WORLD CLASS

Economic vitality compels the United States' top graduate engineering programs to double down on enrollment diversity — often through exhaustive international recruiting

Jeffrey G. Harris, MBA & Richard A. Skinner, PhD

Like many of the nation's top engineering deans, Leo Kempel is scouring the globe for a graduate-school applicant pool that's rich in racial, cultural, and gender diversity.

Social conscience and social desirability are both at play, to be sure, but neither of those factors is the overriding force behind Kempel's ongoing quest for far-flung tech talent. For Kempel, who has led the Michigan State University (MSU) College of Engineering since 2013, the primary driver is far more practical than philosophical.

In an economy marked by high technology, low inflation, and virtually nonexistent unemployment, almost every graduate engineering program in the United States is struggling with the same recruiting imperative: Engage historically underrepresented populations and entice foreign nationals — or perish. Not even MSU's College of Engineering, one of the oldest, largest, and most respected engineering programs in the country, is exempt from this all but existential challenge.

"The Caucasian male that was the predominant grad student in the 1950s is still there in 2019, but, to be honest, my perspective is, if you relied upon that, you would never meet the pool that you need," Kempel said in a just-released installment of the higher-education podcast *Innovators*.

"You've got to have an expanded pool that includes women. It includes African Americans and Hispanic students. It includes international students."

Unfortunately, despite the concerted and sustained efforts of myriad educational institutions, government agencies, and industry groups, women and people of color remain woefully underrepresented at all levels of academic engineering.

"We're seeing gains, but not the kind of gains that you would have thought we could have over 30-some years," Kempel said.

The inevitable upshot: Foreign students — nonresident aliens, in the legal vernacular — have become the lifeblood of graduate engineering programs from coast to coast.

The National Foundation for American Policy (NFAP) goes so far as to declare, "At many U.S. universities, both (undergraduate) and graduate programs could not be maintained without international students."[1]

That's not hyperbole, the data suggest.

Today, the overwhelming majority of full-time graduate students enrolled in U.S. engineering schools come from other countries. According to the NFAP, such individuals account for 81 percent of grad students in both electrical engineering and petroleum engineering, 79 percent in computer science, 75 percent in industrial engineering, 63 percent in mechanical engineering, 59 percent in civil engineering, and 57 percent in chemical engineering.[2]

The dominance of foreign students, moreover, is not limited to certain universities or regions. Fully 93 percent of U.S. electrical engineering programs report that the bulk of their grad students hail from abroad. The corresponding figure for computer science programs is 88 percent. By comparison, according to the Council of Graduate Schools, nonresidents constitute about 20 percent of all graduate students in the United States.[3]

LISTEN IN

Leo Kempel, PhD., dean of Michigan State University's College of Engineering, talks about his job — and the ever-evolving challenges confronting academic engineering — in the latest edition of the higher-education podcast *Innovators*. The audio series, presented by Harris Search Associates, is available on the web at harrisandassociates.com and on leading podcast platforms such as Apple Podcasts, Libsyn, Google Podcasts, Overcast, Stitcher, and Spotify.

International graduate students have, of course, been a fixture in U.S. STEM programs for decades. In 1995, overall graduate enrollment in the nation's electrical engineering and computer science programs was more or less evenly divided between domestic and international students. In the years that followed, however, the inflow of international grad students went from a trickle to a torrent.

From 1995 to 2015, as the number of U.S. citizens in the nation's graduate electrical engineering programs dropped by 17 percent, the number of foreign nationals in the same programs increased by 270 percent. In computer science, meanwhile, the number of nonresident grad students soared by more than *480 percent*.[4]

The tide has receded slightly since 2017, thanks in part, experts surmise, to threats by the Trump administration to reverse policies that allow international STEM students to work in the country, at least temporarily, after graduation.[5]

Despite a dip of about 6 percent, however, foreign nationals remain an enormous — and utterly essential — presence in graduate science and engineering programs throughout the United States.[6]

"Think of this as a supply-chain problem," Kempel said. "If your supply chain is not producing the pool necessary to meet your objectives, you can either quit or expand that supply chain. We don't quit, so (we) have to open up new pathways for recruiting students, and we're extremely aggressive about that."

The "traditional" student pipeline, which once supplied MSU and other top-tier U.S. graduate engineering programs with a steady stream of ambitious Americans wielding bachelor's degrees, has become more porous than a soaker hose.

The New York Times examined the trend in a report bearing a particularly eye-catching title: "The Disappearing American Grad Student." Writer Nick Wingfield opened the piece with an anecdote about "two very different pictures of students roaming the hallways and labs" at New York University's Tandon School of Engineering.[7]

"At the undergraduate level, 80 percent are United States residents," Wingfield wrote. "At the graduate level, the number is reversed: About 80 percent hail from India, China, Korea, Turkey and other foreign countries."

Tandon is hardly an outlier, as underscored by the most recent edition of *Engineering by the Numbers*, an annual report compiled by the American Society for Engineering Education (ASEE).

Close to 90 percent of the bachelor's degrees that U.S. engineering programs conferred in 2018 went to American citizens. However, domestic engineering students received just 43 percent of the master's degrees and 44 percent of the doctorates that were awarded that same year.[8]

At MSU, according to ASEE, 67 percent of the engineering doctoral students enrolled last year were foreign, as were 42 percent of its master's students. Just 14 percent of the school's undergraduates came from abroad.[9]

Kempel isn't alarmed.

"The pipeline leaks, but it leaks for good reasons as well as bad reasons," he said. "The average job offer for a student from our (bachelor's program) right now is over $66,000 a year, starting.

"That's a good thing. Students are able to take what they've learned — the credential they've earned — and they can productively make their way in the economy of the 21st century. It's not necessary to go to the next step."

In other words, at MSU and elsewhere, most U.S.-born engineering students who earn a bachelor's degree are more than happy to take the money and run — or at least jog toward the instant gratification of a perk-laden post in the corporate world.

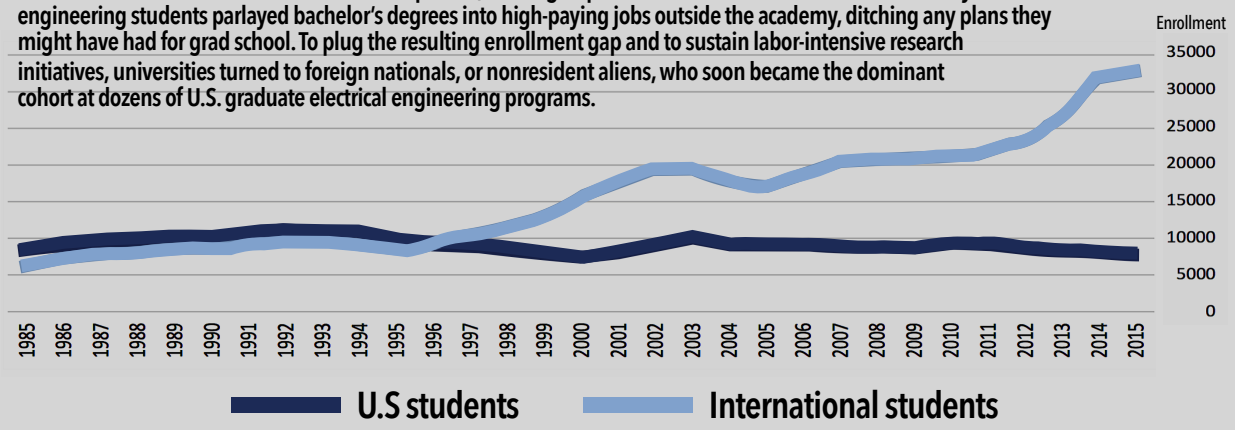
Michigan State University

THE XX FACTOR

Women have had a presence at Michigan State University's College of Engineering since 1933, when Ethel V. Lyon, the school's first alumna, earned a bachelor's degree in chemical engineering. Dean Leo Kempel has made the recruitment of woman and racial minorities a top priority. In 2015, the school's female undergraduate enrollment topped 1,000 for the first time. By last year, the figure had risen to more than 1,300 — some 22 percent of the school's undergraduate population. Still, at MSU — and virtually every other engineering school in the country — historically underrepresented populations remain woefully underrepresented populations.

DOCTORATES WITHOUT BORDERS

Before 1995, domestic students outnumbered international students in graduate electrical engineering programs across the United States. Then the nation's tech sector exploded, creating unprecedented demand for STEM talent. Many American engineering students parlayed bachelor's degrees into high-paying jobs outside the academy, ditching any plans they might have had for grad school. To plug the resulting enrollment gap and to sustain labor-intensive research initiatives, universities turned to foreign nationals, or nonresident aliens, who soon became the dominant cohort at dozens of U.S. graduate electrical engineering programs.



Source: National Foundation for American Policy

Engineering students from other countries, in contrast, have long viewed graduate school as their best path to employment, temporary or otherwise, in the United States. If nothing else, they hope to come away with otherwise-unattainable connections with key players in the nation's thriving tech sector — connections that might pay dividends once they return to their home countries.[10]

The various economic and social factors that shape student decision-making have forced Kempel to adjust his thinking — and the way he approaches the recruitment of potential matriculants, both at home and abroad.

"Here, I'm not competing with Ohio State, although we compete with Ohio State," the dean said. "I'm not competing with Purdue, although we compete with Purdue. I'm competing with Apple. I'm competing with Google. I'm competing with Lockheed Martin and Boeing."

Overseas, he's competing with, well, the rest of academic engineering.

As for the recent dip in international enrollment experienced by U.S. graduate engineering programs, Kempel is somewhat sanguine.

He suggests that the decline is a hiccup that has more to with the maturation of overseas educational institutions than with escalating geopolitical tensions or any travel or immigration restrictions put forth by the Trump administration. Over time, Kempel said, developing nations that invest in educational "infrastructure" simply become less dependent on the "outsourcing" of advanced technical instruction to the United States and other industrialized countries.

Kempel said this ongoing, mostly beneficial cycle of global development requires institutions such as MSU to be nimble, innovative, and relentless — not only in finding, and recruiting, prospective graduate students *wherever* they might reside but also in making sure that enrollees, especially first-generation college students and matriculants from historically underrepresented populations, realize their full potential.

"What that means for us — who still need great, great access to talent — is that we need to look at different places to go recruit," he said. "We're going to have to expand the supply chain again — not just expand the supply chain involving domestic students, which we will do, but also expand the supply chain in terms of what countries (we target to) recruit the graduate student of the future."

The stakes couldn't be higher.

Again, Kempel said, aside from shutting down, an institution such as MSU has no option but to "continually move around the world, seeking out that talent." After all, as he sees it, no major U.S. engineering school can survive long term without a robust, research-rich graduate program, and, at least for the foreseeable future, no graduate program can survive without talented, ambitious international students.

Kempel can think of only one eventuality that could alter that dynamic in the short term — and it's something that he (and most everyone else on the planet) would prefer to avoid: a global economic meltdown resulting in a massive contraction of the tech sector.

"When the job market's *not* good," he said, "it looks a lot more favorable to stay in grad school." ■

Sources

[1] The Importance of International Students to American Science and Engineering. National Foundation for American Policy, Arlington, Virginia. *NFAP Policy Brief.* October 2017, p. 2.

[2] Ibid, p. 1.

[3] Okahana, Hironao, and Enyu Zhou. *Graduate Enrollment and Degrees: 2007 to 2017.* Council of Graduate Schools, Washington, D.C. CGS/GRE Survey of Graduate Enrollment and Degrees. 2018, p. 12.

[4] Redden, Elizabeth. "Foreign Students and Graduate STEM Enrollment." *Inside Higher Ed*, 11 Oct. 2017, https://www.insidehighered.com/quicktakes/2017/10/11/foreign-students-and-graduate-stem-enrollment.

[5] Jackson, Lily. "International Graduate-Student Enrollments and Applications Drop for 2nd Year in a Row." The Chronicle of Higher Education, 7 Feb. 2019, https://www.chronicle.com/article/International-Graduate-Student/245624.

[6] Ibid.

[7] Wingfield, Nick. "The Disappearing American Grad Student." *The New York Times*, 3 Nov. 2017, https://www.nytimes.com/2017/11/03/education/edlife/american-graduate-student-stem.html.

[8] Yoder, Brian L. *Engineering by the Numbers*. American Society for Engineering Education, Washington, D.C. 2018, https://www.asee.org/documents/papers-and-publications/publications/college-profiles/2017-Engineering-by-Numbers-Engineering-Statistics.pdf.

[9] Michigan State University-2018. American Society for Engineering Education, Washington, D.C., *Profiles of Engineering & Engineering Technology*. http://profiles.asee.org/profiles/8165/screen/27?school_name=Michigan+State+University.

[10] Wingfield.

About Harris Search Associates

Harris Search Associates is a leading global executive search and talent advisory firm. Established in 1997 by Jeffrey G. Harris, the firm focuses on the recruitment of senior leaders to support the growth of the foremost universities, research parks, institutes, national laboratories, academic health centers, hospital enterprises, and organizations driving global innovation and discovery. Based in Dublin, Ohio, a suburb of Columbus, Harris Search Associates maintains regional offices in Dallas and San Francisco. The firm is a shareholder member of IIC Partners, one of the largest global retained executive search organizations, with 43 offices in 29 countries.

About the *Innovators* podcast

The ***Innovators*** podcast features timely conversations with global thought leaders in the areas of higher education, research, engineering, technology, and the health sciences. The audio segments, which give listeners an opportunity to learn from national leaders who are changing the landscape of innovation and discovery, are available on the web at **harrisandassociates.com** and on leading podcast platforms such as Stitcher, Overcast, and Player.FM.

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