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Meeting demand in the STEM fields:

Current international student trends
at U.S. higher education institutions

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Introduction

Anticipated changes to the future of work emphasize a new relationship between higher education and employers to prepare students for their careers. The way students perceive the jobs of the future and select their choice of study is shaped by technological advances such as the use of Big Data and the surge of Artificial Intelligence (AI), along with the environmental impacts caused by climate change. Science, technology, engineering, and mathematics (STEM) careers are expected to influence the job market, with the World Economic Forum [Future of Jobs Report](#) (2023) finding that employers foresee AI and machine learning specialists as the fastest-growing job markets, followed by business intelligence specialists and information intelligence specialists. Research shows that individuals seeking to migrate can maximize their potential earnings within a STEM career by obtaining a degree in their host country (Boyd & Tian, 2018). This positive outcome may be due to higher quality education, employer recognition of international degrees and academic credentials, development of skills relevant to the host country's job market, or creation of a professional network in the host country (ibid.).

This changing reality is evident in student mobility trends, with more than 6.4 million students crossing a border to pursue tertiary education in 2020, double the number from 2007 (UNESCO, 2023). However, many international students are focused on similar fields of study. In 2022, 14 Project Atlas partners reported that 47 percent of the international students hosted by these countries pursued STEM fields, with another 21 percent pursuing studies in business and management (Martel et al., 2023). The proportion of international students pursuing STEM fields grew by six percentage points, from 41 percent in 2017, driven by larger numbers of international students studying math, and computer science, and health professions.

International student enrollment has increased since the COVID-19 pandemic in the United States, reaching 1,057,188 international students in the 2022/23 academic year, marking the fastest one-year growth rate in more than 40 years (Martel et al., 2023). More than half (55 percent) of international students enrolled at U.S. higher education institutions are in STEM programs, with math and computer science followed by engineering as the leading fields of study. The United States has attracted increasing numbers of international students in the STEM fields through post-graduation work opportunities, most notably STEM Optional Practical Training, which grants students work authorization up to 36 months after completing their degree. Since

international students comprise only six percent of the total U.S. higher education population, there continues to be capacity to host international students at the nearly 4,000 U.S. colleges and universities.

This exploratory research positions itself within the context of a changing future of work that favors STEM careers. It seeks to understand how institutions are affected by changes in demand for STEM programs and how these shifts influence institutional recruitment practices. This study explored the profile of international student STEM applicants to the United States. It concludes with examples of how some institutions are building capacity to support the growing number of international students interested in STEM fields and establishing opportunities for them to build career pathways.

Key findings

International STEM applicant profile

- Most international STEM applicants are at the graduate level with 13 out of 22 institutions reporting that international graduate STEM applicants comprised more than half of the application volume.
- India is the top place of origin for international STEM applicants, followed by China, Nigeria, Ghana, and Nepal. For undergraduate programs, India was ranked by 37 institutions, of which 18 reported it as their top place of origin. At the graduate level, India was identified 35 times with 27 institutions ranking India as their top place of origin for international STEM applications.
- Computer and information sciences and support services, and biological and biomedical sciences are the leading fields of study for international STEM applicants. At undergraduate and graduate levels, institutions listed computer and information sciences and support services more than three times as often in the number one ranked spot compared to biological and biomedical sciences.

International student demand in the STEM fields

- The majority of institutions reported international student applications in the STEM fields submitted during the 2024-2025 application cycle either increased or stayed the same relative to the 2023-2024 application cycle. Among institutions reporting increased applications, they also reported plans to expand STEM enrollment to meet the demand from applicants.
- Institutions indicated that contributing factors to an increase in applications at their institutions included a growing reputation and greater visibility of their institution abroad (43 percent) and acknowledged the active recruitment efforts of their institution (37 percent) as well as active outreach to prospective students (37 percent).

International student recruitment strategies

- The top three recruitment strategies included the use of educational recruitment agencies (51 percent), in-person international recruitment events (47 percent), and online recruitment events (46 percent).
- Among the external factors contributing to an increase in international STEM applications, 36 percent of respondents indicated increased labor opportunities in the STEM sector.
- Most institutions reported that they expected to increase international STEM enrollment within the next five years, with 65 percent of participants indicating their intention to do so at the undergraduate level and 45 percent at the graduate level. Expanding academic offerings was prioritized by most institutions with plans to add courses or new majors or degree programs in STEM.

Methodology

The following questions guided this research study:

- What is the profile of an international student applicant in the STEM fields?
- To what extent has demand by international students in the STEM fields changed over time? In what ways has it changed (e.g., demographic profile)? How is this reflected in the number of international student applications in STEM fields?
- How does capacity in STEM programs influence institutional recruitment strategy and practices? Advising services?
- In what ways are institutions adapting STEM and other programs (i.e., structure, size, opportunities) in response to international student interest? What are successful models?

In the context of this research, STEM fields are defined as majors associated with science, technology, engineering, and mathematics. It may include, but not be limited to, fields related to agriculture, engineering, health professions, math, computer science, biological and biomedical sciences, and the physical sciences. The research focused on the application phase of admissions to the STEM fields at U.S. institutions for the 2024-2025 academic year.

From April through May 2024, the IIE/IC3 Institute research team administered a survey to U.S. higher education institutions via an open link. The team sent the link to IIE Network member institutions and IC3 Institute partner institutions and shared it on social media. The team also sent targeted outreach messages to member organizations focusing on STEM fields or admissions.

The survey received 73 valid responses from U.S. higher education institutions. The majority (63 percent) of institutional respondents represented public institutions, with the remaining 37 percent representing private institutions. Institutions of all sizes responded to the survey, and 48 percent represented institutions that enrolled fewer than 5,000 students — more than a quarter (27 percent) of respondents enrolled more than 20,000 students at their institution.

Applicant profile

Earning a STEM degree was a popular goal among high school students in grades 9 and 10, as observed in the IC3 Institute 2023 Annual Student Quest Report (Ghulati et al., 2023). The report also found the United States as students' preferred destination to pursue STEM degrees. While recent studies indicate a gender gap within STEM programs and highlight the obstacles female students face regarding STEM academic paths ([Charlesworth & Banaji, 2019](#)), there is limited information about the broader characteristics of international STEM applicants. The following section provides greater insight into international STEM applicants' academic level, place of origin, and field of study.

Academic level

Institutional respondents varied in their degree offerings and STEM specializations. Most (95 percent) institutions offered undergraduate STEM degrees, while half (37) offered graduate STEM degrees. The leading STEM specializations offered at these institutions were computer and information sciences (86 percent), biological and biomedical sciences (85 percent), mathematics and statistics (81 percent), physical sciences (77 percent), and health professions (67 percent).

Application trends differed between the undergraduate and graduate levels. International STEM applicants to undergraduate programs comprised fewer than 25 percent of all STEM applicants at the vast majority (90 percent) of the 38 higher education institutions responding to this question. Furthermore, nearly one quarter (24 percent) of institutions indicated that international applications to STEM majors comprised less than 1 percent of total applications. In contrast, 13 out of 22 institutions at the graduate level reported that international STEM applicants comprised more than half of the application volume.

This highlights an interesting pattern in the composition of STEM applicants in the United States. On one hand, this pattern could be symptomatic of the lack of STEM graduates in the United States relative to the market demands of the country (Tan et al., 2021). In this regard, due to the short supply in the labor force, there are fewer domestic applicants at the graduate level. On the other hand, this could indicate that international STEM applicants have a higher interest or see greater value in pursuing a graduate degree in the United States. However, research shows that international STEM students are

more likely to pursue graduate degrees at the doctoral level than their American counterparts ([Corrigan & Zwetsloot, 2022](#)).

Place of origin

To understand where international student applications came from, we asked institutions to provide their ranking of the top five places of origin for international STEM applications. This ranking was then evaluated as a cumulative order (number of times a place was mentioned) and as a weighted ranking such that the frequency of top choices was scaled by a larger factor.¹ This was done to observe if there were substantial variations in the ranking provided by institutions based on how often a place was ranked as the top place of origin, how often it was ranked second and so on.

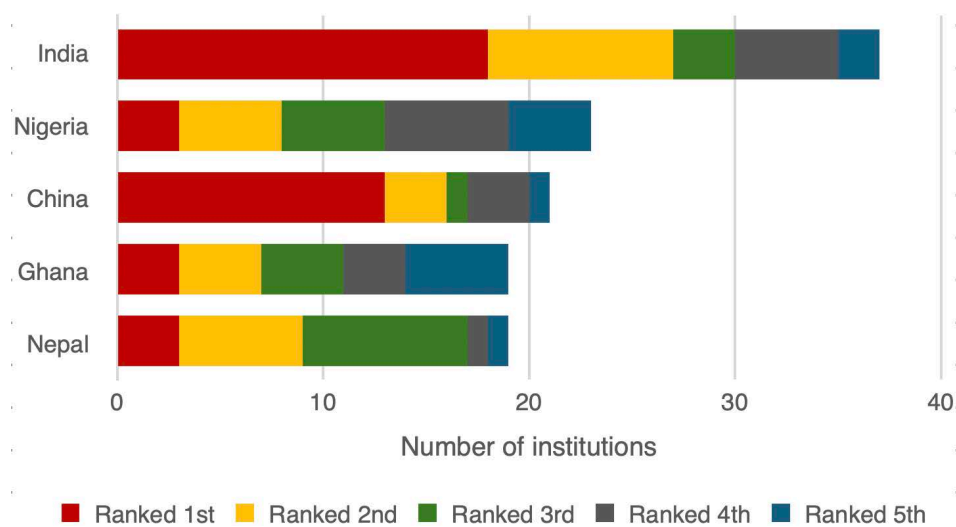
India was the leading place of origin for STEM international applications across all metrics and academic levels. For undergraduate programs, India was ranked by 37 institutions, of which 18 reported it as their top place of origin and nine as the second leading place of origin for applicants (Figure 1). At the graduate level, India was identified 35 times with 27 institutions ranking India as their top place of origin for international STEM applications.

China and Nigeria are the second and third places of origin for undergraduate and graduate applicants. China was listed as a top place of origin for applicants by 21 and 20 institutions at the undergraduate and graduate levels, respectively. Nigeria was ranked by institutions 23 and 22 times. However, China was listed as the top place more often than Nigeria, with 13 institutions reporting China as their top place of origin for international applicants at the undergraduate level compared to just three from Nigeria, thereby making China the second leading place of origin in the weighted ranking. This indicates that when institutions considered applications from China among the leading places of origin, they tended to be the top place of origin for international applicants at these institutions. At the graduate level, China was also the second place of origin in a weighted ranking as five institutions listed it as the top place of origin compared to two institutions for Nigeria.

¹ The frequency at which a place was ranked as the top place of origin was scaled by a factor of five, the second highest by a factor of four, the third by a factor of three, the fourth by a factor of four, and lastly the fifth by a factor of one.

Ghana and Nepal were also listed among the top five places of origin. While Nigeria, Ghana, and Nepal were not frequently ranked as the top places of origin for international STEM applicants (three institutions did so for each place), their distribution varied across the top five placements. Among undergraduate international STEM applications, Nigeria was listed cumulatively by the second highest number of institutions. However, when we weighed the specific rankings, Nigeria dropped to third place, tied with Nepal. Ghana was the fourth highest in the cumulative ranking but fell to fifth when considering the weighted-specific rankings.

Figure 1: Top places of origin of STEM international undergraduate applicants, n=59

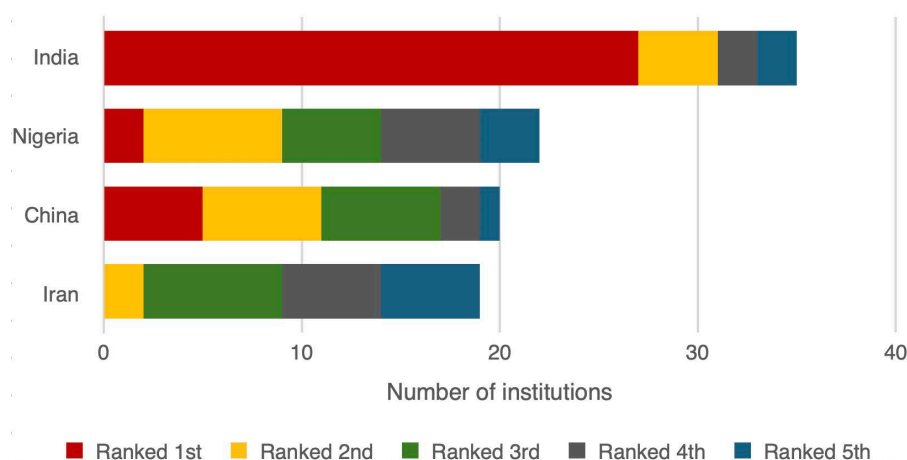


	India	Nigeria	China	Ghana	Nepal
Ranked 1 st	18	3	13	3	3
Ranked 2 nd	9	5	3	4	6
Ranked 3 rd	3	5	1	4	8
Ranked 4 th	5	6	3	3	1
Ranked 5 th	2	4	1	5	1
Total	37	23	21	19	19

At the graduate level, Nigeria was again listed cumulatively by the second-highest number of institutions but dropped to third when considering its weighted ranking. Only two institutions indicated Nigeria as their top place of origin, while seven listed Nigeria as their second place. Iran rounded out the top four places of origin for graduate applicants.

Interestingly, no institution has found Iran to be the top source for international STEM applications. However, 19 institutions listed Iran among the top five places of origin, with seven listing Iran as the third place of origin (Figure 2).

Figure 2: Top places of origin of STEM international graduate applicants, n=37



	India	Nigeria	China	Iran
Ranked 1 st	27	2	5	0
Ranked 2 nd	4	7	6	2
Ranked 3 rd	0	5	6	7
Ranked 4 th	2	5	2	5
Ranked 5 th	2	3	1	5
Total	35	22	20	19

Notably, at the undergraduate level, institutions listed 56 unique places of origin for international applicants. In comparison, at the graduate level, institutions listed only 22 places of origin of international applicants with the majority of applications concentrated from seven places. This shift from undergraduate to graduate levels is also seen when looking closely at places like Ghana and Nepal. Listed among the top five places of origin at the undergraduate level, Ghana and Nepal were not among the top five at the graduate level. This highlights the current academic paths of STEM applicants from these places and prompts consideration of whether the volume of applications observed at the undergraduate level could translate into a higher concentration at the graduate level should these individuals enroll at U.S. institutions.

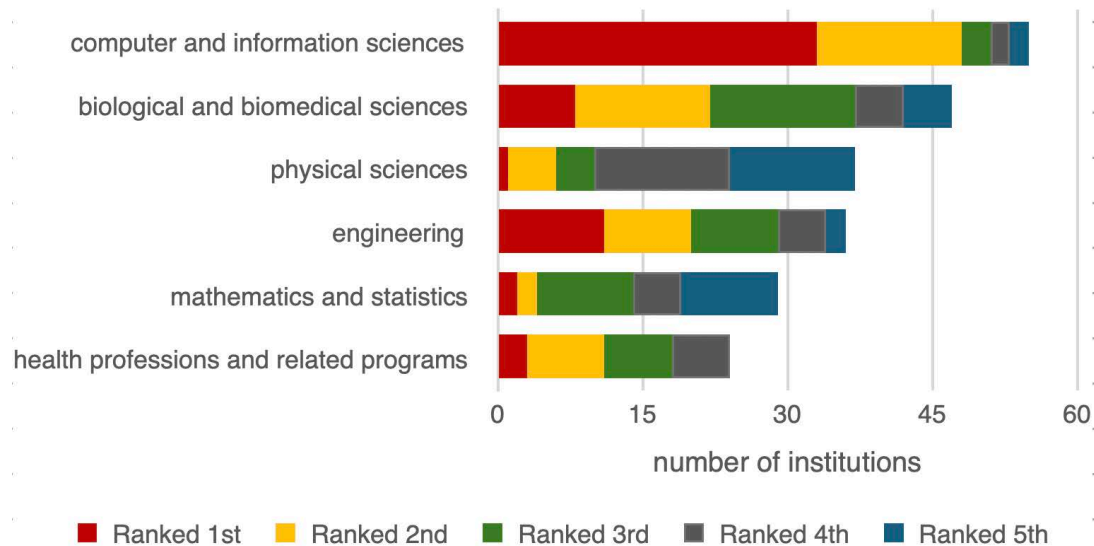
Field of study

STEM encompasses several fields of study which lead to vastly different careers and applications. In this section, we focused on the most common STEM majors. Institutions ranked the top five fields of study among international STEM applicants at the undergraduate and graduate levels.

Among STEM majors, we found that the most popular choice for international applicants was computer and information sciences and support services, which 55 institutions mentioned as a top undergraduate major and 28 as a top graduate major. Biological and biomedical sciences were the second highest major, listed by 47 institutions as a top undergraduate major and by 25 as a top graduate major. Notably, at undergraduate and graduate levels, institutions listed computer and information sciences and support services more than three times as often in the number one ranked spot compared to biological and biomedical sciences. Computer and information sciences and support services stood out, with 33 institutions listing it as the top undergraduate major for international STEM applicants compared to eight institutions that listed biological and biomedical studies as their top major. Biological and biomedical sciences, in contrast, was often listed second (by 14 institutions) or third (by 15 institutions) for undergraduate international applicants. Similarly, among graduate-level applicants, 20 institutions reported computer and information sciences and support services in the top spot for international STEM applicants, compared to only six institutions that listed biological and biomedical studies.

The top six majors at the undergraduate level were listed by institutions as follows: physical sciences (37 institutions), engineering (36 institutions), mathematics and statistics (29 institutions) and health professions and related programs (24 institutions) (Figure 3). However, when we weighed how high institutions ranked each academic field, engineering became the third leading undergraduate field for international applicants, followed by health professions and related programs in fourth place, physical sciences in fifth place, and mathematical and statistics in sixth place.

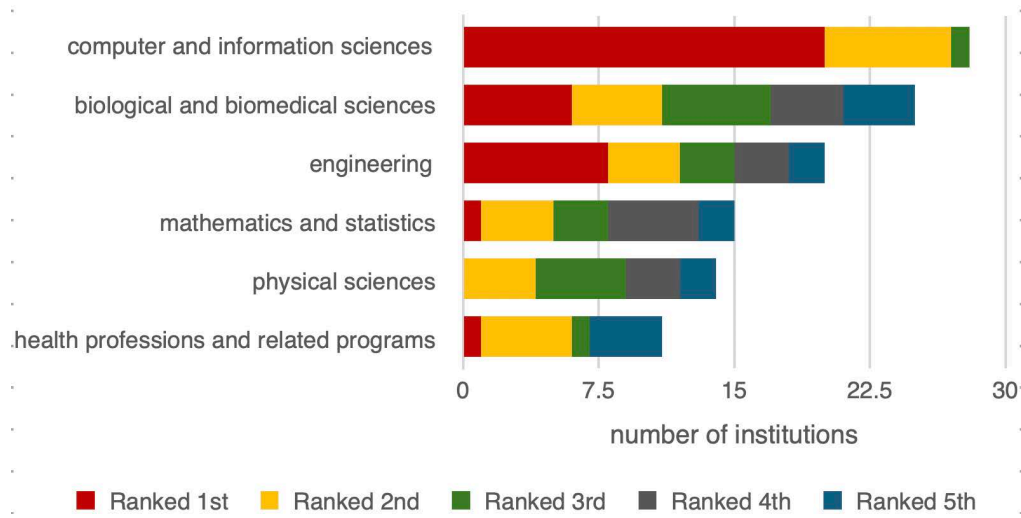
Figure 3: Top STEM majors of international undergraduate applicants, n=63



	Computer and information sciences	Biological and biomedical sciences	Physical sciences	Engineering	Mathematics and statistics	Health professions and related programs
Ranked 1 st	33	8	1	11	2	3
Ranked 2 nd	15	14	5	9	2	8
Ranked 3 rd	3	15	4	9	10	7
Ranked 4 th	2	5	14	5	5	6
Ranked 5 th	2	5	13	2	10	0
Total	55	47	37	36	29	24

The top STEM fields for international applicants were more apparent among the graduate academic fields. Computer and information sciences and support services and biological and biomedical sciences were the top two academic fields, followed by engineering, mathematics and statistics, physical sciences, and health professions and related, both at the cumulative level and when weighing the specific rankings (Figure 4). Certain patterns observed among undergraduate programs were also mirrored within the graduate international applications. For instance, engineering remained the second-highest program in the top spot among international applicants. At the same time, computer and information sciences and support services was listed among the top two places but rarely as the third, fourth or fifth place.

Figure 4: Top STEM majors of international graduate applicants, n=38

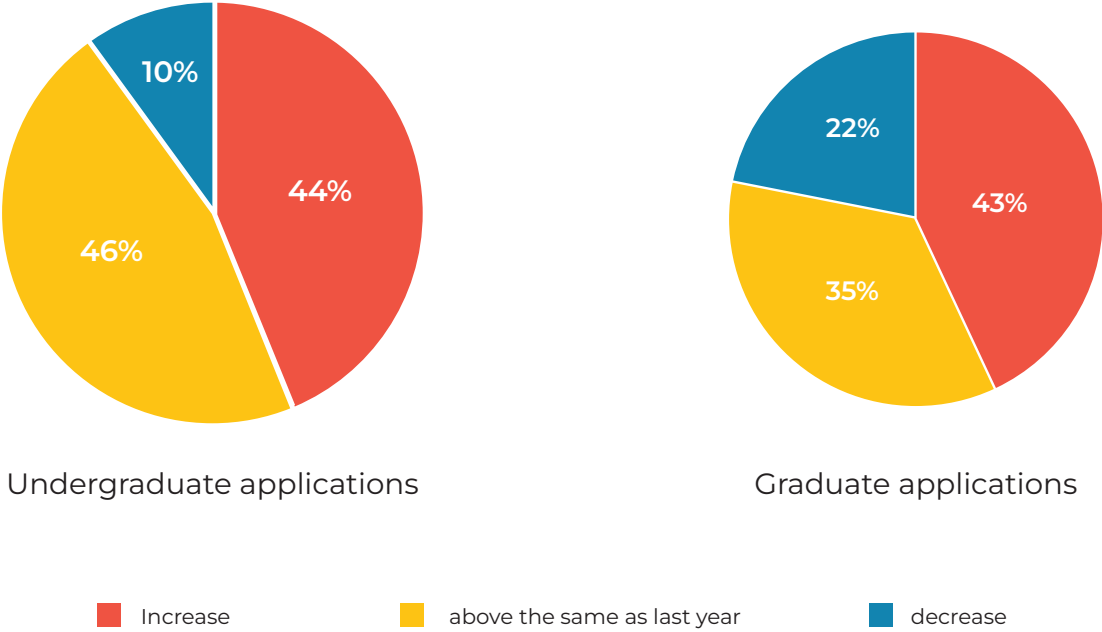


	Computer and information sciences	Biological and biomedical sciences	Engineering	Mathematics and statistics	Physical sciences	Health professions and related programs
Ranked 1 st	20	6	8	1	0	1
Ranked 2 nd	7	5	4	4	4	5
Ranked 3 rd	1	6	3	3	5	1
Ranked 4 th	0	4	3	5	3	0
Ranked 5 th	0	4	2	2	2	4
Total	28	25	20	15	14	11

Institutional perspective

Most institutions reported that international student applications in the STEM fields submitted during the 2024-2025 application cycle either increased or stayed the same relative to the 2023-2024 application cycle. Among undergraduate international STEM applications, 27 institutions (44 percent) reported an increase, and another 28 institutions (46 percent) reported that application numbers were about the same as the previous year. Only six institutions (10 percent) reported some decline in their international application numbers (Figure 5). Out of the 27 institutions that reported increased application numbers, 15 institutions expected to increase their enrollment of international students in STEM programs, while 12 did not have this information readily available.

Figure 5: Reported changes in international STEM applications from 2023-2024 and 2024-2025 application cycles, undergraduate n=61 and graduate n=37



At the graduate level, 37 institutions had graduate STEM programs. Similar to undergraduate application cycle data, 16 institutions (43 percent) reported an increase and another 13 institutions (35 percent) reported that application numbers were about the same as the previous year. Only eight institutions (22 percent) reported some decline in their international application numbers.

Out of the 16 institutions that reported increased application numbers, 11 institutions expected to increase their enrollment of international students in STEM programs, while four did not have this information readily available, and one institution did not plan to increase enrollment.

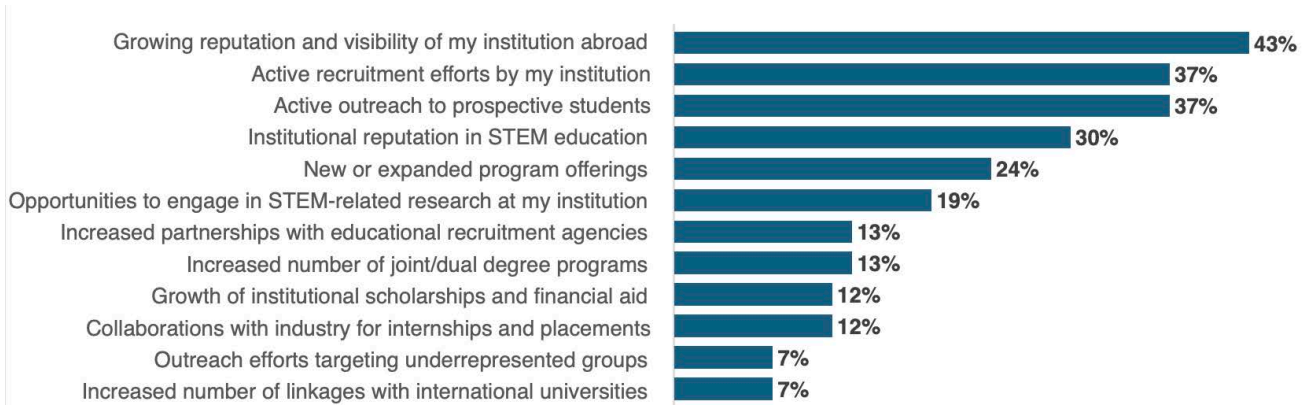
This data indicates that most institutions saw their international STEM applications remain the same or increase. Moreover, while some institutions experienced decreased application numbers, the declines were more prevalent at the graduate level. They also reveal that among institutions that experienced growth, most seek to increase international enrollment in STEM programs further. The following subsection further explores the factors affecting STEM international application numbers to paint a clearer picture of the admissions context.

Factors affecting application numbers

Our research asked institutions to identify institutional or internal factors that positively influenced international STEM applicants and other factors beyond the institution.

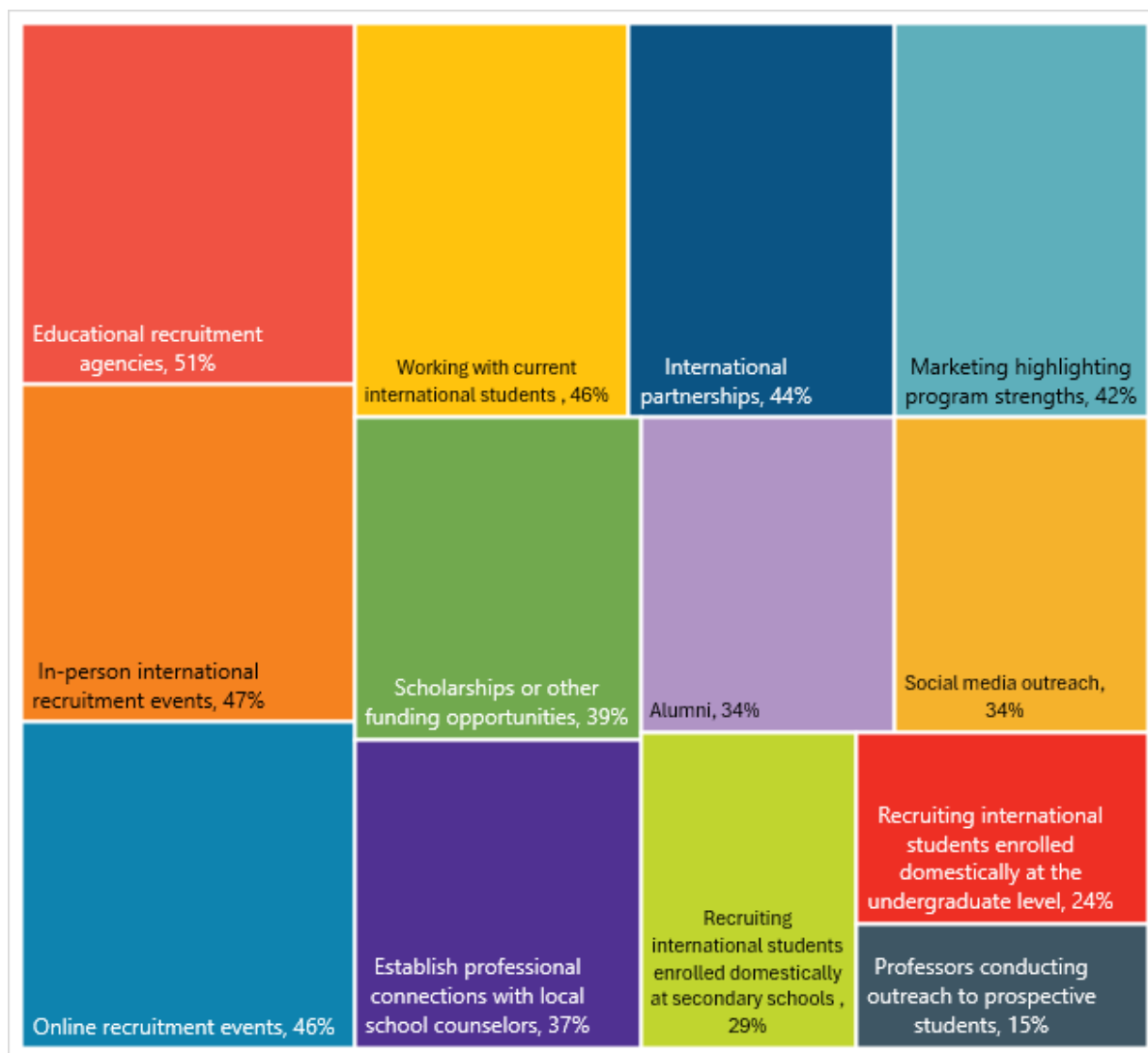
Institutions indicated that contributing factors to an increase in applications at their institutions included a growing reputation and greater visibility of their institution abroad (43 percent) and acknowledged the active recruitment efforts of their institution (37 percent) as well as active outreach to prospective students (37 percent). Additionally, institutional reputation in STEM education was reported by 30 percent of participating institutions, followed by new or expanded program offerings selected by 19 percent of respondents.

Figure 6: Institutional factors contributing to increased international STEM applications, n=67



Looking deeper into specific institutional recruitment and outreach strategies, we found that institutions employed various strategies to attract international students to their institutions. While top strategies included the use of educational recruitment agencies (51 percent) and in-person international recruitment events (47 percent), it is notable that institutions continued to use online recruitment events (46 percent). This strategy gained traction during the COVID-pandemic. The following figure highlights the leading strategies used by at least 20 percent of respondents (Figure 7):

Figure 7: Outreach and recruitment strategies, n=59



We also asked institutions to report the effect of their outreach and recruitment strategies on increasing international STEM applications. While the top strategies, educational recruitment agencies and in-person international recruitment events, were rated positively with 17 out of 22 and 19 out of 23 institutions, respectively, selecting moderately to very effective, online recruitment events were rated less positively. Online recruitment events were among the most common strategies, yet 10 out of 21 institutions indicated it was only slightly effective for increasing international STEM applications. Meanwhile, 19 out of 20 institutions that offered students scholarships and other funding opportunities as a recruitment strategy found it moderately to very effective.

Every institution leverages resources for outreach and recruitment efforts to yield strong international applications. While some of the common strategies were perceived as more effective than others, using multiple strategies has the potential for one strategy to complement another while still contributing, even if only slightly, to outreach and recruitment efforts.

Among the external factors contributing to an increase in international STEM applications, 36 percent of respondents indicated increased labor opportunities in the STEM sector. International STEM applicants are aware of the visa application processes for overseas and 15 percent of institutions reported that students have less concern for securing a visa when applying as a STEM applicant. This indicates that, at least from the institutional perspective, highlighting the prospect of more or better job opportunities is an important component of outreach and recruitment of international students to the STEM fields. Fewer than ten institutions identified all possible external factors, which did not allow for finding a specific trend.²

Factors contributing to stable or diminished growth

Institutions reported several factors that contributed to stable application numbers or declines in their 2024-2025 application numbers, with some differences between undergraduate and graduate applications. These factors were categorized into three main areas: outreach and recruitment, institutional, and external factors.

Outreach and recruitment

Institutions reported that changes to their outreach and recruitment efforts contributed to a stable inflow of applications or had a detrimental impact. Three institutions reported that they made no major changes to their outreach or recruitment efforts and that international undergraduate STEM applications remained stable. Other institutions mentioned established partnerships, word-of-mouth, and support from recruitment agencies as factors contributing to stable numbers. Institutions that experienced declines in international undergraduate STEM applications cited decreased in-country representation and travel, office reorganization, and changes to scholarship programs, such as eliminating tuition waivers. Two institutions reported that

² The other factors that were identified by fewer than 10 respondents were: government incentives towards STEM programs (7), difficulty getting into top universities in country of home country (6), foreign government-sponsored scholarship programs (5), fewer available jobs making graduate school a more attractive option (3), and scholarship opportunities from private sources (2).

outreach factors contributing to a decline in international graduate STEM applications included a lack of engagement with applicants due to staffing challenges and an overall lack of recruitment activities.

Institutional factors

Institutions reported that circumstances or events specific to their institution largely contributed to international STEM application numbers falling at undergraduate and graduate levels. Some reasons shared by respondents included limited STEM course offerings, competition from other degree programs such as business or communications, and changes to application criteria and processing. Several institutions noted that the strength of their academic programs contributed to stable application numbers.

External trends

External trends included factors outside of an institution's control that contributed towards maintaining or negatively impacting their current level of applications. These included perceptions of the labor market for STEM graduates, the pent-up demand after the COVID-19 pandemic, visa concerns, and the overall demand for STEM from particular places of origin.

External trends differed between undergraduate applications, where all five respondents saw it as a contributor to stable applications, compared to graduate applications, which contributed to the decrease in applications for four of the five respondents. Institutions cited the attractiveness of growing job opportunities in the STEM fields as one factor contributing to stable undergraduate applications and the rebound of applicants who could not apply due to the COVID-19 pandemic. These applicants were now submitting applications, which contributed to stable application numbers.

At the graduate level, institutions reported a slowdown in demand for STEM degrees from places of origin, such as India and China, contributing to decreased applications. Notably, one institution also highlighted other external factors, such as the increased cost of attendance, the strength of the U.S. dollar, and increased competition for international students.













Institutions reported visa delays and denials to hurt international undergraduate and graduate STEM applications. Four institutions stated that visa denials, especially from top places of origin, affected applications, and one institution mentioned visa delays affecting undergraduate applications. Only one institution found that visas had a role in stabilizing international STEM applications by remaining relatively constant in their affected applications, and one institution mentioned visa delays affecting approvals and denials.

Expanding capacity

Although most institutions reported stable or increasing international STEM application numbers, most institutions also reported that they expected to increase international STEM enrollment within the next five years, with 65 percent of participants indicating their intention to do so at the undergraduate level and 45 percent at the graduate level. In addition, a quarter of institutions at the undergraduate level and one-third at the graduate level could not confirm whether there were plans to expand enrollment at their institution. It is also worth highlighting that even though international applications comprised more than half of the STEM graduate applicants, 18 percent of institutions reported no interest in increasing international enrollment in these programs. This section highlights the strategies institutions reported using to increase enrollment capacity.

Institutions shared how they prepare for anticipated growth in international STEM enrollment through various strategies (Figure 8).

Figure 8: Top strategies to expand capacity for expected growth in STEM enrollment

Undergraduate (n=46)			Graduate (n=32)		
	Adding courses	17		Adding courses	13
	Adding majors/degree programs	17		Adding majors/degree programs	12
	Hiring faculty	13		Building new facilities	11
	Hiring support services staff	13		Hiring faculty	10
	Building new facilities	11		Expanding research	10
	Expanding research	10		Hiring support services staff	7

Expanding academic offerings was prioritized by most institutions with plans to add courses or new majors or degree programs in STEM. Expanding academic offerings addresses the job market's increased demand for new STEM degrees and majors ([WEF, 2023](#)). Necessary to implement the new offerings, hiring additional faculty and support staff were also common strategies shared by institutions at the undergraduate and graduate levels.

Strategies to increase infrastructure were mixed. Eleven institutions planned to build new academic facilities to address increased STEM enrollment at the undergraduate and graduate levels. However, only nine institutions at the undergraduate and four at the graduate levels planned to increase housing options.

While some institutions (13 undergraduate and eight graduate) did not know how their institution planned to expand their capacity to meet planned growth, a small number of institutions (five undergraduate and three graduate) reported that they already could meet increased international STEM enrollment. Finally, institutions reported a lack of institutional commitment and strategies as the primary reason for not being interested in expanding international STEM enrollment.

Limitations and future research

The research team collected 73 valid responses to this survey from U.S. institutions. As such, the sample size does not represent U.S. higher education and the survey findings cannot be generalized to all U.S. institutions. However, the research can still identify trends within the surveyed institutions and areas of future research.

Each section of this paper, on its own, presents a potential source of future research to better understand the reason behind internal or external factors affecting STEM application numbers, the institutional decision-making process around specific outreach and recruitment activities, as well as the strategies to expand enrollment capacity. Lastly, this research can be further enriched and complemented by looking at the perspectives of international applicants and local counselors.

Conclusion

This exploratory study highlights the strong interest in STEM programs at U.S. higher education institutions. It prompts institutions to maintain a continued focus on adapting STEM programs to address the future needs of employers and the demands of international students. As students consider their professional pathways, seeing and understanding a clear path in the STEM fields is essential to their success. The findings emphasize a changing enrollment landscape whereby students' undergraduate and graduate pathways revealed potential areas for institutions to explore. Institutions can further refine campus internationalization plans to address the future of work, with attention to the enrollment landscape, by reviewing effective outreach and recruitment strategies each institution employs to attract international STEM applicants better. Finally, this research shows that institutions anticipate growth in STEM applications and enrollment in the coming years. To prepare for this expansion, institutional commitment is critical to ensuring expanded academic offerings are paired with additional faculty and staff to carry out the work.

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