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Unlocking STEM Talent: What Happens to Transfer Students at the Four-Year College?

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Community colleges represent a vital, underutilized source of talent for four-year institutions seeking to expand the STEM pipeline and meet regional workforce demands. Community colleges enroll nearly 40% of all undergraduate students, including disproportionate numbers of Black, Hispanic, and low-income students (Brock et al., 2025). Yet just a third of community college entrants transfer to a four-year institution within six years, and only half of those complete a bachelor's degree. Among those completers, only 16% earn their degree in a STEM field (Velasco et al., 2024). The low rate of STEM bachelor's completion among transfer students also affects the share who engage in STEM graduate study: In 2016-17, only 9% of science and engineering master's degree recipients had ever enrolled at a community college (National Student Clearinghouse Research Center, 2017).

Community college transfer students face especially challenging pathways when pursuing a STEM degree. Alignment between community college and four-year programs of study is typically limited, with only 58% of transfer students able to use more than 90% of their community college credits at the four-year institution (Monaghan & Attewell, 2015). This disconnect is particularly acute in technical fields. STEM program pathways tend to be highly sequential, so low credit transferability leads students to lose major-applicable credits and retake foundational courses such as introductory calculus, delaying academic progress and degree completion (Fink et al., 2023; Park et al., 2021). Moreover, STEM-aspiring students often navigate this uncertainty with insufficient advising and information, particularly from four-year receiving institutions, making it difficult to effectively plan coursework and meet program requirements (Schudde & Jabbar, 2024; Sithole et al., 2017; Wang, 2020).

In this report, we analyze National Student Clearinghouse data to better understand the trajectories of community college transfers who completed a STEM bachelor's degree. Our analysis focuses on the 2015-16 national cohort of four-year college entrants who completed a bachelor's degree within six years—a total of 1,723,349 students, 19% of whom were community college transfers. To benchmark the outcomes of STEM transfer completers, we compare them against two groups: non-STEM transfer completers and four-year native STEM completers (hereafter, "non-transfers"). We further break down relevant findings across major STEM fields: biosciences, computer and information sciences, engineering, mathematics and statistics, and physical sciences.

Our analysis addresses the following research questions:

1. To what extent do community college transfers contribute to broadening STEM bachelor's degree attainment, and how likely are they to complete a STEM degree relative to non-transfer bachelor's completers?
2. How do pathways differ between community college transfers who complete a STEM versus a non-STEM bachelor's degree, particularly with respect to time to completion?
3. Among students who earn a STEM bachelor's degree, how likely are community college transfers to continue into graduate school compared to those who did not transfer?

We disaggregate findings by demographic group (female, Black, Hispanic, and low-income students), by prior dual enrollment status, and across individual states.

This report is the first to provide a national and state-by-state breakdown on the trajectories of community college transfer bachelor's completers in STEM fields and to document the extent to which such students pursue graduate education. Together with an accompanying data dashboard, the report seeks to help college and state leaders assess challenges and opportunities for expanding STEM talent through community college transfer pathways.

Key Takeaways

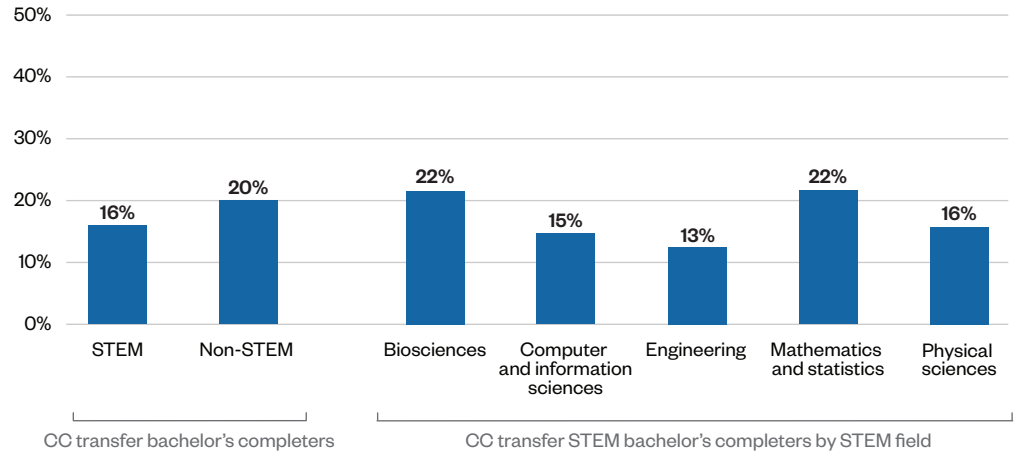
1. **Community college transfer students (or "transfers") already make a substantial contribution to the STEM talent pipeline, but greater potential remains.**
   - Community college transfers accounted for nearly 56,000 STEM bachelor's graduates in our study's 2015-16 four-year college entry cohort, representing 15% of all STEM bachelor's degree earners.
   - Community college transfers broaden the socioeconomic and, to some extent, the racial diversity of STEM bachelor's completers. They contribute graduates across every major STEM discipline in proportions similar to those of non-transfer graduates.
   - Despite these contributions, among those who completed a bachelor's in any subject, community college transfers were less likely than non-transfers to complete a bachelor's degree in STEM (17% versus 23%).
   - If community college transfers were represented among STEM bachelor's completers in the same proportion as in non-STEM fields, an estimated 18,400 additional community college transfer students in our sample would have completed a bachelor's degree in STEM rather than in non-STEM.

2. **STEM transfer bachelor's completers face a longer path to bachelor's completion than transfer students graduating in non-STEM fields.**
   - Among the community college transfers who completed a bachelor's in the entry cohort, those who completed in STEM were less likely to graduate on time than those completing non-STEM degrees (16% versus 20%).
   - While STEM transfer bachelor's completers spent 0.3 years less as community college students compared to non-STEM transfer completers, once they transferred to the four-year institution, they spent on average 0.4 additional years.

- Community college transfers graduating in engineering were the least likely to graduate on time (13%) and spent the longest time enrolled after transfer, suggesting particularly difficult transfer pathways in engineering programs once arriving at the four-year institution.

Figure ES1.

Share of Community College Transfer Bachelor's Completers Who Completed Within Four-Years (On-Time)

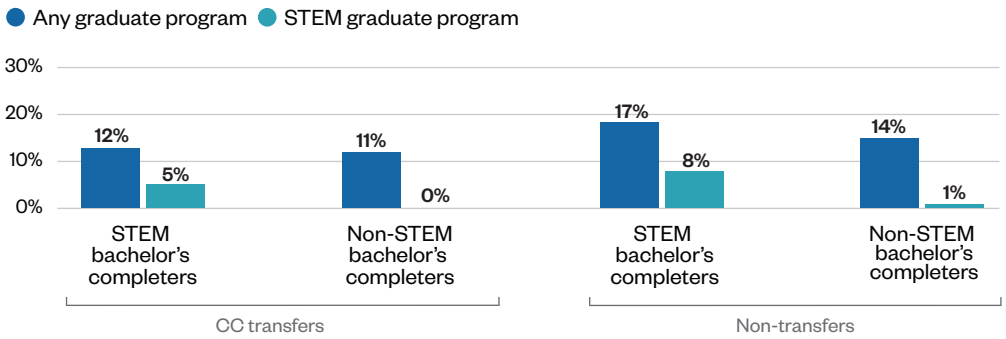


3. Community college transfer graduates are less likely to continue into graduate education, including graduate STEM programs.

- Among STEM bachelor's completers in the entry cohort, only 12% of community college transfers enrolled in graduate school in the year after bachelor's completion, compared with 17% of non-transfers.
- Similar gaps are observed among non-STEM bachelor's completers (11% among community college transfers versus 14% among the non-transfers), suggesting that barriers to graduate education extend beyond STEM and affect transfer students more broadly.
- Community college transfer STEM bachelor's completers were less likely to continue into STEM graduate programs than non-transfer STEM bachelor's completers (5% versus 8%), with the largest gaps observed in mathematics and statistics.

Figure ES2.

Rates of Enrollment in a Graduate Program Among Bachelor's Completers, by Transfer Status



Note. Sample consists of students who entered a four-year institution in 2015-16 and completed a bachelor's degree within six years of four-year entry. Graduate enrollment is measured in the academic year following bachelor's completion.

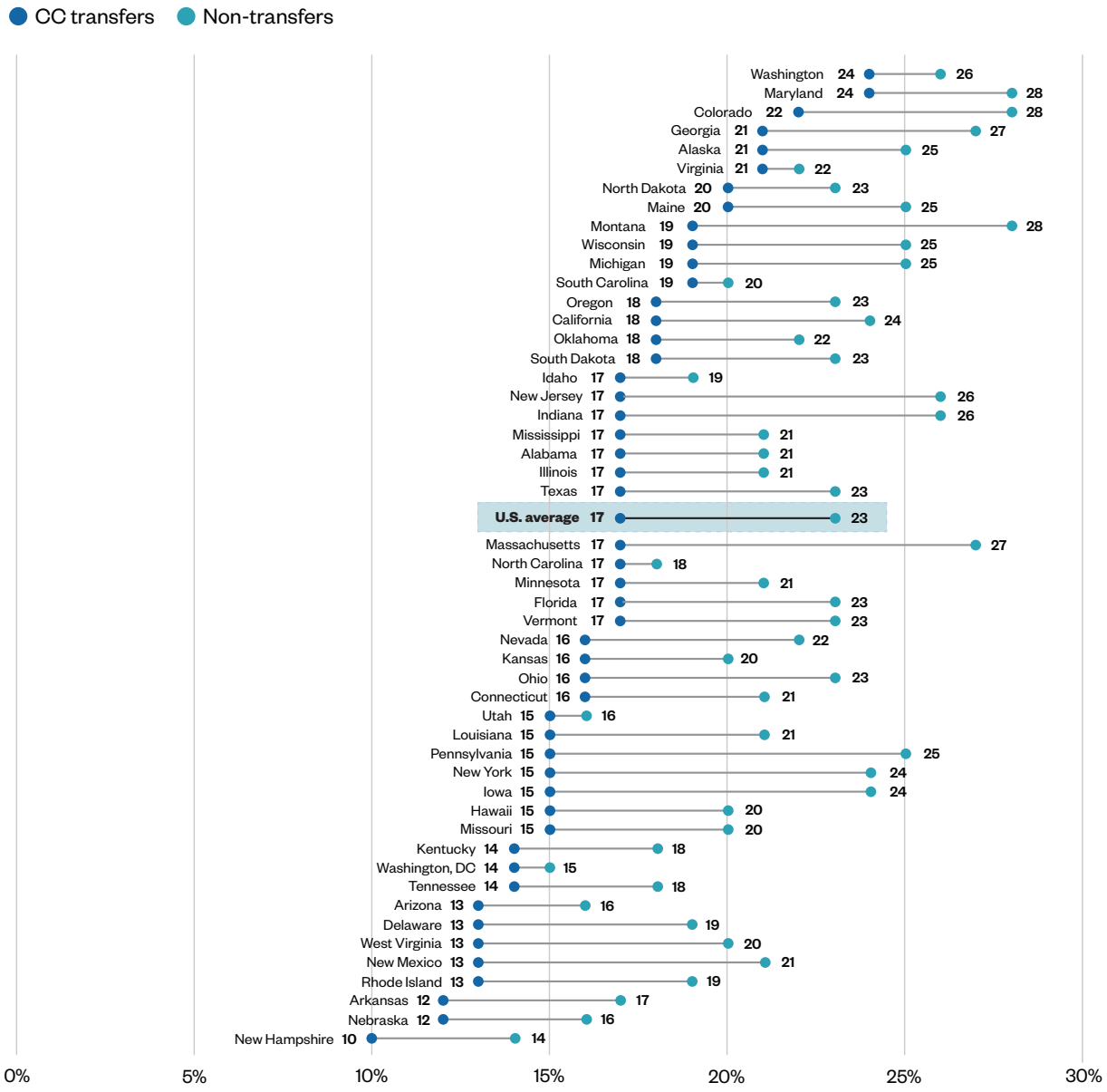
4. **Black, Hispanic, and low-income students face the greatest barriers along STEM transfer pathways. Women are the least likely to complete in STEM, but those who do experience shorter times to degree completion and higher rates of graduate enrollment.**
   - Among bachelor's completers in the entry cohort, Black (13%), Hispanic (14%), low-income (16%), and female (10%) students were all less likely than the average community college transfer to complete in STEM.
   - Among STEM bachelor's completers, Black (12%), Hispanic (11%), and low-income (14%) transfer students were the least likely to complete on time, reflecting more years of enrollment both pre- and post-transfer.
   - Women had low rates of STEM bachelor's completion among both transfer and non-transfer completers. Yet among community college transfers, women who completed a STEM degree were the most likely to graduate on time, largely because they spent fewer years enrolled before transfer.
   - Graduate enrollment rates were broadly similar across demographic groups, although female community college transfers who completed STEM bachelor's degrees were somewhat more likely to enroll in graduate school than transfer STEM graduates in general.
   - We observe similar patterns in terms of racial/ethnic and gender gaps among non-transfer students, suggesting that improving transfer is necessary but not sufficient to address broad disparities in STEM.

5. **Large variation in STEM transfer outcomes across states suggests that improvements are possible. We also observe that prior dual enrollment participation is related to higher STEM bachelor's completion and on-time graduation.**
   - Among bachelor's completers in the entry cohort, transfer students with prior dual enrollment were more likely to complete in STEM than transfers in general (20% versus 17%), and they were substantially more likely to earn their bachelor's within four years (24% versus 16%). Our findings suggest that on-time completion among prior dual enrollees was due to fewer years enrolled pre-transfer and not because they progressed more quickly after arriving at the four-year college.
   - In several states, strong representation of transfer students among STEM bachelor's completers aligns with strong representation of transfer students among bachelor's completers overall and with higher transfer completion rates. This suggests these states have conditions that support community college transfers more broadly, benefiting STEM participation.
   - Across all states, transfer bachelor's completers were less likely to complete in STEM than non-transfer bachelor's completers. But the size of this gap varies, suggesting that the transfer disadvantage in STEM completion observed nationally is not equally pronounced across state contexts.
   - While across all states, years spent post-transfer were relatively large compared to pre-transfer years, in some states, increasing on-time completion will require efforts to reduce both pre- and post-transfer years in college.
   - Washington consistently stands out across multiple measures, with a high representation of community college transfers among STEM bachelor's graduates, one of the highest STEM shares among transfer completers, and a relatively small gap in STEM share between transfer and non-transfer completers. It is also among the states with the highest rates of on-time completion.

- California and Florida also performed well on several measures. California combines strong community college representation in STEM with relatively short time to bachelor's completion after transfer, while Florida combines strong transfer representation with above-average graduate school enrollment among STEM transfer graduates.
- States that performed well across STEM transfer outcomes did not necessarily perform equally well on graduate school enrollment rates, suggesting that stronger transfer systems do not automatically translate into stronger graduate education pathways.

Figure ES3.

STEM Share of Transfer and Non-Transfer Bachelor's Completers, by State



Note. Outcomes reported by the state of the four-year institution. Wyoming data is suppressed because it has fewer than three colleges with students in the sample.

Implications of Study Findings

Our findings highlight four key areas that warrant attention from community colleges, four-year institutions, and state leaders committed to broadening and diversifying the STEM workforce through improved transfer pathways.

- **Community college transfers are a substantial part of the STEM bachelor's talent pool, but there is clear untapped potential.** Of the community college transfers who completed a bachelor's within six years, 17% of them did so in STEM, compared with 23% of non-transfer bachelor's completers. Because community college students represent a large share of higher education enrollment, with a disproportionate representation of students from historically underrepresented groups (Brock et al., 2025), broadening STEM career exploration and STEM-specific transfer supports could help to increase and diversify the STEM talent pool nationwide.

- **Timely bachelor's completion is a major challenge for STEM transfer students.** We found that community college transfers who completed STEM bachelor's degrees were less likely to finish on time compared with transfer graduates in non-STEM fields, with STEM completers spending substantially more time at the four-year institution than at the community college. Black, Hispanic, and low-income transfer students were less likely to earn a STEM bachelor's degree and took longer to do so. Longer times to degree completion, especially in highly sequential programs such as engineering, suggest that program planning, credit transferability, and credit applicability should be major domains of focus for higher education leaders. This builds on prior research showing that for STEM-aspiring transfer students, taking the right courses on time is a major factor influencing on-time degree completion (Bahr et al., 2017; Burdman et al., 2025; Fink et al., 2023). Furthermore, longer post-transfer completion times suggest that four-year institutions have a critical role to play in facilitating on-time completion among STEM transfer students.

- **Transfer students face barriers to graduate study in both STEM and non-STEM fields.** Our findings suggest relatively low graduate enrollment rates (overall and in STEM programs) for community college transfers compared with non-transfer bachelor's completers. We take this as suggestive evidence that obstacles faced by transfer students continue to influence their education decisions even after bachelor's completion. While more research is needed to better understand the factors driving these choices, four-year institutions can proactively support graduate school pathways by ensuring that transfer students have equal access to research-related opportunities and faculty mentorship.

- **Wide variation in STEM transfer outcomes across pathways and states suggests that better outcomes are achievable.** Community college STEM bachelor's completers with prior dual enrollment experience were more likely to major in STEM and to complete their bachelor's degrees on time, consistent with the large body of research on the benefits of dual enrollment participation (see Schaller et al., 2025). Similarly, state-level differences suggest that greater STEM completion is possible nationwide if more states adopt effective transfer practices. Washington, for example, stands out for relatively strong outcomes across multiple measures, coinciding with a statewide transfer system that promotes institutional coordination and major-specific alignment. Other states, such as California and Florida, also show strong results on key metrics. Colleges and state systems can use these findings to assess where to prioritize efforts to broaden STEM degree attainment and improve timely progression through STEM pathways.

Recommendations for Universities, Community Colleges, and State Systems

Four-year institutions:

Remove post-transfer barriers to STEM bachelor's completion and graduate enrollment.

- Accelerate bachelor's degree completion by aligning coursework and mapping sequential STEM program pathways with transfer partners.
- Expand access to graduate education by ensuring transfer students have equal opportunity to participate in undergraduate research, access faculty mentorship, and explore graduate programs.

Community colleges:

Help more students enter and navigate STEM transfer pathways.

- Help more students—particularly those historically underrepresented in STEM—explore STEM bachelor's programs and career opportunities.
- Ensure that STEM transfer-intending students become "major-ready," not merely transfer-ready, by guiding them through the appropriate lower-division coursework before transfer and providing major-specific academic advising.

States and higher education systems:

Build the infrastructure for strong STEM transfer pathways.

- Map statewide major-specific STEM pathways connecting community college programs to bachelor's completion, ensuring that lower-division coursework applies directly toward degree requirements across receiving institutions.
- Use data to identify and close gaps in STEM transfer, bachelor's completion, and graduate enrollment.

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