHPE, ScholarSHPE, SHPE Academy, and professional development programs. She is passionate about helping college students form meaningful, goal-aligned connections with peers, professionals, and companies. To accomplish this, she uses a data-based approach to customizing best practices to fit the individual needs and goals of students and companies. Ashleigh has worked for a variety of higher education institutions (large, public 4-year; small, private 4-year; community college) in a myriad of roles and offices. This varied experience has provided her with a first-hand understanding of the challenges and barriers college students face related to success, persistence, and degree completion. This understanding is key to the successful design and implementation of higher education adjacent programming at industry partners. Ashleigh completed a BS in Biological Engineering at Kansas State University where she worked in the Women in Engineering and Science program. In this role, she witnessed the incredible impact targeted support and guidance can have for STEM students. She then completed an MEd in Higher Education Administration and a Graduate Certificate in Institutional Research at Pennsylvania State University.

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Dr. Kimberly D. Douglas is SHPE's Chief Research & Innovation Officer. She has over 25 years of experience as an engineering educator and designs programs and infrastructure for increasing the persistence and degree completion rates of STEM students, with a particular focus on the Hispanic and Latino community. Kimberly holds a Doctorate in Industrial and Management Systems Engineering from Arizona State University, and B.S. and M.S. degrees in Industrial Engineering and Management from Oklahoma State University. She has held tenured faculty appointments at Oregon State University and Kansas State University; her Professional Engineering license in the state of Oregon; and holds a DEI certificate from Cornell University. Dr. Douglas served as Editor-in-Chief of the Journal of Women and Minorities in Science and Engineering for 10 years and is a past President of WEPAN.

Future GR.A.D.S. (GRaduate & Advanced Degree Students); A mentoring program to support undergraduate Hispanic seniors through the graduate school application process.

Background/Motivation

The continuous development of the United States economy requires increased participation of its STEM workforce. While there is currently a STEM workforce supply shortage in some fields and surplus in others, there is consistently a shortage of STEM workforce supply for individuals with graduate degrees in engineering [1]. Hispanic people are a growing demographic in the United States population, and they are growing even faster in their representation in the labor force, where their growth accounts for "73 percent of the growth" in the labor force since 2010 [2]. As the fastest growing ethnic group in the United States, both in population and participation in the labor force, inequities faced by Hispanic people in education and the workforce must be of utmost importance to address the STEM workforce shortage and promote an equitable and efficient economy. As a result, public movements including a recent House of Representatives Appropriations Report expressed concern about the severe underrepresentation of Hispanic Ph.D. graduates in STEM [3]. Research has consistently shown that an increase in representation of doctoral graduates and institutional support at their post-graduation employer (typically a university or academic institution) are key to increasing the representation of minorities in STEM faculty roles [4]. To increase the number of doctoral degrees earned, there must be an increase in the number of Hispanic students entering graduate programs. According to the Engineering by the Numbers ASEE report, even though Hispanics represent 18.7% of the US population, only 9.2% and 6.1% of master and doctoral degrees, respectively, are awarded to Hispanic recipients [5]. Further, the numbers decrease again when faculty appointments are considered, where only 3.6% of faculty appointments in engineering are held by Hispanic professors.

Convincingly, increasing Hispanic representation in engineering graduate school and in engineering faculty positions is imperative to the success of the United States economy. Hispanic representation in both these settings provides critical role models and will likely attract more Hispanic students to graduate degree programs, encourage more young Hispanic people to pursue STEM degrees, and increase the number of positive classroom experiences for this subpopulation [6].

Research finds that students' persistence to graduate in engineering degree programs and pursuit of graduate education is tied to students' sense of belonginess in the academic institution, profession, and industry [7]. Moreover, Litzler & Samuelson suggests that student involvement in affinity-based student groups can increase student belonginess and persistence to graduation [8]. Moreover, Holloway-Friesen suggests that mentoring activities in particular increase "Hispanic graduate students' sense of belonging and academic self-efficacy" [9]. In response to the need of increasing Hispanic representation in STEM graduate degrees, Society of Hispanic Professional Engineers (SHPE) a non-profit dedicated to the advancement of the Hispanic population in STEM, developed a mentorship program aimed at supporting Hispanic student success in applying for acceptance into graduate school in STEM fields. This paper will discuss

the program's objectives, share results from pilot cohorts, and give information on future direction and next steps for this program and others alike.

Program Objectives and Description

Future GRADS' overall objective was to provide support for Hispanic undergraduates as they prepare to apply to graduate school accomplished via a one-on-one mentoring relationship. Mentors were faculty, post-docs, and graduate students that have gone through the graduate school application process (GSAP) themselves. The mentees were undergraduate seniors that were considering applying to graduate school.

By the end of the mentoring relationship, participants completed a written personal statement/CV, identified writers that could provide strong letters of recommendation, evaluated research experiences, addressed any mitigating factors such as GPA, and learned about any hidden knowledge regarding the GSAP and selection.

Platform

This mentoring program utilized an online platform, Chronus, to support matching and relationship management. Chronus allows for multiple mentoring experiences to be managed using common profile elements, as well as tailored aspects unique to a type of mentoring. The platform provided a space for the mentor and mentee to track the progress of their connection. It can be used through the computer browser function and/or via an app on the user's phone.

Emails, newsletters, and social media posts directed potential participants to the mentoring platform where they found general program information and could apply to participate.

Once participants were accepted into the program, there were four elements that helped drive their Future GR.A.D.S. connection.

1. Connection Plan – Future GR.A.D.S. utilized a ten-week connection plan that laid out the schedule with goals and tasks for each week. This connection plan included tasks for both the mentor and mentee regarding the goals, meetings, and surveys. For some tasks, email notifications were sent to the participants to remind them of the timeline. For other tasks, the platform also sent multiple reminders if the task went uncompleted.
2. Messaging Portal – The messaging portal allowed participants to communicate in a thread viewable in their connection. This single continuous thread is convenient for tracking.
3. Meeting Tracker – Participants were encouraged to link their calendars to their profile in the portal. If participants took that step, they were able to see when their partner was available and more efficiently book meetings. If they booked the meeting through the portal, it would send calendar invites with the link for the meeting to their personal or work calendars they had connected. If participants selected to meet outside of the portal (e.g., phone, Teams, Zoom), they could log past meetings in these elements. This was another useful tool in tracking the connection activity for evaluation purposes.
4. Goal Tracker – While there was a standard set of goals for the program participants, this element allowed the mentee to personalize the goals and list specific tasks under each goal. The mentor could also make comments on each goal and task. This communication element supported connections between meetings and priorities for further discussion at the pair's next meeting.

The Chronus platform allowed for tracking of connections from various views. Reports could be tailored to view engagement from the perspective of messaging, meetings, and goal progress. Reports on surveys were also available including submission content and missing submissions.

Formative evaluation was used to make improvements to program elements and to the portal overall to make it more user friendly and effective. Communicating these improvements with the participants led to more connections using the portal for better tracking metrics. This communication was vital because participants could be reluctant to accept another app in their life. Communicating the rationale and the importance of the data increased user willingness to utilize the platform.

Matching Criteria & Process

In the mentor and mentee applications demographic and academic/professional information was collected and used in the matching process.

Three criteria were utilized to match mentors with mentees. The matching objective was to give the connection a strong balance of experience with types of institutions, desired degree paths, and disciplinary expertise. This allowed mentors to share information that is not common knowledge (e.g., hidden knowledge) due to the differences in the approach to evaluating graduate school applications and variations in the application cycle on different campuses.

Table I shows the criteria that were used to match mentors and mentees with the corresponding weight assigned in the matching algorithm.

TABLE I

MATCHING CRITERIA AND ASSIGNED WEIGHTS

Criteria	Weight
Degree Path	35%
Carnegie Classification	35%
Discipline	30%

Degree Path

Mentees were asked what type of degree they were planning to pursue. Mentors were asked what types of degree paths they felt comfortable mentoring. The multiple-choice answers for mentees were: 1) Combined Masters & PhD; 2) Masters; 3) PhD; or 4) Not Yet Decided. The "not yet decided" was mapped on the mentor application as referring to the mentee's planned degree path. This choice from the mentor would mean they were comfortable mentoring someone who was not yet sure of their degree path. This criterion was weighted at 35% in the matching algorithm.

Carnegie Classification of Institutions of Higher Education

A criterion was needed for matching that aligned with the likely rigor of the graduate application process. Carnegie Classification was used as a surrogate for capturing differences by institution type. Mentees and mentors were provided links to the listing of universities with the Carnegie

Classification. Mentees were asked to which type of universities they were planning to apply. Mentors were asked about their familiarity with the application processes of the classification types. The multiple-choice answers were: 1) Tier 1 (very high research activity); 2) Tier 2 (high research activity); or 3) Both Tier 1 & 2. This criterion was also weighted at 35% in the matching algorithm.

Discipline

Graduate school application processes also vary by STEM discipline and can even vary by research area. Mentees were asked about their intended research field for graduate school. Mentors were asked for their current research field and what research fields they were comfortable mentoring. This criterion was weighted at 30% in the matching algorithm making it marginally the least important criterion in the matching process.

After the platform offered matching recommendations using these criteria and weights, the administrator had the opportunity to utilize additional criteria to finalize matches. Specifically, geographical location using time zone was incorporated to see if there could be any adjustment to pairings without decreasing their match percentage. The intention was to try to make scheduling meetings as easy as possible.

Once the matching was complete, mentors and mentees were notified. The connection start date was the date this email was sent, and the end date was calculated to be ten weeks later. The start date also established appropriate deadlines for each goal and task in the connection plan. This schedule was visible to both mentor and mentee on the mentoring platform.

Recruiting and Participant Selection

The recruiting process started by sending a Save the Date to target participants through SHPE's marketing to increase program awareness. This was primarily done through membership lists using mail merge to send personalized messages. A shortform was also used to collect information from those interested in hearing more and helping with a beta test on the platform.

A few months after the Save the Date, applications officially opened and participants were given a period of approximately three weeks to apply. To recruit both mentors and mentees, a personalized email was sent to all participants that matched the criteria to participate in the program. LinkedIn campaigns for all SHPE members and connections with faculty and current graduate students were also used to spread the word.

Fig. 1, shown on the next page, is an example of a LinkedIn post that was created. It was shared mainly by SHPE staff that have connections with those noted as candidates for both mentors and mentees.

The majority of participants heard about the program through personalized mail merge emails. All mentee candidates that could be supported were accepted. Only one was declined due to the timing of when that applicant was planning to apply to graduate school. A wait list was created for those mentee applicants that the program did not have enough mentors to accommodate, and those applicants were the first invited to participate in the next cohort.

To aid in the recruitment of mentors, they were offered an honorarium because of the time commitment required beyond a traditional mentoring program.
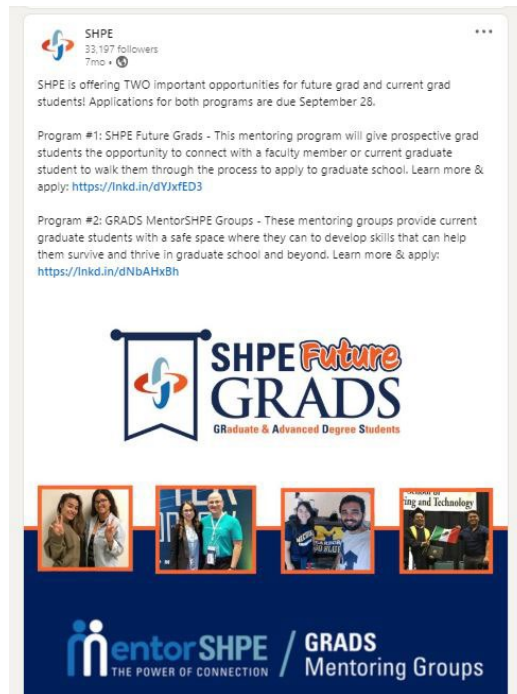
Fig. 1. Social media post to recruit participants.

Trainings and Orientations

Orientations were offered to both mentors and mentees and are described below.

<u>Mentor Training</u>

Mentors were trained to guide and coach their mentees through the GSAP and give feedback along the way on everything from creating a strong personal statement to how to handle mitigating factors like a low GPA. These meetings were recorded for mentors that were not able to attend live.

The orientation had the goals of creating community among the mentors, overview of the program content and timeline, training on the Chronus platform, and mentoring best practices. The meeting started with introductions allowing each mentor to share a little about themselves as well as learning more about the staff organizing the program. Information was also shared on SHPE's graduate student membership to demonstrate the case for needed growth in the number of Hispanic students in graduate programs.

The next part of the orientation focused on the overview of the program details, and a list of deliverables and goals for the mentees was shared. Deliverables that were discussed included a completing a written personal statement, identifying writers that could provide strong letters of recommendation, evaluation of research experiences, addressing mitigating factors such as GPA, and understanding any hidden knowledge regarding the GSAP and selection. At this point mentors were also asked for input on suggestions for improvements to the list. The result of this conversation was the addition of a completed CV and diversity statement to the list of deliverables.

After an agreement on the list of goals, the schedule for the 10-week connection and the list of expectations for the mentors was addressed. The orientation concluded with a discussion centered around the mentoring model utilized by this program where the mentee is expected to take ownership of the relationship while the mentor guides and gives feedback.

<u>Mentee Orientation & Kick Off</u>

A mentee orientation and program kick off was hosted virtually and recorded for those that were not able to attend.
Some of the content from the mentor orientation was also replicated at this event for the mentees. In an effort for both parties to hear the same information, the same intro information was shared about the need for the program, the schedule of the connection, deliverables for the mentee and the Chronus platform.

The mentoring model was then shared highlighting the focus on the mentee's expectations and their role to drive the relationship. It was reinforced that the mentees were explicitly responsible for scheduling the meetings and planning the agenda for each meeting. A schedule document was shared that included a suggested plan for each week of the connection to accomplish the goals and deliverables.

The orientation also covered best practice advice on how to get the most out of the mentoring experience focused particularly on being prepared to connect, learning to ask questions to the mentor, and listening for examples that connect with their goals, being open and honest in the communication, and periodically assessing and reflecting with their mentor to make sure both parties were bringing what the other needs to the connection.

At the end of the meeting, any mentoring pairs who were present were encouraged to take time to meet in breakout rooms.

Meetings

The mentoring relationship lasted for 10 weeks. Table II, shown on the following page, includes the suggested meeting schedule that was shared with participants. This schedule was based on the model of seven meetings within the 10-week timeframe. Knowing that it likely would not be possible to meet each week and that some tasks the mentee needed to work on would take some time. This design was intended to avoid pressure for the mentee to produce deliverables each week, and with the understand that there would be some exchange of messages in between meetings where the mentee would send, for example, their drafted personal and diversity statements to the mentor for feedback. The cadence of meetings not happening each week gave each mentee time to produce materials and the mentors time to provide feedback.

During the first meeting, it was suggested to use the time to introduce themselves, set the goals for the mentoring relationship and discuss the Mentoring Partnership Agreement. This agreement document outlined the aspects of the relationship to have a healthy connection. The first topic in the agreement related to the frequency of communication and specifically what was the appropriate amount of time for message responses. The second topic was to come to an agreement on the frequency and duration of meetings. It was recommended that meetings last at least 30 minutes to be fruitful and again restated that mentees should be responsible for the agenda. The third topic was on the modes of communication, Chronus platform or other tools,

they agreed to use. The last two topics were for the top three expectations of the mentor and the mentee. Each party was asked to share their top expectations of each other. It was also recommended that the participants revisit the agreement and make changes when it was necessary to keep the connection productive and healthy.

TABLE II

SUGGESTED MEETING SCHEDULE WITH TIMELINE AND TOPICS

Meeting	Suggested Topics
Meeting #1	• Introductions • Personal Goal Setting • Mentoring Partnership Agreement Discussion

Meeting #2	• Discuss progress on timeline checklist:
	   ○ GRE
	   ○ List of programs they are applying to
	   ○ Letter of recommendations progress
	   ○ Communities & Mailing Lists Status
	   ○ Planned conferences to attend/campus visits
	   ○ CV Status/Personal Statement
	• Create meeting plan for areas of work needed

Meeting #3	• Continue working on timeline checklist and personal goals • Address any mitigating factors such as GPA that are potential challenges
Meeting #4	• Continue working on timeline checklist and personal goals • Evaluating research/fellowship experiences
Meeting #5	• Continue working on timeline checklist and personal goals • Explore hidden knowledge topics
Meeting #6	• Continue working on timeline checklist and personal goals
Meeting #7	• Evaluate progress overall

Surveys and Evaluations

The program implemented a series of evaluation touch points to gauge involvement level as well as program design and support satisfaction. There was also a virtual midpoint meeting with the mentors and program staff to talk and share lessons learned as well as ideas for improvements. Survey data collected from mentees were designed to evaluate the transformative learning process that occurred as students gained information and adjusted their thinking and materials for the GSAP.

Two-week Check-In

This short survey helped SHPE gauge the user comfort with the Chronus platform, the connection plan, supporting materials in the resources section, emails and the training/orientation that was provided. The survey was the same for both mentors and mentees.

The survey also asked about the comfort level of the mentoring partner with whom they were paired. If a participant indicated a lower level of comfort, the survey asked if they would like to be rematched. Program staff could see this information and reach out if someone indicated this on the survey to start next steps.

The survey also asked if they had begun to set goals for the connection as a temperature check and a reminder to the participant. The final question was an open-ended question asking for any other feedback they would like to share.

Mid-point Check-In and Meeting

The checkpoint survey occurred at the halfway mark in the connection plan. The survey instrument was slightly different for the mentor and mentee. The difference in the instrument for the mentor and mentee occurred in the first question. For the mentor, the question checked on the mentor's perception of the mentee's progress towards their goal completion. For the mentees, the question asked for a rating of their own progress towards accomplishing the goals.

The remainder of the survey asked for overall satisfaction with the partnership and again checked for a desire for a rematch if the satisfaction was scored low. Other questions focused on the connection plan usefulness and program communications. The final question asked for qualitative feedback on suggestions for program improvement.

The program manager also hosted a mid-point check meeting with the mentors. The meeting focused on some of the open-ended feedback mentors provided in the midpoint survey and ideas for future improvements.

Closing Survey

There were again some common questions for both the mentor and mentee closing survey related to overall satisfaction with the mentoring relationship, goal achievement status, and overall program. Each area was also followed with an open-ended question for more qualitative data. Mentors were also asked their observations on any positive changes in the knowledge, skills, and experience of the mentee during the course of the relationship.

Mentees were asked to report on the number of meetings they held with their mentor, the topics they felt personal improvement related to graduate school applications, and status of goal achievement. They were also asked if they would like to continue involvement in the spring semester to work on interview skills for the application process and an updated list of schools they planned to apply to.

Focus Groups

A focus group was conducted at the end of the program to provide additional results focusing on the success of the program beyond perceptions of satisfaction provided by participants.
The focus group included seven participants (all mentees) who were previous participants in the Fall 2022 cohort of Future GRADS. They were designed and conducted by an external evaluator, and a high-level summary of the findings is provided below.

Results

Future GRADS pilot was implemented during the Fall of 2022 with 26 mentees and 23 mentors. The program entailed a one-on-one mentorship relationship, hence, three mentors had two mentees. The relationship was set to last three months with the option to extend the relationship to guide through the interview process. One of the pairings extended their mentoring relationship through January 2023. The program had a total of over 600 interactions in messages, meetings, tasks completed, and survey responses.

For this cohort, 53.85% of mentees identified as male, 42.31% identified as female and 3.85% identified as non-binary. For the mentors, 60.87% and 34.78%, identified as male and female respectively, while 4.35% chose not to identify. 69.23% of mentees and 60.87% of mentors self-identified as a first-generation-to-college student. 76.92% of the mentees and 96.65% of mentors identified as Hispanic, Latino or Spanish origin. Most of the mentees identified their ethnic origin as coming from Mexico, followed by Puerto Rico and Guatemala. The majority of mentors also identified their ethnic origin as Mexico, followed by El Salvador and Spain.

Survey Results

For the 2-week check-in survey, 100.00% of mentors and 57.70% of mentees completed it with 50.00% indicating that the software was either very easy or extremely easy to use, and the other 50.00% indicating that it was either moderately or slightly easy to use. They were also asked about the usefulness of different program elements, and results are reported in Table III. As noted, most program participants rated all program elements as moderately, very, and extremely useful.

TABLE III

TWO-WEEK CHECK-IN: PROGRAM ELEMENTS USEFULNESS RESULTS

	Connection Plan Tasks and Suggested Activities	Reference Materials and Attachments	Program-related Communications and Emails	Mentor/ Mentee Training
Extremely Useful	28.95%	28.95%	36.84%	23.68%
Very Useful	31.58%	15.79%	23.68%	31.58%
Moderately Useful	28.95%	42.11%	21.05%	31.58%
Slightly Useful	7.89%	7.89%	18.42%	13.16%
Not at all Useful	2.63%	5.26%	0.00%	0.00%

When asked about their comfort with the mentor/mentee pairing, 92.11% reported to be very or extremely comfortable. At this point, participants could ask to be rematched, but nobody asked for a change. At the two-week mark, 65.79% had already set their goals for the mentoring relationship and 26.32% had already started talking but haven't formally set goals yet, only 7.89% hadn't connected at all.

Five weeks in, a mid-check-in survey was conducted. For this survey, response rate declined slightly for mentors and significantly for mentees, with a 95.70% and 38.50% response rate, respectively. By this point, 9.40% reported to have completed their goals, 9.40% reported to be ahead of schedule, 71.90% reported to be on track, 6.30% reported to be behind, and 3.10% reported to not setting any formal goals yet.

At this point nobody asked to be rematched, and 90.70% reported to be satisfied or very satisfied with their mentoring pairing, the other 9.30% reported to be neutral. As with the two-week check-in, participants were asked to rate the usefulness of program elements, and results are reported in Table IV shown below. The majority of the participants still rated the connection plan, program communications, and relationship with partner very or extremely useful.

TABLE IV

MID-CHECK-IN: PROGRAM ELEMENTS USEFULNESS RESULTS

	Connection Plan Content	Program Communications	Relationship with Mentoring Partner
Extremely Useful	28.13%	34.38%	46.88%
Very Useful	34.38%	25.00%	40.63%
Moderately Useful	34.38%	37.50%	9.38%
Slightly Useful	3.13%	3.13%	0.00%
Not at all Useful	0.00%	0.00%	3.13%

A closing survey at the end of the mentorship relationship was also implemented. Only 85.71% of mentors and 20.00% of mentees completed this survey. At the close of the relationship, 84.00% reported to be satisfied or very satisfied with their mentoring relationship, with 12.00% reporting to be neutral and 4.00% dissatisfied. By the end of the program 52.00% reported to have achieved all their goals, 36.00% some, and 12.00% reported to not have set formal goals at all.

Mentees and mentors were also asked qualitative questions. For mentees, one of the questions was about the topics in which they were most interested. A list of these is provided in Table V. This list of topics informed the program goals for future cohorts; as well as what topics need to be covered in SHPE's other graduate programs. Mentees were asked to list the goals achieved during the program. These are listed in Table VI.

TABLE V

Topics of interest	
Being your authentic self	Budgeting and financial management
Managing gender role expectations	Financial aid/FAFSA
Understanding bias	Paying for college
Handling stress	Working while going to school
Issues with being first-gen-to-college	Considerations with changing majors
Managing emotional familial expectations	How to deal with micro-aggressions
Managing financial responsibilities	Whether to go to graduate school/MBA
Student loans	Improving time management
What do you wish you knew when you were in my position?	Managing financial familial responsibilities
Securing an internship	Tips and tricks to get a job
Understanding career path alternatives	Networking etiquette
Sustainable networking	Growth vs. fixed mindsets
What graduate programs are best for my career goals	

TABLE VI

GOALS ACHIEVED BY MENTEES

Goals achieved	
Create ranked list of graduate programs you are planning to apply	Have committed list of recommenders for letters of reference
Identified communities and mailing lists to subscribe to for resource and community building	Have finished CV
GRE Preparation or completion	Attended/planned conferences and participated in graduate recruitment activities

Mentors were asked qualitative questions, including what positive changes they saw in mentees. Mentors reported noticing changes in their mentee's writing skills, self-confidence in the application process, ability to make mature decisions, a better understanding of the GSAP, and the different pathways to a graduate degree. Quotes highlighting these improvements are included below:

1. *"I noticed that she was able to write better paragraphs and learn how to structure ideas."*
2. *"I am not sure if I directly lead to any changes in the mentee's skills or experience. The mentee has plenty regarding technical knowledge, skills, and experience. Where I think I did contribute was provided experiential knowledge of the application process and*

graduate studies in general (things they don't tell you up front). That's where I believe I was the most valuable. The mentee expressed her gratitude for having someone to help them proofread their essays."

3. *"I feel like her main challenge was her confidence in the process. I think she has an idea now of what she needs to do and is making progress in taking those steps for her future. Prior to this, she knew that she wanted to do more, but she was not sure what, or how to take those first steps. She has made great progress in the last few months."*

4. *"More involved towards the end of the program, more initiative and mature decisions were demonstrated."*

5. *"I observed a very positive change in my mentee, at the beginning of the sessions, my mentee did not have a strong idea about how to approach his application packet, and gradually, after the sessions, my mentee started to get a clearer idea of how to approach grad school applications and my mentee received my feedback and advice in a very positive way."*

6. *"Confidence, understanding of how to apply and prepare a robust application, and knowledge of different ways to pursue a Masters' degree."*

Focus Groups Results

Focus groups were also utilized to gather additional qualitative data to further explain some of the trends identified in the surveys.

Program Impact

Overall, the feedback from participants provided evidence that the program had a positive impact on them. There were four themes that emerged from the focus groups results. They are highlighted below:

- **Participants reported that they found it highly valuable to work with a mentor during the program.** One respondent stated: "*I really liked the experience that your mentor had when it came to the whole application process, along with choosing which program would best suit your needs and your goals as well as financially and kind of where you are in your life. Same thing happened when it came to writing personal statements and writing a resume and how that differs from a typical professional resume to a graduate resume when you're applying. So having that type of experience was extremely helpful, especially coming from a university where that type of knowledge isn't really gone through in too much detail, and there's not really any guidance that was given. Having that person there to ask and help you along the way was really exceptional, and it was such a huge help when it came to actually applying and going through that whole process.*" Another said: "*My advisor* (mentor) *suggested I participate in a summer research program, and actually, she helped me with my proposal. It was a very good experience when someone who is not in your institution cares about you and gives you that guidance.*"

- **Participants reported that the mentoring connection directly helped them produce better deliverables and meet their goals.** One respondent stated: "*They were amazing in providing me with the feedback that I needed to be able to excel in almost all my*

writing, from my resume to my personal statements. I guess they really did a really good job of giving me insights on what it is to write professionally, write academically, and gave me other pointers that I needed to excel in the next phase of my life. I don't know if I would have been able to produce the type of writing that I did without them." Another said: *"When it came to the statement of purpose, I had no idea, quite frankly, how to write one. Working with my mentor really helped me and gave me a clear idea of what is actually involved in that as well as resumes when it came to the graduate resume and how actually to prepare one. My mentor was super kind enough to provide his own resume that he used when he applied for graduate school. I feel if I didn't have that, I probably would've just gone with a typical college resume, which probably wouldn't have been beneficial for me."*

- **All the students met their goal of being prepared to submit or submitting at least one application.** For example, a student who submitted more than one application said, "*I applied for Ph.D. programs, and I submitted seven applications for PhDs. And my mentor also helped me with four fellowship applications as well.*" Another said, "*I submitted a total of ten applications, even though I missed a couple of deadlines cause a couple of schools moved their deadlines around.*"
- **Participants reported that it was important to them that the program helped them connect with other engineers who were members of the same communities.** One respondent stated: "*I really liked meeting another Latino engineer or STEM major at my school. I go to a predominantly white institution, so it is very difficult to find people from my culture with the same identity that I could relate to, and that can also give me guidance and a mentorship relationship.*" Another said, "*I would say the biggest thing for me was probably meeting another black and brown professional in the academia space. I often feel it's hard for us to get into those areas, especially the higher positions like Ph.Ds.*"

Participant Suggestions for Program Enhancements

During the focus group, participants were also asked for feedback and suggestions on program enhancements. Major themes are reported below:

- Participants would have liked to have been matched with a mentor in their own fields or other characteristics.
- Participants reported that they would like to see the program extended so that it begins earlier in a student's academic career.
- Participants suggested that the mentors should be provided with more direction for how to structure program time.

These recommendations have already been taken into account into the design for the Spring 2023 cohort.

Future Direction and Next Steps

Future GRADS ran a second cohort during Spring of 2023, with 25 mentors and 34 mentees. This cohort was extended to include juniors in response to feedback from mentors that Fall semester was too late for seniors to have time to create strong application materials to meet application deadlines. SHPE is in the process of looking for either a sponsor, grant, and/or partner to be able to provide participants with additional resources like GRE prep classes, GRE waivers, and application fee waivers.

As SHPE continues developing and improving the program, the goal is to begin supporting students during their freshman year with resources, webinars, and other activities that would allow awareness of the graduate school pathway to be provided earlier. Early exposure to the concept of graduate school will allow these students to jumpstart participating in activities that will allow them to have strong graduate school applications, such as research opportunities and publishing.

This program can also be generalized to other historically unrepresented communities as well as other STEM degrees. This program is designed to identify additional areas where Hispanic students struggle when applying to graduate school. The goal is to use this information to continuously improve the current program; as well as, to support the development of new interventions to fill any identified gaps.

Future GRADS also provides the opportunity to educate both mentors and mentees, not only in the topics pertaining the GSAP, but also in how to be good mentors for future generations, giving participants the opportunity to pay it forward once they are done with the process themselves.

Acknowledgements

We would like to express our sincere appreciation to Christine Paulsen for her contributions as an external evaluator of our program. Their expertise, professionalism, and constructive feedback have been essential to the success of this project.

In addition, we extend our gratitude to Cientifico Latino for their guidance in shaping our program. Their innovative ideas and expertise greatly enhanced the quality of our program and helped us achieve our goals.

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