Board #444 - Professional Practice Experiences of Collegiate Rising Scholars Students—A Work-in-Progress

Ms. Grace Lynn Baldwin Kan-uge

Grace Baldwin, joined the Rising Scholar NSF S-STEM program in the Summer of 2017 as a Graduate Research Assistant. She completed her Bachelor of Science, Master's, and Docterate of Philosophy at Purdue University in Agricultural and Biological Engineering (ABE).

Dr. Carol S. Stwalley, Purdue University

Dr. Carol S. Stwalley, PE joined the Minority Engineering Program team in the fall of 2007 as Recruitment and Retention Analyst. She earned her Bachelor of Science in Agriculture and Biological Engineering (ABE), MSABE, and PhD ABE from Purdue University.

Dr. Robert Merton Stwalley III P.E., Purdue University

Dr. Robert M. Stwalley III, P.E. joined the Agricultural and Biological Engineering department as a faculty member in the fall of 2013. He earned his Bachelor of Science in Agriculture and Biological Engineering (ABE) and his M.S.E. and Ph.D. from Mechanical Engineering, all from Purdue.

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Abstract

The National Science Foundation established the Rising Scholars program to demonstrate how the cultivation of mentor support networks could promote the matriculation and retention of qualified low socio-economic students into STEM fields. Rising Scholars students are those individuals with low socio-economic status that have distinguished themselves academically in secondary education and wish to move into a collegiate STEM major. The overarching goal of this NSF S-STEM effort was to determine if professional-based mentors could help an individual make-up for a lack of 'institutional' collegiate knowledge within their own family and friends. Under this program, twenty-one incoming exploratory studies students, across three years, who had expressed an interest in engineering were provided with a defined path of social and professional activities in college, where they engaged in numerous experiential activities, including on-campus research and internships. The overall goal of this defined path was to introduce the students to potential mentors within technical fields, who might later assist the students with their own careers. Rising Scholars students were sent to the Minority Engineering Program's Academic Boot Camp, prior to entering school as freshmen, and they were scheduled for annual seminars and continuing social events to provide group cohesiveness. While many elements of keeping the students on the designated path where they could co-mingle with potential mentors was difficult, finding paid work experience for the students was particularly challenging. COVID-19 negatively affected the ability of these students to find professional employment, but some of students truly excelled in collegiate Professional Practice. Anecdotal experiences and data from employment-based activity of the Rising Scholars program are presented. Some students from the program remain actively working toward completing college, but to-date graduation and entry-level employment data are provided.

Keywords

collegiate work experience; low socio-economic status; professional mentors; support networks

Introduction

The amount of difficulty that first generation college students face pursuing higher education cannot be underestimated. If first generation status is also combined with low-socioeconomic status (SES), then the number of obstacles before a talented student desiring an education in a STEM field can seem insurmountable [1]. Collegiate educations are also expensive in terms of both the cash outlay to attend college and the missed income during the collegiate studies. Low SES families have meaningful financial constraints that can have less impact on other higher status families [2]. Compounding the barriers, low SES families are less willing to utilize debt to invest in education [3]. Students in these situations may try to work menial jobs to earn some money, either to help support themselves or send home. This dilutes their collegiate studying time, lessening their chances of success [4]. These students are unfamiliar with the academic environment, as no one within their circle of acquaintances has any experience with the admittedly arcane world of higher education [5]. They do not have any

knowledge about the resources that are available to help them succeed, and this can contribute to feelings of not being capable or not belonging within the university environment [6], [7]. Low SES students contend with more external stressors than other students, and they must overcome greater levels of adversity to complete collegiate educations [8].

The Rising Scholars (RS) program was funded by a National Science Foundation S-STEM grant in 2016 and designed to help low SES students adapt to collegiate life and find their way forward in higher education. The program utilized a selection system for granting scholarships, based upon identifying a student's understanding of the importance of mentoring networks and work ethic [9]. Students were provided with on-campus faculty and staff contacts, and they were given access to numerous networking opportunities throughout their time in the institution. The overall program incorporated their pre-existing social skills and strengths, and it taught them how to succeed through the cultivation of professional support networks. How those support networks changed over time and the resilience of those students that cultivated strong networks in persisting in collegiate activities has been reported elsewhere [10], [11], but the impact of work place relationships on those networks has not been fully reviewed. The RS program was designed to prepare the students for life-long professional careers by providing them with extensive collegiate experiential activities to build their confidence, practice their professional skills, and introduce them to the social dynamics of professional workplaces. This feature of the program was thought to be critical to the student's success, since it contributed to the student's transition into professional life. The impacts of the work-related elements of the program are reported here.

Program Overview

The RS program was inspired by the work of Derek Peterson [12], [13], who surmised that the strongest correlation with student academic outcomes and career success was that the student had a sufficiently large and involved mentor support network. Peterson's work was centered on disadvantaged secondary school students. Purdue University researchers modified Peterson's concepts to apply to higher education, by creating a program which could relieve some of the financial stress on the RS students and provide them with an initial support network that could be grown to serve the student as they transitioned into a professional career [14]. The RS program selected students who had previously expressed a preference for an engineering education, but were only admitted into Exploratory Studies at the university. The selection process was based upon the student demonstrating a minimum level of academic preparation, financial need, determination, an understanding of mentoring support networks, and a strong work ethic [9]. Twenty-one matriculating students in three cadres of six, nine, and six were chosen during the summers of 2017, 2018, and 2019.

The RS students were given a defined pathway through the institution, which included a pre-freshman academic bootcamp, special seminars concentrating on network development and social skills, and a variety of experiential activities. Social activities and special functions for the Rising Scholars students were organized to create a familial climate and sense of belonging for the students [15]. Program efforts to promote student retention utilized active learning components, which were also leveraged to engage the students with potential mentors and demonstrate the impact that their work might possibly have on society [16]. Pre-existing

university programs that involved students in the on-going activities of the institution and acquainted them with older professionals, who could potentially serve as mentors, were incorporated into the sequence of recommended activities [11], [17]. Since today's college students are deeply motivated by large scale problems and environmental issues [18], significant effort was expended in helping them to select broad, diverse faculty-directed projects oriented toward the Grand Challenges for their initial research team experiences, where possible [19]. As rising sophomores, the RS students participated in the Louis Stokes Alliance of Minority Participation (LSAMP) program [20], becoming team members within an experimental laboratory, directly participating in the active research, and observing how other professionals interacted with one another. By working with other professionals and being treated as a peer, the RS students were given an opportunity to envision themselves as young professionals, hopefully motivating them to continue and finish their collegiate STEM educations through these contacts [21].

As rising juniors, the students were encouraged to undertake their own self-directed research projects under the guidance of the Principal Investigator. This pre-capstone experience was designed to help them to gain marketable problem-solving skills, aiding them in securing an entry-level professional position [22], [23]. Technical writing ability, a highly sought-after professional skill, was emphasized through the reporting about their individual projects to enhance the students' proficiency at communication, thereby providing an opportunity for reflection [24], [25]. Other qualitative skills useful in STEM industries, such as initiative, analytical thinking, problem-solving, and oral communication with potential collaborators, were also utilized during the student-directed experiential projects, to provide training with those valuable tools that could be transferred to later professional life [26], [27], [28]. Since the benefits of experiential education are well-defined with regard to increased student motivation [29] and professional identity [30], the students were strongly encouraged to expand their horizons beyond the university and attempt to secure a paid internship with an organization that could place them into a pre-professional position as rising seniors.

External work experience was selected as the final experiential component of the program, because of the multiple benefits that it accords participants [31]. Professional Practice increases the students' post-degree marketability to a remarkable extend, as these students have stronger references, will interview better, and are initially more productive on the job [32]. It is well-accepted that students with practical, in-industry work experience get more job offers, receive higher salary offers, and are given more entry-level job responsibility [33]. Students engaged in co-op or internship work experience sessions as undergraduates get to put their technical skills to use in a manner similar to an entry level position. They build confidence in their own abilities by getting to apply their knowledge to real world situations. Students who receive work experience in college get a jump on their peers by learning about the culture and dynamics of the workplace. These individuals are more savy with regard to the social functioning of organizations, and they have earlier opportunities to begin building and developing their professional mentor support network. Students with in-college work experience generally advance faster in the workplace and have more success within their careers, due to their earlier start [34], [35], [36].

For comparison purposes, the students in the RS program were statistically linked with similar students directly admitted into engineering and into exploratory studies in what are called "matched pairs". The timeline of the 'normal' expected progress for the RS cadres in college is

shown in Figure 1. The success of the RS students initially was in both retention, as shown in Figure 2, and GPA, as shown in Table 1. However, COVID academically disrupted some of the Rising Scholars students with thinner support networks, as shown in Figure 3 [10], [37]. As Table 2 shows, the pandemic had the same detrimental effect on the students' abilities to secure meaningful professional employment within their undergraduate experience. The first cohort of students was able to begin looking for internship-type experience during the summer of 2019, and four of six were eventually able to secure positions. The second cohort only managed to find employment for four of the nine students, and the third cohort only had one of six was able to secure a professional work experience position as an undergradute.

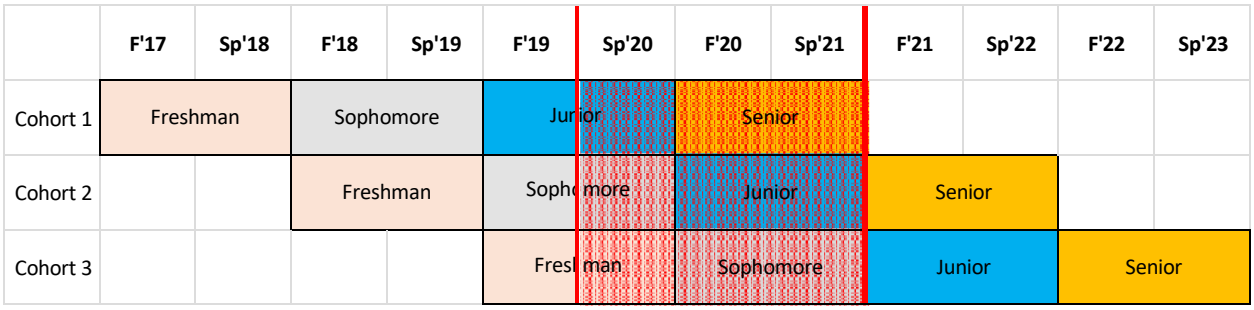
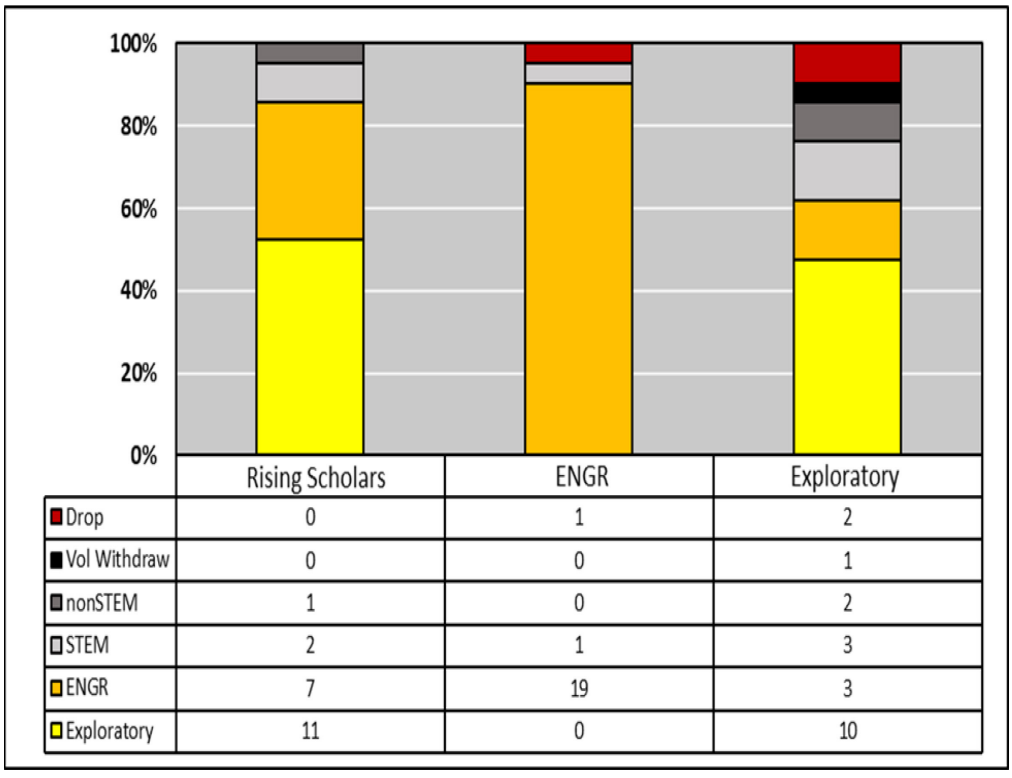


Figure 1- Timeline of the Rising Scholars program students' expected normal progression through higher education, with COVID pandemic cross-hatched between the red lines.



	Rising Scholars	ENGR	Exploratory
Drop	0	1	2
Vol Withdraw	0	0	1
nonSTEM	1	0	2
STEM	2	1	3
ENGR	7	19	3
Exploratory	11	0	10

Figure 2 - First Year Retention between Rising Scholars and matched students starting in Engineering and Exploratory Studies [17] (Baldwin et al., 2021b).

Table 1 - Cumulative Grade Point Averages earned at the end of each year compared between the Rising Scholars, Engineering, and Exploratory students.

		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

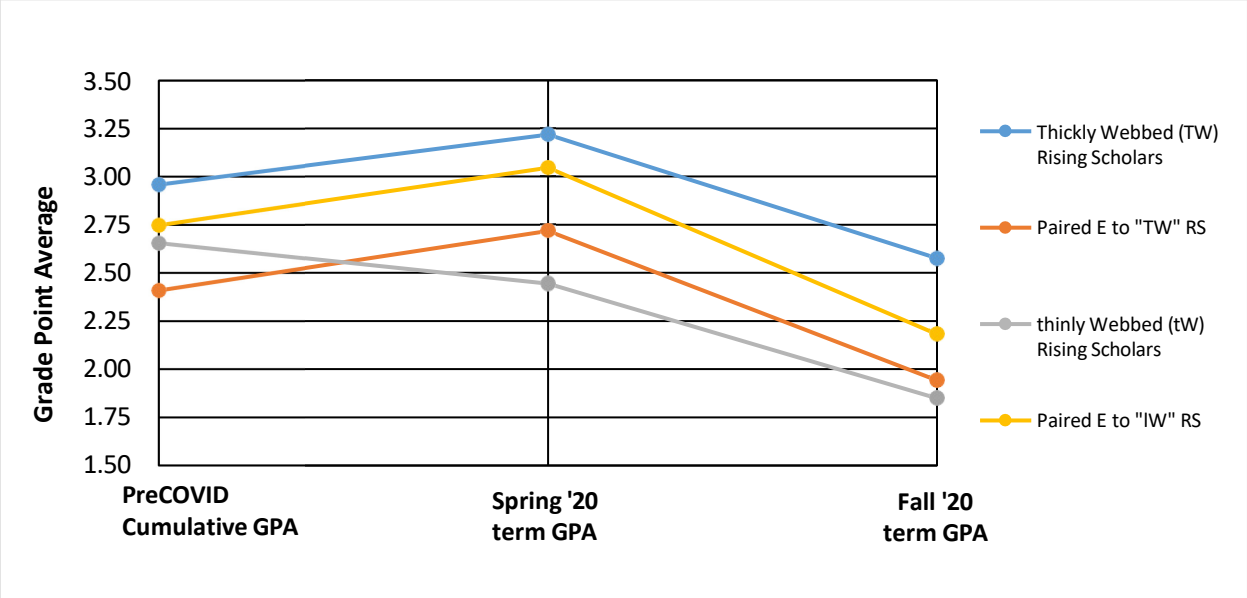


Figure 3 - Comparison between groups of the pre-COVID cumulative GPAs compared to term GPAs during the first two semesters of the pandemic [10] (Baldwin, et al, 2023).

Table 2 - Comparison between groups of the undergraduate professional experiential experience level of the three Rising Scholars cohorts, showing the drop-off with COVID.

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

It is completely fair to note that all hiring collapsed during the pandemic, and the categories of workers matching the characteristics of the RS students were particularly hard hit [38]. None-

the-less, the students participating in the Professional Practice experiences provided overwhelmingly positive feedback regarding the formative nature of professional work experience inside an undergraduate program. The positive elements that the students stress in their interviews are their skills development, enhanced networking abilities, increased knowledge regarding the working world, and access to professional role models with commonality in background. As the excerpts from these post-graduation interviews show, these Professional Practice program elements have helped these young men and women progress in their careers and become respected STEM professionals. The study was conducted under the oversight of Purdue University IRB #1607017964.

Individual Experiences

Longitudinal data about the continuing careers of the RS students will be periodically ascertained to potentially foreshadow any long-term positive effect of the program [39], [40], [41], [42], [43]. During a first post-graduation interview, the RS students were asked to describe their intra-collegiate professional work experiences and what their current professional position was:

"*My first paid professional experience was in an experiential program with the Louis Stokes Alliance for Minority Participation (LSAMP) in a biomedical engineering lab, and I helped one of the graduate students in developing a process that could assist individuals with high thoracic spinal cord injuries. They were in the early stages of creating this device, so I worked closely with their test animals, the lab rats. I ran baseline tests on the animals, seeing how they reacted physiologically to sounds with a normal nervous system. Then they would induce spinal cord damage, and we would repeat the sound tests to see if their reaction to the noise changed. I learned a lot about data analytics in this position.*

The next summer, I was going to intern with Lowe's as an industrial field engineer in their Kissimmee, Florida distribution center, but COVID cancelled the opportunity. I did get to report the following winter break for some time with Lowe's. This was my first real experience in the workforce doing what an Industrial Engineer does. I did a lot of AUTOCAD and layout with the various machines that they used to move pallets and crates around the distribution center.

The next year, I interned with Cisco Systems in San Diego. I got to do my first time study, and it really highlighted for me what an Industrial Engineer can contribute to an organization. During my senior year, an acquaintance from marching band suggested that I try to interview with Lockheed. It ended-up going really well, and now I'm a year into that job. I do a lot of time studies for parts that we run in our shop. For example, last year I was in charge of the harness shop, where they bring-in old missiles, repair them, and send them back-out. I'm getting more involved on the mechanical side now, trying to improve things. I do a lot of cost analysis, trying to improve our worst performing parts. At Lockheed, Industrial Engineers are valued people. We understand six sigma in the shop, and we spend a lot of time keeping things clean and safe. I'm really happy to be working in such a great industry."

Rising Scholar Eta (Industrial Engineer)

"*My first internship was with Caterpillar, Incorporated. I was a metallurgical engineer there and performed failure analysis on engines and components that would fail in the field and come back to the plant for evaluation. I got the chance to do sample preparation, physical strength testing, magnetic particle analysis, and finite element analysis on a computer at the Cat metallurgical laboratories. I was also exposed to my first technical report writing and learned how important this skill is at Caterpillar. My experience there was really great. It was in-town with college, and I worked part of the day at Cat and came to school part of the day.*

My next internship was with Corning, Incorporated in New York. It was in a small town, but I got to work on an amazing research project determining the properties of molten glass coming down the line. I wore thermal gloves, had the pyrometer, and was right in there where the action was. It was very exciting. My third internship was with Amcor, Incorporated in Nina, Wisconsin. I really liked this experience too. It was working with polymers and recycling, which I am passionate about. I wasn't sure I wanted to take that job, but it turned-out to be an incredible learning experience.

Now, I'm back home in Indianapolis working for Rolls-Royce. I'm currently in a new engineer training and rotation program, where you get to see multiple areas of the company for several months at a time, before choosing a more long-term duty station. I've worked in materials applications group, crunching data. I've done an engine oil study trying to discover if some of our older engines can successfully operate with newer oil formulations. Now, I'm in my second rotation in an actual materials lab, doing all of the things I've been trained to do and writing reports about them. It's really nice here. I love Rolls-Royce and have zero complaints."

Rising Scholar Pi (Material Science Engineer)

"*All of my professional experience to date has been straight through at John Deere and that's been a good thing. My first internship was in the Quad Cities as a line process engineer. My job was to interface with the different functional engineering teams in the plant on behalf of the machining and production process lines. The general idea was to measure the lines by modern manufacturing world metrics and aid the lower performers. I got to be involved at all levels of the project, whether it was to add bodies, move them elsewhere, re-arrange the equipment, or buy new. I wound-up learning at great deal about the shop floor. It was an incredible exposure to industrial and manufacturing engineering for me.*

I was extremely fortunate to get my second internship, with COVID, but in the end, it was a great experience too. It was virtual, and I remained associated with the Deere team for a year, doing data analytics. It was all totally new to me, involving how you collect data, clean it, structure it into usable database formats, and then finally be able to pull useful information from it. This was all totally new to me. I found it extremely challenging, but also very, very eye-opening with regard to the power of the technique.

My last internship was with construction products in Davenport, where I was assigned to standardize back-up tooling for an entire production plant. This was quite different from the more rapid paced agricultural products divisions. Initially, I thought that would reduce the complexity of the task, but it didn't. There were so many aspects to consider in the project. I just focused on trying promote less rigidity and supplying with what the lines said they needed. I

enjoyed this experience as well, and I think the increasing responsibility at each step of the way was an important motivator for me. I stayed with Deere for my first professional post-graduate work in their plant engineering rotational program.

My first station was in manufacturing, which really teaches you how the factory works. I was able to do this tour at our Waterloo plant in the transmissions division. I enjoyed this, because I have a very strong interest in how teams perform. This whole element of manufacturing appeals to me. My second rotation returned me to some hard-core engineering. I went into a factory controls group, programing machine instructions for the various pieces of equipment in the factory. This pulled in lots of my academic training: Python, Arduino boards, Excel. There was quite a bit more pressure in this group too. You could be thinking about finishing your day, when the heat treatment line would call with a weirdly behaving machine. You could potentially have to drop everything and get the error in heat treat fixed right away. It's exciting work."

Rising Scholar Epsilon (Mechanical Engineer)

"*With regard to professional experience, you guys really set the ball rolling. I learned how to network, present myself, and communicate in a professional environment from the activities that you engaged us in. The outside speakers were great. Now, my role includes a great deal of management responsibilities and being able to handle those tasks started with my Rising Scholars experiences.*

During my last two summers in college, I worked for Southwestern Advantage in a sales position. It wasn't technical, but that may have also helped me to see the other parts of the business world. My first year was strictly devoted to sales, which is brutal. At first, I had trouble, but then I backed-up and analyzed the problem like I'd been taught. Things started to go better, and I created my successful little business from the ground up. The second summer, I got loads more responsibility, as they had me teaching other associates how to do as well as I did at it.

I am currently a 'Mechanical Engineer II' at Caterpillar, Incorporated. I work in the Large Engines Division at the Lafayette, Indiana plant. I've just bought my first house, and I'm in my dream job. I'm in charge of multiple assemblies and do what needs to be done to keep those items flowing through the organization. It's technical, because I have to know what I'm dealing with and what the part can do, but it's also about people. I have to be able to work and interface with others to move the assemblies along. I have to be able to keep track of the different contacts that I've made along the way. I am still polishing the soft skills from Rising Scholars."

Rising Scholar Gamma (Engineering Technologist)

"*The summer before I graduated, I managed to land an internship with the Vulcraft division of Nucor, here in Indiana. I had a good round of interviews and managed to make it to the final part of the process with three companies. I picked Nucor and started with two other new hire engineers, and they ran all three of us together for orientation. Vulcraft probably gave me the most responsibility initially, and I started designing and optimizing steel joist fairly quickly. I was then lucky enough to receive a full time offer from them, just as I was finishing my final semester.*

I really just continued to do the same work at Vulcraft, which was great, since I had just finished training and was comfortable with it and the organization. I selected Vulcraft based on the challenge that I thought they could provide. It's more than just the structural codes and engineering requirements that I learned in Civil Engineering. I work with our detailing and shopwear departments, so there's a lot of Industrial Engineering in my job too. That keeps things interesting. I'm always moving and keeping things productive. Professional accreditation is important here at Nucor. I passed my PE exam last June too, so that was exciting."

Rising Scholar Zeta (Civil Engineer)

The RS students were then asked to describe how their work experiences had contributed to their current career success:

"*The in-college work experience was really helpful in getting me off to a fast start in my career. I know because there were one or two other new Lockheed employees that came in at the same time I did, without any work experience. They were just lost. They hadn't been exposed to the same preparation you provided, nor had they been given the chance to experience the professional working world the way you encouraged us to. I think the real world internship experiences with the various tools provided by the university gave me confidence to jump-in running when I got to Lockheed. I certainly noticed that many of my peers from other institutions who started when I did, weren't as aware of the connections between their academic studies and what Lockheed needed from us. I was able to do coding, time studies, and data analytics right away, because I had previous seen how they were applied in industrial problems*."

Rising Scholar Eta (Industrial Engineer)

"*I learned a lot from all of my various work stations, and I loved being able to apply my technical skills to the problems that the company needs solved. The Rising Scholars practice and head-start at technical writing has been really good for me, career-wise. However, I'd say the most important element of being out in the professional working world is being able to learn and apply people skills. I am collaborating with other technical professionals on higher level technical problems than I ever dreamed I'd be doing, because of my soft skills. Those got well-established during my internships, and they are continuing to help me to this day*."

Rising Scholar Pi (Material Science Engineer)

"*I would place a great deal of emphasis in my case on the ability to familiarize yourself and get acclimated into a specific industrial environment. The internships gave me a very broad understanding of the Deere manufacturing system, which has just been indispensable as I have advanced through the company. For instance, I had a role in factory automation that typically had a two month on-boarding process. I was able to skip that and be productive from the first day, since I already was familiar with the factory flow and the general requirements on the line equipment. That institutional knowledge and experience in the Deere system makes me an extremely valuable asset for them in manufacturing, and I feel professionally appreciated for it*."

Rising Scholar Epsilon (Mechanical Engineer)

"*Honestly, the power of Excel and MATLAB are still stunning to me, and I was totally unaware of either software before my experiences at Purdue and in Rising Scholars. These simple*

tools give me such an incredible ability collect information, examine it, and act on it. I was taught the basics in my college classes, but then I saw it applied everywhere. The projects we did along the way made us use them. I used Excel for tracking at Southwestern Advantage. My current job would be impossible without my computer technology skills. I learned that not everyone from other collegiate backgrounds was as lucky as I was in this regard, so I'm pretty happy on this score."

Rising Scholar Gamma (Engineering Technologist)

"*For me, the power of connections and networking from the work experience have been crucial to my success. I chose to return to Vulcraft based upon the co-training that I received with other new hires, my understanding the organization, being able to see how I fit within the company, and being satisfied with the career being offered. Vulcraft provided me with a professional community that I could fit into, be a part of, and function effectively. They gave me advanced training on proprietary software and offered me a professional job, with an edge over other engineers with potentially more work experience. I enjoy the challenge of what I do and where I do it*."

Rising Scholar Zeta (Civil Engineer)

The RS students were asked to elaborate on how their work experience had helped them build their own self-confidence as STEM professionals:

"*Internships definitely helped me gain the confidence to speak-up and ask questions. I remember during my first internship, when I was confused about something, I'd just try to figure it out for myself. I was really nervous to ask for help. Then I realized that things took longer and were harder that way. I've learned to constantly be asking good questions and keep learning no matter what situation that I'm in. Right now, I'm learning all about simulation, and there are some real geniuses around me. I am trying to take advantage of their knowledge and come away with as many professional skills as I can. Understanding the value of continuing to learn new skills comes from needing to learn everything as an intern that I didn't know. I still find a curious and inquisitive attitude useful in solving company problems.*"

Rising Scholar Eta (Industrial Engineer)

"*Internships, Rising Scholars, and Purdue all helped make me more confident. I can honestly say that it was everywhere in the Rising Scholar process. You made us believe in ourselves. When I applied to engineering and didn't get in, it was hard. But then you came to me and said that you believed that I could do it, and that if I worked with you and believed myself, as well, that I could do it. You made me believe enough in myself to apply to an engineering school. I had imposter syndrome really bad to start with. Internships made me see that I was just a capable as the next person and likely better. Rising Scholars, Purdue, and the work experience all made me into who I am today: confident!*"

Rising Scholar Pi (Material Science Engineer)

"*I definitely think that MEP helped me, but my internships are what got me comfortable interacting and talking with other people. As an intern at Deere, I was paired with some pretty high-powered people to solve some of the on-going problems in the factory. My contributions become more noticeable to me, once I developed a more confident attitude about myself. It*

became much easier to set-up one-on-one meetings and go into the details about some specific aspect of a project. The whole connections and networking piece began to take on a greater significance to me. You guys had been saying it, but when I saw it in action, I quickly realized how powerful the concept of being connected and having a professional network support was. I now have the confidence to succeed today, because of the lessons that I learned in college with the Rising Scholars program and its experiential work activities."

Rising Scholar Epsilon (Mechanical Engineer)

"*Work experience for me was about building my own confidence and being able to talk positively about those experiences and what I had learned along the way. For instance, you taught me a lot about leading interviews and being able to sell myself through my experiences and accomplishments. I don't think that this comes natural to me, and I would have walked into my after-graduation interviews blind about the process and how it works, without your help. It makes sense now, after the fact, but it was tough going through it. I appreciated that you guided us in it, had us make resumes early, and then helped us to improve them. When I finally got interviewing down, I was doing what you told us. I was leading the exchange, getting them to ask me about stuff that I wanted to talk about. I would have never been confident enough to get to that point without some coaching on what was going to happen and what they were looking for. The Caterpillar interview obviously went great, and I am right here in town where I wanted to be*."

Rising Scholar Gamma (Engineering Technologist)

"*Seeing things in the real world boosted my confidence and let me know that I was getting the education that I needed to hold the career I wanted. Being able to look at steel trusses and recognize the basic statics elements and see the critical strength areas really helped my self-confidence. When I saw my actual design classes being applied to real-life experiences, it all came alive for me. It just boosted my thoughts to a completely new level and made me realize how applicable everything from my training was to my professional career. Seeing how necessary social skills are on the job during the internship also helped improve my confidence. Knowing that I already knew how to interact and function with others gave me a pretty good internal boost. It's allowed me to work with others here in my own department effectively, as well as with other Nucor departments across the US*."

Rising Scholar Zeta (Civil Engineer)

Conclusions

Rising Scholars students that participated in Professional Practice gained confidence in their ability to make their own way in the world. Low SES students often face mental issues stemming from their upbringing, which require some successes to overcome. Working as a professional and bringing a sound work ethic to the job can help cement the needed confidence in an individual that might not otherwise get the chance to solidify and come to the forefront. Developing professional mentors outside the university environment also assists students build confidence in a their own abilities to navigate the professional world. To promote positive outcomes, the RS program helped low SES students learn networking skills and provided them with opportunities to meet potential mentors. Although it was during a difficult economic period, some RS students excelled at Professional Practice and experiential learning. As to the influence

of intra-collegiate professional work experience on the success of the RS in their careers, the noteworthy findings from this study include:

- The RS students appreciated the chance to put their skills to use in on-going problems of relevance to others in their fields.
- An increase in confidence in their own technical abilities was nearly universally reported by participating professional practice RS students in post-graduation interviews.
- Successful RS work experience students frequently acknowledged the support network lessons associated with the program as being quite valuable to their career success.

It should be noted that only students who got to participate in Professional Practice during their collegiate careers were interviewed for this paper, but all of the students received the same experiences on-campus that these students spoke so highly of. The RS students in Professional Practice noted their ability to try different things, practice their professional skills within a real working environment, and apply their knowledge of professional networking skills were positive and valuable features the experiential experiences. First-generation, low SES students seeking to become technical professionals in the modern world have a steeper ramp to climb toward collegiate graduation, but an understanding of their pre-existing assets and proper coaching can improve their chances of success. The students associated with the RS program would not normally have been predicted to graduate in a STEM field and move into the professional world, but they clearly demonstrated that with desire and mentoring, the ability to succeed in the professional STEM world is not limited by upbringing or economic status.

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