



Leadership at Risk:

How International Students Can
Help Save America's Global
Economic and National Security
Leadership

White Paper

April 2023

DATA CATALYST INSTITUTE

Executive Summary

For several decades, U.S. global leadership has been a result of several factors, including a commitment to human dignity and democratic ideals and possessing the economic and national security muscle to support a global vision. A rarely discussed foundation of America's economic and national security strength – and, thus, global leadership – is a seemingly unceasing commitment to technological innovation, which is itself fueled by a marvelous higher education system that annually produces thousands of graduates skilled in science, technology, engineering and mathematics (STEM).

STEM graduates have been driving corporate and national security innovation, which in turn produces economic growth and military might that support global leadership. But here's the problem: if America wishes to maintain its global leadership by continuing to drive economic and national security innovation, it must produce enough STEM-educated graduates. Yet, for years American technology companies and economic policy leaders have lamented a national shortage of high-skill, STEM-educated workers that stay and work in STEM fields, and all signs are that the problem is getting worse. Companies and industry associations have worked hard to modify immigration policy and expand opportunities for international high-skill workers to legally work in the U.S., but Congress has struggled to enact any significant immigration legislation. As a result, the skilled worker well seems to be running dry, and America doesn't seem to have a Plan B.

One Plan B - the subject of this paper - could be attracting more international students and workers. Historically, America's economy and opportunistic spirit have been a beacon to immigrants, and our higher education system has attracted the best and brightest international students. But recently, other countries have raised the quality of their higher education institutions, and have made policy changes that make their education and career opportunities more attractive than America's. This competition for students, and particularly for the best STEM students, is creating new challenges for American universities that will ripple out into the commercial and national security innovation economies. The economic challenge will soon become even more acute when silicon chip firms' recent manufacturing investments are completed, and the new factories lack enough skilled workers to operate efficiently and meet demand.

How can America fix its increasing STEM graduate shortage and thereby support its innovation economies and global leadership aspirations?

- Recognize international students as a key resource in the country's economic and national security innovation infrastructures and valuable allies in the development of America's international "soft power"
- Enact policies that reflect these priorities, including student-to-career pathways that attract students and eliminating regulatory deterrents that drive students to other countries

These actions, even collectively, will not solve America's skilled worker shortage. But they will help by increasing the number of STEM students in American universities and the flow of those students into U.S. companies. These first steps would allow international STEM talent to make meaningful contributions to America's academic, research and development, and innovation communities, and thereby support America's economic growth, national strength, and global leadership.

Introduction

Since the end of World War II, the United States has been a global economic and national security leader. This combination has enabled America to financially and militarily support democratic and human dignity ideals internationally, which has led to more democracies, economic development in many corners of the globe, increases in rules-based trade, and global prosperity.

For at least several decades, America's strong economy and national security have been powered by science and innovation leadership, made possible by highly-educated and high-performing STEM graduates. Successful modern business and defense-related firms disproportionately rely on advanced STEM-educated talent, and so it is easily argued that STEM education leadership and strong student enrollment are critical to America's continuing national security and economic leadership and, in turn to the nation's ability to continue supporting democracy and human dignity globally.

Unfortunately, the U.S. has a shortage of skilled, STEM-educated workers working in critical STEM jobs, and all signs point to that problem worsening due to declining birth rates and diminishing intentions of U.S.-born students to enroll in college. One potential solution to our domestic talent gap is readily accessible international talent, as students globally are attracted to U.S. higher education institutions and disproportionately seek degrees in STEM fields that support critical and emerging technologies. That solution, however, is being undermined by U.S. laws and policies that discourage international students from enrolling in U.S. universities and by increasingly competitive and attractive national policies and university marketing efforts in Canada, the U.K., and Australia.

Uniquely, today the U.S. has a surplus of higher education supply – the capacity to teach an additional 1 million international students. This excess capacity will grow as the country’s population of 15-24 year olds declines over the next decade, resulting in what higher education leaders call the “enrollment cliff.”

Without action on the part of policymakers and higher education institutions, the United States risks losing - or accelerating losing - its global economic and national security leadership. In this paper, we explore how U.S. global leadership hinges on its innovation-based economic and defense strength, exemplify how the nation cannot rely on domestic STEM talent alone to fill workforce shortages, and illustrate how international students are critical to America’s future high-skilled STEM workforce. We will also broadly note that there are policy deficiencies that disincentivize international student enrollment and retention rates, and make recommendations for policymakers and higher education institutions.

U.S. Global Economic and Defense Leadership Relies on Innovation Driven by an International STEM Workforce

America’s standing as a global leader is attributed to several key factors: commitment to human dignity and democratic ideals, economic strength over the long term, and robust national security/defense program. Strength in innovation (enabled by STEM) has long been a mainstay of these factors, and ultimately, of American security, economy, and leadership.

America’s STEM workforce significantly contributes to the nation’s economic, national security, and innovation strength

STEM workers are critical engines of innovation and growth, and in a world where “every company is a tech company,” STEM-based education powers many diverse industries and significantly contributes to America’s economy. According to a 2020 report, “[STEM and the American Workforce](#),” STEM directly employs 64 million jobs and accounts for almost 1/3 of the U.S. GDP. When also considering employment generated by STEM industries, STEM’s total impact includes 130 million jobs and 2/3 of GDP.[1]

Public and private investment in new technologies such as 5G, artificial intelligence (AI), clean energy, biotechnology, and quantum computing is necessary to fortify U.S. national security and defense, as well as its manufacturing and economic capabilities relative to other nations. An extraordinary percentage of people working in critical emerging technologies and national

security require advanced STEM degrees. According to the October 2022 U.S. National Security Strategy, “creating more effective and efficient hiring, recruitment, retention, and talent development practices, particularly in STEM fields, economics, critical languages, and regional affairs is critical to strengthening the national security workforce.”

America’s STEM workforce is driven in large part by international talent

According to the U.S. Bureau of Labor Statistics, in 2020 immigrants accounted for more than a quarter of the people employed in “computer and mathematical occupations,” and 50% of advanced STEM degree holders working in the defense industrial base are foreign-born. In order to maintain its economic and defense leadership, the U.S. requires a STEM-educated, international workforce (i.e., a workforce that includes both U.S.-born and foreign-born talent).

U.S. Global and Economic Leadership is at Risk Due to STEM Talent Shortages

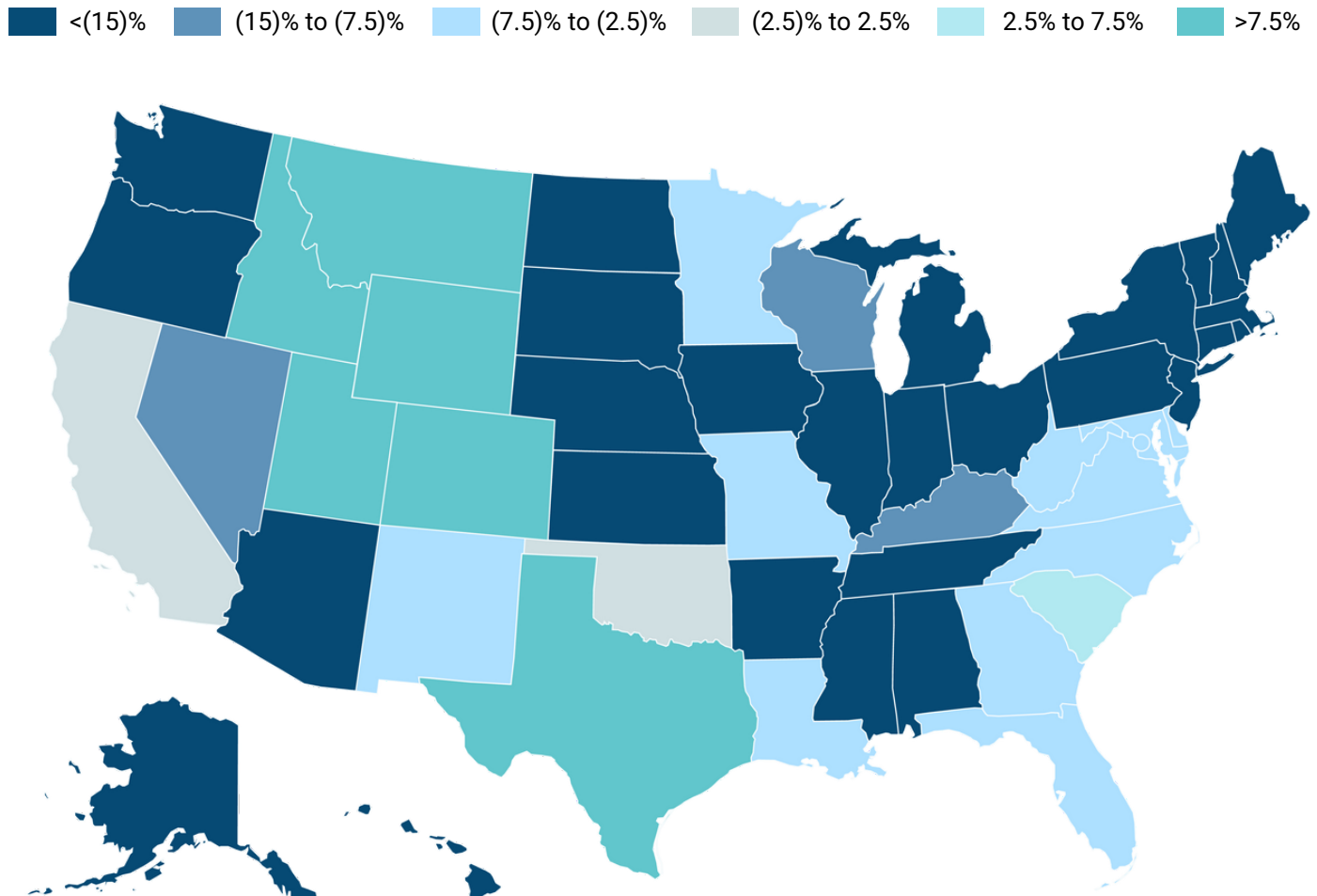
Key industry leaders are struggling to hire the STEM talent they need to stay on the cutting edge

The Pentagon released a report in 2021 contending that a STEM education deficit is weakening America, particularly due to its adverse impact in the defense industry. In order to work in key emerging industries, such as semiconductors, AI, and quantum computing, the majority of workers need advanced STEM degrees. And according to a 2022 report by the Institute for Progress, 82% of companies in the defense industrial base report that it is difficult to find qualified STEM workers.

U.S.-born STEM talent is insufficient to fulfill the shortages

By 2030, the U.S. Bureau of Labor Statistics predicts that there will be 11.28 million available STEM jobs in the U.S. For several years, the U.S. has focused its domestic students on STEM education and opportunities and the number of bachelors, masters and doctoral degrees awarded to domestic students in STEM fields trended up over 2011-2019. (Note: “domestic students” are American citizens or permanent residents). However, this percentage growth is offset by diminishing overall domestic student enrollment in post-secondary institutions, which is primarily due to steadily declining birth rates since the 2008 recession (see Figure 1).

Figure 1. Projected Change in Domestic College Attendance from 2021-2029 Resulting from Declining Birth Rates



International Students Are Needed for the STEM Workforce to Continue Powering America's Commercial and Defense Innovation Industries

A report by the [National Security Commission on Artificial Intelligence](#) recently noted “for the first time in our lifetime, the United States risks losing the competition for talent on the scientific frontiers...Nations that can attract and retain highly skilled individuals gain strategic and economic advantages over competitors.” In [July 2020](#), companies including Google, Facebook, and Microsoft wrote to the U.S. Immigration and Customs Enforcement (ICE) that “America’s future competitiveness depends on attracting and retaining talented international students.”

Many international students focus their studies on critical STEM areas and populate the STEM programs driving U.S. research and innovation

From 2011 to 2019, over one-third of U.S. doctorates in science and engineering fields were awarded to temporary visa holders (i.e., international students), including over one-half of doctorates in engineering, mathematics, and computer sciences. During the same period, over 30% of U.S. master's degrees in science and engineering fields were awarded to temporary visa holders, including almost 50% of master's degrees in engineering and 55% of master's degrees in mathematics and computer sciences. Some programs and labs would close without international students, as there simply are not enough U.S.-born graduate students for programs to remain viable absent international students.

According to the Institute of International Education (IIE), over half of the international students in the U.S. are studying or working in STEM, and international students also disproportionately earn doctoral degrees in fields underlying critical and emerging technologies. Further, over 70% of all graduate students in industrial engineering, electrical engineering, and computer and information sciences are international students.

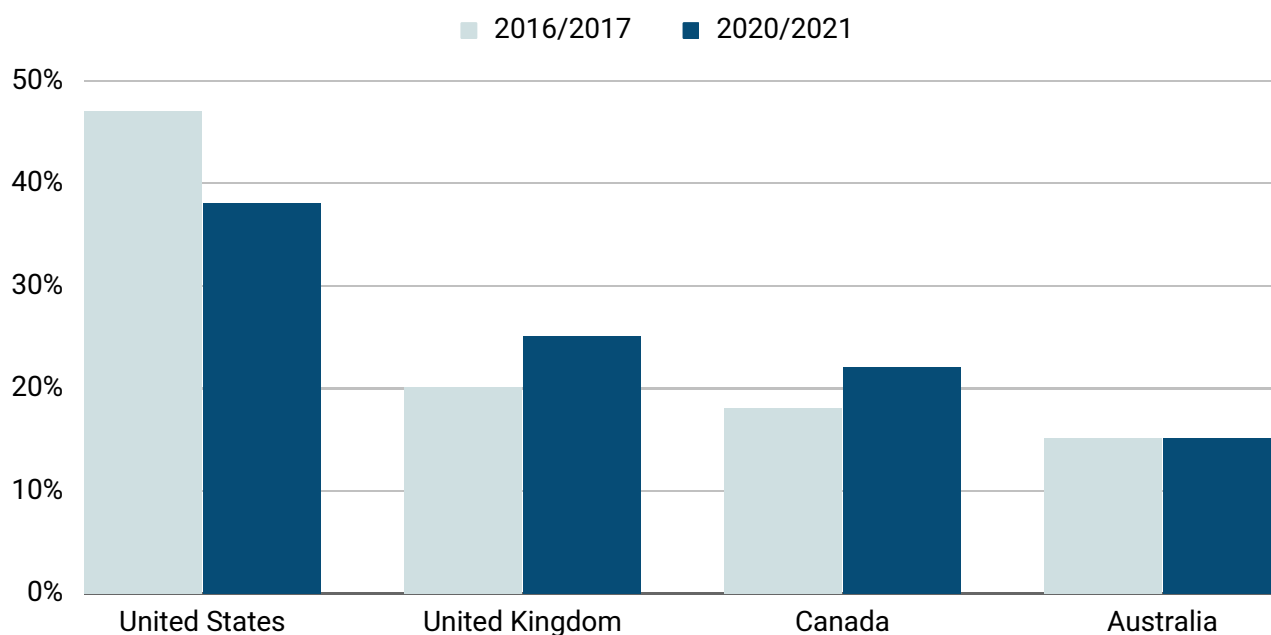
International students studying STEM are willing to join the U.S. workforce upon graduation, but U.S. policies inhibit them from doing so

100,000 international student graduates of U.S. colleges and universities – including tens of thousands of business management, health, and STEM-related students each year and three-quarters of science and engineering doctorate recipients – would choose to stay in the U.S. to work in the U.S. after graduation if only they could. Frustrating and tedious laws and policies (e.g., requiring that potential international students prove non-immigrant intent) are discouraging potential enrollees and preventing international student graduates from staying and working in the U.S. In fact, a recent study by the National Bureau of Economic Research showed how few international students stay in the U.S. after graduation because of policies that cap the number of skilled-worker visas. The advanced training that they receive in the U.S. then goes elsewhere and benefits another country's labor force, while the U.S. has incurred costs associated with educating them. If immigration laws were modernized to create competitive student-to-career pathways, this would translate to an additional \$233 billion in U.S. economic activity this decade and reduce STEM-related talent shortages by about 25%.

The U.S. is also falling behind in the global recruitment competition to attract international students

The U.S.' share of international students declined relative to its top three competitors (i.e., the UK, Canada, and Australia) in 2020-2021 compared to 2016-2017 (see Figure 2).[2] Moreover, new international student enrollment in the U.S. is down 9.9% from 2016-17 to 2021-22. These downward trends are explained, in part, by increased international student recruitment efforts from competitor nations that are proving successful. For example, the number of international student applicants to higher education institutions in the UK is projected to increase by 50% within the next 5 years thanks to the country's recruitment efforts.

Figure 2. Percent Global Share of International Students Hosted by the Top Four Host Countries



Recruiting International STEM Talent Is in the U.S.' Best Interest to Maintain Its Global Leadership

If the U.S. wishes to maintain its global leadership, policymakers, the private sector, and higher education leaders should prioritize both international student recruitment and retention. The federal government, higher educational institutions, and other organizations in the United States should take immediate action to avoid falling further behind international competitor nations and causing irreparable damage to the U.S. brand of higher education globally.

Plus, international students bolster domestic STEM education enrollment, increase diversity, and are an excellent source of soft power

Supplementing the talent pool of the U.S.-born students with international students benefits U.S. economic competitiveness by increasing a diversity in knowledge, thought, and perspectives, which drive innovation. By hosting international students in STEM fields, universities can gain access to new ideas and perspectives, and build relationships with top students from around the world.[3] International students are also an excellent source of soft power for the U.S. and can inspire others to study in the U.S. as well. It is in the U.S.' strategic interest to have former international students around the globe who think positively of their experiences in the U.S., which also in turn supports the nation's higher education industry.

The U.S. should implement a strategic, organized "National Recruitment Strategy" that incentivizes international STEM talent to study and work in the U.S.

The Department of Education's and State Department's 2021 Joint Statement of Principles in Support of International Education, signals the importance of international students to U.S. higher education at the highest levels of government, and international education experts consider this as potentially the foundation to a "National Recruitment Strategy," which should ideally align with the following core principles:

- Recognizing international students are key to the country's economic and national security
- Prioritizing international students and their importance to, for instance, helping to recruit following generations of students, supplying the U.S. STEM workforce, and increasing American "soft power" overseas
- Incentivizing international students to study or work in the U.S. and reduce government and higher education deterrents to doing so, particularly for graduate students (MS, PhD, etc.)

Our recommendations for the federal government, higher education institutions, and other key stakeholders are depicted in Table 1 on the following page, which provides key strategic opportunities and specific action items.

Table 1. Summary Table of Recommendations for Government Institutions, Policymakers, Higher Education Institutions, And Other Relevant Stakeholders

Strategic Opportunity	Action Items	Stakeholder	Priority Level
Reducing deterrents to studying or working in the U.S. for STEM, PhD-level students	Streamlining and expanding the visa system to unlock student flow at the PhD level in STEM programs	Government	High
	Ease visa burdens on international students and remove “intent” from F-1 visa category	Government	High
Proactively and broadly attracting talent	Retain STEM programs and develop a policy framework that supports seizing and retaining STEM talent	Government	High
Incentivizing international students to study or work in the U.S.	Increasing state funding for institutions and federal funding for STEM students generally (and for international STEM students, to the extent possible)	Government	Medium
	Increasing focus on and funding for STEM degree programs	Higher Education Institutions	Medium
Addressing the projected shortage of U.S.-based STEM workers	Attracting talented international students via a National Recruitment Strategy, and promoting U.S. education as a path to prosperity	Higher Education Institutions	High
	Recognizing international students are key to filling employment gaps and increasing recruitment of international student graduates	Private Companies	Medium

In conclusion, high-skilled international students in the STEM fields could help America drive the innovation that powers its position as a global leader in economic prosperity and national security tools. If the U.S. wishes to maintain its leadership position in the world based on a foundation of innovation, economic prowess, and defense power, the country should prioritize creating and implementing a “National Recruitment Strategy” that focuses on attracting international students that will supplement the U.S. high-skill STEM workforce. These actions will allow international STEM talent to continue to make meaningful contributions to America’s scholarly, research and development, and innovation communities, which is critical to its global leadership, economy, and strength.

Endnotes

[1] We note that this figure includes occupations that require a STEM-based degree, which can range from scientists, doctors, engineers, mathematicians, and entrepreneurs in technology industries to other members of the STEM community, such as insurance claim adjusters, credit authorizers, tax preparers, community health workers, etc.

[2] Note the U.S. share could decline even if the number of international students in the U.S. rose, and these data include all international students, not only those in the STEM fields.

[3] Critics often allege that U.S.-born students would be more likely to major in STEM fields and work in STEM jobs if they didn't face as much competition from international students and foreign-born workers. However, enrolling more international students not only does not crowd out U.S.-born undergraduate students at universities but actually leads to an increase in the number of U.S.-born students graduating with a STEM major.