

# Pathways of Master's Degree Recipients to and through the STEM Workforce

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The Council of Graduate Schools' (CGS's) Master's Exit Survey, fielded by CGS and 12 partner institutions, captured a snapshot of master's students who graduated in 2022 or 2023 from participating institutions in the study. Participating students had completed their master's degrees during the height and waning days of the COVID-19 pandemic, and had navigated not only a changed academic landscape, but also a changed workforce upon graduation. The survey was part of a project that examines patterns of enrollment, career mobility, and pathways of students in and out of their master's degrees and provides insight into the behaviors of students during the waning end of the COVID-19 recovery period.

We found distinct patterns in STEM pathways and learned how students entered or exited STEM fields from their undergraduate field into their master's field, based on gender and future career aspirations.

## Key Takeaways

- The Council of Graduate Schools conducted a survey with 12 partner institutions to understand the experiences of master's students graduating in 2022-2023 and their pathways into and through the STEM workforce during and after the COVID-19 pandemic.
- The survey results pointed to there being systemic differences in the way that pathways in and out of STEM fields were chosen by students along their Master's journey.
- There were differences in how students in different STEM fields reported how closely related their Master's program was to their current occupation.



## Gender

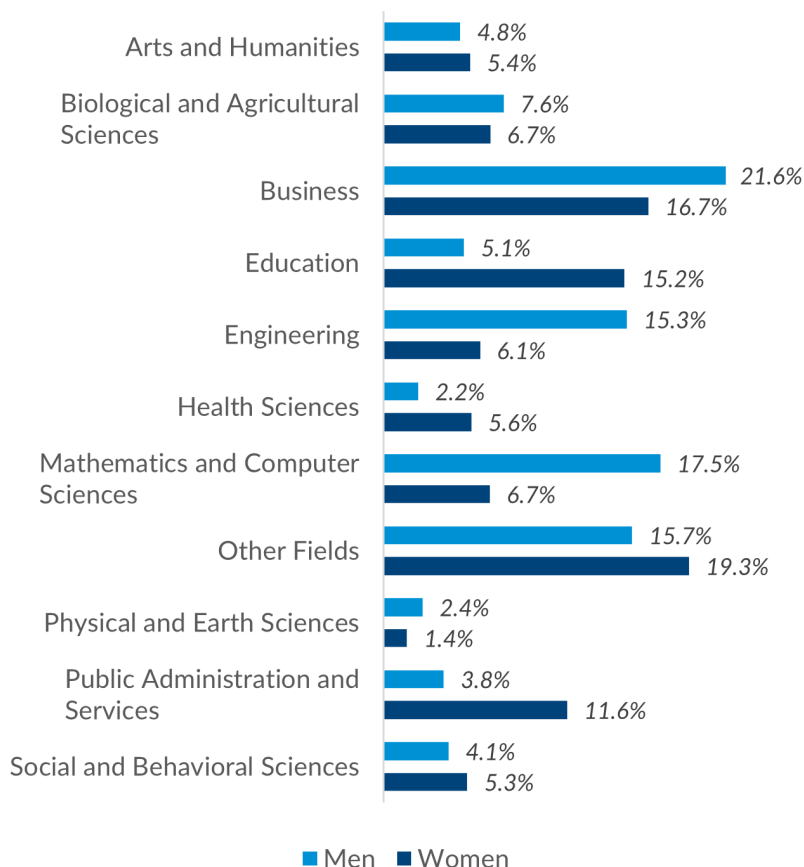
Broadly speaking, survey respondents followed commonly-known patterns of master's students when it came to enrollment in different fields of study.

Proportionally, more women were enrolled in Education and Public Administration and Services than men. The reverse is true for Engineering and Mathematics and Computer Sciences, where men were more likely to be enrolled in those disciplines than women. Business, a field that is traditionally considered to be more proportionally populated by men, shows a closer gap. This is supported by external studies that showed a steady increase in women enrolling in business programs over the last four years.<sup>1</sup> What is particularly noticeable for both men and women is that "Other Fields" is a relatively popular choice, so much so that it was women respondents' largest field.<sup>2</sup>

When comparing how women and men either entered or left STEM fields, almost half of women who left STEM had completed an undergraduate degree in Social and Behavioral Fields (49.5%). STEM

departures from other STEM fields ranged between 15% and 9%, except Physical and Earth Sciences, at 1.8%. Men mainly left STEM from Engineering undergraduate programs (33.4%), with only 11.1% of women leaving from the same major. Men and women joined STEM fields at similar rates for the same undergraduate fields. Entries into STEM from "Other Fields", or fields not associated with traditional fields of study, were high for both men and women (67.7% for men and 64.2% for women). The same was true for Business majors, with 21.9% of men and 16.7% of women entering STEM from this undergraduate degree.

### Master's Field by Gender



<sup>1</sup> Anne Sych, "For the First Time, Women MBA Candidates Equal or Outnumber Men at 5 Major Universities," The Business Journals (The Business Journals, November 2, 2023), <https://www.bizjournals.com/bizwomen/news/latest-news/2023/11/women-mba-candidates.html>.

<sup>2</sup> "Other Fields" as defined by the Council of Graduate Schools include disciplines such as Architecture and Environmental Design, Communications and Journalism, Family and Consumer Sciences, Library and Archival Sciences, and Religion and Theology

## Which STEM Path?

Motivations for entering a master's program often relate to future professional goals, not just past undergraduate studies. Understanding why individuals choose to enter or remain in STEM master's programs is crucial, especially post-pandemic, as their intentions have gained increased interest from researchers and school administrators.

Of the 3,265 respondents who either joined STEM or remained in a STEM field, 27.9% earned a master's degree in Mathematics and Computer Sciences, 25.2% in Engineering, 19.1% in Biological and Agricultural Sciences, 12.5% in Social and Behavioral Sciences, 10.7% in Health Sciences, and 4.6% in Physical and Earth Sciences. Women were more likely to study Biological and Agricultural Sciences (21.3%) compared to men (15.4%).

**Table 1.1: Primary Motivation to Join Master's Program by Field of Study, Joining or Remaining STEM—All Demographics**

STEM Fields	Employment	Family	Financial	Knowledge	Other
Biological and Agricultural Sciences	34.0%	0.5%	2.6%	59.6%	3.3%
Engineering	36.4%	0.1%	4.6%	56.0%	2.7%
Health Sciences	50.2%	0.9%	2.1%	45.9%	0.9%
Mathematics and Computer Sciences	36.0%	0.5%	1.3%	61.8%	0.5%
Physical and Earth Sciences	27.9%	0.0%	2.7%	68.0%	1.4%
Social and Behavioral Sciences	48.2%	0.0%	2.5%	46.4%	2.8%

Motivations for entering a STEM field, as shown in Table 1-1, varied by gender and ethnicity. Most students pursued their degree for knowledge gain, except those in Health Sciences, who mainly cited employment reasons (50.2%). Few students mentioned Family, Financial, or "Other" reasons for joining a Master's program. Knowledge-related motivation was highest among Physical and Earth Sciences students (68.0%), but only 45.9% of Health Sciences students reported this reason.

Women who left STEM programs mainly cited a desire to improve their employment (58%) as their primary reason, while men cited desire to develop knowledge or expertise in their field (56.2%). Among those who never joined STEM, 46% of men reported knowledge as their main reason, compared to 52% of women who cited employment. Additionally, 44.6% of men and 52% of women who never entered STEM said their current job was directly related to their master's degree.

**Table 1.2: Current Job Relation to Master's Field, Joining or Remaining STEM—All Demographics**

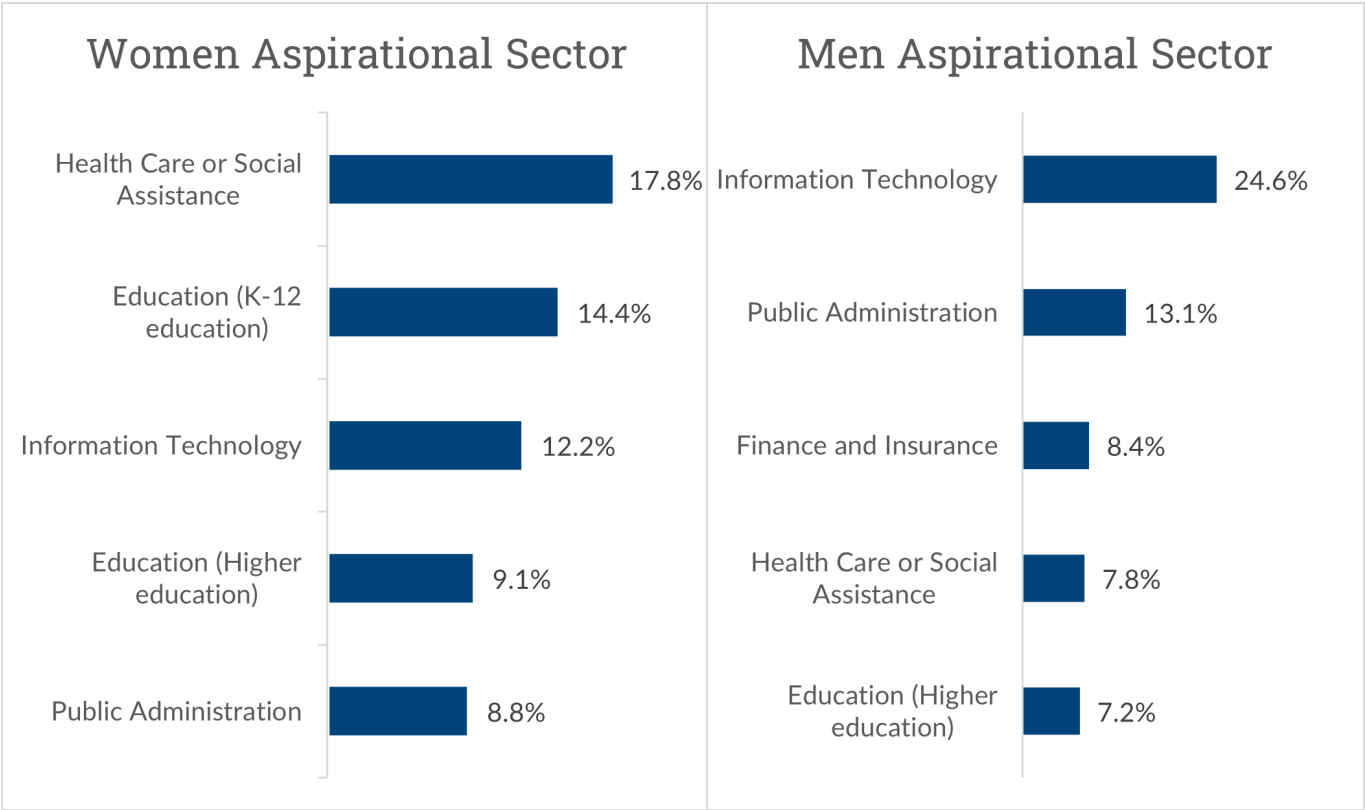
STEM Fields	Directly Related	Closely Related	Somewhat Related	Not Related
Biological and Agricultural Sciences	34.6 %	18.9 %	20.9 %	25.6 %
Engineering	36.6 %	28.7 %	23.6 %	11.1 %
Health Sciences	49.8 %	30.9 %	15.0 %	4.3 %
Mathematics and Computer Sciences	50.1 %	27.7 %	14.1 %	8.1 %
Physical and Earth Sciences	39.5 %	23.3 %	23.3 %	14.0 %
Social and Behavioral Sciences	25.4 %	23.4 %	32.5 %	18.8 %

Different STEM fields also had different relationships to the current employment of respondents as shown in Table 1-2 on the preceding page. Mathematics and Computer Sciences students had the highest relationship to employment (50.1%) whereas Social and Behavioral Science students had the lowest (25.4%). Health Sciences students had the weakest connection between their program be related to their current employment at 4.3%, which highlights how one’s job relation to their degree varies by field.

Future Careers

Master’s students mostly wanted to enter the following sectors: information technology, health care or social assistance, public administration, K-12 education, and higher education. When asked what students’ aspirational title or occupation might be called, the most common terms were “director,” “manager,” “engineer,” and “analyst.”

Along gender lines, both women and men mainly aimed to join the same sectors but at different rates. Both wanted to join the information technology sector, though men (24.6%) were twice as likely to say so than women (12.2%). Women (17.8%) were more likely to aim for Health Care or Social Assistance than men (7.8%), but less likely to want to join public administration than men (8.8% to 13.1% respectively). Men reported wanting to join Finance and Insurance as their third-most targeted aspirational sector (at 8.4%) at higher rates than women.



Information Technology remained the most popular aspirational sector, unsurprisingly for those who joined STEM (25.5%) and for those who remained in STEM (31.0%); for those who left STEM, 14.1% also aspire to join the Information Technology sector, second after Healthcare or Social Assistance (18.2%). Most of these students reported aspirational occupations with titles such as “manager,” “director,” and “engineer,” mirroring the more general pattern from above. This signals that those who left STEM likely used their Master’s experience to refine their leadership and management skills to further their careers in Information Technology as opposed to focusing on more technical skills. This trend instead was more likely to be the case of those who remained in STEM, as they overwhelmingly reported “Engineer” as their top aspirational job title.

## Final Takeaways

The prevalence of "Other Fields" as the second-most popular field across both men and women indicates a growing interest in non-traditional or emerging subfields. Institutions may want to consider extracting some of these subfields and placing them in more traditionally established fields. For example, the merging subfields of Intelligence Studies, Data Analysis, and Homeland Security could potentially be placed in the established fields of Social and Behavioral Sciences or Mathematics and Computer Sciences. Institutions may want to keep track of these subfields' popularity and perhaps deploy their own surveys to understand better the deeper motivations for students' choices to join these subfields of study.

Overall, the majority of students reported being satisfied with their overall experience while completing their Master's degrees, giving an average rating of 4.08 on a scale from 1 to 5. The strongest satisfaction scores were given to institutions' curricula (4.11 average) and faculty (4.15 average). The weakest satisfaction scores were with institutions' advising (3.71 average) and employment assistance (3.34 average). Generally, satisfaction between students who took different STEM pathways did not differ significantly. Students who joined STEM reported an average overall satisfaction of 4.05, while those who left STEM reported 4.11. This suggests that students found satisfaction in their overall Master's experience regardless of their choice to join or leave a STEM field, indicating that a student's degree satisfaction is not necessarily determined by a strong alignment between the degree focus and the first job post-graduation.

Lastly, future aspirations to work in a STEM field are not entirely limited to those who pursued a STEM pathway or degree. For instance, of those who left STEM, 26.8% reported still aspiring to work in a STEM field. In comparison, 31.8% of those who joined STEM reported that same aspiration. Additionally, 12.4% of respondents who reported never being in STEM also expressed aspirations to work in a STEM field. The assumption that those who join STEM do so primarily for employment-related motivations was challenged. Those who joined STEM cited knowledge-gaining reasons (51.9%) as their primary motivation, compared to employment-related reasons (43.4%). However, those who left STEM reported doing so for employment-related reasons at a higher rate of 50.9%.

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