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Rising Scholars Program Cultural Lessons for Small-to-Moderate Sized Engineering Departments

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ABSTRACT. *The National Science Foundation established the Rising Scholars program at Purdue University to promote the cultivation of professional mentor support networks for qualified low socio-economic students in STEM fields. In collaboration between the Agricultural and Biological Engineering Department and the Minority Engineering Program, Rising Scholars students, in three cadres of 21 students total, were recruited from general admissions to the institution, who had previously expressed an initial desire for engineering. These students were provided with a defined path of activities in college designed to enhance their professional mentoring networks among STEM specialists. Rising Scholars students were provided with a partial scholarship and intensive academic guidance. These students participated in multiple networking and social activities sponsored by the program administrators. Academic results for the Rising Scholars students against their matched pair grouping for graduation rate and GPA will be presented. Students who socialized well and developed stronger social networks within the high-touch, student-centric environment fared better academically and outperformed their matched pair direct-to-engineering admits to the university. Small-to-moderate sized academic engineering departments are well-suited to provide a similar nurturing culture for support and belonging that can help all students succeed.*

Keywords. *collegiate culture; low socio-economic status; professional mentors; STEM disciplines, support networks.*

Introduction

The aspirational goal of public education within society should consist of a school system where all students are nourished and access to instruction is provided that will enable the learner to flourish according to his or her skills and ambition. In America, Jefferson originally envisioned a multi-tiered system that extended from the elementary levels through higher education (Allison, 1983). Following his presidency, he continued to support that vision by founding the University of Virginia (University of Virginia, 2024). Jefferson believed in a meritocracy, where mental ability would be recognized and

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educated to the fullest extent of its capability, for the good of society. Unfortunately, the reality today is that a college education is an expensive proposition (Holland, 2014; Weis et al., 2014). This oversized cost limits the representation of talented and worthy students of low socio-economic status (SES) (Mistry & Elenbaas, 2021). Low SES families are also less inclined to view education as an investment worthy of borrowing to acquire, thereby limiting their ability to break-out of the cycle of generational poverty (Payne, 2013).

When these wide-ranging tendencies are combined with first-generation collegiate status, the hurdles in front of low SES young men and women hoping to become STEM professionals are numerous (Major & Godwin, 2018; Jury, et al., 2017; Karimshah, et al., 2013). None-the-less, a significant enough number of students succeed with these demographics that they have become termed ‘Rising Scholars’ (Kent State University, 2021; Stanford University, 2020). These students represent the best and the brightest that Jefferson wanted educated to increase what he called ‘the mass of mind for the nation’. Experience at Purdue University has demonstrated that minority students having lower than recommended credentials, yet plenty of ambition and motivation, can successfully complete engineering degrees with the proper guidance and persistence (Baldwin et al., 2022a). Building upon that unconventional finding, a long term proposal was developed, and Purdue received S-STEM grant funding from the NSF in 2016 to determine the effect of mentor support networks and intentional mentoring on student success using a program of partial scholarship support and a recommended activity pathway through the institution. The climate created for these students at the university was a critical component of the program (Bastedo et al., 2019; Bastedo & Bowman, 2017; Holloway et al, 2014), and the lessons about climate and student interactions from this study are valid for small academic units.

The climate of an academic department can have a significant impact on students already struggling to adapt and fit into an unfamiliar culture (Baldwin et al., 2021a; Crosnoe & Muller, 2014). Key takeaways from the Rising Scholars (RS) program that can be used to help transform the climate in smaller engineering departments into a nurturing and stimulating environment for all students will be provided. The balance of this paper will describe the RS program at Purdue University and detail the performance of RS students against two sets of matched pair cohorts directly admitted into engineering or exploratory studies. The influence of culture within the academic environment will be explored, and comments from graduates of the Purdue program about the influence of culture on their academic success will be provided. The conclusions section will describe how the lessons from this experience can be utilized in shaping the overall climate of a small engineering department in a positive manner that encourages student success, particularly for the low SES students (Browman et al., 2017).

Program Overview

The overall RS program was based upon the premises that students with numerous people engaged as members of their mentoring support network are more likely to succeed and that the recruitment of mentors and the cultivation of a professional support network are skills that can be taught. The work was inspired by Mr. Derek Peterson, who studied secondary education success among indigenous peoples living within remote communities in Alaska (Peterson, 2016; Peterson, 2010). Peterson wanted to understand how villages with substandard educational systems that were clearly failing most students managed to occasionally produce doctors, scientists, and other professionals. His research demonstrated that the biggest correlation factor with academic success was the size of the student’s adult support network. He maintained that if a young person had at least five caring adults in their social circle, who had what could be termed ‘grade card rights’, then their academic success was almost guaranteed. Purdue University researchers have extended Peterson’s ideas to post-secondary students by encouraging the utilization of academic professionals within their own mentoring support networks.

The overall organization of the Purdue Rising Scholars program involved selecting high school students matriculating into higher education, who initially expressed an interest in engineering, but were denied admission into freshman engineering and came into the university through exploratory studies. The program filtered applicants for adequate and sufficient academic qualifications, grit, work ethic, an understanding of the power of mentorship, and financial need. Potential students applying to the program were pre-screened, invited to apply, and chosen based upon their high school transcripts, a written essay responding to prompts about persistence and work habits, and an interview with the selection committee. This process was used throughout the program and was previously detailed (Baldwin et al., 2022a). Three cadres of six, nine, and six were admitted into the program during the fall terms of 2017, 2018, and 2019. The demographics of the group were as follows:

- Gender: 9 - females and 12 - males;
- Residency: 18 - residentials and 3 - non-residentials;
- Ethnicity: 14 - Hispanic (1 with American Indian (AI) identity);
- Race: 3 - Black or African-American;
4 - Two or more race (3 with Black and 1 with AI identity); and
- First generation: 11 students.

A comparison of demographics and incoming metrics between the Rising Scholars and their engineering and exploratory studies matched pair students is included in table 1.

Table 1 - Demographics and incoming metrics of the Rising Scholar students and their matched pair students in engineering and exploratory studies.

	Rising Scholars	Engineering	Exploratory
RESIDENCY			
Non-Resident	3	4	4
Resident	18	17	17
GENDER			
Female	9	9	8
Male	12	12	13
ETHNICITY			
2 or more races	4	2	3
Black or African American	3	4	4
Hispanic/Latino	14	15	14
HIGH SCHOOL METRICS			
HS GPA	3.72	3.83	3.55
Max Verbal (SAT)	579	641	604
Max Math (SAT)	607	646	617
Max V+M (SAT)	1186	1287	1221

The program utilized a fairly defined path through the institution that primarily consisted of established activities which would introduce the RS students to multiple professionals who might potentially serve as mentors. A study of Purdue University graduates conducted by the Gallop organization determined that a close connection to a faculty member who showed a positive interest in them as a student had a significant impact on the way that the graduates felt about their entire collegiate experience (Raposa et al., 2021). The RS program operated in a manner that enhanced those potential contacts. Experiential activities which involved the students with numerous faculty and staff members were chosen for the pathway, along with specialized seminars concentrating on soft skills, career planning, and professional networking. Figure 1 illustrates the design of the program as the students moved forward toward their degrees (Baldwin et al., 2023).

Prior to the start of their freshman year, all RS students were enrolled in the highly regarded Minority Engineering Program (MEP) Academic Bootcamp (Purdue University, 2023; Dickerson et al., 2014). Students were given an opportunity to experience the rigor of collegiate-level STEM classes and understand the increased amount of work that courses within their planned major were going to require. Bootcamp experiences, if properly run, have been demonstrated to have longer-term positive effects on participants than other freshman orientation activities (Cooper et al., 2018a). Students were required to take annual seminars with MEP and RS administrators, which included topics on study habits, acquiring and maintaining mentor networks, career planning, and interviewing. Additionally, special events with unique activities or external speakers for RS students were also periodically scheduled throughout the students' time on campus to reinforce mentoring concepts (Baldwin et al., 2023; Baldwin et al., 2022b; Baldwin et al., 2021b). As rising sophomores, RS students participated in the on-campus Louis Stokes Alliance for Minority Participation (LSAMP) program which placed the students in faculty labs as members of their research teams (Purdue University, 2020). Most of the projects were selected for their linkage with the 'Grand Challenges', which today's college students feel a strong connection to (National Academy of Engineering, 2021). Students working in faculty labs became research team members, participated in internal discussions, witnessed research management and decision making, and developed contacts with professionals who could potentially serve as mentors (Baldwin et al., 2021c).

Rising juniors were scheduled to participate in a self-directed research project with RS program administrators. These experiences were designed to mimic the capstone courses in most engineering and technology programs. This involvement in managing a technical project was intended to occur before an actual capstone course within the traditional plan of a major, so that RS students could gain an understanding of project management and then potentially assume some leadership roles in the required curricular classes. Capstone experiences provide students with the opportunity to enhance their problem-solving skills, discover the benefits of working within a larger organization, and practice their communication and people skills (Stwalley, 2017; Stwalley, 2016; McCarthy, 2011; Bolton, 2006). In conjunction with the seminar classes, RS students developed manuscripts of their experiences, offering a chance to reflect upon what they had learned (American Journal of Rising Scholars Activities Volume 2, 2023; American Journal of Rising Scholar Activities Volume 1, 2022). Finally, experiential work activities outside the university were encouraged for rising seniors. Multiple studies have shown the benefit of collegiate professional work experience in helping to advance careers of entry-level graduates moving into the workforce (Chopra, 2023; Cooper et al., 2018b; Stwalley, 2006a; Stwalley, 2006b). The involvement of RS students in internship programs has been described previously (Baldwin Kun-age et al., 2024a; Baldwin et al., 2021d). Although not all program's participants were able to partake in external work experience activities, the overall pathway was specifically chosen to provide maximized contact with university and career professionals who could potentially become mentors to the

RS students. Feedback from graduates indicated that goal was well-attained (Baldwin Kan-uge et al., 2024a).

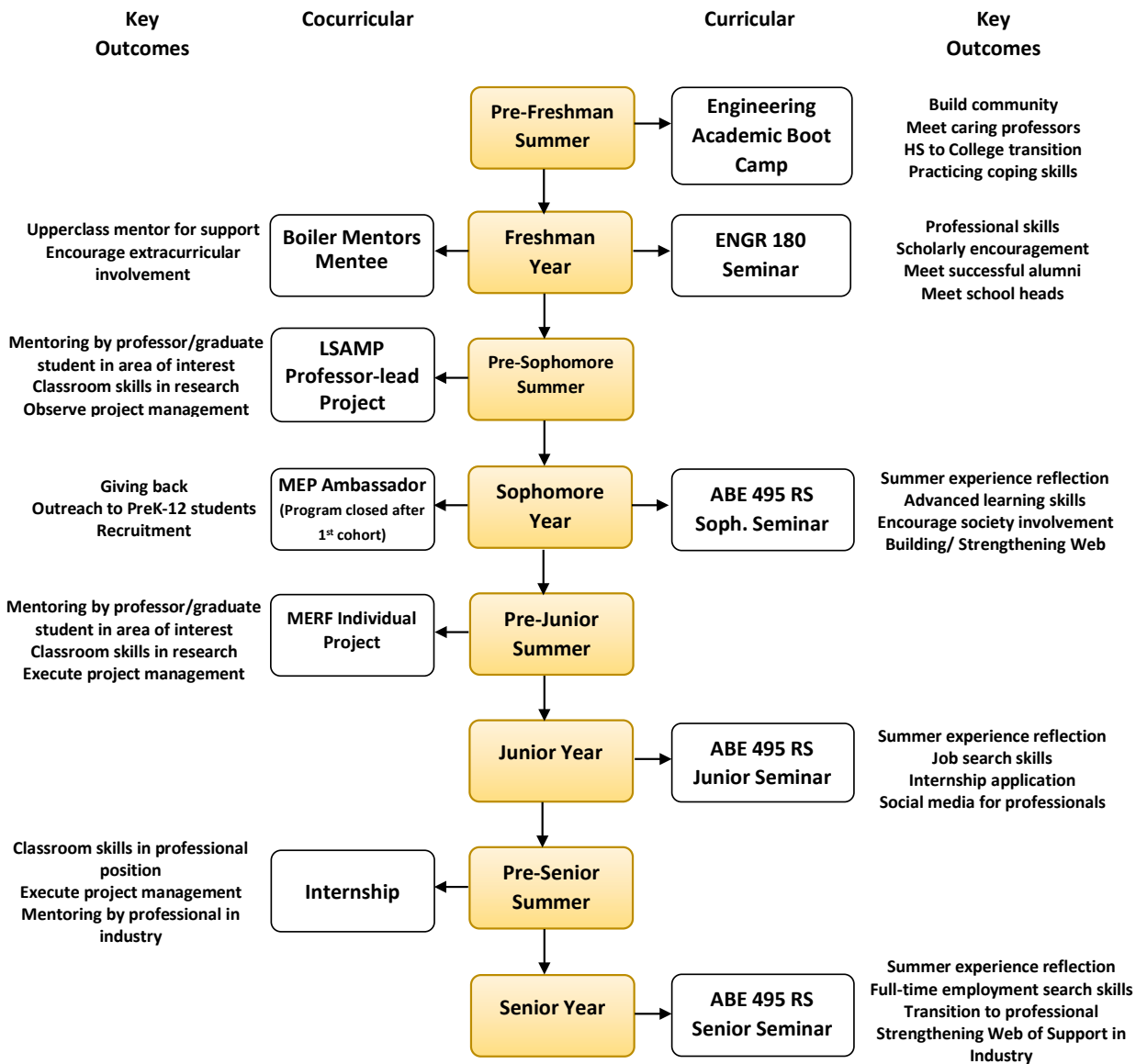


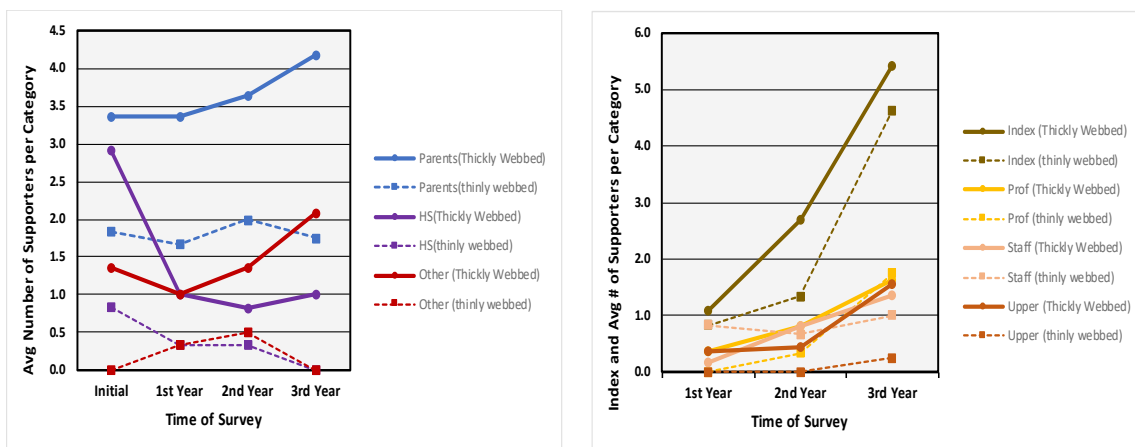
Figure 1 - Rising Scholar recommended "Best Path" through the university, designed to maximize a professional web of support through high-value collegiate contacts (Baldwin, et al., 2023).

Performance of the Rising Scholars Cohorts

As shown in Figure 2, the standard progression of the RS students through their collegiate years demonstrates how COVID was a progressively more influential adverse element in their experience (Baldwin et al., 2023; Baldwin et al., 2022c). This particularly affected those students with smaller or ‘thinner’ support webs than those with ‘thicker’ webs. RS students over the course of the program varied in their ability to strengthen their mentor support network. All students grew their networks, but some did so at a much slower pace, as shown in Figure 3 (Baldwin et al., 2023). Table 2 provides a detailed look at how these support networks evolved during the students’ college years (Baldwin et al., 2022b). The importance of this connectedness is implied in Figure 4, which shows how the academic performance of the RS students compared to their matched pair engineering admission cohort as COVID progressed (Baldwin et al., 2023). Table 3 clearly illustrates the decline in the students’ ability to participate in professional practice (Baldwin Kun-age et al., 2024a), which is well-attributed to the general employment drop-off during the pandemic (Organization for Economic Co-operation and Development, 2022).

	F'17	Sp'18	F'18	Sp'19	F'19	Sp'20	F'20	Sp'21	F'21	Sp'22	F'22	Sp'23
Cohort 1	Freshman		Sophomore		Junior		Senior					
Cohort 2			Freshman		Sophomore		Junior		Senior			
Cohort 3					Freshman		Sophomore		Junior		Senior	

Figure 2 - Expected normal timeline of the Rising Scholars program students' progression through higher education, with COVID pandemic cross-hatched between the red lines.



(A) PreCollege Supporters

(B) Collegiate Campus Supporters

Figure 3 - Average progression of the average yearly Web of Support between "Thickly Webbed" and "thinly webbed" and split between (A) Pre-College Supporters and (B) Collegiate Campus Supporters (Baldwin, et al., 2023).

Table 2 - Results of comparing number and type of supporters between the undergraduate STEM students who came in as "Thickly-Webbed" with strong webs of support against those that had weaker webs of support from their initial application through the third year of research, with the supporter line colors in the table represent the colors in Figure 3 (Baldwin, et al., 2022b).

	INITIAL		1st YEAR		2nd YEAR		3rd YEAR	
	Thickly Webbed	Thinly Webbed	Thickly Webbed	Thinly Webbed	Thickly Webbed	Thinly Webbed	Thickly Webbed	Thinly Webbed
Parents/Relatives	3.4	1.8	3.4	1.7	3.6	2.0	4.2	1.8
High School People	2.9	0.8	1.0	0.3	0.8	0.3	1.0	0.0
Other	1.4	0.0	1.0	0.3	1.4	0.5	2.1	0.0
Purdue Index			1.1	0.8	2.7	1.3	5.4	4.6
PU Professors(*2)			0.4	0.0	0.8	0.3	1.6	1.8
PU Staff			0.2	0.8	0.8	0.7	1.4	1.0
PU Upperclass(*0.5)			0.4	0.0	0.5	0.0	1.5	0.3

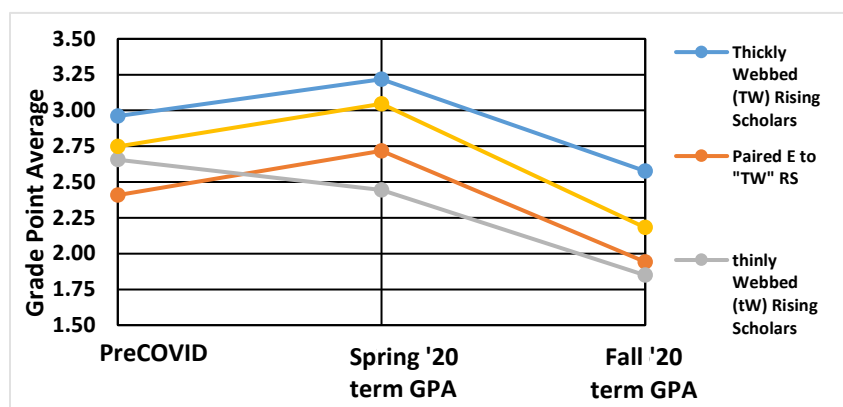


Figure 4 - Groups comparison of the pre-COVID cumulative GPAs with term GPAs during the pandemic first two terms (Baldwin, et al, 2023).

Table 3 - Comparison between groups of the undergraduate professional experiential experience level of the three Rising Scholars cohorts, showing the drop-off with COVID (Baldwin, et al, 2024a).

Cohort	Total Number of Rising Scholars	Professional Practice Experience	(%)
F17	6	4	67
F18	9	4	44
F19	6	1	17

Overall, the RS students outperformed their matched pair comparison cohorts academically. Table 4 provides an aggregate of student class GPA for the RS and matched pair cohorts (Baldwin Kan-uge, et al., 2024b). The grade differential between the matched pair diminished as the students progressed toward graduation, but the RS students got off to a stronger start in college, most likely through participation in the MEP academic bootcamp. The RS students also exceeded their matched pair colleagues in retention within major. Figure 5 presents first year retention, and Figure 6 provides second year retention (Baldwin et al., 2021b). Although the third cohort of students are still working on their degrees, the RS students appear to perform at equivalently levels with their matched pair counterparts in obtaining degrees. Figure 7 illustrates the progress of the first cohort graduating from the institution, while Figure 8 shows the second (Baldwin Kan-uge et al., 2024b). Although the sample size was too small to know with statistical certainty, it appears that the RS students were slightly more successful at finishing some kind of four year degree from the institution. No RS students were dropped from the university, and only one received a degree from a non-STEM field.

Table 4 - Cumulative Grade Point Averages earned at the end of each year compared between the Rising Scholars, Engineering, and Exploratory students (Baldwin Kan-uge, et al., 2024b).

		1st Year	2nd Year	3rd Year
F17	Rising Scholar	3.21	3.25	3.26
	Engineering	2.96	2.82	2.94
	Exploratory	2.94	2.94	3.10
F18	Rising Scholar	2.80	2.88	2.88
	Engineering	2.57	2.62	2.50
	Exploratory	2.51	2.59	2.66
F19	Rising Scholar	3.33	3.06	2.88
	Engineering	2.48	2.41	2.35
	Exploratory	2.75	2.60	2.61
Overall Average	Rising Scholar	3.07	3.04	2.99
	Engineering	2.66	2.62	2.58
	Exploratory	2.70	2.69	2.77

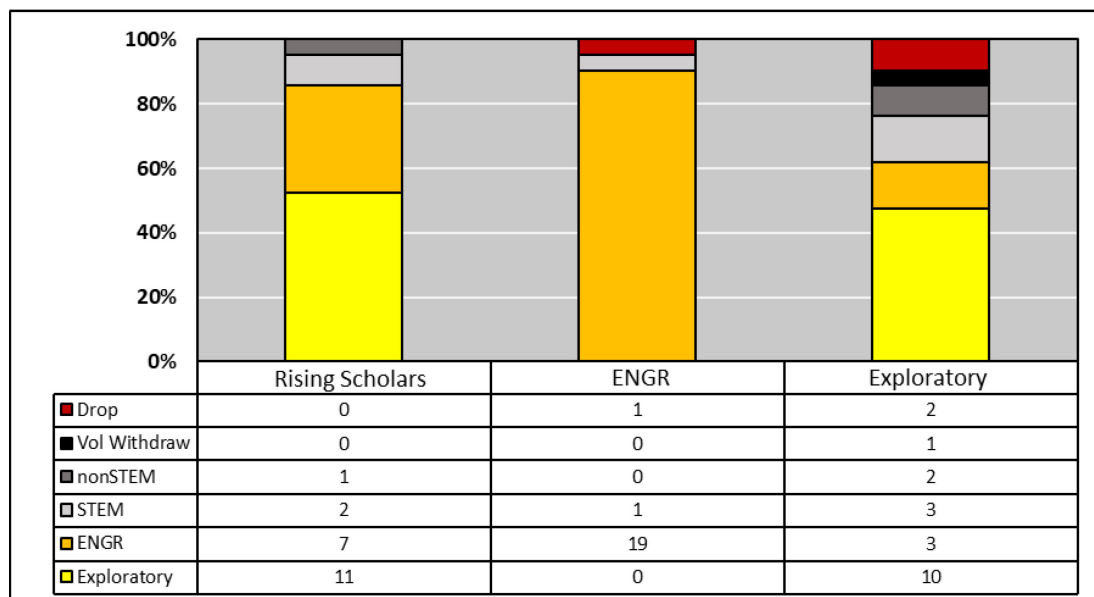


Figure 5 – First Year Retention between Rising Scholars and matched students starting in Engineering and Exploratory Studies (Baldwin, et al., 2021b).

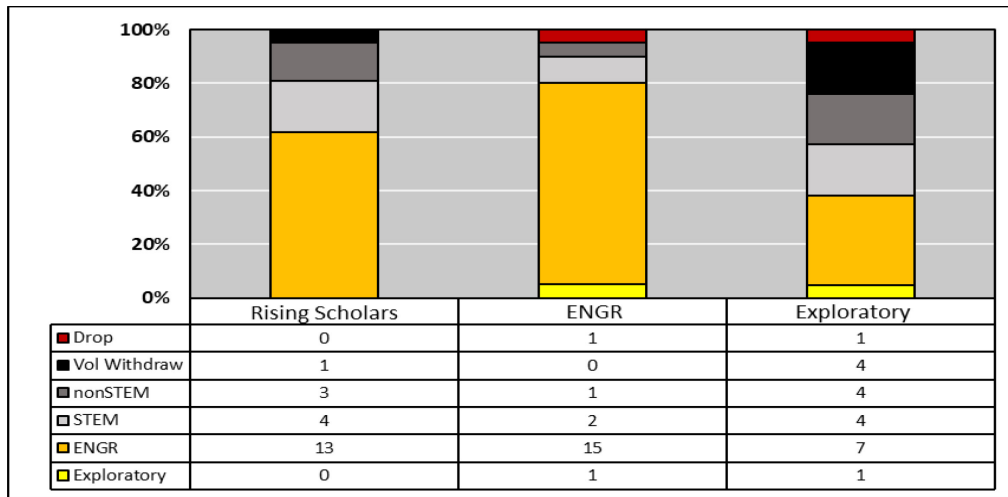


Figure 6 - Second Year Retention between Rising Scholars and matched students starting in Engineering and Exploratory Studies.

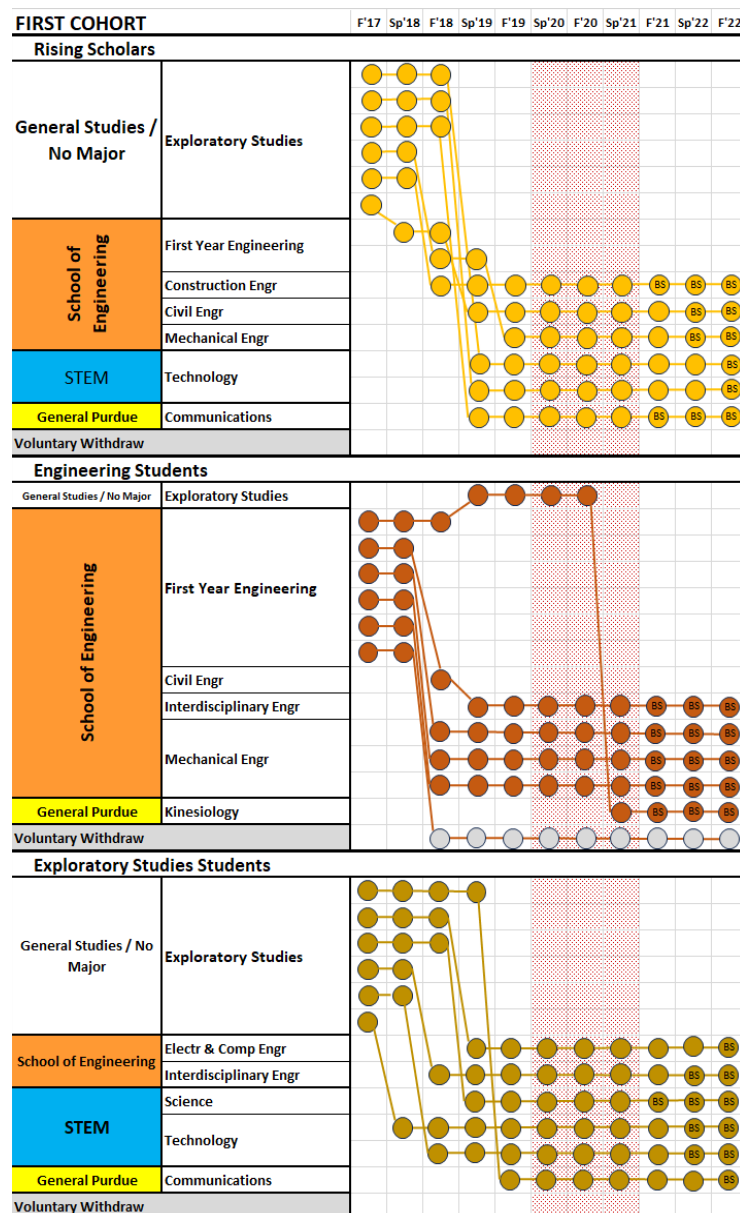


Figure 7 - Diagram of the five-year path of each first cohort student from entry through leaving the university with a degree. Red hash signifies the COVID semesters. (Baldwin Kan-uge et al., 2024b).

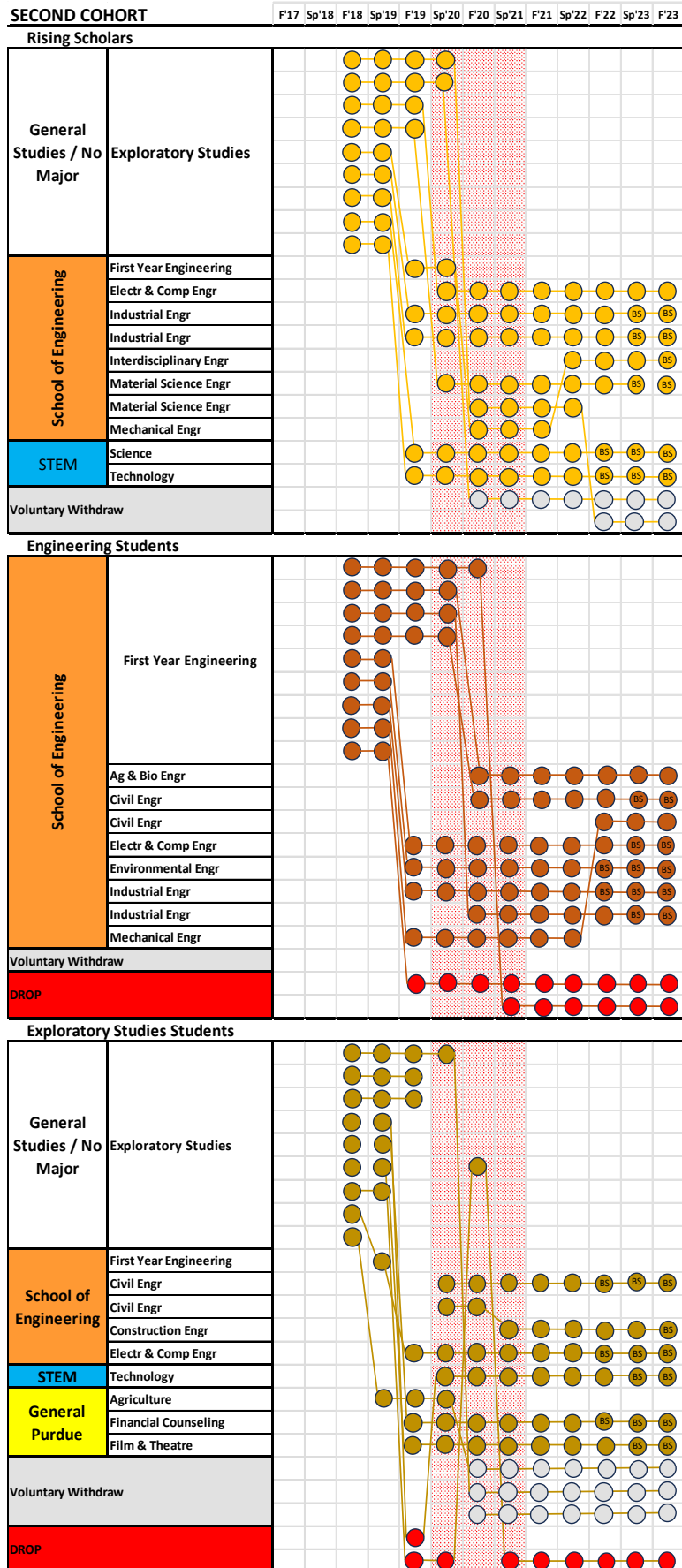


Figure 8 - Diagram of the five-year path of each second cohort student from entry through the university. . Red hash signifies the COVID semesters. (Baldwin Kan-uge et al., 2024b).

Cultural Elements and Discussion

The RS administrators worked extremely hard at providing a comfortable, welcoming social circle for the students. The planning that went into this element was quite deliberate and mindful. Students were invited to frequent family dinners in the Principal Investigator's home. Special events for RS students were organized, and the three cadres were frequently brought together for peer-to-peer mentoring opportunities. All of the social elements were designed to create a close-knit community of students who knew that there were adult professionals at their campus who were in their corner for the duration of their college experience. Since the program goal was to create satisfied graduates who were happy in their profession, this familial atmosphere was well-aligned with the conclusions from the Raposa et al. (2021) study at Purdue.

The S-STEM proposal funded by the NSF to create the Purdue RS program was heavily based upon the professional and personal experiences of the administrative team, who felt extremely positive about their own collegiate experiences. The PI and two of the co-authors are alumni of the Purdue Agricultural & Biological Engineering (ABE) department. While it is acknowledged that this evaluation is completely subjective, all three individuals found the small engineering department environment in ABE to be friendly, hospitable, and supportive. The local activities organized by department personnel created a close-knit community, where undergraduates were able to feel a camaraderie with graduate students, staff, and faculty. Students in smaller schools typically have access to more internal experiential opportunities than those in bigger departments. These opportunities can be either through paid positions as hourly help or for academic credit. Many actual graduate-level research projects in smaller engineering departments are initially established as capstone experiences. Additionally, faculty in these smaller departments generally have numerous connections with recruiters and companies that hire graduates within the specialized major. Smaller engineering departments have the ability to provide close contact with the undergraduate students and a more personalized educational journey through higher education than in larger departments.

Two of the co-authors were professionally engaged with the Purdue Minority Engineering Program (MEP), one of the earliest and most successful STEM support organizations for under-represented students in higher education. MEP is a comprehensive advocacy organization working to establish an improved pool of qualified students for matriculation into professional STEM fields and to support and retain students admitted to the institution within engineering. Staff members provide cultural affirmation and understanding for minority students, as well as providing a safe space on campus for them to hold dialogs or seek counseling from mentors on issues requiring a unique understanding. MEP promotes professional development for students and provides multiple opportunities for celebration and uplifting events. Students connected with the MEP are heard, respected, and supported along their journeys. The RS program administrators were determined to provide the students with the best elements of these organizations in order to nurture the students' development within the larger collegiate environment.

The RS program included multiple positive elements from MEP and ABE that were designed to provide the students with a memorable and impactful experience. Many of the students were able to participate directly in the PI's other technical research projects. Biannual evening meeting functions provided opportunities to engage over food and hold open discussions with the students and help promote peer mentoring between program entry cohorts. Special events and professional development occasions were incorporated at a level significant enough to be distinctive, but not overwhelming. Students were given personalized attention and were made to feel part of a close-knit learning community. The culture of the RS program was positive by design, and it was meant to provide encouragement and support to the students, who were studying extremely demanding STEM curricula under admittedly difficult circumstances.

Student Observations

As part of the overall continuing efforts associated with the RS program, the researchers are collecting a survey of Rising Scholars longitudinal information as the participants progress through their professional careers. This study was conducted in accordance with the requirements of Purdue University IRB #1607017964. During a first post-graduation interview, the RS students were asked to describe what positive features of the Rising Scholars program climate were memorable and aided them in navigating the stress of an undergraduate education in a STEM field (Rising Scholar Eta, 2024) (Rising Scholar Pi, 2024) (Rising Scholar Epsilon, 2024) (Rising Scholar Gamma, 2024) (Rising Scholar Zeta, 2024):

"The Rising Scholars program really helped me create a bond with everybody in the Minority Engineering Program, and honestly on my own, I would have probably never found them. I'm so thankful that I got to meet other Latinos studying the same things as me. People who don't make that connection would have a completely different college experience than me. I am just so thankful that I had a community from the very beginning. The tutors and the study center were vital to me. That was somewhere I could go if I was struggling or got stuck on a problem. The camaraderie with all of the individuals that the Rising Scholars program introduced me to was just amazing. You made me feel like I belonged in this place. From day one, you guys were there along the way for me. You helped me form bonds, understand the world, and graduate."

Rising Scholar Eta (Industrial Engineer)

“The Rising Scholars program supported me. I had imposter syndrome really bad when I first got here, but you believed in me. And then you helped me to believe in me. You surrounded me with like-minded people when you got our cohort together. You got us up off the ground and going. The Rising Scholars program and the people in it watered us like plants, helped us to bloom, and grow into the amazing people we’ve become. The program was an incredible resource for me. It got me published, taught me how to get through an interview, gave me the opportunity to gain knowledge that I couldn’t have otherwise gotten. It definitely propelled me further than I ever thought I’d go. The Rising Scholars gave me the chance to go to school in a great major, provided me with an incredible set of work experiences while still in college, and made me confident in my own abilities. It has given me the chance to pursue my love and passion: scientific research.”

Rising Scholar Pi (Material Science Engineer)

“The Rising Scholars was great. When I compare my experience to that of my brother, what happened to me really stands out. With you, the big thing was people skills and networking. He hasn’t gotten that extra training under the standard path through the system. I really enjoyed Derek Peterson’s lessons. I still follow him on Facebook. He talked about casting a wide web for supporters and contacts. That’s been very helpful in my career. I remember that you were always talking about patience and perspective. This was important to me and helped me focus on the job at hand. You taught me to reflect on things and use the resources that I had. The program’s structure and the activities that you had us do were vital for me. I see now how they were designed to connect us and get us to meet people. That was important to me, coming from my background. Looking back now, I know you helped me with interviewing too. Not many sophomores get internships. I remember you said that I might not have a lot of experience, but that I should be proud of what I had and talk about it. Just being able to talk things out with you was a big advantage and was always a good lesson for me. In summary, I guess the thing is: you gave us extra attention. You helped open my eyes to a larger world, and I’m very grateful.”

Rising Scholar Epsilon (Mechanical Engineer)

“Rising Scholars was everything that I needed. I don’t think that I’d have even been at Purdue without the Rising Scholars. You guys were so amazing. When something would go wrong, you’d pick me back-up and point me in the right direction. You provided us with an environment where it was okay to ask questions, and of course, I had a lot of questions. I remember discussing interviewing, and you told us to get to where we were leading the interview. I didn’t fully understand it then, but I remember grilling you on it, and then, it happened. I felt so good, and it went so well. I remember walking-out thinking how happy you’d be with me. The Rising Scholars program gave me an environment where I could learn things like that. No one ever tried to do that anywhere else with me. You provided such a supportive atmosphere. You reminded me that I am a resilient person and was going to make it. I never felt like there was a time when I wasn’t going to get finished, because with you, the expectation was always that I would finish. You were my school parents.”

Rising Scholar Gamma (Engineering Technologist)

“The whole Rising Scholars experience was incredible. The bootcamp was critical for me. It was important for me to meet others and study within a diverse background. That initial climate was critical for me, and the skills that I learned there continue to help me excel on the job today. I’m also extremely glad that you helped develop my social side. You pushed me hard there, but I think maybe that’s what’s helped me the most professionally. Learning how to make connections and benefit from them has really boosted me at work. I saw how collaboration and teamwork worked in studying at Purdue, and I continue to use those people skills today on the job. I think the lessons on interviewing were really important for the Rising Scholars. You were right in how different an experience it was going to be. How they could ask the same thing from so many different angles still amazes me. Your early exposure to the process helped me get an internship, which helped me get this incredible job. I’ve already passed my PE exam, and it all started with the Rising Scholars program.”

Rising Scholar Zeta (Civil Engineer)

Conclusions

The Rising Scholars program was designed as a high-touch, supportive community for low SES undergraduate students trying to attain a STEM degree. The program modeled the social environment for the students on the close-knit communities of smaller engineering departments and advocacy organizations. The program administrators held special functions for the students addressing their needs for personalized attention, flexibility, professional development, safe dialogue, cultural support, and a support network within the professional world. In post-graduation interviews, the graduates all referred to memories of these events and seemed to recognize their importance in providing them with a collegiate ‘family’. The program produced STEM field graduates at the same rate as standard admissions criteria, even though the students were initially identified as not qualifying for an engineering education. A supportive climate matters to college students, and creating a positive space for learning in higher education isn’t difficult. From the overall RS experience, some simple recommended beginning components for improving the climate within a smaller bachelorette STEM department would be:

- Promoting collegiality and engaging with the students in various ways that help to put them at ease, instead of stressing them
- Becoming a comfortable, welcoming place for students to connect, study, and socialize.
- Establishing a study lounge where students can find peers, resources, and tutors for classes.
- Scheduling fun things and bringing food.
- Finding some manner to financially reward students for progress toward their degrees.
- Asking faculty to integrate undergraduate students into their research more readily and be more willing to engage with students outside of the classroom.

The Rising Scholars program researchers have demonstrated that the current admissions process for engineering underestimates the potential of numerous students from low SES backgrounds. The young people who studied for STEM degrees in the Purdue RS program received some financial support, were given an initial mentor support network, provided a list of recommended collegiate opportunities, and taught to go look for professional mentors. They were well-served by this program, and the basic ideas from this plan should be executable by small and medium sized engineering programs anywhere. If the success of our students is paramount, then we need to build them a collaborative learning environment and provide them with support and clear expectations about our goals for them. They will do the rest.

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