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Measuring Equity Gaps in Enrollment and Graduation Trends in Illinois Computer Science Programs

Part 2: 2-Year Institutions

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External Review

To ensure that this report's contents are rigorous, accurate, and useful to educators and policymakers with varying levels of background knowledge, IWERC solicits feedback from experts. We thank the following reviewers of this report:

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Measuring Equity Gaps in Enrollment and Graduation Trends in Illinois Computer Science Programs

Part 2: 2-Year Institutions

Introduction

In Illinois, community colleges are becoming increasingly popular, with statewide enrollments increasing by almost 5% since Fall 2023.[1] Moreover, 2-year institutions in Illinois are increasingly racially diverse, enrolling many Hispanic/Latino and Black/African American students, who represent around 40% of total enrollment, greater than their 30% enrollment representation in 4-year institutions.[2–4] Community colleges also offer lower costs and flexible admission policies, making it more affordable for students who wish to pursue a bachelor's degree by transferring to a 4-year institution after earning an associate degree.[5,6] In Illinois, the average cost for a full-time student for one year at a community college is $4,604, whereas the average cost at a 4-year public institution is more than three times higher and the average cost at a 4-year private institution is more than ten times higher.[7] Lastly, Illinois is among the top five states with the highest proportion of students entering community colleges who transfer and earn a bachelor's degree.[8] While transfer pathways differ by state and depend on complex factors like transfer agreements between 2-year and 4-year institutions, transfer pathways from community colleges significantly drive diversity and enrollment in 4-year institutions.[8,9]

In 2023, a bachelor's degree was required for two-thirds of computer and mathematics workers, and most entry-level computer and information technology jobs still required a bachelor's degree.[10,11] That said, 2-year computing and technology degrees have an early career pay between $49-57k and a median mid-career pay between $75-93k per year[12]—offering students a livable wage[13] after their 2-year program.[a] Given this, computer science (CS) programs offered at 2-year institutions are important, as they could significantly impact disparities in educational opportunities and outcomes (i.e., equity gaps) for Hispanic/Latino, Black/African American, and low-income students. These groups have been historically marginalized in 4-year CS programs and often face financial challenges in their education.[14–16] Two-year institutions could help diversify a workforce that offers competitive pay with a 2-year degree. As noted earlier, 2-year institutions play a considerable role in the recruitment and transfer of students with historically marginalized backgrounds into 4-year institutions. Because CS and tech employers often require 4-year degrees, it is essential to understand how 2-year CS programs in Illinois are enrolling and successfully matriculating these students to an associate or bachelor's degree.

The previous report in this series focused on 4-year institutions and revealed an increase in enrollment over the last decade, with more degrees being awarded. However, the report also showed that historically marginalized groups still exhibit lower enrollment and degree completion compared to their peers. Furthermore, an equity analysis uncovered the underrepresentation of Black/African American, Hispanic/Latino, and female CS students at most 4-year institutions.[16] This report continues the enrollment and completion trends analysis for CS students in Illinois 2-year institutions, paying particular attention to female, Hispanic/Latino, and Black/African American students. We again completed an equity analysis for all 2-year institutions in the state and included

[a] Examples of such associate degree programs included: Computer Programming, Computer Science, Applied Computer Science, Electrical & Computer Engineering, Computer Aided Design (CAD), Computer Technology, and Electronic & Computer Technology.

a follow-up analysis of transferability to 4-year institutions. The results can identify disparities and opportunities for growth for 2-year CS and tech programs as they endeavor to improve student experiences.

Methods

Data Source

The data used in our analyses are publicly available from the Illinois Board of Higher Education's (IBHE) website.[4] This data includes school-level data for Fall Enrollment[b] and Academic Year Degrees Conferred at 2-year community colleges in Illinois across academic year (AY) 12-13 to AY 22-23.[c] Data included public, private for-profit, and private non-profit institutions awarding associate degrees. Student demographics included binary gender (male and female)[d] and race/ethnicity (American Indian and Alaska Native (AIAN), Asian, Black/African American, Hispanic/Latino[e], International, Native Hawaiian and other Pacific Islander (NHPI), White, and Two or more (2+) races[f]). The data also contains detailed information on the names of programs and fields of study using CIP codes.[17] The data does not include information on graduation rates (i.e., percent of students who complete their degree within 150% of their program's anticipated length), but it does include the number of degrees conferred each year.

Defining Computer Science & Computer Science Programs

As in the previous report, we use the following definition of CS from the Illinois Legislative Assembly:

"Computer science studies computers and algorithms, including their principles, hardware, software designs, implementation, and societal impact. "Computer science" does not include the study of everyday uses of computers and computer applications, such as keyboarding or accessing the Internet."[18]

New to this report, we include programs that are not quite CS but share similar aspects. We bucket these programs into two groups: CS-adjacent and Tech. **CS-adjacent** programs are defined as programs using some programming language or principles of CS in their core work (e.g., Computer Software Technology/Technician). **Tech** programs are defined as programs using emergent technology but not the principles or programming of computers (e.g., Robotics Technology/Technician). Both CS-adjacent and Tech programs are much more common in 2-year institutions than in 4-year institutions, hence their inclusion here and not the previous report. The Supplemental Materials provide a detailed list of CS programs and CIP codes included in this analysis and the criteria used to select them.

Descriptive Analysis

As in the previous report, our descriptive analysis uses magnitude (i.e., number of students) and percentages (i.e., the proportion of students in a particular group) to show trends in enrollment and

[b] Fall enrollment counts include **every** student who is enrolled in a computer science program as defined by the CIP code our research team selected (see Supplemental Materials for more information on CIP codes). It is **not** a count of only new enrollees, but all CS students for that academic year.
[c] Enrollment data from AY 13-14 was not available and is not included in any analyses.
[d] Our analysis is restricted to binary gender, as that is what was available in the data set.
[e] We use language throughout the paper to match that of the data source. For example, we use Hispanic/Latino instead of Hispanic/Latino/a/x because Hispanic/Latino is the label used by IBHE.
[f] See IBHE's website for more information on how they collect and label student identity data.

degrees conferred by sector (public, private for-profit, and private non-profit), binary gender, race/ethnicity, and the intersection of binary gender and race.

Measuring Equity: Proportionality Index (PI)

Continuing our analysis of equitable representation from the 4-year report, we use the Proportionality Index (PI) method as a way of measuring disproportionate impact of a subgroup of students relative to their overall population.[16,19] In this report, we use the PI to measure whether or not female, Black/African American, and Hispanic/Latino students are equitably represented in enrollment and completion of CS programs at 2-year institutions in the state. We again calculated three different PIs for each 2-year institution: (1) the **Illinois-Institution Enrollment PI** compares enrollment in 2-year programs relative to the Illinois state population[20]; (2) the **Institution-CS Enrollment PI** compares enrollment in CS programs relative to the enrollment in all 2-year programs within an institution; and (3) the **CS Enrollment-Completion PI** compares degrees attained in CS programs to enrollment in CS programs within an institution. Table 1 includes PI values and their meaning. See our 4-year report for more information on these indices, including equations and limitations of this method.[16]

Table 1. Proportionality index numeric scale, category, meaning of categorization, and an applied example.

PI value	Category	Meaning
PI < 0.85	Disproportionate impact	The institution is **not** doing well for a particular subgroup of students.
0.85 ≤ PI < 1	Somewhat proportionate impact	The institution is close to doing well for a particular subgroup of students but could be doing better.
PI ≥ 1	Proportional impact	The institution is doing well for a particular subgroup of students.

Note: Throughout the report, we often use the terms “proportionate” and “equitable” interchangeably.

The PI method effectively assesses equitable group representation but can produce errors with small cell sizes, especially for small institutions and programs. To address this, we calculated PIs using combined enrollment or completion data for the five most recent years available (AY 18-19 through AY 22-23) to reduce variability. Year-to-year PIs for each institution are available in the Supplemental Materials for tracking progression over time. Lastly, we categorized each 2-year institution by its size using Carnegie's size classification[g] of Higher Education Institutions.[21] Institution size may impact the institutional structure, culture, and finances, affecting the availability, character, and/or quality of service (and possibly experiences) for student subgroups.

Findings: Descriptive Analysis

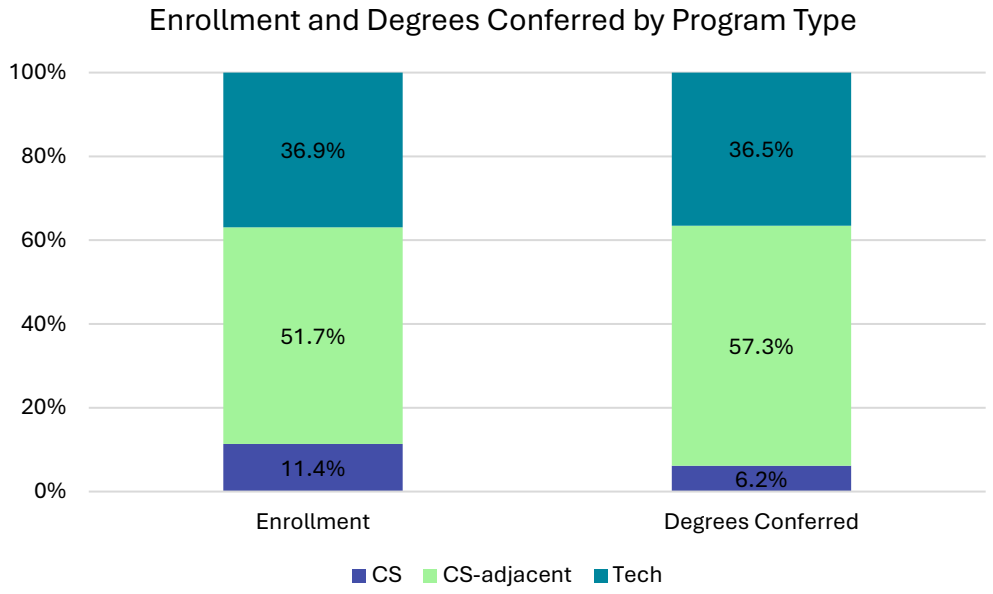
What does a 2-year post-secondary CS education look like in Illinois, and how has it changed in the last decade?

Illinois has 68 public and private institutions that offer associate degrees in CS, CS-adjacent, and Tech programs. As shown in Figure 1, of all the students enrolled in these programs, over half are enrolled in CS-adjacent programs, and another 36.9% are enrolled in Tech programs. CS programs represent a small percentage of students in 2-year programs. Moreover, the representation of students in CS programs lessens for degrees conferred, whereas the representation of CS-adjacent degrees increases. This suggests that students in CS-adjacent programs are more likely to receive

[g] Very Large (Full-Time Enrollment of at least 10,000), Large (FTEs 5,000-9,999), Medium (FTEs of 2,000–4,999), Small (FTEs of 500-1,999), Very small (FTEs less than 500).

their associate degrees than those in CS programs. Students in Tech programs have similar proportions of enrollment to degrees conferred.

Figure 1. Overall enrollment and degrees conferred for 2-year CS, CS-adjacent, and Tech programs between AY 12-13 and AY 22-23.

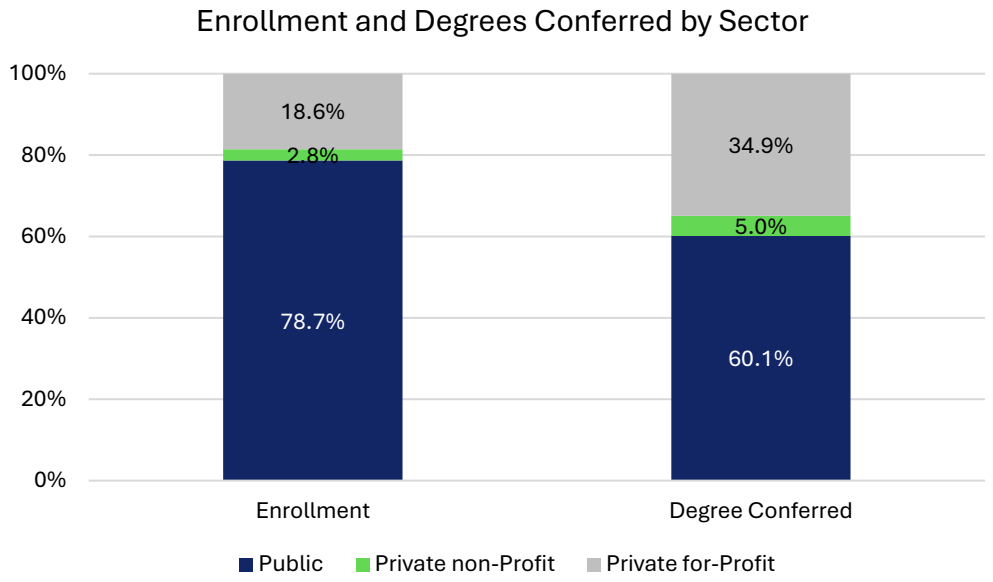


What this tells us is that the nature of CS education at 2-year institutions differs from that at 4-year institutions, where CS programs dominate, and CS-adjacent and Tech programs are scarce. While CS degree programs at the 2-year level are relatively rare (as seen in Figure 1), a broader spread of computing and tech-related degrees provides students with the opportunity to learn CS-relevant knowledge and skills. As such, for the remainder of this report, we combine these three program types together and refer to them collectively as "CS" as we analyze enrollment and graduation trends over time.[h]

As noted in Figure 2, most CS students, 78.7%, are enrolled in public institutions, followed by private for-profit institutions with 18.6% of the total enrollment. However, public institutions awarded only 60.1% of all degrees, while private for-profit and non-profit institutions awarded almost twice their representation of degrees compared to their share of enrollment. The enrollment and degree conferral rates in CS programs differ significantly between private for-profit and private non-profit sectors in both 2-year and 4-year institutions. Private for-profit institutions enroll a higher proportion of students in CS programs and have a higher success rate in graduating their students at 2-year institutions than 4-year programs, where their enrollment is less than 2%.[16]

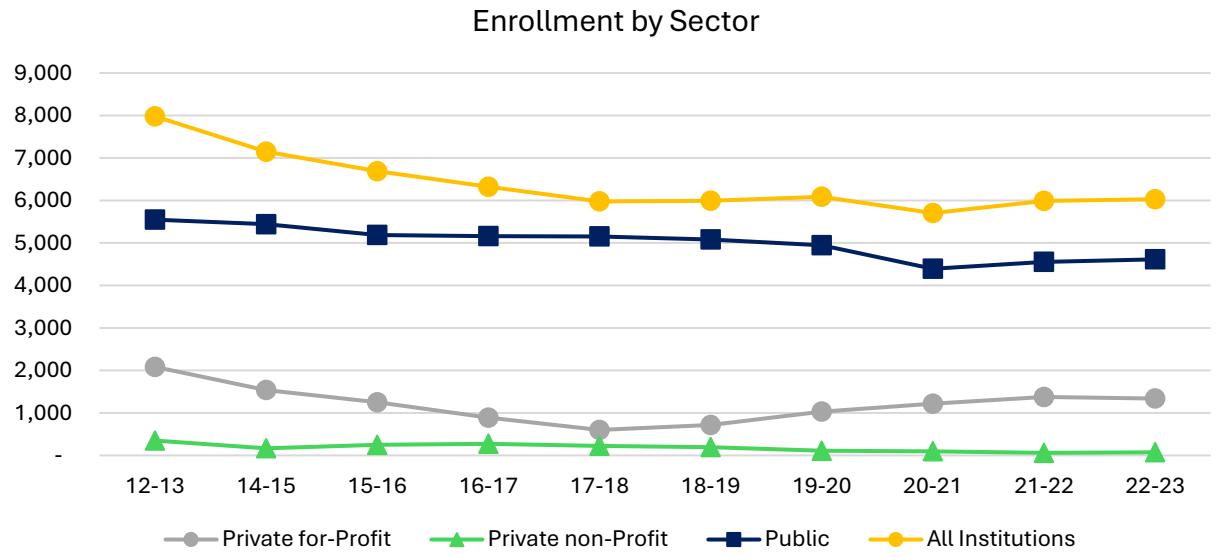
[h] See the Supplemental Materials for findings specific to each program type.

Figure 2. Average enrollment and degrees conferred in 2-year CS programs by sector between AY 12-13 and AY 22-23.



CS enrollment in 2-year institutions has declined in all sectors since AY 12-13 except for private for-profits, which have seen an enrollment increase since AY 17-18. There was a modest increase in enrollment in the public sector beginning in AY 20-21; however, it is still lower than the enrollment level in public institutions 10 years ago (Figure 3). Overall enrollment in 2-year institutions in Illinois decreased by 8.9% between AY 18-19 to AY 22-23.[22] However, during that same 5-year period, enrollment in Illinois 2-year CS programs increased slightly (by less than 1.0%), indicating CS programs did not experience the same level of 2-year enrollment loss as other programs.

Figure 3. Enrollment trends in 2-year CS programs by sector between AY 12-13 and AY 22-23.

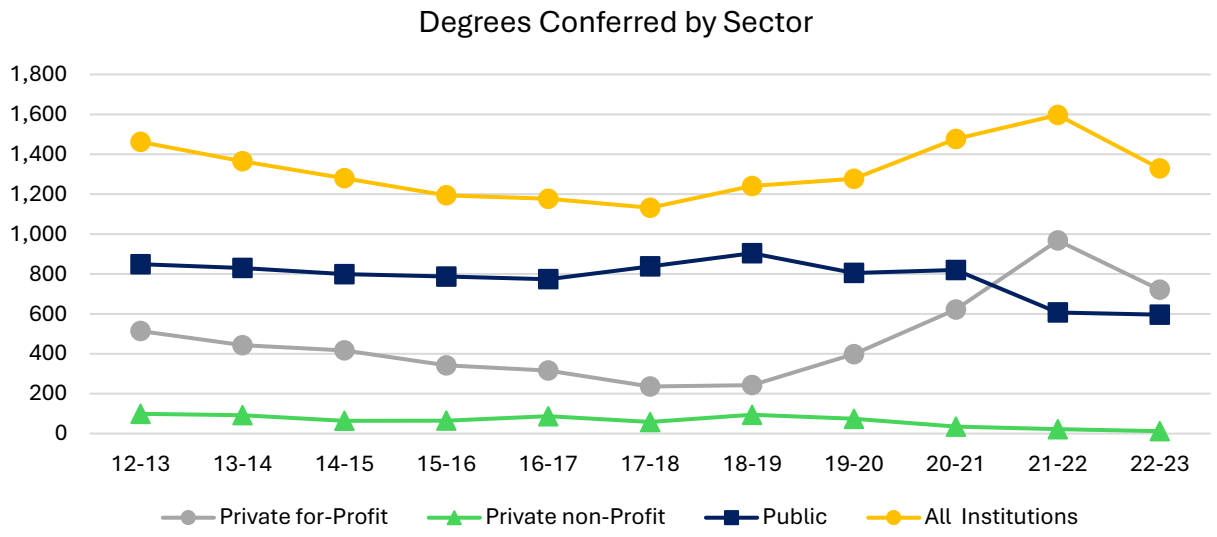


As shown in Figure 4, the number of degrees awarded for all institutions follows a similar trend as enrollment across all institutions until AY 17-18, after which a pattern shift occurred. After AY 17-18, the number of degrees awarded increased, peaking in AY 21-22. Between AY 12-13 and AY 20-21, the national trend showed a 12.3% decrease in CS degrees awarded[23], while Illinois 2-year CS programs saw a 1.0% increase in all CS degrees during the same time period. This increasing trend in degrees

conferred in 2-year programs is similar to that in 4-year programs, while the national trend also decreased.[16]

Private for-profit institutions carried the increasing trends seen across all institutions, with these institutions increasing degrees conferred by 40.3% from AY12-13 to AY22-23. Degrees conferred by private for-profit institutions peaked in AY 21-22, making up about 60% of all 2-year CS degrees that year. This increase is aligned with national trends in the uptick of for-profit institutions' enrollment and advertising coinciding with the onset of the COVID-19 pandemic, when marketing of existing online post-secondary programs increased.[24]

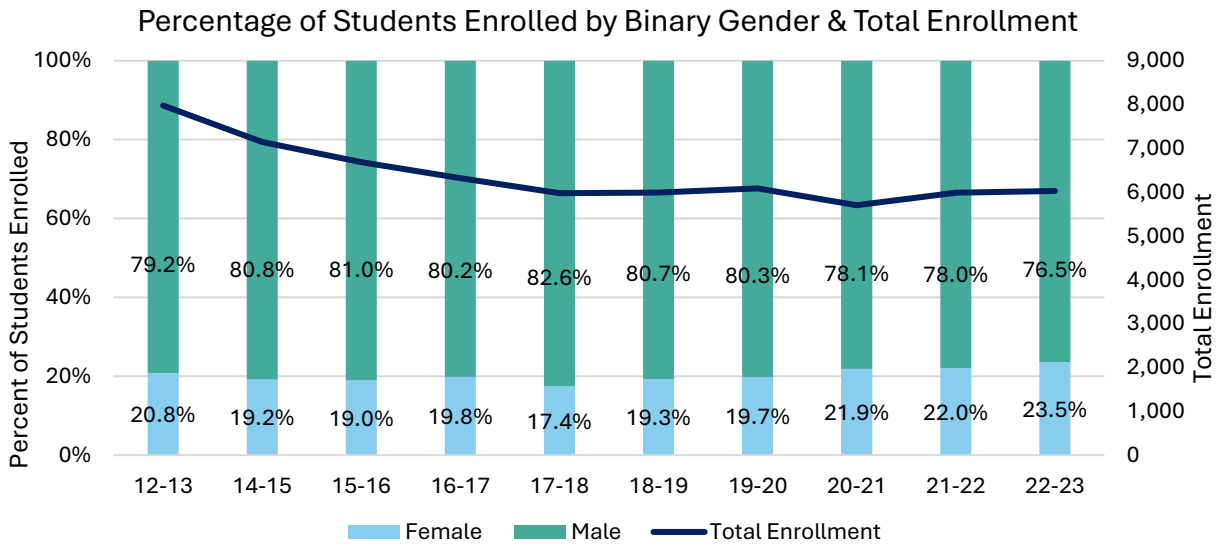
Figure 4. Degree conferred trends in 2-year CS programs by sector between AY 12-13 and AY 22-23.



Does representation in CS differ by binary gender or race?

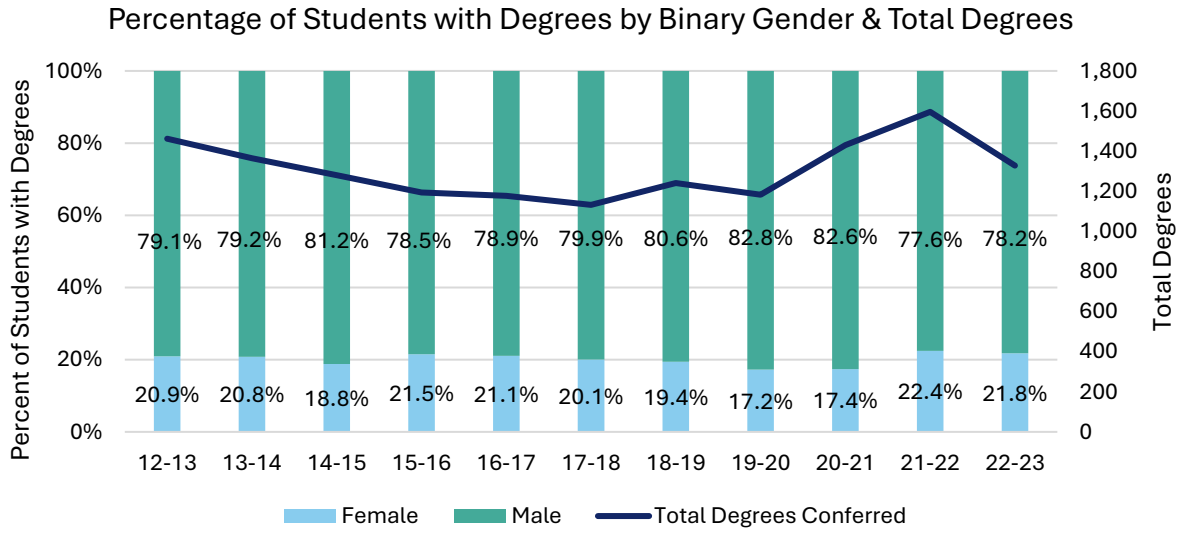
Over the past decade, male students have consistently dominated the 2-year programs in CS in Illinois, averaging about 80% of enrollment (see Figure 5). However, despite total enrollment decreasing, there has been some modest improvement in gender diversity, as the percentage of women enrolled increased from about 21% in AY 12-13 to about 24% in AY 22-23. Even though representation is low, 2-year CS programs have slightly better representation of women than 4-year CS programs.[16]

Figure 5. Percent of students enrolled in 2-year CS programs by binary gender (left axis, bar chart) and total enrollment (right axis, dark blue line) for AY 12-13 through AY 22-23.



As shown in Figure 6, men continue to receive a significantly higher proportion of 2-year CS degrees than their female counterparts, who received up to 22.4% of degrees awarded across all years. In comparing the representation of women in degrees conferred by 2-year and 4-year institutions, representation of women has remained mostly stagnant at 2-year institutions (increase of 1 percentage point) whereas 4-year institutions experienced a steady increase (increase of 10 percentage points from 10.3% to 20.0%) over the same 11-year period.[16]

Figure 6. Degrees conferred in 2-year CS programs by binary gender. Percent of students with CS degrees conferred by binary gender (left axis, bar chart) and total degrees conferred (right axis, dark blue line) for AY 12-13 through AY 22-23.

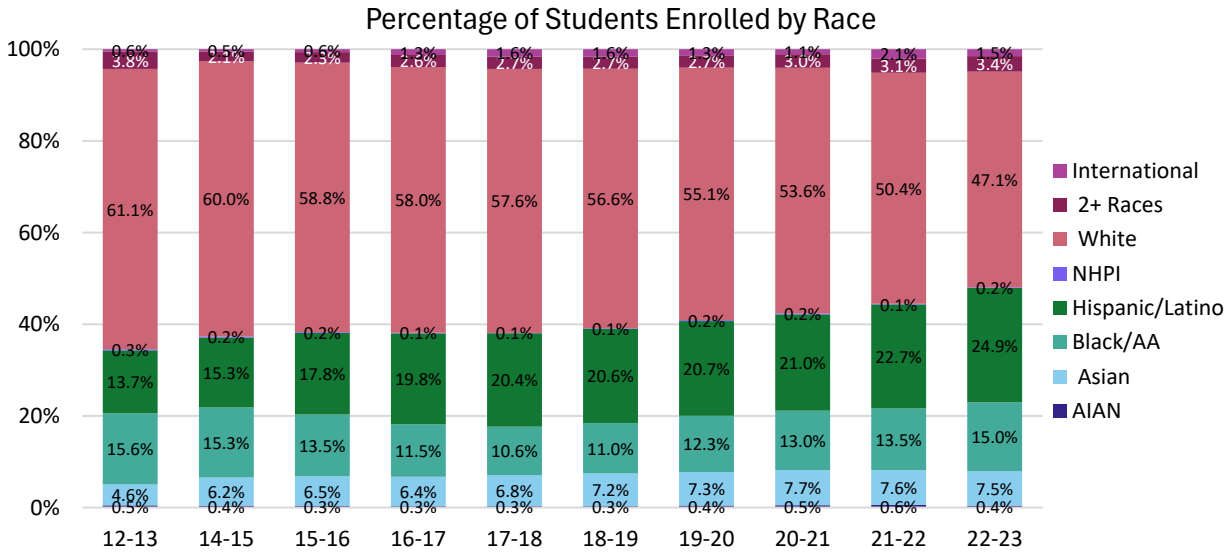


Enrollment has also changed when disaggregated by students' racial identity (see Figure 7). Enrollment of Hispanic/Latino students (both magnitude and percent representation) has been steadily increasing over the past decade. At the same time, enrollment of Black/African American students (both magnitude and percent representation) has decreased but showed recovery in SY 22-23. Overall, both these groups are better represented in 2-year CS programs than they are in 4-year

CS programs in Illinois, with Black/African American representation nearly doubling what it is at 4-year institutions.

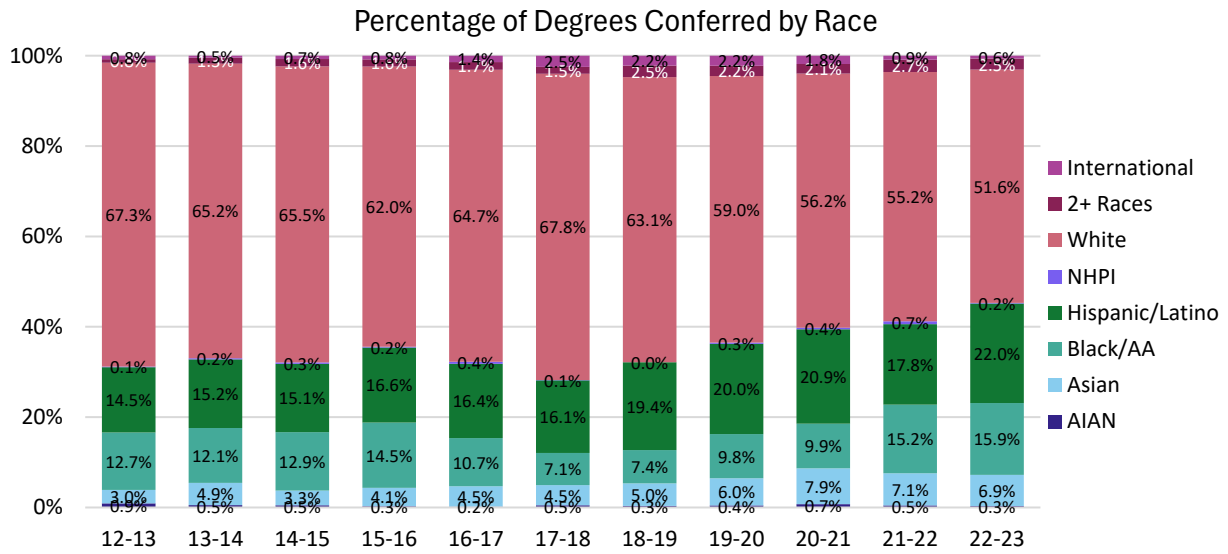
There has been a steady decline in the percentage of White students enrolled in 2-year CS programs. In AY 12-13, White students accounted for 61.1% of enrollment. However, by AY 22-23, this figure had dropped to 47.1%. There is also a significant difference in the proportion of Asian students enrolled in 2-year CS programs compared to 4-year CS programs. Asian students make up only about 8% of students in 2-year programs (which has increased over time), as opposed to up to 27% in 4-year programs.[16] Two-year CS program enrollees in Illinois are gradually becoming more racially diverse, with slow but steady changes.

Figure 7. Percent of students enrolled in 2-year CS programs by racial group for AY 12-13 through AY 22-23.



The trends we observed in enrollment by race are reflected in the degrees conferred during AY 13-23 (see Figure 8). Over the past three years, despite some inconsistency in previous years, we have seen promising progress in the degrees conferred for Black/African American students. While the number of diplomas awarded to Hispanic/Latino students has steadily increased, they have not graduated in proportion to their enrollment representation in most years. The increased enrollment shows promise, but there may remain structural barriers that prevent certain subgroups from achieving proportional degree attainment.

Figure 8. Percent of degrees conferred in 2-year CS programs by racial group for AY 12-13 through AY 22-23.



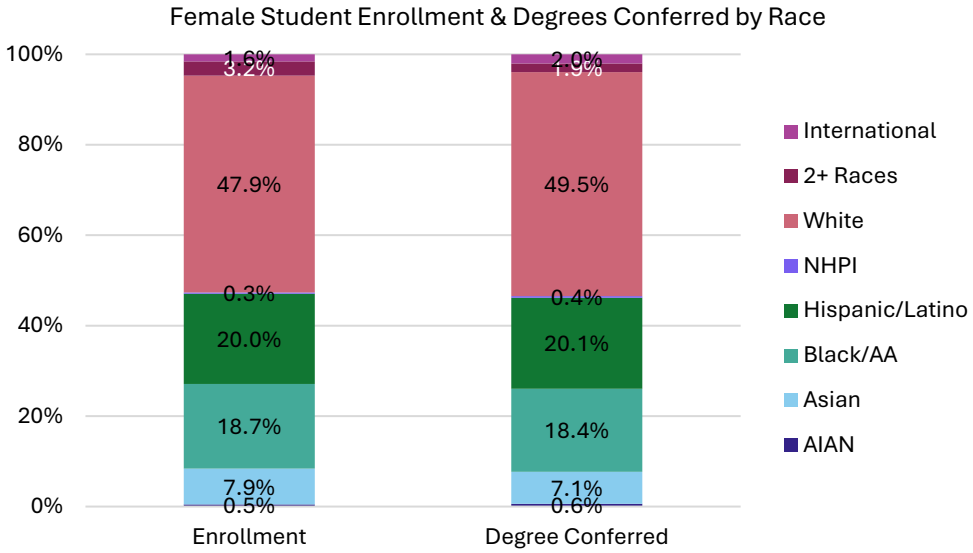
The increased representation of Black/African American and Hispanic/Latino students in 2-year CS programs is excellent progress. That said, where this progress is being made is cause for concern. We examined representation of racial groups by sector given the trends observed in private for-profit institutions earlier. Black/African American students represent a higher proportion of enrollees in 2-year private for-profit institutions (24.7%) than in 2-year public institutions (10.6%). Moreover, both Black/African American and Hispanic/Latino students represent a higher proportion of degree earners at 2-year private for-profit institutions (20.6% and 22.6%, respectively) than at 2-year public institutions (7.0% and 14.1%, respectively). The higher representation of Hispanic/Latino and Black/African American students in for-profit institutions can be explained by several factors, all of which may have negative consequences for these students. For-profit institutions often recruit students for training programs to prepare them for the job market. Additionally, these schools tend to target low-income students and students of color. Neighborhoods with a majority Black/African American or Hispanic/Latino population are over 75% and 110% more likely, respectively, to have at least one for-profit school compared to communities that are not majority Black/African American or Hispanic/Latino, which might also contribute to this trend.[25] This enhanced presence of for-profit institutions, along with unethical recruitment practices and higher college tuition fees, often without a corresponding increase in the quality of education, can lead to higher levels of student debt, difficulty in repaying loans after graduation, and poorer educational outcomes.[25–27] It can result in these institutions failing to fulfill their promise of providing well-paying jobs after training. In Illinois, for example, the data reveals that only a minority of graduates from for-profit institutions surpass the median earnings of high school graduates.[28]

Does representation in CS differ by the intersection of binary gender and race?

While women comprise only 23.5% of the CS student body at 2-year institutions, their subgroup is relatively more racially diverse than their male counterparts. Moreover, female students from various racial backgrounds are all making significant progress in CS programs. CS enrollment for women is nearly equal between Hispanic/Latino and Black/African American women, who together represent 38.7% of women's enrollment in CS programs. White women make up 47.9% of enrollment, and the remaining 13.4% of women in CS include Asian women, women of two or more races, and Indigenous women (both AIAN and NHPI; see Figure 9). Enrollment and degree attainment

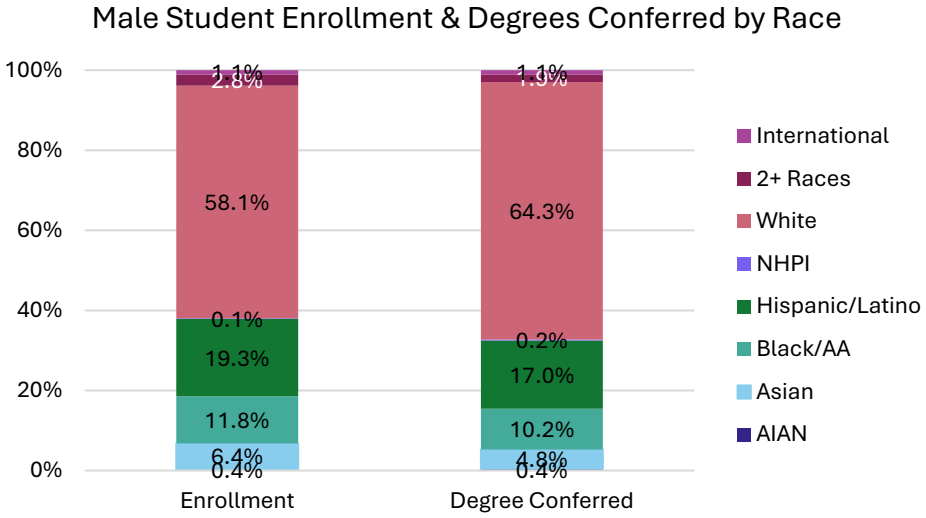
percentages are nearly equal for the majority of the racial groups. The few women who are registering in CS seem to be successfully completing their studies.

Figure 9. Female student enrollment and degrees conferred in 2-year CS programs by race between AY 12-13 and AY 22-23.



The male population enrolled in and graduating from 2-year CS programs is slightly less racially diverse than the female population. As shown in Figure 10, White male students represent 58.1 % of enrollment and 64.3% of degrees awarded. All other racial groups are better represented among the female population than the male population. The disproportionately high number of White male students receiving degrees brings attention to the challenges faced by other groups in completing their diplomas. It is crucial to identify and address these challenges to provide support for all students.

Figure 10. Male student enrollment and degrees conferred in 2-year CS programs by race between AY 12-13 and AY 22-23.



The distribution of students by gender and race indicates noticeable variations. A greater proportion of male students are White compared to their female counterparts. On the other hand, Black/African American students represent less of the male student body (11.8%) than the female student body

(18.7%). The enrollment percentages for Hispanic/Latino students show minimal disparity between male (19.3%) and female (20.0%) students. Despite this, there appears to be a discrepancy in degree attainment, as degree earners are 20.1% Hispanic/Latino among female students and 17.0% Hispanic/Latino among male students. This overall trend of representation by gender and race of CS enrollees and graduates is similar to the one observed in the 4-year report.[16]

Findings: Measuring Equity in Illinois CS Programs

Table 2 summarizes the three types of proportionality index (PI) of all 2-year post-secondary institutions in the state offering CS programs[i] for AY 18-19 to AY 22-23 (5-year pooled) for each subgroup. PIs are coded as either a gradient of green or solid blue. The impact for a subpopulation is *somewhat proportionate* ($0.85 \leq PI < 1$) when a cell is shaded light green or *proportionate* if a cell is darker green ($PI \geq 1$). The impact is *disproportionate* if a cell is shaded blue ($PI < 0.85$). In short, any shade of green implies an institution is approaching or at proportionate impact for a particular student group, while blue indicates disproportionate impact, and the institution could be doing more to recruit and retain a particular student group.

Suppose an institution has a dark green color on all the indicators. In this case, not only does its enrollment rate match the percentage of the subpopulation in Illinois' general population, but the enrollment rate school-wide matches the enrollment rate in CS, and associate degrees conferred in CS match the CS enrollment rate. The enrollment and completion data suggest that the institution appears to be recruiting and retaining students well for that subgroup of students. The Supplemental Materials include similar PI tables completed for each year in the data set. It is important to note that because the PI calculations are based on individual institution populations, they are not meant to be used as comparisons across institutions, particularly those of different size classifications.

[i] CS programs include CS, CS-adjacent, and Tech programs in this report. See our Supplemental Materials for specific CIP codes included in the analysis. City College of Chicago Malcolm X campus is not included in PI tables as it did not have the minimum data requirements to be included.

Table 2. Pooled 5-year PIs for Illinois 2-year institutions with CS programs between AY 18-19 and AY 22-23.

Institution	Size	Illinois-Institution Enrollment PI			Institution-CS Enrollment PI			CS Enrollment-Completion PI		
		AfAm	Hisp	Female	AfAm	Hisp	Female	AfAm	Hisp	Female
Public										
College of DuPage	Very Large	0.58	1.48	1.06	0.74	0.77	0.34	0.68	0.82	1.02
College of Lake County	Large	0.44	2.28	1.07	1.08	0.96	0.48	0.48	0.94	1.17
Harper College	Large	0.30	1.60	1.09	1.46	0.92	0.38	0.62	0.93	1.09
Joliet Junior College	Large	0.60	1.48	1.11	1.24	0.85	0.28	0.70	0.92	0.94
Moraine Valley Community College	Large	0.65	1.40	1.02	0.82	1.03	0.26	0.87	0.85	0.65
Black Hawk College	Medium	0.56	0.80	1.25	0.77	1.13	0.41	0.61	1.63	1.05
CCC - Harold Washington College	Medium	2.02	2.47	1.16	0.62	1.35	0.58	2.71	0.00	0.00
CCC - Harry S Truman College	Medium	1.77	1.89	1.19	1.20	0.81	0.46	0.36	1.20	0.00
CCC - Richard J. Daley College	Medium	1.12	3.75	0.99	0.82	1.19	0.37	1.20	0.96	1.30
CCC - Wilbur Wright College	Medium	0.46	3.28	1.07	2.00	0.71	0.55	0.97	0.91	1.15
Elgin Community College	Medium	0.28	2.03	1.10	1.06	1.03	0.32	1.20	0.87	0.94
Heartland Community College	Medium	0.64	0.46	1.14	1.47	1.05	0.42	0.78	1.40	1.22
Illinois Central College	Medium	0.69	0.31	1.17	0.98	0.71	0.24	0.42	1.21	0.60
John A. Logan College	Medium	0.58	0.11	1.18	0.78	0.34	0.34	0.66	0.00	0.73
Lake Land College	Medium	0.22	0.17	1.19	1.18	0.79	0.18	0.91	1.41	0.60
Lewis & Clark Community College	Medium	0.55	0.12	1.14	1.14	1.34	0.50	0.97	1.38	1.04
Lincoln Land Community College	Medium	0.65	0.22	1.24	1.24	0.98	0.37	0.35	0.00	0.72
McHenry County College	Medium	0.11	1.12	1.10	0.86	1.17	0.24	0.00	0.57	0.85
Oakton College	Medium	0.46	1.05	1.03	1.17	0.89	0.33	1.03	1.44	0.94
Parkland College	Medium	0.82	0.50	1.03	1.18	0.82	0.27	0.69	1.29	0.34
Rock Valley College	Medium	0.57	1.24	1.14	0.98	0.77	0.28	0.55	0.38	0.85
Southwestern Illinois College	Medium	1.20	0.32	1.13	0.79	1.01	0.38	0.70	0.97	0.89
Triton College	Medium	0.98	2.40	1.03	1.09	1.02	0.47	1.03	0.97	0.99
Waubonsee Community College	Medium	0.50	2.11	1.11	1.03	0.89	0.35	0.36	0.63	1.39
Carl Sandburg College	Small	0.41	0.48	1.29	2.17	0.88	0.32	1.93	0.00	0.48
CCC - Kennedy-King College	Small	5.06	0.98	1.22	1.09	0.53	0.39	1.24	0.00	4.20
CCC - Olive-Harvey College	Small	4.92	1.12	1.30	1.20	0.64	0.86	1.15	0.00	0.00
Danville Area Community College	Small	1.11	0.27	1.28	0.39	0.82	0.26	0.59	0.61	1.05
Highland Community College	Small	0.55	0.26	1.23	0.64	0.72	0.83	0.00	3.22	1.29
Illinois Valley Community College	Small	0.11	0.85	1.19	0.95	1.04	0.23	1.61	0.68	1.14
John Wood Community College	Small	0.27	0.11	1.24	0.48	5.89	0.18	0.00	0.00	3.21
Kankakee Community College	Small	0.90	1.02	1.24	0.68	1.26	0.42	0.00	0.61	1.89
Kaskaskia College	Small	0.20	0.11	1.22	0.00	0.45	0.29	NA	1.89	0.65
Kishwaukee College	Small	0.91	1.16	1.16	0.48	0.77	0.22	0.51	0.59	0.76
Morton College	Small	0.22	4.60	1.18	0.80	0.98	0.34	0.99	0.95	0.62
Prairie State College	Small	3.91	1.08	1.30	1.10	0.70	0.43	0.65	2.47	0.93
Rend Lake College	Small	0.30	0.08	1.10	0.69	1.22	0.21	0.51	0.00	0.41
Richland Community College	Small	1.23	0.18	1.34	0.71	1.00	0.43	0.90	1.15	0.67
Sauk Valley Community College	Small	0.19	0.82	1.24	0.00	1.76	0.48	NA	0.45	0.93
Shawnee Community College	Small	1.10	0.27	1.31	0.83	1.58	0.23	0.00	0.00	0.00
South Suburban College of Cook County	Small	3.65	1.25	1.23	1.23	0.77	0.31	0.82	1.04	1.90
Southeastern Illinois College	Small	0.21	0.11	1.16	0.64	0.47	0.12	0.00	0.00	1.41
Spoon River College	Small	0.62	0.20	1.21	1.10	1.16	0.21	1.17	0.68	0.68
Illinois Eastern - Frontier	Unclassified	0.07	0.20	1.24	1.99	0.00	0.92	0.00	NA	1.00
Illinois Eastern - Lincoln Trail	Unclassified	0.30	0.15	1.16	0.26	1.66	0.08	0.00	0.67	0.67
Illinois Eastern - Olney Central	Unclassified	0.13	0.12	1.19	0.00	0.00	0.21	NA	NA	1.80
Private Non-Profit										
Roosevelt University	Medium	2.59	2.08	0.70	0.68	1.02	0.52	1.16	1.16	1.08
Morrison Institute of Technology	Very Small	0.21	0.38	0.14	1.00	1.00	1.00	0.00	1.71	0.86
St. Augustine College	Very Small	0.25	4.55	1.52	0.32	1.03	0.28	0.00	1.09	0.62
Robert Morris University-Illinois	Unclassified	2.69	1.03	0.82	0.83	0.92	0.31	0.63	2.55	1.39
Private For-Profit										
DeVry University, Inc.	Large	2.02	0.89	1.25	0.83	1.14	0.47	0.71	1.03	0.74
Taylor Business Institute	Very Small	1.61	0.16	0.90	0.33	0.48	0.27	0.00	1.56	1.10

Note: AfAm = Black/African American; Hisp = Hispanic/Latino; NA = Data not available. Illinois Population: Female (50.6%), Black/African American (14.7%), Hispanic/Latino (18.3%).

Below, we highlight several institutions where Black/African American, Hispanic/Latino, and female students are equitably represented at some level in their institution or CS program in both public and private institutions.

Public Institutions

Of the 46 public community colleges and universities in the state that offer CS programs, 19 have a CS Enrollment-Completion PI greater than 1 (dark green) for women, 13 for Hispanic/Latino students, and only 10 for Black/African American students. However, 7 more are nearing equitable attainment for women, 10 for Hispanic/Latino students, and 6 for Black/African American students.

- **Small size: South Suburban College of Cook County** attracts equitable populations of Black/African American, Hispanic/Latino, and female students to its institution more broadly in terms of the representation of these groups' representation within the state (all three Illinois-Institution Enrollment PIs > 1). However, while Black/African American is the only group that is equitably represented in CS compared to the larger student body (Institution-CS Enrollment PI = 1.23), it is also the only group that is not close to or at or above equitable attainment in CS (CS Enrollment-Completion PI = 0.82), indicating space for improvement. Although Hispanic/Latino students and female students are not very well represented in the CS program (Institution-CS Enrollment PI = 0.77 and 0.31, respectively), both groups are above equitable representation in CS degrees awarded (CS Enrollment-Completion PI >1).

  City College of Chicago - Kennedy-King College has an Illinois-Institution Enrollment PI greater than 1 for Black/African American and female students. Black/African American students are also equitably enrolled in CS compared to the rest of the undergraduate student body (Institution-CS Enrollment PI = 1.09) and they are above equitable degree attainment in CS degrees (CS Enrollment-Completion PI = 1.24). Institution-CS Enrollment PI values are below 1 for both Hispanic/Latino and female students; however, female students are above equitable attainment in CS degrees (CS Enrollment-Completion PIs > 1), while Hispanic/Latino students are not graduating proportionally to their enrollment. While female students are not equally represented in CS compared to other majors at **Illinois Valley Community College**, female students enrolled in CS graduate proportionally compared to their enrollment (CS Enrollment-Completion PI = 1.14) and are also proportionally represented in the school compared to the state population (Illinois-Institution Enrollment PI = 1.19). Additionally, Black/African American students are approaching equitable representation in CS compared to other majors (CS Enrollment-Completion PI = 0.95) and graduate proportionally to their enrollment while not equitably represented in the school compared to their state population.

  Prairie State College attracts equitable populations of female and Hispanic/Latino students to its institution more broadly in terms of representation of these groups' representation within the state (Illinois-Institution Enrollment PIs ≥ 1). While neither of these student groups is close to equitable representation in CS compared to other majors in the school, those enrolled in CS graduate proportionally to their enrollment. However, while Black/African American students are equitably represented compared to their state population in school and equitably represented in CS compared to other majors, those enrolled in CS are not graduating in proportion to their enrollment.

- **Medium size:** Out of the 19 medium-sized institutions, six (**CCC - Richard J. Daley College, CCC - Wilbur Wright College, Elgin Community College, Lewis & Clark Community College, Oakton College,** and **Triton College**) are approaching or have exceeded equitable representation of Black/African American, Hispanic/Latino, and female students in degrees awarded compared to their enrollment. Additionally, **Elgin Community College, Heartland Community College, Lewis & Clark Community College, and Triton College** enroll Black/African American and Hispanic/Latino students in CS majors in proportion to other majors (Institution-CS Enrollment PI ≥ 1). **City Colleges of Chicago** campuses **Harold Washington College, Harry S. Truman College**, and **Richard J. Daley College,** as well as **Triton College,** all are approaching or at equitable enrollment of all three subgroups compared to their state population.
- **Large/Very Large size: College of DuPage, College of Lake County,** and **Harper College** not only enroll female students at equitable rates compared to their state representation (Illinois-Institution Enrollment PIs = 1.06, 1.07, and 1.09, respectively), but both groups are at equitable completion in CS compared to their CS enrollment (CS Enrollment-Completion PIs = 1.02, 1.17, and 1.09, respectively). However, women are not represented as well in the CS program as in the student body (Institution-CS Enrollment PIs < 0.85) at these schools. On the contrary, Black/African American students are equitably enrolled in CS programs at **College of Lake County** and **Harper College** compared to their overall student body. However, they do not graduate proportionally to their enrollment in either institution (CS Enrollment-Completion PI < 0.85), thereby revealing space for improvement. Only **Moraine Valley Community College** is nearing equitable completion in CS for Black/African American students (CS Enrollment-Completion PI = 0.87).

Private non-Profit Institutions

All 4 non-profit institutions that offer associate degrees in CS[j] have demonstrated equitable representation in CS completion for Hispanic/Latino students, with 2 also showing equitable completion for female students. However, only 1 institution, **Roosevelt University**, showed equitable completion for Black/African American students. All 4 institutions have demonstrated equitable representation or nearing equitable representation in CS enrollment compared to the aggregated student body for Hispanic/Latino students, with equitable representation also seen in relation to the state population except for one institution.

- **Very small sizes:** Despite less than an equitable representation of women and Black/African American and Hispanic/Latino students in the institution compared to their state population, **Morrison Institute of Technology** enrolls Black/African American, Hispanic/Latino and female students in CS at equitable proportions compared to the broader student body (Institution-CS Enrollment PIs = 1.00) and graduates Hispanic/Latino and female CS students at or near equitable rates compared to their CS enrollment (CS Enrollment-Completion PIs = 1.71 and 0.86, respectively).

[j] Of the four private non-profit institutions noted in this report that offer associate degrees in CS, Morrison Institute of Technology is the only private non-profit *2-year institution*. Roosevelt University (a 4-year institution) does not offer associate degrees in CS. They are included in this dataset because after Roosevelt University merged with Robert Morris University Illinois, Robert Morris students were allowed to complete their associate degree at Roosevelt University, which is how IBHE reported their enrollment and degrees conferred for those years. Before merging with Roosevelt University, Robert Morris University Illinois offered both associate and bachelor's degrees in CS. St. Augustine College is a small private non-profit 4-year institution that offers both associate and bachelor's degrees in CS.

- **Medium size: Roosevelt University** not only enrolls Black/African American and Hispanic/Latino students above equitable representation compared to the state population, but they also enroll Hispanic/Latino into CS above equitable rates compared to the student body. They have also been doing well at graduating students from historically marginalized backgrounds in their institutions; Black/African American, Hispanic/Latino, and female students are all at equitable representation in CS degrees awarded compared to CS enrollment. The institution seems to be performing well overall. Its 4-year CS programs are also graduating female students in proportion to their enrollment and approaching equitable representation in the degrees awarded to Hispanic/Latino students compared to their enrollment.[16]
- **Unclassified[k]: Robert Morris University - Illinois** graduates Hispanic/Latino and female students at equitable rates compared to their CS enrollment (CS Enrollment-Completion PI ≥ 1), and the enrollment of Hispanic/Latino students in their CS program is nearing an equitable rate compared to the overall student body (Institution-CS Enrollment PI = 0.92).

Private for-Profit Institutions

- **Large size:** While **DeVry University, Inc.** approaches or equitably enrolls Black/African American, Hispanic/Latino, and female students compared to their state representation, it only equitably enrolls Hispanic/Latino students in CS compared to other majors (Institution-CS Enrollment PI = 1.14) and graduates them proportionally to their enrollment (CS Enrollment-Completion PI = 1.03).
- **Very Small size:** Female and Hispanic/Latino students enrolled in CS major programs at **Taylor Business Institute** graduate in proportion to their enrollment (CS Enrollment-Completion PIs = 1.10 and 1.56, respectively). None of the student groups are equitably represented in CS majors compared to other school majors. Black/African American and female students are equitably represented (or nearing equity) when compared to their state population.

In 2-year programs, female students are faring slightly better than their counterparts in 4-year institutions. While a minority of CS programs at various 2-year institutions enroll women proportionately to the undergraduate student body, with only three achieving this parity, no 4-year programs enrolled women in CS proportionally to their undergraduate student body.[16] Twenty-five 2-year institutions are at or approaching equitable representation in CS degrees awarded to more than one historically marginalized group proportionally to their enrollment in CS. However, only approximately one-fourth of 2-year institutions effectively graduate Black/African American students with a degree proportionally to their enrollment in CS, indicating a significant gap in 2-year CS programs for these students. Nevertheless, this situation represents an improvement compared to 4-year institutions, where only approximately 6% of institutions successfully graduated Black/African American students proportionally to their enrollment.[16] Moreover, despite some positive trends toward equitable representation of Black/African American, Hispanic/Latino, and female students in CS compared to the overall student body, no public institution has achieved equitable representation across all three subgroups simultaneously.

[k] Unclassified: The college was not classified under the Carnegie College classification.

Transferability

As noted in the introduction, the prevailing requirement for most CS positions remains the attainment of a bachelor's degree. Although 2-year institutions demonstrate greater success in graduating a diverse cohort of students, transferring to a 4-year institution often becomes necessary to increase employability and access higher-paying roles requiring a bachelor's degree.[29] Facilitating transfers from 2-year to 4-year institutions is crucial to helping students from lower-income families earn bachelor's degrees. The Illinois Articulation Initiative (IAI) allows students to move coursework from one institution to another and is designed to guarantee transferability (though is not always met in practice) among more than 100 participating colleges and universities.[30] Articulation agreements between 2-year and 4-year public and private institutions complement IAI. The efficacy metrics for community college transfer are intricate. The U.S. Department of Education assesses the performance of both 2-year and 4-year institutions in each state using two metrics: the state's "transfer-out rate" or "access" and the transfer's "bachelor's completion rate" or "success." The first measures the rate at which students who start their education at a public certificate- or associate-granting institution transfer to a bachelor's-granting institution within an 8-year timeframe. The second, on the other hand, measures the rate at which students who transferred from a 2-year institution (within 4 years) ultimately obtain a bachelor's degree from a 4-year institution within 8 years of initially starting at the 2-year institution.[9] These metrics are not specific to CS programs but to the institution. However, they could still impact CS programs because they could influence the decision to enroll in a community college. At the same time, institution-wide supports and barriers to transferring could affect students in CS programs specifically. Students who aim to transfer for a bachelor's degree later may be more likely to choose a 2-year institution if they know that their odds of successfully transferring to a 4-year institution and attaining a bachelor's degree are higher.

Table 3 lists the top 10 community colleges with the highest transfer-out rates (or access) in Illinois. Seven out of 10 institutions offering a CS program are achieving or approaching equitable representation for at least 2 student groups in CS compared to the broader student body. In terms of degree attainment, 7 institutions also are achieving or approaching equitable representation for at least 2 student groups. These findings indicate the potential of community colleges to enhance racial and gender diversity at 4-year CS programs through transfers.

Table 3. Illinois 2-year institutions with high transfer-out rates and their respective pooled 5-year Institution-CS Enrollment and CS Enrollment-Completion PIs.

Institution	State rankings of Transfer-out Rate	Transfer-out rate	Institution - CS Enrollment PI			CS Enrollment-Completion PI		
			Afm	Hisp	Female	Afm	Hisp	Female
Harper College	#1	41%	1.46	0.92	0.38	0.62	0.93	1.09
Oakton College	#2	41%	1.17	0.89	0.33	1.03	1.44	0.94
College of DuPage	#3	39%	0.74	0.77	0.34	0.68	0.82	1.02
McHenry County College	#4	36%	0.86	1.17	0.24	0.00	0.57	0.85
Moraine Valley Community College	#5	36%	0.82	1.03	0.26	0.87	0.85	0.65
Waubonsee Community College	#6	36%	1.03	0.89	0.35	0.36	0.63	1.39
College of Lake County	#7	35%	1.08	0.96	0.48	0.48	0.94	1.17
Heartland Community College	#8	35%	1.47	1.05	0.42	0.78	1.40	1.22
Joliet Junior College	#9	35%	1.24	0.85	0.28	0.70	0.92	0.94
Elgin Community College	#10	33%	1.06	1.03	0.32	1.20	0.87	0.94

Note: AfAm = Black/African American; Hisp = Hispanic/Latino.

The successful completion of a bachelor's degree post-transfer is greatly influenced by the partnerships and agreements between these institutions to facilitate course transfers. Therefore, examining the effectiveness of partnerships between community colleges and 4-year institutions is crucial. In addition to the access and success indicators above, the Department of Education also calculated the bachelor's completion rate of pairs of 2-year and 4-year institutions (referred to as "dyads"). A dyad's completion rate is defined as the proportion of students who start at the dyad's 2-year institution and graduate from the dyad's 4-year institution. Dyads denote a collaboration between a public community college and a public or private 4-year institution, presenting opportunities for numerous student transfers.[9] Table 4 ranks Illinois's bachelor's completion rate (or success) for dyads.

Table 4. Illinois institutions with high dyads rates and their respective pooled 5-year Institution-CS Enrollment and CS Enrollment-Completion PIs.

Institution	State rank - dyad bachelor's completion rate	Dyad bachelor's completion rate	Institution - CS Enrollment PI			CS Enrollment-Completion PI		
			Afm	Hisp	Female	Afm	Hisp	Female
Heartland Community College	#1	13%	1.47	1.05	0.42	0.78	1.40	1.22
Illinois State University			1.18	0.93	0.19	0.40	0.51	0.83
Parkland College	#2	7%	1.18	0.82	0.27	0.69	1.29	0.34
University of Illinois Urbana-Champaign			0.25	0.34	0.50	0.83	0.67	0.85
Elgin Community College	#3	6%	1.06	1.03	0.32	1.20	0.87	0.94
Northern Illinois University			0.54	0.80	0.33	0.41	0.81	0.80
Black Hawk College	#4	6%	0.77	1.13	0.41	0.61	1.63	1.05
Western Illinois University			1.15	0.56	0.26	0.40	0.82	0.56
Waubonsee Community College	#5	6%	1.03	0.89	0.35	0.36	0.63	1.39
Aurora University			0.71	1.21	0.25	0.73	0.76	0.98
Oakton College	#6	5%	1.17	0.89	0.33	1.03	1.44	0.94
University of Illinois Chicago			0.64	0.57	0.36	0.81	0.78	0.90
Moraine Valley Community College	#7	4%	0.82	1.03	0.26	0.87	0.85	0.65
University of Illinois Chicago			0.64	0.57	0.36	0.81	0.78	0.90
Harper College	#8	4%	1.46	0.92	0.38	0.62	0.93	1.09
University of Illinois Chicago			0.64	0.57	0.36	0.81	0.78	0.90
CCC-Harold Washington College	#9	4%	0.62	1.35	0.58	2.71	0.00	0.00
University of Illinois Chicago			0.64	0.57	0.36	0.81	0.78	0.90
Moraine Valley Community College	#10	3%	0.82	1.03	0.26	0.87	0.85	0.65
Saint Xavier University			1.39	1.09	0.33	0.62	0.92	1.21

Note: PI values for 4-year institutions were taken from our 4-year institutions report. See Kom Nguiffo & Werner (2024) for more information.

Overall, 2-year institutions are generally more diverse than their paired 4-year transfer institutions. The partnership between **Heartland Community College** and **Illinois State University** stands out with a dyad bachelor's completion rate of 13%, almost twice that of the institutions in second position. This reveals that there are effective processes in place at these institutions, which could be further studied and possibly adapted by other similar institutions. None of the dyads have female students proportionately represented in CS compared to their enrollment in the institutions. However, in three instances (**Waubonsee Community College** and **Aurora University**; **Oakton College** and **University of Illinois Chicago**; and **Harper College** and **University of Illinois Chicago**), female students receive degrees in proportion to their enrollment in CS or are approaching proportional representation in diplomas awarded relative to their enrollment at both the 2-year institution and the 4-year institution where they transfer. **Moraine Valley Community College** and **Saint Xavier University** represent the sole dyad within the top 10 that approaches equitable representation of Hispanic/Latino students in conferring CS degrees in proportion to their respective enrollment within each institution. Work still needs to be done to support Black/African American students in top ranked 4-year institutions in the dyads.

Limitations

There are a few limitations to the analysis performed in this report. First, proportionality indices measure equity gaps between two time points but can vary widely for institutions with small student counts. This variability was addressed using a 5-year pooled calculation. Yearly PI tables can be found in the Supplemental Materials. Second, public community colleges are meant to serve the population within their boundaries. Because we did not have population data for each community college boundary area, we instead used state population data. As such, the Illinois-Institution Enrollment PI may not be as precise as it would be if we used population data within the community college boundaries. This would have allowed us to calculate the Illinois-Institution Enrollment PI indicator by comparing Black/African American, Hispanic/Latino, and female enrollment to the population within the community college boundaries rather than comparing it to the entire state population. For a more detailed discussion of limitations and more information on the PI methodological details and critiques, refer to the 4-year report.[16]

Conclusion

In this report, we analyzed the enrollment and completion trends of the last decade of Illinois CS programs at 2-year institutions. We found that CS programs at 2-year institutions include more than just CS—they also include CS-adjacent and Tech programs, which are actually more abundant than traditional CS programs. In terms of sector, private for-profit institutions played a big role, making up about 19% of enrollment and almost 35% of degrees conferred. Over the last decade, both enrollment and degrees conferred have declined overall, but to varying degrees. Within all 2-year CS programs, female student representation has increased minimally over the last 10 years, and women represent about 22% of the CS student body. That said, 2-year CS enrollment and degrees conferred are more racially diverse compared to 4-year CS programs[16], with Black/African American and Hispanic/Latino students representing nearly 40% of the 2-year CS student body. Private for-profit institutions are driving much of the increase of Black/African American and Hispanic/Latino students in 2-year CS programs.

We used the enrollment and degrees conferred data to complete an equity analysis of each 2-year institution in the state and how they are serving female, Black/African American, and Hispanic/Latino students. Only three 2-year institutions enroll female students at or near equitable rates in their CS programs as their representation in the overall student body; however, this is still better than what was found for 4-year programs (i.e., none).[16] The majority of institutions are enrolling Black/African American and/or Hispanic/Latino students in CS programs at or near equitable rates compared to the student body more broadly and the majority of institutions graduate at least one of the three student groups at or near equitable rates compared to their CS enrollment. Discrepancies in equitable attainment among these groups vary across 2-year institutions within the state. Institutions highlighted above that are doing well to recruit and retain at least two of these historically marginalized groups could be studied further to better understand how they are supporting their students.

Lastly, we analyzed the calculated PI values in relation to state ranking of 2-year institution transfer-out rates and 2-year and 4-year institution dyads as a way of understanding the role of transferring in the CS post-secondary education space. Many of the top 10 2-year institutions with the highest transfer-out rates enroll and graduate at least two student groups at equitable rates. For institution dyads, the 2-year institution in the pair typically showed better representation of these student groups than the 4-year institution. This points to one possible way of 4-year institutions increasing their gender and racial diversity in their CS programs—through transfers.

Addressing these disparities is a shared responsibility and needs cohesive efforts from all stakeholders. State-wide programs, such as the Workforce Equity Initiative (WEI)[31] and the Illinois Graduate and Retain Our Workforce (iGROW) Tech Act[32], are aimed at supporting historically marginalized students (such as Black/African American and low-income students) at 2-year and 4-year CS programs through funding colleges or students directly. Other initiatives aimed at improving wrap-around services to support students during their tenure in community college, aiding their transition to 4-year institutions, enhancing transfer agreements between community colleges and 4-year institutions, and supporting students transferring to institutions with a less diverse student body are just some of the ways post-secondary institutions can support CS learners from historically marginalized backgrounds.[33–35]

This report characterized the state of 2-year CS programs in the state, displayed their enrollment and completion trends over the last decade, and measured equitable representation of Black/African American, Hispanic/Latino, and female students in these CS programs. What this report could not do was provide ways in which to eliminate barriers for students and to better support them. For that, we would need to incorporate student voice. See our accompanying report, *Towards an "uplifting environment": Understanding supports and barriers for students in Illinois computer science college programs*, for an in-depth analysis on how 2-year and 4-year CS programs in Illinois impact student success and how institutions can continue the work to build an inclusive and diverse CS community.[36]

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