What are the characteristics of the CS student body?

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Part 2 of The State of Computer Science in Illinois High Schools Series

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The State of Computer Science in Illinois High Schools Series
Part 2 - What are the characteristics of the CS student body?

The purpose of **The State of Computer Science in Illinois High Schools Series** is to analyze the landscape, structures, and pathways of computer science (CS) education in Illinois and to create a baseline by which to measure the expansion of CS education in the coming years. Beginning in the 2023-2024 school year, all districts in the state that serve grades 9-12 must offer every student the opportunity to enroll in a CS course.[1] Because not all districts in the state had CS offerings before this school year, it is imperative we measure capacity for, access to, participation in, and experiences in CS education (i.e., CAPE framework[2,3]) before and after the mandate went into effect. Analyzing trends through the lens of the CAPE framework will highlight progress while identifying existing gaps in providing equitable access and outcomes for all students. The first report of this Series provided an overview of the CS education landscape in the state by analyzing overall participation trends and details about the most enrolled CS courses.[4] In this second installment of the Series, we dive further into the characteristics of the CS student body.

Part 2 of The Series

Because Part 1 focused on overall trends in the CS education landscape, a report that focuses specifically on students is essential to understanding if Illinois high school students have equitable access to and outcomes in CS education. This report analyzes student participation in Illinois high school CS coursework overall and by course level (e.g., general, honors, etc.), dual credit (DC) coursework, Career and Technical Education (CTE) coursework, CS sequences, and differentials in final course grades. We detail the representation of various student demographic groups in the CS student body, including female[a], Black/African American (labeled as Black/AA), and Hispanic/Latino students as well as students with disabilities (labeled as IDEA), low-income students who qualify for free or reduced-priced lunch (labeled as FRL), and English learners (labeled as EL). These groups represent identities that have been historically marginalized within CS education and the CS workforce nationally and statewide.[5]

Data & Analysis

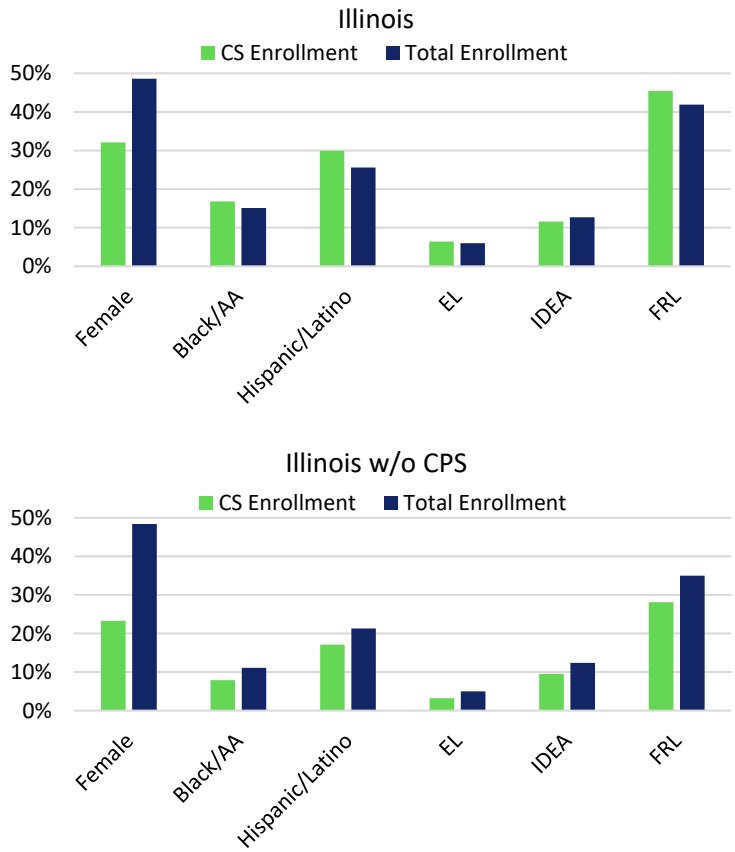
As in Part 1, we analyze student-level data provided by the Illinois State Board of Education (ISBE) on every Illinois high school student who enrolled in at least one CS course[6] between the school years 2017-2018 (SY 2018) and 2021-2022 (SY 2022). Results include tables or graphs showing findings for the statewide sample (labeled as Illinois) then another for the sample excluding CPS (labeled as Illinois w/o CPS). We did this to provide an accurate picture of where the state is in terms of CS education that is not skewed by the largest district in the state, as CPS accounts for 60.4% of the CS enrollment[4] due to their

[a] Analyses do not include data on non-binary students due to cell size and are not shared in accordance with our data share agreement with ISBE.

extensive CS program that includes a graduation requirement.[b] While much of this report analyzes the data in a descriptive nature, some statistical modeling is used (e.g., regression). Detailed descriptive and statistical outputs are included in the Series Supplemental Materials. Lastly, this dataset, and subsequent analyses, are only as accurate as what districts provide to ISBE. These data are the data of record to the state and represent the state's understanding of each district's data at the time of data finalization for reporting purposes. See the Supplementary Materials for all the state course codes included in this analysis and for more information on the data source.

Who enrolls in CS coursework?

Figure 1. Representation of each student demographic group in CS high school enrollment compared to total high school enrollment for SY 2018-2022 in Illinois (top) and Illinois without CPS (bottom).



What the data tells us. Overall, many historically marginalized student demographic groups, including Black/ African American, Hispanic/Latino, and FRL students are overrepresented in the CS student body relative to their overall high school representation for Illinois (see Figure 1), which is ahead of national trends for those same groups.[5] EL student representation in the CS student body mirrors their representation in the high school student body for Illinois.[c] However, none of these groups are equitably represented in CS coursework with respect to their overall high school enrollment after removing CPS from the analysis, indicating this district is driving much of the participation by students from historically marginalized groups. Representation of students with disabilities (IDEA) has not quite reached equitable enrollment rates in CS (relative to their high school enrollment) for both Illinois and Illinois without CPS, and current representation is on par with national trends.[5] All other groups not mentioned or

[b] The Chicago Alliance for Equity in Computer Science (CAFÉCS) reports on CPS's CS coursework. See their reports for more information on CPS district-specific findings.

[c] EL student representation in CS for Illinois without CPS was suppressed for public disclosure and is represented as < 5%.

shown in Figure 1 (male, White, Asian, non-EL, non-IDEA, and non-FRL) are at or overrepresented in CS compared to their total enrollment in high school, and as such will not be the focus of this report.[d]

Throughout the state, there is a clear gender disparity in overall CS coursework enrollment with female students representing only 32% and 23% of the CS student body, respectively for Illinois and Illinois without CPS, while accounting for nearly half of all student enrollment in the state. Female student enrollment in CS nationally is at 31%, so some districts are behind the national mean.[5] That being said, as shown in Table 1, female students in Illinois have among the highest increases in CS enrollment in the last five years (12.2% increase in Illinois and 7.6% increase in Illinois without CPS), so progress is being made.

Representation of Hispanic/Latino and EL students in CS increased between SY 2018-2022 across the state, though part of this increase could be explained by their increase in total high school representation during that same period (see Table 1). FRL students' representation increased for CS enrollment in Illinois but decreased once CPS was removed. Black/African American students saw minimal increases, if any, in CS representation, and students with disabilities (IDEA) have decreased in their CS representation despite an increase in total high school representation.

Table 1. Percent relative change of representation of student demographic groups in CS high school enrollment and total high school enrollment between SY 2018-2022 for Illinois and Illinois without CPS.

	Change in CS Representation		**Change in Total Representation**	
	Illinois	**Illinois w/o CPS**	**Illinois**	**Illinois w/o CPS**
Female	12.2%	7.6%	0.1%*	0.1%*
Black/AA	1.4%	-1.4%	-2.6%	0.2%
Hispanic/Latino	5.4%	5.0%	11.2%	14.8%
EL	53.2%	77.1%	57.6%	65.1%
IDEA	-2.8%	-8.0%	9.9%	9.7%
FRL	3.7%	-6.5%	-4.4%	-2.2%

*Calculations for female representation in total high school enrollment were from data including all grade levels, rather than just 9th-12th grade, due to only high school data not being available. Calculations for female representation in CS high school enrollment were from data that only included 9th-12th grade.

Summary. Student demographic groups that have been historically marginalized in CS are well represented in CS across Illinois. However, these same groups are not as well represented in the state once CPS is removed from the analysis, even when accounting for differential representation in total enrollment, signaling CPS's positive influence on equity. Other districts may also be progressing towards equity, which we will explore more in Part 5 of this Series.

[d] Descriptives for all student groups are within the Supplemental Materials.

What are the characteristics of CS students by course level?

What the data tells us. CS courses are offered at all available course levels and course level can change depending on the school or district. For example, Computer Programming is offered throughout the state as remedial, general, enriched, and honors. That said, the majority of CS students in the state enroll in a general CS course (see Table 2).

Table 2. Representation of CS student enrollment within each CS course level (remedial, general, enriched, honors, and Advanced Placement) between SY 2018-2022 for Illinois and Illinois without CPS.

	Remedial	General	Enriched	Honors	AP
Illinois	0.4%	63.7%	4.1%	12.6%	19.2%
Illinois w/o CPS	0.1%	54.6%	4.6%	23.0%	17.7%

However, differences in the representation of student demographic groups in other course levels were observed. Moving across Tables 3 and 4 from left to right, the rigor (as defined by ISBE) of CS courses increases from remedial to Advanced Placement (AP).[e] Because our findings differ significantly between Illinois and Illinois without CPS, we describe them separately below and compare each group's representation within the course level student body to the general CS coursework student body.

We begin with Illinois (see Table 3). Compared to their representation within the student body who enrolls in general CS coursework, Black/African American students, students with disabilities (IDEA), and low-income students (FRL) are all overrepresented in remedial coursework. Most notably, over 90% of all students enrolled in remedial coursework are students with disability status. Honors coursework is interesting in that some historically marginalized groups are underrepresented whereas others are overrepresented compared to general coursework. EL, IDEA, and FRL students are all underrepresented; however, female, Black/African American, and Hispanic/Latino students are all overrepresented in honors coursework. That said, all historically marginalized student groups shown are underrepresented in enriched and AP coursework relative to their representation in general coursework. In sum, many historically marginalized student groups are overrepresented in remedial coursework and underrepresented in AP coursework in Illinois. However, honors CS coursework shows a more equitable representation of students relative to general coursework, indicating its critical role in providing advanced CS educational opportunities for diverse student groups.

[e] Both AP CS A and AP CS Principles are included in the AP column of Table 2. See the Supplemental Materials for more information on what data was included in this table and definitions for each of the course levels.

Table 3. Representation of each student demographic group within CS course level (remedial, general, enriched, honors, and Advanced Placement) between SY 2018-2022 for Illinois.

	Remedial	General	Enriched	Honors	AP
Female	27.6%	32.0%	29.3%	42.4%	30.1%
Black/AA	23.7%	19.6%	18.5%	21.3%	7.7%
Hispanic/Latino	10.3%	32.5%	25.7%	37.1%	21.1%
EL	< 5.0%	8.9%	< 5.0%	< 5.0%	< 5.0%
IDEA	90.7%	15.8%	9.0%	7.3%	< 5.0%
FRL	54.9%	51.9%	45.9%	49.4%	27.6%

Note: Shading indicates overrepresentation (green) or underrepresentation (blue) compared to each group's relative representation in general CS coursework.

For Illinois without CPS (see Table 4), Black/African American students, students with disabilities, and low-income students are again overrepresented in remedial coursework relative to their representation in general coursework. Female, Black/African American, and FRL students are overrepresented in enriched coursework, but Hispanic/Latino (slightly) and IDEA students are underrepresented compared to their representation in general coursework. All these groups were underrepresented in the Illinois analysis so this could possibly signal greater prevalence in enriched CS courses in districts outside of CPS. Conversely to what was observed in Illinois honors coursework, Black/African American, Hispanic/Latino, IDEA, and FRL students are all underrepresented in honors coursework. Only female students are overrepresented in honors coursework in Illinois without CPS. The same trends were observed for AP coursework. In sum, historically marginalized groups are overrepresented in remedial coursework but underrepresented in rigorous coursework. Enriched coursework played a more crucial role for these students, with many overrepresented there, but the same cannot be said for honors or AP. Female students are the one group who are overrepresented in rigorous coursework for Illinois once removing CPS from the analysis.

Table 4. Representation of each student demographic group within CS course level (remedial, general, enriched, honors, and Advanced Placement) between SY 2018-2022 for Illinois without CPS.

	Remedial	General	Enriched	Honors	AP
Female	11.7%	16.2%	16.6%	18.5%	18.3%
Black/AA	18.3%	6.0%	10.0%	< 5.0%	< 5.0%
Hispanic/Latino	5.0%	16.6%	16.5%	13.1%	11.3%
EL	< 5.0%	< 5.0%	< 5.0%	< 5.0%	< 5.0%
IDEA	91.7%	9.5%	7.9%	< 5.0%	< 5.0%
FRL	45.0%	27.6%	31.3%	15.2%	14.6%

Note: Shading indicates overrepresentation (green) or underrepresentation (blue) compared to each group's relative representation in general CS coursework.

Summary. The analysis of who enrolls in each level of CS coursework revealed a tale of two states. Black/African American students, students with disabilities, and low-income students are overrepresented in remedial coursework across both analyses. Honors and enriched coursework seem to be playing inverse roles in Illinois and Illinois without CPS, respectively, with groups being equitably represented in one or the other depending on the framing of the analysis. All historically marginalized groups are underrepresented in AP coursework, though female students are at or nearing equitable enrollment rates for both analyses.

As CS offerings expand throughout the state, including honors and AP, equitable recruitment and representation of students in these courses is essential as to not perpetuate inequities already expressed in general coursework.

What are the characteristics of CS students in CTE or DC coursework?

What the data tells us. Overall, representation of students with marginalized identities in CS is mostly consistent across Illinois and Illinois without CPS in CS CTE and DC coursework (see Table 5). Although this consistency may seem to imply equitable enrollment across the state, it actually shows that CPS enrolls fewer students in DC or CTE compared to all other districts collectively, as discussed in Part 1.[4] CPS CS students are far more likely to be female, Black/African American, Hispanic/Latino, or FRL than other CS students in the state; as such, one would expect to see a higher percentage of those populations in this coursework in Illinois as a whole than in Illinois without CPS. The fact that we do not see these differences reinforces the enrollment disparities between CPS and the wider state in these particular types of CS coursework. Thus, discussion of findings in this section will focus on Illinois when CPS is excluded.

Dual credit vs. Dual enrollment
Throughout this Series, we refer to dual credit as it is defined by Illinois state agencies: courses that offer students *both* high school and college credit. Dual credit is not the same as dual enrollment, which is defined by Illinois state agencies as courses that offer high school students *only* college credit (and not high school credit). Districts that offer dual enrollment as opposed to dual credit will not be captured in this data set or our analyses.

Sources: ISBE, ICCB

Table 5. Representation of each student demographic group within CS CTE or CS DC coursework between SY 2018-2022 for Illinois and Illinois without CPS.

	CTE		DC	
	Illinois	**Illinois w/o CPS**	**Illinois**	**Illinois w/o CPS**
Female	23.8%	22.8%	22.7%	22.1%
Black/AA	10.0%	7.8%	7.8%	6.5%
Hispanic/Latino	22.4%	18.8%	23.6%	23.0%
EL	< 5.0%	< 5.0%	< 5.0%	< 5.0%
IDEA	10.6%	10.2%	10.0%	10.1%
FRL	35.6%	31.1%	35.8%	34.5%

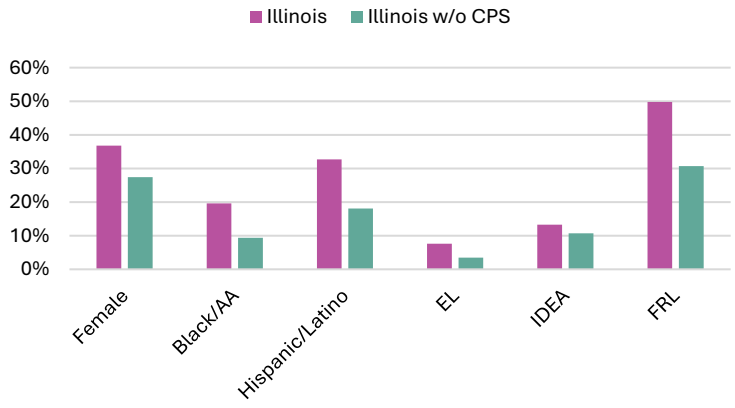
Compared to Figure 1, female students are as well represented in CS CTE and DC coursework as they are in the CS student body (23.3%), though still underwhelmingly so compared to their representation in the high school student body (48.4%). Hispanic/Latino and FRL students are actually overrepresented in both CS CTE and DC coursework compared to their representation in the CS student body (17.1% and 28.1%,

respectively). Black/African American and EL students are at or nearing equitable representation in both CS CTE and DC compared to their CS student body representation (7.9% and less than 5%, respectively).

Summary. As previously noted in Part 1 of this series, CTE and DC coursework offer flexible and diverse pathways into CS while allowing students to earn college credit and/or enhance their career readiness, which might have impacts on long-term educational and professional outcomes for marginalized groups.[9,10] These CS course offerings seem to be popular throughout the state and attract students to a similar degree as their representation in the larger CS student body. As districts begin to expand their CS course offerings, exploration into CS CTE and DC coursework could bring an alternative to other rigorous course offerings such as AP.

What are the characteristics of CS students who take only one CS course?

Figure 2. Representation of each student demographic group among those who took only one CS course between SY 2018-2022 in Illinois (purple) and Illinois without CPS (teal).



What the data tells us. As noted in Part 1, 82.5% of CS students only take one CS course in their high school academic career.[4] Representation for those that enrolled in only one CS course in their high school career does not differ too much from the overall CS student body (see Figure 2). Each of the student demographic groups represents a greater proportion of the CS student body when all of Illinois is considered. Removal of CPS from the analysis indicates this one district represents a larger proportion of CS students from these groups who take only one CS course.

When examining change in representation (see Table 6), we see that female and Hispanic/Latino student representation among those that take only one CS course has increased throughout the state. Similarly, representation of EL students has also increased and had the highest relative growth over the same period, though this group only represents 7.5% and less than 5.0% of the Illinois and Illinois without CPS CS student body[f], respectively. Representation of low-income students (FRL) has increased in Illinois overall but has decreased when CPS is removed from the analysis, indicating CPS accounts for much of the

[f] EL student representation: The data on those who took only one CS course for Illinois without CPS and two or more courses for Illinois and Illinois without CPS were suppressed for public disclosure and are represented as < 5% in Figures 2 and 3.

Table 6. Percent relative change of representation for student demographic groups who took only one CS course between SY 2018-2022 for Illinois and Illinois without CPS.

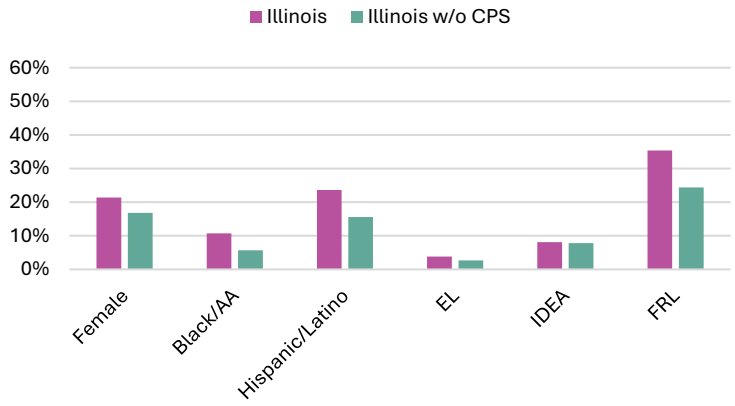
	Illinois	Illinois w/o CPS
Female	9.4%	4.1%
Black/AA	-0.2%	0.4%
Hispanic/Latino	5.0%	8.4%
EL	43.6%	74.5%
IDEA	-4.1%	-7.7%
FRL	4.1%	-3.6%

enrollment growth of this student demographic group. There has been no growth in the representation of Black/African American students, and students with disabilities (IDEA) have declined in their representation across the state among those who take only one CS course.

Summary. As offerings expand across the state to ensure every student has the opportunity to enroll in at least one CS course in accordance with state mandates, state agencies and research efforts should focus on measuring growth for Black/African American and low-income students and students with disabilities since historical data indicates no growth or declines in CS enrollment.

What are the characteristics of CS students who take a CS course sequence?

Figure 3. Representation of each student demographic group among those who took two or more CS courses between SY 2018-2022 in Illinois (purple) and Illinois without CPS (teal).



What the data tells us. Compared to those who take only one CS course, students who take two or more CS courses in their high school career (17.5% of all CS students) are less diverse in terms of gender, race, and socio-economic status (see Figure 3).[f] Even though female, Black/African American, Hispanic/Latino, IDEA, and FRL students represent a higher proportion of the CS student body when CPS is included in the analysis, representation plummets for most groups taking two or more courses.

Table 7. Percent relative change of representation for student demographic groups who took two or more CS courses between SY 2018-2022 for Illinois and Illinois without CPS.

	Illinois	Illinois w/o CPS
Female	11.4%	11.6%
Black/AA	-3.6%	-12.2%
Hispanic/Latino	-1.3%	-4.6%
EL	85.0%	85.7%
IDEA	-4.8%	-8.3%
FRL	-5.2%	-15.5%

As for changes in representation for students who enroll in two or more CS courses while in high school (see Table 7), both female and EL students increased their representation at similar rates in Illinois and Illinois without CPS. In fact, these groups are growing at similar rates in both districts across Illinois and CPS. However, representation of Black/African American, Hispanic/Latino, and low-income students (FRL) and students with disabilities (IDEA) in two or more CS courses has declined

across the state and at higher rates when CPS is removed, indicating these declines are happening in districts throughout the state more so than in CPS.

In Part 1 of the Series, we reported on several 2-course sequences that are common among CS coursework. Table 8 shows four of these 2-course sequences, three of which are the most popular (i.e., highest enrollments; Computer Programming to AP CS A, Computer Operations and Programming I & II sequence, and Web Page and Interactive Media Development I & II sequence) and one that was included because of its rich diversity amongst its students (Computer Programming to Web Page and Interactive Media Development I).

Table 8. Representation of each student demographic group in four 2-course sequences between SY 2018-2022 for Illinois, the total student enrollment in these sequences, and the representation of CPS students within each sequence.

	Computer Programming → AP Computer Science A	Computer Operations and Programming I → Computer Operations and Programming II	Web Page and Interactive Media Development I → Web Page and Interactive Media Development II	Computer Programming → Web Page and Interactive Media Development I
Female	30.2%	17.9%	31.3%	33.9%
Black/AA	13.3%	8.9%	15.7%	13.5%
Hispanic/Latino	29.7%	24.1%	25.3%	39.3%
EL	< 5.0%	< 5.0%	5.8%	7.3%
IDEA	< 5.0%	9.1%	12.0%	10.3%
FRL	41.1%	32.9%	45.7%	47.8%
Total enrollment	4371	3544	2362	813
% within CPS	57.4%	23.0%	28.3%	69.7%

Representation of female, Black/African American, Hispanic/Latino, EL, and FRL students in the most popular 2-course CS sequence, Computer Programming to AP Computer Science A, closely mirrors their representation in the CS student body. However, students with disabilities (IDEA) are poorly represented in this CS sequence. Just over half of all students who enroll in this sequence are from CPS, so this sequence has only moderate representation from all other districts. This is also the only sequence analyzed here that includes an AP course, indicating an implied level of rigor that the other courses may not offer.

Most student demographic groups that have been historically marginalized in CS are poorly represented in the Computer Operations and Programming I & II sequence, with the exception of Hispanic/Latino students who are equitably represented compared to their overall state CS and total enrollment. The majority of students who enroll in this sequence are in districts outside of CPS, so this poor representation of marginalized groups aligns with overall CS student body characteristics for Illinois without CPS. Overall, each of the student demographic groups shown have higher representation in the Computer Programming to Web Page and Interactive Media Development I sequence and the Web Page and Interactive Media

Development I & II sequence. The former has significant influence from CPS enrollment (69.7%), but the latter is much less so (28.3%), indicating this sequence is potentially the most diverse throughout the state. These last three two-course sequences all contain at least one CTE course, so, in addition to expanding their CS knowledge across two courses, students also learn career-based skills for the CS workforce.

Summary. While it may be uncommon for students to enroll in two or more CS courses during their high school career,[4] schools or districts that do offer multiple CS courses or sequences should ensure these offerings are available and universally accessible to all students.

Outcomes Spotlight: Do CS course grades vary by CS student characteristics?

Table 9. Percentage of each student demographic group who received a failing or passing grade in their CS course between SY 2018-2022.

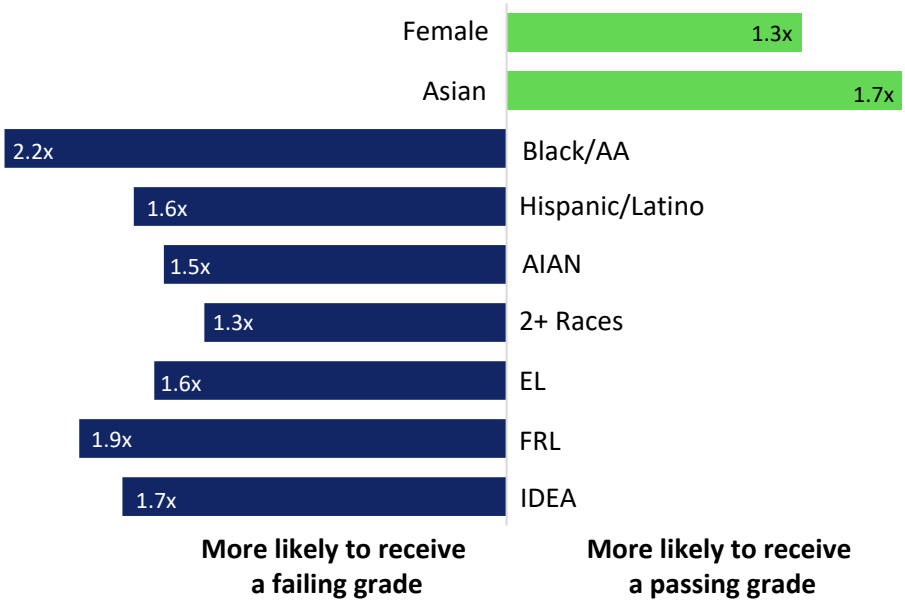
	Fail	Pass
Female	20.4%	79.6%
Male	21.4%	78.6%
AIAN	23.5%	76.5%
Asian	9.0%	91.0%
Black/AA	33.5%	66.5%
Hispanic/Latino	28.1%	71.9%
NHPI	15.5%	84.5%
Two or more races	18.6%	81.4%
White	14.1%	85.9%
EL	36.2%	63.8%
Non-EL	20.0%	80.0%
IDEA	35.1%	64.9%
Non-IDEA	19.2%	80.8%
FRL	30.2%	69.8%
Non-FRL	13.6%	86.4%
Overall	21.1%	78.9%

What the data tells us. When analyzing student outcomes (pass or fail) of their CS course[g], disparities were observed for several student demographic groups in those that received a disproportionate amount of failing grades. As seen in Table 9, there were few disparities between gender groups, but substantial disparities between racial groups, as well as EL, IDEA, and FRL groups in Illinois.[h] Notably, more than a third of Black/African American students and 28% of Hispanic/Latino students received a failing grade in their CS courses, which are much higher rates compared to many of their peers; and nearly one-third of EL, IDEA, and FRL students, respectively, received a failing grade in their CS courses, nearing double the rate of their peers without those designations.

To further explore these disparities in a comparative way, we used a statistical model to predict student outcomes based on their identities. We found that Black/African American, Hispanic/Latino, 2+ races, EL, FRL, and IDEA students all had a higher likelihood of receiving a failing grade in their CS course compared to their White, non-EL, non-FRL, and non-IDEA peers (see Figure 4). Black/African American students had the highest odds of receiving a failing grade: 2.2 times more likely than their White peers, all other demographic characteristics equal. However, not all student demographic groups had higher chances of failing. Both female and Asian students were more likely to receive a passing grade compared to their male and White peers, respectively.

[g] In this analysis, passing grades included A, B, C (including +/-) and failing grades included D, F, W (withdraw), WP (withdraw with credit; including +/-). See the Supplemental Materials for the Series on rationale of these grade categorizations, how the data for this section was analyzed, and descriptive and inferential tables.
[h] Pass/fail descriptives for Illinois without CPS are in the Supplemental Materials for the Series.

Figure 1. Predicted likelihood of students receiving a passing (green) or failing (blue) grade in a CS course by various student characteristics compared to their respective reference groups.



Note: Only statistically significant predictors shown. All groups are compared to the reference group: male, White, non-EL, non-FRL, and non-IDEA students.

However, students do not have just one identity. We observed worse outcomes for some student groups (and better outcomes for others) when taking into account students' intersectional identities. As noted in Table 10, the odds of receiving a failing grade are exacerbated for many historically marginalized groups when compared to their peers with more historically privileged identities (i.e., White, male, non-FRL, non-EL, non-IDEA, and most combinations thereof). These findings on intersectional identities of students suggest a complex dimension of educational equity in CS education.

Table 10. Odds of students receiving a passing or failing grade in a CS course by various intersectional student characteristics compared to their respective reference group.

	More likely to receive a failing grade…	**More likely to receive a passing grade…**
Compared to White male students…		
Asian female students	-	1.9x
Black/African American female students	2.0x	-
Hispanic/Latino male students	2.0x	-
White female students	-	1.2x
Compared to White non-FRL students…		
Asian FRL students	1.3x	-
Asian non-FRL students	-	1.7x
Black/African American FRL students	3.2x	-
Black/African American non-FRL students	2.2x	-
Compared to White non-EL students…		
Asian EL students	1.8x	-
Asian non-EL students	-	1.9x
Hispanic/Latino EL students	2.8x	-
Hispanic/Latino non-EL students	1.9x	-
Compared to White non-IDEA students…		
Black/African American IDEA students	3.4x	-
Black/African American non-IDEA students	2.4x	-
White IDEA students	2.1x	-
Compared to White male non-FRL students…		
Black/African American male FRL students	3.4x	-
Black/African American male non-FRL students	2.3x	-
Hispanic/Latino female FRL students	2.2x	-
Hispanic/Latino female non-FRL students	1.7x	-
White, female, non-FRL students	-	1.3x

Note: See Supplemental Materials for descriptives and calculation.

Summary. Simply providing access to CS education does not guarantee equitable outcomes for all students. Our analysis of student outcomes as they relate to student characteristics accounts for just part of the differences we see between students. Further research into other factors, such as content of courses, teacher training, student prior knowledge, and more, could provide a more wholistic understanding of the disparities in student outcomes. That said, student characteristics do associate with differences in outcomes, the result of systemic barriers which could be relieved in part by incorporating equitable and inclusive practices. Factors affecting student outcomes will be explored in more detail in Part 4 of this Series.

Can we assess equity in Illinois high school CS education using the CAPE framework?

This second report continued to analyze the **access** and **participation** components of the CAPE framework and we added **experiences** of students in CS education. This report provides a description of the CS student body and highlights three important findings: (1) Many student demographic groups are still not equitably represented in or have access to CS coursework, especially outside of CPS; (2) Across the state, both female and Hispanic/Latino students have moderately increased their representation in CS coursework and are equitably represented in rigorous CS coursework, such as AP, DC, and CTE; (3) Huge disparities were observed in final course grades, such as Black/African American students being 2.2 times more likely to receive a failing grade in their CS course compared to their White peers, as one example. Moreover, the intersection of multiple identities further exacerbates these disparities for some groups. In summary, Illinois is progressing towards increased access and participation in CS education for some student demographic groups, but substantial challenges remain for others.

Figure 5. CAPE Framework assessment of Illinois high school CS education.

What's coming next?

This was the second report in **The State of Computer Science in Illinois High Schools Series**. The third report will analyze the capacity of CS education throughout the state by describing the CS teacher workforce and its characteristics.

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