The State of Computer Science in Illinois High Schools Series

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Executive Summary

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 Series consists of five parts, each focusing on a different aspect of CS education in the state.

Data

This Series analyzes 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 between the school years 2017-2018 (SY 2018) and 2021-2022 (SY 2022), including course details, student demographic information, and information on the teacher of record. Additional data sources such as teacher licensure data (submitted via Freedom of Information Act requests), data from the Illinois Report Card, and data from the National Center for Education Statistics (NCES) were used periodically in this Series.

Findings

Part 1 provided a bird's-eye view of the CS education landscape in the state.[4] We found that between SY 2018 and SY 2022, on average, 7.4% of all Illinois high school students enrolled in at least one CS course in a given year. However, 60% of the state's CS enrollment was through one district, Chicago Public Schools, and as such most analyses in the Series were separated to include and exclude this district so that we could have a more accurate picture of CS education throughout the whole state. Part 1 also found that about 1 in 5 CS students go on to enroll in another CS course, a high rate given the elective nature of CS in most districts. Finally, this report also noted the prevalence of Career and Technical Education (CTE) in CS education, offering diverse and flexible pathways for students to participate in CS education.

Part 2 shifted focus onto the CS student body.[5] We found that girls, Black/African American, Hispanic/Latino, and low-income students, as well as students with disabilities and students with English Learner status, were all underrepresented in CS coursework compared to their relative representation in high school enrollment. This was true especially when Chicago Public Schools was removed from the analysis. That said, representation of both girls and Hispanic/Latino students moderately increased and reached equitable representation in rigorous CS coursework like honors, dual credit, and CTE. Lastly, an analysis of passing rates in CS coursework revealed significant disparities for several historically

marginalized groups, with Black/African American students, low-income students, EL students, and students with disabilities having the lowest passing rates (less than 70%) compared to their peers who were more likely to pass (over 80% passing rates).

Part 3 turned to the CS teacher workforce.[6] This report found that while the number of CS teachers increased between SY 2018 and SY 2022 by about 14%, the percentage of teachers with a CS endorsement declined in the same period, indicating many teachers entering the CS teacher workforce lack the appropriate qualifications. Only half of all CS teachers held at least one CS endorsement needed to teach CS coursework in high school, and rates of in-field teachers varied greatly from course to course (ranging between 34-70% qualified and appropriately assigned CS teachers depending on course). This report also found that the CS teacher workforce does not match the CS student body. The CS student body is more racially diverse than the CS teacher workforce, which is predominately White. That said, the CS teacher workforce, overall, has reached gender parity while representation of girls in CS coursework is closer to 30%.

Part 4 explored the factors associated with positive student outcomes such as passing grades and continued enrollment in high school CS courses.[7] We employed multi-level models and found that student, teacher, course, and district characteristics all had relationships with student learning outcomes. Specifically, we observed statewide disparities in CS passing and continuation rates that permeate through individual courses and districts for Black/African American, Hispanic/Latino, low-income, EL students and students with disabilities, indicating a need for widespread, systemic change. This analysis also found that, on average, students taught by CS-endorsed teachers demonstrated higher rates of passing and a greater likelihood of enrolling in additional CS courses. Lastly, girls paired with teachers who are women as well as Black/African American students paired with Black/African American teachers had higher chances of passing their CS course, possibly suggesting the value of culturally and/or gender affirming instructional contexts.

Part 5 examined how CS offerings vary by districts and their characteristics as well as highlighted districts in the state that have robust and equitable CS programs.[8] This report found that as of SY 2022, 59% of all districts serving grades 9-12 in the state offered at least one CS course, meeting the state mandate of Public Act 101-0654 before it went into effect in SY 2024. However, the percentage of districts employing at least one qualified CS teacher was much lower at 42%, indicating the same state-wide gap observed in Part 3 but at the district level. We also observed disparities in CS programming, including in offerings of CS through rigorous coursework (i.e., Advanced Placement, Dual Credit), in having multiple CS courses, and in employing CS-endorsed teachers. These disparities occurred along geographic and incomes lines, with rural and town districts and districts with a high percentage of low-income students offering less CS programming than city, suburb, and higher income districts. Throughout this Series, we found gaps in CS education state-wide and at the district level; therefore, we highlighted districts from around the state that have robust and equitable CS programs. These Cases of Excellence

shared their methods for hiring, training, and supporting CS teachers, their methods of advising, enrolling, and igniting interest in their students, and their policies and strategies for providing equitable CS education.

Conclusion

The State of Computer Science in Illinois High Schools Series set out to better understand CS education in the state. The analysis of five years of data shows that while CS education is becoming more popular in Illinois, the state overall and many districts struggle with equitable capacity, access, participation, and experiences. Specifically, we see three areas of critical need:

1. **More support to grow CS programs in rural, town, and low-income communities.** This may include community support, financial support, programmatic support, integration with other subjects, and more. While this Series did not identify which supports are needed, it did show that rural, town, and low-income districts offer fewer CS learning opportunities, revealing a lack of geographic and socioeconomic equity in CS education in the state.
2. **The state needs more qualified, CS-endorsed teachers.** As districts across the state expand their CS programming, qualified CS teachers are needed. Our team collated the CS endorsement programs currently available in the state, but offering these opportunities may not be enough. Financial assistance and district support are needed as well for teachers to succeed. Having a qualified CS teacher is a form of equity.
3. **Increased participation and equitable outcomes for historically marginalized students** such as girls, Black/African American, Hispanic/Latino, and low-income students as well as students with disabilities and students with English Learner status. Our research found that these groups of students were underrepresented in CS relative to their high school enrollment and that some of these groups receive a disproportionate number of failing grades if they do enroll. Offering CS courses is not enough for students to equitably enroll and achieve equitable outcomes. While not a focus of this research, others have found success in equitable participation and outcomes when using culturally relevant and sustaining practices in CS education.[9–11]

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