Impact Report 2013-2019

ENGINEERING the Future
A Message from the Associate Dean

STARS was a long-time dream. Data showed us that students from low-income backgrounds were not being admitted to the competitive majors in engineering, yet those are the degrees that launch lucrative careers and can change a family’s future. We knew we had to act.

We launched STARS in 2013 with a National Science Foundation grant. Since then, the program has exceeded our every expectation. In 2019, the Washington Legislature invested in the future of STARS with $500,000 a year in permanent funding, which will have a substantial impact on our ability to increase equity and opportunity for Washington state students.

Many people had a hand in launching this program. For years, I served on undergraduate admissions committees where I saw students — many of whom I believed could be excellent engineers — denied admission because they arrived on campus without sufficient preparation to compete in the engineering prerequisites.

Scott Winter, then associate director of student academic services, learned about the GoldShirt program at the University of Colorado Boulder. The Colorado program identified high school graduates who needed extra time to catch up on math and science before tackling an undergraduate engineering curriculum. From that point on, every time I complained about UW engineering admissions, Scott would say: “We need a Purple Shirt program.”

With our colleagues at Washington State University, in particular Bob Olsen, who was then associate dean, we applied for and were awarded a National Science Foundation grant in May 2013. Then we learned that NSF wanted us to enroll our first cohort by the fall. Boy, did we have to scramble!

Fortunately, Sonya Cunningham had just moved to Seattle and became the STARS director in August 2013. Thanks to her stellar leadership, STARS has achieved so much more than Scott, our colleague Dawn Wiggin and I ever dreamed of: Not only does Sonya stress the need for high expectations and hard work, but she also has an innate sense of what each student needs. Her dedication has paid off: Retention for STARS students in engineering through the two-year program is 80 percent.

Our STARS students are amazing and our course instructors work incredibly hard. The result is that second-year students in the program have a 3.30 GPA compared to a 3.16 GPA for their peers who are not enrolled in STARS.

Dr. Eve Riskin

"Your ZIP code shouldn’t determine whether you can become an engineer."

DR. EVE RISKIN, ASSOCIATE DEAN, DIVERSITY & ACCESS, COLLEGE OF ENGINEERING

A Message from the Director

When I arrived in Seattle six years ago without a job, I was simply hoping for employment — and quickly! The quick was accomplished but the “simply employed” never happened. As a first-generation student from a very low-income background, I found from the start that STARS was more than just a job. It was a cause and a passion. It was a knowing that I had come to Seattle to be of service in a very special way.

I can hardly believe how we have grown since that first day in September 2013 when both Cohort I and I had no idea what we had gotten ourselves into! I’m proud to say that Cohort I has since graduated and in fall 2019 we welcomed our seventh cohort of STARS students. STARS is designed to provide students with academic, personal and professional development and support. Students receive on-going coaching, academic preparation courses, workshops, tutoring and career guidance to increase retention and improve graduation rates.

People often ask what is the one thing that makes STARS so successful. That’s impossible to answer because STARS takes a holistic approach. However, one of the major driving forces behind STARS is dedication.

"With the right guidance, structure and support, students will rise to the level of excellence set before them."

SONYA CUNNINGHAM, DIRECTOR, STARS PROGRAM
COLLEGE OF ENGINEERING

Our students are dedicated to giving their all and doing their best. This same level of dedication is matched by the STARS staff. By creating a culture of caring, our counselors, instructors, teaching assistants, peer educators and operations manager work tirelessly on behalf of our students. After six cohorts, we’ve seen that students will rise to the level of excellence set before them if they are given the right guidance, structure and support.

There are many people to whom we owe a tremendous amount of gratitude. A special thank you to all of our University of Washington STARS partners: College of Engineering Academic Affairs, College of Engineering Advancement, Paul G. Allen School of Computer Science and Engineering, Counseling Center, First Year Programs, Housing & Food Services, Office of Admissions, Office of Minority Affairs & Diversity, and Office of Student Financial Aid. We thank all our off-campus and industry partners as well as the Washington State Opportunity Scholarship for their generous and continuous support.

STARS is still a young program, and there is much to learn about how best to help our students succeed. Our ultimate dream, of course, is that someday we will not need programs like STARS because educational equity and access at the K-12 and college levels will have been achieved. In the meantime, it remains an honor and a pleasure — every day — to serve these amazing students!

Sonya Cunningham
Providing a pathway to engineering success

The Washington State Academic Red Shirt (STARS) program at the College of Engineering helps highly-motivated Washington students from low-income backgrounds succeed in engineering and computer science by providing a strong foundation in critical learning skills and core academics.

Statistics show fewer than 50 percent of first-year engineering students nationwide graduate with an engineering degree. The graduation rate for students from disadvantaged backgrounds is even lower. The primary reason: lack of preparedness.

STARS students get an additional year of intensive preparation, supported by a network of instructors, tutors and peer educators who help them develop the skills to successfully complete core math and science prerequisites before they start the full engineering curriculum. It’s the boost they need. In the program’s second year, for example, 24 out of 32 students in Cohort II, or 75 percent, graduated with an engineering or computer science degree. Seven students graduated with other degrees, and only one did not graduate.

A comprehensive approach

A variety of obstacles can affect a student’s ability to remain in and graduate from college. By using a holistic approach, the STARS team builds cognitive, interpersonal and intrapersonal skills with particular attention on how these factors interact. This process focuses on advising (intrusive model), mastering academic math and science basics (intensive focus on the problem-solving process), study and personal skills development (emphasis on accountability and excellence), and community-building activities.

The STARS Model

Students who enter the STARS program follow a rigorous schedule. Here’s a look at the program’s structure.

MEETING THEIR COHORT: Several months before the fall quarter begins, incoming STARS students convene at the UW’s advising and orientation session as a cohort for the first time. Here they meet STARS students from other cohorts, learn what’s expected of them, register for classes, and get their summer homework assignments.

CAMPUS ARRIVAL: STARS students arrive on campus two weeks before the rest of the student body. Their jam-packed schedule includes early-start classes in math and science, learning skills development, an on-site industry visit, and some fun activities to promote community-building.

YEAR ONE: During the redshirt year, all students live in the Engineering Living Learning Community on campus and meet regularly with their academic counselor. They take courses in math and chemistry problem solving, attend workshops and group tutoring, and end the year with calculus and chemistry. A yearlong seminar provides learning skills, career, professional and personal development.

YEAR TWO: Students live on campus during the second year as they continue to improve their study skills and prepare academically for their chosen majors. They take classes in physics, chemistry, calculus and computer science as well as workshops in math and science and general education courses.

By the numbers

Student enrollment

YEAR ONE: Cohort VI had 40 students, Cohort V 51 students, Cohort IV 28 students, Cohort III 29 students, Cohort II 32 students, and Cohort I 29 students.

YEAR TWO: Cohort VI had 40 students, Cohort V 51 students, Cohort IV 28 students, Cohort III 29 students, Cohort II 32 students, and Cohort I 29 students.

What’s a redshirt?

In college athletics, the term “redshirt” was applied to student athletes who spent an extra year training before playing with the team. In a similar fashion, STARS students devote the first two years to strengthening their learning, academic, problem-solving and critical-thinking skills. The program uses a specialized curriculum and a support network of academic tutors and career counselors. “Basically, we’re saying we want you on the team, but you’re not quite ready,” says Sonya Cunningham, STARS program director. Students who fulfill the program requirements are guaranteed a spot in one of the UW’s competitive engineering or computer science programs.
In Nepal, Lama lived in a local village for a week, observing how the villagers used their resources. She also visited a hospital in Kathmandu to see how technology had been incorporated. Both experiences gave Lama insight into what engineering can mean to different communities.

As a Nepalese American, Lama is interested in connecting with diverse communities through engineering and technology. “The study abroad experience gave me an opportunity to contribute my knowledge of languages and cultures,” she said. “I was able to conduct interviews with local community members to better understand their unique needs so we could later propose technological supports that would be both affordable and realistic. While my work was only in the initial stages of the research process, I found the experience incredibly valuable.”

Cordero was interested in engineering, but had no idea how to navigate the college application and financial aid process. The STARS program gave him the support he needed to pursue and complete his engineering degree.

For Cordero, being part of a cohort — an integral component of the STARS program — was one of the keys to his success. “Knowing there’s a group of individuals who had similar backgrounds to mine made me feel like I belonged,” he said. Cordero completed three internships with Boeing and landed an engineering position after graduation. He sees his career as a way to thank his parents for the sacrifices they made. “I want my parents to feel like they’re on this journey with me,” says Cordero. “I want a good career so in the future I can support my parents the way they’ve always supported me.”

By the numbers

To date, 98 percent of STARS students who have successfully completed the two-year program were placed into their first-choice major.

Ivan CORDERO
Aeronautics & Astronautics ’19

Ivan Cordero grew up in Yakima, WA, working in the fields and orchards with his parents who had emigrated from Mexico.

Jyoti LAMA
Computer Science & Engineering ’22

In 2018, STARS student Jyoti Lama traveled to Kathmandu, Nepal, on a study abroad program with the UW Department of Bioengineering where she saw first-hand the intersection between global health and technology.

In Nepal, Lama lived in a local village for a week, observing how the villagers used their resources. She also visited a hospital in Kathmandu to see how technology had been incorporated. Both experiences gave Lama insight into what engineering can mean to different communities.

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STARS SEMINAR:
Helping students reach their full potential

The STARS Seminar is a cornerstone of the program, going well beyond the traditional university introductory course. For a year, the seminar teaches critical survival skills, making sure that students understand what they need to know to excel at the university level.

It’s the only class during the redshirt year that all the students in a cohort take together. In this safe environment, students learn life skills, develop a support network and make connections — skills that will be useful throughout their university career. "The seminar is an opportunity for students to get to know each other better and learn how to be supportive of one another," says Jordan Walsh, STARS academic counselor and seminar instructor. "Through the seminar, the cohort becomes a community within a huge school." By the end of the first year, bonds have been forged, communities created and individuals empowered.

"Transitioning from high school to college can be pretty rough," says Kyle Herbruger (Aeronautics & Astronautics ‘23). "The seminar taught me how to make that transition more smoothly. I went from high school, where all I had to do was show up to pass the class, to college where studying three or more hours each day still wasn’t enough."

A rigorous schedule
Each quarter of the seminar is devoted to different skills. In the fall, the seminar centers on ways to become a master student, emphasizing study skills and time management. During the winter, the focus shifts to preparing for career success. Counselors partner with the Career Center at the College of Engineering to introduce such topics as writing resumes, networking and dressing for success.

By spring, students start to explore engineering options and make faculty connections. Speakers from different departments at the College of Engineering visit with students in the classroom, describing what their discipline entails and what career options are available. Students also hear from business leaders in the community through career fairs and in-class speakers.

For Kyle Herbruger, having speakers who came from a similar background was invaluable. "The speakers gave me a lot of insight into the different engineering majors and the work environment after graduation," he says. "It was encouraging to hear from people who had made it and see that they aren’t all that different from me.

STARS student Jasmine Woon (Computer Engineering ‘22) enjoyed the opportunity to build a network and make friends through activities held during the year. "My favorite part was the brown bag class where we put thoughtful notes into each other’s bag," she says. "It was the ultimate reflection of how we started off as strangers and became very close classmates through shared struggles and experiences."

By the numbers

<table>
<thead>
<tr>
<th>STUDENTS BY GENDER*</th>
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<tbody>
<tr>
<td>Men 59%</td>
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<tr>
<td>Women 41%</td>
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<table>
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<tr>
<th>FIRST-GENERATION COLLEGE STUDENTS*</th>
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<tbody>
<tr>
<td>73%</td>
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<table>
<thead>
<tr>
<th>UNDERREPRESENTED MINORITIES*</th>
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<tbody>
<tr>
<td>51%</td>
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<table>
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<th>PELL-ELIGIBLE STUDENTS*</th>
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<table>
<thead>
<tr>
<th>WASHINGTON STATE OPPORTUNITY SCHOLARSHIP RECIPIENTS*</th>
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<td>67%</td>
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*Indicates average over six years (2013-2019)
Once accepted into the STARS program, she chose to focus on mechanical engineering. “I love math and ME seemed like the right fit, especially as I learned more about the role math plays in device development,” she says. She narrowed her focus to mechatronics, which integrates mechanical, electrical and computer engineering. After internships at Boeing, a fiber optics lab and a nanosystems engineering research center, she drilled down even more, selecting robotics systems as her area of interest.

For Karikari, STARS was her introduction to an amazing community of students, instructors, mentors and tutors. “Community is so important when you are in college,” she says. “No one wants to feel alone. STARS helped me realize there are people like me in engineering—women, people of color, first-generation students. That alone was a huge discovery.” Karikari is currently attending graduate school at Stanford University.

The performance of STARS scholars in prerequisite courses such as calculus, chemistry, physics and computer science is better than the performance of students from similar backgrounds. The mean cumulative Grade Point Average (GPA) for STARS students for the first two years is 3.30 compared with 3.10 for STARS-like students.*

<table>
<thead>
<tr>
<th>COURSE</th>
<th>STARS STUDENTS MEAN GPA</th>
<th>STARS-LIKE STUDENTS MEAN GPA</th>
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<tbody>
<tr>
<td>Calculus III**</td>
<td>3.46</td>
<td>2.62</td>
</tr>
<tr>
<td>Calculus II**</td>
<td>3.44</td>
<td>2.84</td>
</tr>
<tr>
<td>Calculus I*</td>
<td>2.90</td>
<td>2.72</td>
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<tr>
<td>General Chemistry I*</td>
<td>3.33</td>
<td>2.68</td>
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<tr>
<td>General Chemistry II*</td>
<td>3.08</td>
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<tr>
<td>Physics I*</td>
<td>2.99</td>
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<tr>
<td>Computer Science I*</td>
<td>3.33</td>
<td>2.59</td>
</tr>
<tr>
<td>Computer Science II*</td>
<td>2.92</td>
<td>2.63</td>
</tr>
</tbody>
</table>

* includes students who started between 2013 and 2017
** includes students who started between 2013 and 2018

Consistently outperforming their peers

The performance of STARS scholars in prerequisite courses such as calculus, chemistry, physics and computer science is better than the performance of students from similar backgrounds. The mean cumulative Grade Point Average (GPA) for STARS students for the first two years is 3.30 compared with 3.10 for STARS-like students.*
Diverse perspectives in the workplace encourage creativity and drive innovation. Multiple voices and varied approaches inspire engineers to see the world differently. Companies benefit as well, because a diverse employee base can increase productivity and staff morale.

The STARS program is preparing graduates to face the challenges of the future and the post-graduation program statistics bear that out. Nine out of 10 students in Cohort I, for example, were employed immediately after graduation. More than 80 percent of Cohort II graduates had a job lined up or were headed to graduate school by the last day of exams.

The program’s reputation continues to grow. In 2018, there were 212 applications for 40 openings. As with other cohorts, the students selected for Cohort VI come from varied backgrounds. Some 43 percent are women, 45 percent are underrepresented minorities, and 85 percent are the first in their families to attend college.

**STARS director receives Thorud Leadership Award**

In 2018, Sonya Cunningham received the University of Washington’s David B. Thorud Leadership Award for her stellar leadership of the STARS program. Cunningham was cited for embodying the very values imparted to all STARS scholars: “Have a strong work ethic, be responsible, set and meet (or exceed) high expectations, provide access, engage in hard conversations, be fully committed, tailor support, and motivate others.”

- Accenture
- Amazon
- AT&T
- Boeing
- Empower Engine
- Expedia
- Facebook
- Goldman Sachs
- Honeywell
- HP
- IBM
- Infectious Disease Research Institute
- Jacobs Engineering Group
- Microsoft
- Naval Facilities Engineering Command
- Pure Watercraft
- Qualcomm
- Sage Bionetworks
- Sound Transit
- Stantec
- Tesla
- United Technologies
- Washington State Department of Transportation
- Washington State Police

**STARS graduates: Where are they now?**

STARS graduates work for major companies, government agencies and nonprofit organizations in Washington state. Here is a partial listing of employers.

**Building a foundation for success**

According to recent survey data, STARS scholars credit the support, community and resources provided by the STARS program as responsible for their successful transition from high school to the University of Washington.

- are more attached to engineering or computer science;
- feel a greater sense of belonging to the College of Engineering community;
- are more confident in their math and science abilities;
- are more confident in their time management, networking and interviewing skills;
- are more familiar with campus resources; and
- are more comfortable asking for help.
Inspired by her family’s ancestral village of Kampong Cham which lacks electricity and clean running water, Teal was interested in environmental issues. After graduation, she was hired as a transportation engineer to work on the revitalization of the downtown Seattle waterfront. One day she hopes to improve infrastructure in developing countries like Cambodia.

When she first arrived on the UW campus, Teal had trouble finding friends with similar interests. “Through STARS, I found a group within the cohort who evolved from colleagues to close friends,” she says. “This support system extended to professors and advisors who interacted with me academically and personally. Without STARS, I wouldn’t be an engineer.”

Donavan Erickson
Electrical and Computer Engineering ‘20

Nothing in his four years of high school prepared Donavan Erickson for college. Not only was the workload significantly different, so too was the rigorous level of academics.

STARS helped Erickson develop good study habits and improve his problem-solving and critical-thinking skills. “It takes a tremendous amount of time and energy to do well at the UW,” he says. “I am so thankful for the foundation that STARS is giving me.”

Erickson gives a big thumbs-up to the STARS community. “With STARS, I’m closer to my peers, closer to campus resources like the engineering, math and writing centers, and I have a network of people I can ask when I need help,” he says. “When I came to the UW, I was one person. Now, I’m a very different person — more focused, conscious, engaged and prepared.” With graduation day not far off, Erickson has given himself three career goals: earn an MBA, create his own start-up business, and keep learning. “If my career goes along as I hope it does,” he says, “I should have the background and foundation to be successful.”

Tammy Teal grew up in Mukilteo, WA, but when her mother’s multiple sclerosis progressed, she went to live with her father, a Cambodian civil war refugee who suffers from post-traumatic stress disorder.

The STARS curriculum emphasizes four principles designed to carry students throughout their college career and into life.

Helping STARS Students shine

The STARS curriculum emphasizes four principles designed to carry students throughout their college career and into life.

**TENET 1**
What works is work
We believe that deliberate intentional practice makes perfect. Not every student starts in the same place, but when guided by skilled, caring and supportive instructors and mentors, students can be empowered to work harder and smarter, and learn to push themselves to their fullest potential.

**TENET 2**
Learn how to learn
There is no right way to learn. We emphasize the importance of asking deep, and then even deeper, questions, and we value practicing new learning and study strategies. In STARS, students are exposed to a variety of learning techniques so they can find what works best for them.

**TENET 3**
The problem-solving process
Being able to effectively problem solve is key to being an excellent engineer. Throughout the program, students have multiple opportunities to practice and strengthen their problem-solving skills. This valuable step-by-step process can be applied to any discipline.

**TENET 4**
Communicate and collaborate
Students are taught how to ask for and receive help and they are encouraged to do so throughout the program. Being part of a small community allows students to build relationships with people of different perspectives. Working together or in teams is what makes strong engineers, but STARS students also benefit from making friends for life. In fact, many refer to their cohort as their family.
Connect with the

STARS

Learn more

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