

Testimony
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Chairman Buschon, Ranking Member Lipinski, and members of the committee, thank you for the honor of allowing me to testify before you today about private sector programs that engage students in STEM.

My name is Phil Cornwell, and I am Vice President for Academic Affairs and Professor of Mechanical Engineering at Rose-Hulman Institute of Technology. Therefore, I come to you, not as a private sector provider of such programs, but as the representative of a university that furthers the education of students benefiting from such programs.

Rose-Hulman is a private university focused exclusively on science, engineering and mathematics education. For the past 15 consecutive years we have been ranked by U.S. News & World Report as the best undergraduate engineering program among colleges whose highest degree awarded is a bachelor's or master's. We have approximately 2200 students, so we are a small school. About 80% of our students study an engineering discipline, so in terms of engineering, we would be considered a mid-sized college of engineering. In fact, we are in the top 20 – 25% of all engineering colleges in terms of the number of engineering graduates we produce each year. Our placement rate is around 99% each year, and last year our median starting salary was around \$67,000.

The mission of Rose-Hulman is to provide our students with the world's best undergraduate science, engineering, and mathematics education in an environment of individual attention and support. We hire faculty members who are experts in their fields, but who are also passionate about teaching and preparing students for success.

We are also strong believers that a Rose-Hulman education is much more than what happens in the classroom. Student life and extracurricular activities play in critical role in the education of our students and in enabling us to graduate well-rounded, liberally educated, STEM professionals. Every student group on campus has leaders who have technical majors. I love going to a football game, looking at our team, and being able to say "every Rose-Hulman student out there has had calculus and differential equations." There are not many other schools where you can say that!

We believe that retention is everybody's responsibility. We do have a retention task force, and something called the "RHIT Link Survey" to help identify at-risk students. We don't have any large classes, so faculty members know all the students in their classes and will identify and help any who are struggling. A few years ago I had a student named Betsy in three courses. In the first two, she received A's, but in the third she received a D on her first exam, which was completely out of character for her. I called her into my office to see what was going on. With tears in her eyes she said she didn't know if she wanted to be an engineer, and she didn't enjoy the material we were studying. I encouraged her to persevere, and I know her friends, who were also engineering students, encouraged her to persevere, and she did. She ended up graduating, and she is currently a Whittaker Fellow working on a Master's degree at Oxford. That is what happens when you have faculty members who care about the success of each and every student. At Rose-Hulman our 1st to 2nd year retention rate is usually between 90-93% and our 5 year graduation rate is about 80%.

One of our most successful outreach programs is called "Operation Catapult," which is a three week summer program for rising high school seniors where students live on campus and work in teams on a technical project. Every team is mentored by a faculty member with a Ph.D. There are also numerous demonstrations, lectures, and field trips. About 30% of the students who attend Catapult choose to come to Rose-Hulman.

Two other ways Rose-Hulman helps support pre-college students in their technical education is through the "Rose-Hulman Homework Hotline" and through "PRISM."

Rose-Hulman's Homework Hotline was started in 1991 as a free math and science tutoring service for Indiana students in grades 6 through 12. Tutoring is still the primary activity of the Homework Hotline, but the scope of the program has expanded to include many outreach and STEM promotional activities. Although the program was originally intended for Indiana students, calls have been received from every state in the country. Even though we target students in grades 6 through 12, we have received calls from students in the 3rd grade, college and even graduate students. The Homework Hotline has not turned down a call for homework help since its founding.

PRISM helps Indiana teachers of STEM take advantage of digital learning tools to meet the state academic standards. PRISM provides a library of teaching resources and access to Moodle, a secure platform for delivering educational content through the Internet. PRISM also fosters teacher professional development by helping instructors try out emerging digital tools that will transform their pedagogy without significantly increasing their workload.

Rose-Hulman hosts a regional FIRST Robotics competition, and we recently became an affiliate school for Project Lead the Way.

A unique way Rose-Hulman partners with industry is through Rose-Hulman Ventures (RHV). RHV operates as a successful engineering consulting business on the campus of Rose-Hulman. At Rose-Hulman Ventures, teams of student interns, under the supervision of a professional engineering project manager, work with

client companies to develop new products, services, and processes that are important to the success of the clients. RHV provides client companies access to outstanding undergraduate engineering and computer science talent while offering students real-world, hands-on learning experiences. Student interns with RHV aren't just learning about engineering; they are helping generate real business value for clients.

Rose-Hulman Ventures consults for a diverse mix of customers, from entrepreneurial start-ups, such as FAST BioMedical and NICO, to established companies with global operations, such as Dow AgroSciences, Cummins, and Alcoa. Our state-of-the-art facility in a Certified Technology Park ensures that students and clients have access to professional-level laboratories, equipment, tools and workspaces—all on the Rose-Hulman campus.

Internships are not currently a required part of the curriculum, but they are important to the education of our students. Currently, about 92% of our students have at least one paid summer internship and about 80% have two or more internships before graduation.

In my opinion, there are two aspects to increasing the number of STEM educated professionals in the United States: 1) increasing the graduation rate of the students who currently enter college with a desire to study a STEM field, and 2) increasing the number of students in K-12 interested in a career in STEM.

The average 6-year graduation rate for students who enter college with an expressed interest in studying engineering is less than 50%. Improving this number by just 10% would produce around 100,000 new engineers in 6 years. How do we do this? There has been a lot of research done on retention. Factors that make a difference include providing an early connection to the discipline; rewarding professors who have a passion for and expertise in undergraduate STEM education; and providing meaningful internships early in students' educational experiences.

I believe FIRST Robotics, Project Lead the Way, and other similar programs are great at helping make students aware of engineering as a possible career option. However, we need more than just awareness of STEM as an option – we need excellent high school mathematics and science instruction to prepare students for the rigors of an engineering education.

How could the federal government help? Here are some possible suggestions. 1. Offer incentives for companies to provide meaningful internships early in students' education, that is, after the first and second year. No such incentive should be necessary for upper level students. 2. Differentiate student loan rates based on schools' graduation rates and on student major.

In closing, I wish to thank the Committee for the opportunity to participate in today's hearing. I am happy to answer any questions.