Board 424: What Works: Intra-Institutional Partnerships and Processes for S-STEM Recruitment

Dr. Tamara Floyd Smith, West Virginia University Institute of Technology

Dr. Tamara Floyd Smith is a Professor of Chemical Engineering and Dean of Engineering and Sciences at West Virginia University Institute of Technology.

Dr. Kenan Hatipoglu, West Virginia University Institute of Technology

Kenan Hatipoglu is the chair and professor in the Department of Electrical and Computer Engineering at West Virginia University Institute of Technology. He completed his Master of Science degree in Electrical Engineering at the University of Louisville, Kentucky in 2008 and joined Tennessee Tech University in 2009 to pursue his Ph.D. in Electrical (Power) Engineering. He completed his graduate study in August 2013. He served as the WVU Tech IEEE student branch advisor between 2014 and 2018. He has been the IEEE West Virginia section chair/vice-chair since 2018. He served as Technical Committee Program Chair of the 49th North American Power Symposium (NAPS 2017) held in Morgantown, WV. He was a WVU IDEA (Innovation, Design, Entrepreneurship, Applied) Fellow and WVU TLC Faculty Associate for Assessment. He is currently a WVU Faculty Senator. He was a DoE visiting faculty member at Oak Ridge National Laboratory in the Summer of 2018 and 2019. He is an active member of IEEE (senior) and ASEE.

Kelly J Cunningham

What Works: Intra-Institutional Partnerships and Processes for S-STEM Recruitment

1 Abstract

Scholarships in Science Technology Engineering and Math (S-STEM) is a national program administered by the National Science Foundation (NSF). The purpose of the S-STEM program is to provide scholarships and programming to recruit, retain and graduate low-income scholars in STEM disciplines. S-STEM offers grants in three tracks: Track 1, Institutional Capacity Building; Track 2, Implementation by a Single Institution; and Track 3, Inter-Institutional Consortia. Currently, West Virginia University Institute of Technology (WVU Tech) has a Track 1 S-STEM project and is participating in an accelerator grant program administered by a Track 3 project at Virginia Tech.

Recruitment for S-STEM programs can be a challenge. To combat this challenge, the present study is part of a larger initiative to investigate intra-institutional partnerships and share findings broadly to help ensure that no eligible S-STEM scholars are overlooked in future S-STEM program recruitment efforts. Institutional partners at WVU Tech included the S-STEM principal investigators, financial aid, the Student Success Center where first year advising occurs, enrollment management where admissions is housed and university relations where marketing and communications is housed. The current study focused on efforts to recruit S-STEM scholars over two recruitment cycles.

To better understand current recruitment efforts, institutional partners and current S-STEM scholars responded to reflection prompts about their experience with recruitment. The sample included all institutional partners and 13 out of 14 scholars. The authors analyzed the written reflections using thematic content analysis with most findings relating to (1) factors in awareness and decision making, (2) reasons for applying, (3) hesitancies and potential barriers and (4) future opportunities and communication strategies. The study revealed that staff perspectives regarding what worked for students did not necessarily align with student perspectives. Students were informed and influenced both internally by institutional partners and externally by relatives and high school teachers. There was not one form of communication that was clearly most effective. Rather, each mode of communication (the website, emails, print materials and word of mouth) played an important role in reaching different groups of potential scholars. These and other findings from the study can provide guidance for future S-STEM and related programs to help ensure that partnerships are leveraged effectively, and recruitment efforts are successful.

2 Background/Introduction

2.1 NSF S-STEM Program

The Scholarships in Science Technology Engineering and Math (S-STEM) program is administered by the National Science Foundation (NSF). NSF cites the "American Competitiveness in the Twenty-First Century Act" enacted in 1998 in its description of the S-STEM program. S-STEM is one of several programs funded by H-1B visa fees that are charged to employers who hire foreign workers. The S-STEM program provides scholarships for low-income students studying in fields in which NSF provides research funding. In addition to the scholarship, funded programs include effective curricular and co-curricular components to help ensure the recruitment and retention of students in STEM. S-STEM offers grants in three tracks: Track 1 is capacity building and offers scholarships at institutions that have not previously had an S-STEM project; Track 2 is like Track 1, but it is a larger single institution award; Track 3 projects are for multiple institutions collaborating on a common S-STEM related goal [1].

2.2 Recruitment and Partnerships as Key Components of S-STEM Programs

Because the S-STEM program has strict requirements of financial need and academic talent, recruitment is a critical component for many S-STEM programs [3-12]. Directors of S-STEM programs often indicate working with intra-institutional partners like admissions, financial aid, university relations and related academic areas, such as honors colleges, to recruit students. They also frequently indicate partnering with high school counselors to recruit for S-STEM programs.

Smaller schools with correspondingly smaller recruitment pools may be more likely to experience recruitment challenges. Campbell University [5], for example, noted trying several different approaches for recruiting and commenting that "overall, it is difficult to determine the most effective strategies for recruitment." However, "because the student population is small, a strategy to encourage even a few students to apply is valuable." Recruiting can be challenging, but one of the benefits of strategic recruiting is the potential to shift the demographics of STEM programs toward more inclusivity [6]. Successful recruitment often requires adding new partners [8] or recognizing the strategic importance of certain partners [10]. The addition of new partners may be intra or inter-institutional, depending on the need. Recruitment for S-STEM programs is so important that it has prompted analysis of its effectiveness. Strawderman et al. noted that the S-STEM program didn't seem to attract students who were not already planning to attend the institution, but it did shift their interest in majors [9]. When evaluating why students who were offered the scholarship were not recruited, Jones et al. noted that some students were offered more money by other institutions or didn't have the institution as a first choice [12].

2.3 S-STEM Program at WVU Tech: Overview

In March of 2021, WVU Tech was awarded a Track 1 S-STEM project. The project targets low-income Electrical and Computer Engineering (ECE) and Computer Science and Information Systems (CSIS) students. The overarching goal of WVU Tech's S-STEM Track 1 project is to recruit, retain, and graduate students with high motivation and entrepreneurial mindset. Instilling these characteristics will increase the likelihood of employment in technology-based businesses and/or the creation of technology-based start-up ventures in the region. The program accepted the first cohort of students in Fall of 2021 and the second cohort in Fall 2022. The program will end in 2026 with 20 students graduating.

2.4 S-STEM Program at WVU Tech: Recruitment Process

Initially, the main recruitment activities were intended to reach high school seniors and convince them to apply for the scholarship program. Recruitment activities for cohort 1 included the following:

- The team developed a flyer (digital and print) with the help of the University Relations / Marketing (URM) office and shared it with high school senior career counselors across West Virginia. Also, the team obtained a list of science and math teachers for Southern West Virginia and contacted them about this opportunity. The WV Department of Education also helped the team reach more teachers and counselors.
- The Project team posted the flyer on social media and across campus on bulletin boards.
- The team developed a website and a special email account for the project.

Figure 1: S-STEM Flyer

After getting regular applications to the ECE and CSIS departments for

Fall 2021, the team started contacting those students by email and postcards. The URM office assisted with emailing students. The Admissions office assisted by mailing the informational flyer. The team received approximately 20 applications. However, after checking with the Financial Aid (FA) office, the team learned that most applicants were not eligible for a scholarship due to having no unmet need. There were 6 students accepted in electrical engineering (4), computer engineering (1), and computer science (1) programs in Fall 2021 after completing their interview process with the team. The team recruited 2 electrical engineering students and 1 computer science student into the S-STEM program in Spring 2022. The Spring cohort of students is small and doesn't represent a robust recruitment opportunity. Consequently, the recruitment phase was extended to include Fall 2022 to reach the goal of a total of 20 students.

To recruit the second cohort of students, the team began by meeting with university relations and marketing personnel to plan. The PI, Dr. Hatipoglu joined a radio interview with WJLS News Network about the NSF SUCCESS program, and the URM office interviewed Cohort 1 students and published the interview online [13]. Additionally, the team switched to a more targeted approach on recruitment and worked with the FA office very closely to identify all the admitted and current sophomore students in the 4 programs with an unmet need joining WVU Tech. The FA office provided a list of approximately 30 students, most of whom were CSIS, and the team started contacting the students via email and mail. The response rate was low, but the team did receive a few eligible applications before the semester started. Ultimately, the team took a more boots-on-the ground approach and recruited students out of the first-year seminars that senior personnel were teaching.

Recruitment efforts were successful. However, the experience of unresponsiveness led the team to reflect on why students were not responding to their emails / mail communications even though they were eligible for a scholarship of up to $10K. This reflection led to (1) the formulation of a research question on partnerships and S-STEM recruitment and (2) the submission of a proposal to receive an accelerator grant from a Track 3 program studying partnerships within S-STEM programs.

2.5 VA Tech Research on Organizational Partnerships in Education and STEM (ROPES) Project

Research on Organizational Partnerships in Education and STEM (ROPES) is a Track 3 S-STEM project that is based at VA Tech. ROPES seeks to improve understanding of intra and inter institutional partnerships that support pathways for S-STEM students. The research hub has several components including an accelerator grant program. WVU Tech was included in the first cohort of ten institutions. WVU Tech is one of two institutions in Cohort 1 whose project focuses on "building partnerships across different offices within a university" [2]. Other foci for accelerator grants include "recruitment partnerships across different institutional types," "building partnerships that have a community college component," and "building partnerships that have a student programming element" [2].

3 Research Question

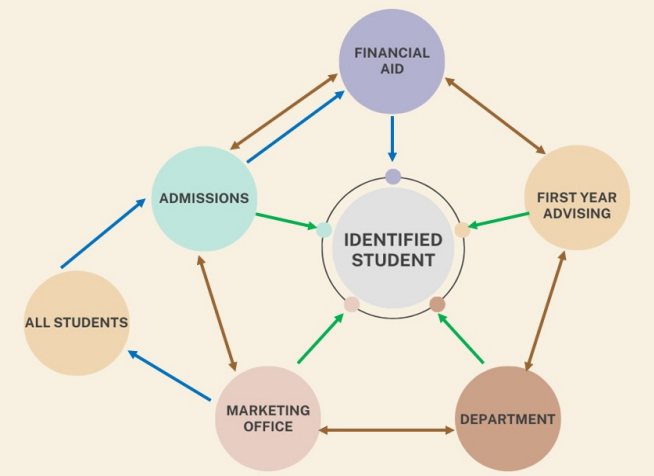

Figure 2: Pathways to Identify S-STEM Students (Blue arrows - identification pathway; Green Arrows - interacting with students after identification; Brown arrows - hypothesized intra-institutional partnerships to be mastered and sustained;)

Given the importance of recruitment to all S-STEM programs, the associated challenges, and the importance of partners to its success, the authors pursued the opportunity offered by the VA Tech ROPES project [2] to study partnerships. While the team viewed all partnerships as important, the goal was to study how to improve intra-institutional partnerships to enhance recruitment efforts. Pathways and hypothesized opportunities for improvement are presented schematically in Figure 2.

Research Question: How can intra institutional partnerships be designed in a way that no low-income Engineering and Computer Science (ECS) student is undetected and/or unsupported?

4 Methods

The research team used qualitative research to answer the research question. Data for the study included (1) minutes of two meetings of the intra-institutional partners and (2) student and partner responses to reflection prompts.

4.1 Data Collection

The team collected data through written reflections. Four out of four institutional partners responded and 13 of 14 students responded. Staff and students responded to the prompts listed below:

Staff prompts:

1. What was your role and your office's/department's role in making students aware of and apply for the scholarship program?
2. How did you and/or your office try to make students aware of and apply for the scholarship?
3. From your perspective, how did these efforts go?
4. What would you like to see in future recruitment efforts for future scholarship programs similar to this one? Why would you suggest these approaches?
5. From your interactions with students, what seemed to influence their awareness of the scholarship and intent to apply?

6. What gaps do you see in the current recruitment strategy?

Student Prompts:

1. When did you become an S-STEM scholar?
2. What is your department?
3. How did you first come to find out about the scholarships? What were your initial impressions?
4. How did you decide to apply? (What experiences, ideas, interactions, people and/or materials influenced your decision and made it seem like a good fit for you?)
5. After you found out about this program, was there anything that made you consider not applying?
6. How do you like to learn about opportunities like this scholarship and what do you think is the most effective way to make you aware of them?

4.2 Positionality

The researcher who completed the analysis was not involved with the administration of the S-STEM program at WVU Tech and had no prior interaction or affiliation with WVU Tech. The other two researchers are faculty at WVU Tech and PIs for the S-STEM grant.

4.3 Analysis

The authors used thematic content analysis to analyze the responses. Responses were read several times and notes and comments added. An initial scheme was developed to categorize response content and responses were coded and new categories created as needed. Response content was grouped by way of these codes, and themes were identified through an interpretation of these groups in context.

5 Findings

5.1 Factors in Awareness and Decision Making

5.1.1 People made a difference in the decision-making process for some students.

Family in Decision Making: For two students, after finding out about the scholarship and considering applying, discussing the opportunity with family members helped them decide to apply. This included support from family members in an engineering profession whom the student felt could help them succeed and who could write a letter of reference. In another case, discussions with a parent helped a student realize the importance of the scholarship.

School and University Community in Awareness: For other students, interpersonal interactions helped them first become aware of the scholarship. Some students (3) learned of the scholarship

from professors at the university. One student who was proactively searching for funding found out about the scholarship from a current scholar. Another was made aware of the scholarship from a high school science teacher.

Program staff in overcoming hesitancies: At least one student indicated applying only after program staff discussed the added requirements with them.

Additional Opportunities: Students mentioned individuals and offices they interacted with who they felt could have or should have been able to make them aware of the scholarship. This included high school teachers, high school guidance counselors, and university financial aid. Students look to these sources for broad and individual guidance.

5.1.2 Physical Media was an important factor in finding the scholarship and deciding to pursue a degree, especially for students with less exposure and resources for college.

A component of the recruitment strategy included mailings directed to students prior to enrolling at the university. Students emphasized the importance of these mailings in making them aware of the scholarship and the university and influencing their decision to attend the institution.

"I found out from a WVU Tech card in the mail. I had no idea that WVU Tech existed until I received this card and then researched the college. After seeing the ABET-accredited program for Computer Science, I became very interested and applied for the scholarship."

"I would like to note that, as a first-generation college student living in rural West Virginia, I did not know how to apply for colleges or what colleges constituted as good while I was in high school. So, I did not know what resources to look for. I believe that letter in the mail profoundly impacted me to who I am today."

It appears critical that such mailings emphasize the legitimacy of the program and a way to follow up and learn more. Students who indicated mailings as their introduction to the scholarship also indicated that the scholarship's financial support was the key influencing factor in them deciding to pursue a degree. Despite only 2 individuals in this group, the impact for these individuals and the alignment of their interest with S-STEM goals suggests a need for future recruitment efforts to include mailings to students before college application deadlines.

Posted flyers also helped make students aware of the scholarship. Flyers on campus can help pique student curiosity and help current students in need of aid find the scholarship. Others mentioned they thought it could have been beneficial if flyers had been posted. It is uncertain whether such students had the opportunity to see the existing posted flyers or not. Considerations of specifically where and when flyers were posted were not accounted for but could be useful to investigate in the future.

5.1.3 Personalized emails captured student interest.

Three students indicated learning about the scholarship via email. Two of these students indicated emails of a more personal nature rather than broad awareness campaigns. One remembered the name of the professor who contacted them and the other reported that the email let them know their eligibility for the scholarship. Only one of the students in the email group indicated financial need as a reason for seeking out the scholarship. The others indicated their major fulfilling their career goals and support the scholarship program could provide as reasons for applying.

"I got an email from [a PI]. My initial impressions were that I thought it was something I could join and would be worth being a part of."

5.1.4 Few students found the scholarship through their own proactive searches, despite students being aware of their own financial need.

The majority (10/13) of students found the scholarship through passive means. However, three students indicated that they were actively searching for funding opportunities. Two indicated finding the scholarship on the website via their own funding searches. A third indicated finding the scholarship when asking current students about their own funding after attempts with offices seemed to fail. Some students indicated that they found the scholarship only after beginning classes at the university and that they were still in financial need at that time. Because the scholarship recruited not only from potential new students but also from those already at the university, it helped meet this need.

"I was highly interested as there were many new financial troubles for my freshman year to deal with, and after I received eligibility about halfway through that year it became a great help to me."

5.2 Reasons for Applying

5.2.1 The financial aspect of the scholarship influenced student decisions to apply and accept.

Most students (10/13) indicated that financial support was a contributing factor to applying for or accepting the scholarship. For some it seemed to also influence their choice to go to college or to attend WVU Tech. For several, the scholarship was seen as path to meet their financial need. This group included students already on campus and those who had not yet enrolled.

"I applied because I was in need of financial support."

"I decided to apply for the scholarship because I was in need of financial aid and wanted to pursue electrical engineering. In the summer of 2021, I had been working on a farm and bussing tables at my uncle's restaurant, trying to get some funds together so that I wouldn't have to worry

about taking out loans in the 2021-22 school year. Once I learned of the scholarship, I applied, hoping it could be the answer to my prayers and bless me with a free education."

5.2.2 Career alignment and support were less influential factors.

Some students indicated that the support promised by the program or its alignment with their major and career goals influenced their decision to apply. The support offered by the program was seen as a bonus to the financial support:

"The SUCCESS Scholarship already was important to me as financial aid, because my EFC is 0, meaning I need all the aid I can get. The support network that came with the scholarship though, was especially appealing to me as someone that appreciates help from those in STEM fields."

"The biggest reason [why] I applied was so that I could obtain more financial support, but I really liked the idea of having more overall support with my classes through each semester."

The scholarship being tied to their school and major was seen as a positive for students.

"it was offered specifically for my major and through WVU Tech, which I liked."

One student indicated the university was not their top choice, but the scholarship helped them choose the program "since it would also allow [them] to pursue computer engineering" and pursue a career they loved.

5.3 Barriers & Future Opportunities

5.3.1 Financial support and human intervention helped students overcome hesitancies in applying related to the application process and the requirements of the program.

Students expressed concerns about the application process such as having to get reference letters for the first time or considering it competitive. These factors made some hesitate to apply. The requirement of having to complete a business minor made some students consider not applying as well.

"I believe initially the idea of having to take more classes made me consider WVU Tech less."

"I heard that I may be required to take additional classes in business, which is something I can't really afford."

However, the amount of the scholarship helped some students decide to apply despite hesitancies.

"I almost didn't consider applying because I thought the program would be competitive. I was under the impression that it was exclusive, and that it might just be a waste of my time to go

through the application process. I was also a little hesitant because I needed references and had never done that before. However, I did apply in the end because of the amount of money offered."

For other students, discussing the need for the added courses helped sway them to apply.

"The only thing that made me hesitant was the business minor expectation. After listening to [a PI] talk about why it's necessary, I changed my mind."

5.3.2 Students indicated a multifaceted approach for future communications about scholarships would be beneficial.

Email: Email was regularly cited as a strategy for communicating future scholarship opportunities and regarded as useful for scholarship communications prior to enrollment. Some students suggested this as a strategy for communication with them, while others saw it as potentially appealing to other students.

"I never go out of my way to look for scholarships now that I am in college; the only ones I know about are the ones presented to me through emails basically."

"I personally, before I arrived at WVU Tech or afterwards, I always used my email to find opportunities or news about scholarships."

Even proactive students indicated email to get them to apply for scholarships:

"Typically, I prefer to look for scholarships (for example, I found this one), but if I am emailed a scholarship opportunity, I will consider applying for it."

Other Digital**:** Some students indicated other digital strategies as useful as well. For instance, one stated, "I check my texts more often than emails, so I would like to receive scholarship opportunities through text notification." Another indicated they would also "see opportunities through social media like Instagram."

Students suggested having the information on the website could also be helpful even if it wasn't needed for them.

"Fliers were helpful to me as an individual, but I also feel an electronic approach would be more beneficial for other students moving forward. The [electronic] approach via email, or the WVU Tech website will reach more commuting students on a daily basis that may not visit other areas of campus regularly."

Students indicated that physical media continues to be an important strategy to reach them. These indicated flyers posted on campus and opportunities continuing to be sent through the mail.

“I think the most effective way is to have them posted around campus and send out emails.”

Others indicated word of mouth can be one of several ways to reach them. One suggested this should specifically be “word of mouth from people whose opinions I value.”

One indicated they still preferred word of mouth, the way they found out about the scholarship, for future scholarship notifications and that hearing about the scholarship in a course with specific follow up action indicated by the professor made them “retain the idea in my head and made me more comfortable with following through with it.”

Timing: One student mentioned that the timing of when students are notified of opportunities makes a difference.

“I feel the most efficient time to learn about opportunities such as this would be during the summer or breaks. Often times when information is spread during classes, students are not able to make the adjustments needed to obtain eligibility for the program.”

New Partners: As discussed above, students also indicated that other partners could be better equipped to connect students with this scholarship at key points prior to enrollment. This included the university financial aid office in responding to students and high school teachers and guidance counselors in taking an active approach to promoting the scholarship before students apply.

“The only way I learned about scholarships before college was through the internet and my teachers. Google searches would come up with a few things, and teachers really pushed the Promise Scholarship as well as other state scholarships.”

Since Googling is a key strategy being promoted to students and used by proactive students, it may be advisable to attempt to optimize scholarship pages to clearly appear in results if possible. However, it seems integrated systems and stronger partnerships with staff in high school spaces and university financial aid would be beneficial as these are sources students go to but did not readily find the scholarship.

5.4 Staff

5.4.1 Staff efforts and perspectives on what worked for students did not necessarily align with student perspectives.

Staff mentioned new student orientation, in person discussions, and phone calls as influencing student decisions and awareness. However, these were not mentioned by students. Staff and students agreed that emails and mailings were influential and both mentioned faculty involvement playing a role. Staff agreed with students on an expanded multifaceted recruitment approach. Staff suggested a mix of recruitment practices could be useful for the future including mailings, email, and in person outreach to students who are still in high school. One staff member also suggested short video testimonials on the website and social media.

5.4.2 Process refinements could help reach more students.

On the practical side, staff shared the need for more efficient processes for identifying eligible students so that students may be made aware of and accepted into the scholarship program prior to key decision making. During intra-institutional partner meetings, team members suggested the addition of other partners such as personnel from federal TRIO programs to aid with recruitment.

6 Conclusions, Limitations, Implications and Future Work

The S-STEM in this study is a Track 1 project with a smaller number of students than a Track 2 or Track 3 proposal. Therefore, the sample size was limited. Additionally, the student perspective was limited only to those who became S-STEM scholars. Future work might consider investigating the perspectives of eligible students who did not apply for the scholarship. Despite the study limitations, the data suggest that the preferred communication mode varies by the individual student, and it is most effective to use multiple modes of communication. These modes include email, text, websites, the internet with searches optimized to the extent possible, social media and print materials that are mailed and posted on campus. The study particularly highlighted the importance of physical media to reach students in the S-STEM target audience who were not already planning to apply for college as well as the ability of S-STEM to meet the financial need of already enrolled students beyond the first year. Additionally, the study illustrates the importance of intra-institutional partners in recruiting S-STEM scholars who are both academically talented and have unmet financial need. These typically include financial aid, admissions, marketing and communication as well as advising centers and other areas that interact regularly with first year students. The study also highlights the need to expand these partnerships to additional intra-institutional partners such as TRIO and external partners like high school counselors. In this study, faculty, family, and high school mentors were seen to play key roles in the decision-making process. Expanding student access and interaction with informed individuals such as these may help students to act once informed of opportunities. Given that students in this study identified potential deterrents in the application process including a competitiveness or newness of process (reference letters) and program requirements, recruitment of S-STEM scholars may benefit from streamlined guided processes and assurances on program requirements. This is critical given that S-STEM programs regularly report low numbers of interested eligible applicants. The challenge is less about sifting through many applicants to find

the best, and more about ensuring eligible students are finding, applying for, and enrolling in S-STEM programs. Intra-institutional partners and external partnerships are key in helping to achieve this goal.

7 Acknowledgements

This material is based upon work supported by the National Science Foundation under Grant No. 2030707 and Grant No. 2138188. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

8 References

[1] https://new.nsf.gov/funding/opportunities/nsf-scholarships-science-technology-engineering (accessed February 8, 2024)

[2] D. Knight, B. Watford, W. Lee, J. Grohs, T.K. Reed, P.K. Imbrie, D. Grote, A. Richardson, M. Klopfer, S.J. Austin, B. Berhane, "Organizational Partnerships S-STEM Research Hub," The Harbor of Engineering Education for 130 Years: Proceedings of the American Society of Engineering Education Annual Conference, Baltimore, MD, June 25-28, 2023.

[3] H. Darabi, R. Nazempour, S. M. Reckinger, P. C. Nelson, R. Revelo, J. Abiade, D. Ozevin, A. Felder, B. Bilgin and Y. Siow, "An integrated program for recruitment, retention, and graduation of academically talented low-income engineering students." At Home with Engineering Education: Proceedings of the American Society of Engineering Education Annual Conference, Virtual, June 22-26, 2020.

[4] M. Ahmadian, "Influence of S-STEM funding: challenges and successes," Frankly, We Do Give a D*mn: Proceedings of the American Society of Engineering Education Annual Conference, Atlanta, GA, June 23-26, 2013.

[5] J. Gartner, M. Miller and A. M. Rynearson, "Lessons learned in an S-STEM program: how to improve recruitment and cohort building," Proceedings of the American Society of Engineering Education Annual Conference, Virtual, July 26-29, 2021.

[6] S. Atwood and K. DeGoede, "NSF S-STEM EPIC scholarship program," At Home with Engineering Education: Proceedings of the American Society of Engineering Education Annual Conference, Virtual, June 22-26, 2020.

[7] A. Miguel, "ECE Scholars: NSF S-STEM grant," 125 Years at the Heart of Engineering Education: Proceedings of the American Society of Engineering Education Annual Conference, Salt Lake City, UT, June 24-27, 2018.

[8] R. Kandiah, K. K. V. Nedunuri and E. Perdomo, "USE4WRM: recruitment and retention for environmental engineering and water resources management programs," 125 Years at the Heart of Engineering Education: Proceedings of the American Society of Engineering Education Annual Conference, Salt Lake City, UT, June 24-27, 2018.

[9] L. Strawderman, R.W. Sullivan and M. J. Mohammadi-Aragh, "Recruitment, mentoring and retention through the aerospace and industrial engineering (ASPIRE) scholarship program,"

125 Years at the Heart of Engineering Education: Proceedings of the American Society of Engineering Education Annual Conference, Salt Lake City, UT, June 24-27, 2018.
[10] K. Chen, J. Duerr, L. T. Schlemer, J.L. Lehr, E.E. Liptow, M.L. Singer and H. Finger, "Leveraging a NSF S-STEM grant to initiate "PEEPS" (Program for Engineering Excellence for Partner Schools) for recruiting and retaining students from underrepresented groups while covertly transforming ourselves and our university, Proceedings of the 2018 CoNECD – The Collaborative Network for Engineering and Computing Diversity Conference, Crystal City, VA, April 29, 2018.
[11] C.W. Ferguson, P.M. Yanik, Y. Yan and S. Kaul, "NSF S-STEM scholarship program initiative via recruitment, innovation and transformation: SPIRIT program year-one results," Jazzed about Engineering Education: Proceedings of the American Society of Engineering Education Annual Conference, New Orleans, LA, June 26-29, 2016.
[12] S.C. Jones, K.A. Rusch and W.N. Waggenspack Jr., "S-STEM ENG2 scholars for success 2007-2013," 360° of Engineering Education: Proceedings of the American Society of Engineering Education Annual Conference, Indianapolis, IN, June 15-18, 2014.
[13] https://www.wvutech.edu/news/2022/03/10/students-reaping-benefits-of-success-program (accessed May 1, 2024).