

Why don't students stick with STEM degrees?

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The number of jobs requiring expertise in science, technology, engineering, and mathematics (STEM) fields has risen by 34% over the past decade, leaving employers scrambling to recruit graduates with the

required skills. But training the workforce of tomorrow isn't easy: research shows that fewer than 40% of students who begin a STEM program ultimately graduate with a degree in their chosen field, while about a fifth drop out of college altogether.

In a [study published in 2021](#) in the *Journal of Higher Education*, Leo Pedraza, assistant dean of [students](#) and director of [student](#) life at Stevens Institute of Technology, used two-factor theory—a methodology originally developed to study corporate workforce issues—to analyze data collected by the National Center for Education Statistics. His findings help explain the challenges that drive some students to leave STEM programs—and shed new light on the efficacy of different measures intended to [support](#) them.

"Historically, the onus has been put on students to dig deep and simply persevere," said Pedraza, who earned a doctorate in higher education leadership, management, and policy at Seton Hall University. "But this research reveals that there are important untapped opportunities for institutions to equip students for success."

To assess different practices intended to drive STEM persistence, Pedraza sorted them into "hygiene" factors and "motivator" factors. The former are foundational, must-have supports that students need in order to succeed, such as tuition aid and strong family networks. The latter operate by inspiring and engaging students: such factors might include opportunities to co-author research with faculty, prestigious internships, or academic accolades.

"What we found is that hygiene factors are an effective way to help ensure that students don't drop out of college altogether—but motivator factors are much more powerful when it comes to encouraging students to stick with STEM programs," Pedraza explained.

A student who completes an internship related to their field is more than 300% more likely to graduate with a STEM degree, for instance, while completing research with a faculty member drives a 121% increase in STEM persistence.

Importantly, gender and racial imbalances in STEM persistence were far less pronounced among students who benefited from motivator factors. The STEM persistence gap between men and women fell by almost two-thirds, to just two percentage points, among students who completed internships, for instance.

"Academic institutions say they're committed to tackling inequities and increasing diversity in STEM fields," Pedraza said. "This research shows that certain interventions can help students from all backgrounds to succeed in STEM fields."

The research also identifies some areas where institutions could be doing much more to support STEM students. Study abroad programs are potentially a powerful motivator factor, but currently have no impact on STEM persistence; participation in service-learning programs, meanwhile, actually reduces a student's chance of completing a STEM degree by almost 60%.

"This effect is likely because study abroad and service-learning programs aren't currently tailored to the needs of STEM students," said Pedraza. "By offering study abroad or service-learning opportunities with a more direct connection to STEM fields, we could potentially boost STEM persistence."

The key, said Pedraza, is to identify high-impact practices and make data-driven decisions to help students to realize their potential. Accessing Careers in Engineering and Science, known as ACES, was developed at Stevens and takes an innovative approach to support

students from underserved communities and under-resourced backgrounds. The program identifies STEM talent in high-school and nurtures their path toward STEM careers through STEM access, immersion and support.

(According to Pedraza's findings, there is a 56% decrease in the likelihood of Black students achieving a STEM degree as more work needs to be done to support them.)

"Providing financial support is important, but it's just one piece of the puzzle," he added. "To help students gain the skills needed in today's global economy, we need to think more strategically about how to give them the support they need."

Provided by Stevens Institute of Technology

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