

How does CS education vary by district across Illinois?



Illinois Workforce and Education
Research Collaborative

PART OF THE UNIVERSITY OF ILLINOIS SYSTEM

Part 5 of The State of Computer Science in
Illinois High Schools Series

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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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The State of Computer Science in Illinois High Schools Series

Part 5 – How does CS education vary by district across Illinois?

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 **C**apacity for, **A**ccess to, **P**articipation in, and **E**xperiences 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 The second report analyzed the CS student body, focusing on students from historically marginalized backgrounds, including trends in their participation in general and rigorous coursework and course outcomes.⁵ The third report uncovered the characteristics and assignability patterns of high school CS teachers to assess the state's capacity to deliver equitable CS education.⁶ The fourth report explored what factors predicted student learning outcomes and continued enrollment in CS courses.⁷ In this fifth and final report of the Series, we examine how CS offerings vary by districts and district characteristics, as well as highlight districts in the state that have robust and equitable CS programs.

Part 5 of The Series

Parts 1-4 of this Series touched on different aspects of CS education in the state: course offerings, student body, teacher workforce, and student outcomes. Part 5 of this Series takes pieces from each of these reports and brings them together to explore differences in CS programming at the district level.

The first half of this report examines districts' readiness to meet state mandates on CS course offerings. In March 2021, Governor J. B. Pritzker signed into law Public Act 101-0654, or the Education and Workforce Equity Act. Public Act 101-0654 was brought forth by the Illinois legislative Black Caucus and was aimed at bringing equity to various spaces of K-12 education and the Illinois workforce.¹ Most relevant to this work, one such mandate regarding CS education was that all districts serving grades 9-12 were required to offer students the opportunity to take at least one CS course beginning in the 2023-2024 school year (SY 2024).^a This mandate underscores the importance placed on CS education in the state, but could be a daunting feat if most districts in the state did not already offer CS coursework. As such, an exploration of CS coursework before the mandate went into effect is warranted to determine

^a Other mandates from Public Act 101-0654 included requiring the Illinois State Board of Education (ISBE) to develop rigorous student learning standards, AP CS courses counting toward the three-year mathematics graduation requirement, and districts being required to include curriculum information for CS courses in their school's report card prepared by ISBE. While very important for CS education in the state, these mandates are not discussed in this Series.

which districts need additional support to meet the requirement. Moreover, if the state wishes to continue expanding CS education, a baseline is needed by which to measure future CS learning opportunities and associated outcomes. This report examines which districts offered CS education during SY 2022, two years before the mandates went into effect, and how CS programming, including various offerings and staffing of qualified CS teachers^b, may differ by district characteristics like geography, evidence-based funding (EBF) tier, and percentage of low-income students in the district.

Because earlier reports in this Series indicated that overall CS enrollment was moderate but steady and CS offerings were vast between SY 2018 and SY 2022, there must be districts in the state already doing CS education well. As such, the second half of this report highlights districts that have robust and equitable CS programs. These districts, or *Cases of Excellence*, were selected based on a rubric using components of the CAPE framework. In previous reports, we looked to the CAPE framework as a way to measure equity in CS education for the state in terms of capacity for, access to, participation in, and experiences in CS education.⁷ We take this framework one step further and apply to it every district in the state. We highlight districts' hiring, training, and supporting of CS teachers, their methods of advising, enrolling, and igniting interest in their students, and their policies and strategies for providing equitable CS education.

Data & Analysis

CS programming by district

As in previous reports of this Series, we analyze student-level data (including student demographic data) provided by the Illinois State Board of Education (ISBE) for every Illinois high school student who enrolled in at least one CS course⁸ between SY 2018 and SY 2022. Data for the teachers who were the instructors of record for each of these students in CS coursework were provided, including teacher demographic information (gender, race/ethnicity), licensure, and endorsements.^c 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.

Additional data from the Illinois Report Card and National Center for Education Statistics (NCES) were also used in the analyses for this report. From the Illinois Report Card, we use several data points including total enrollment, enrollment of various student subgroups, and EBF tier.⁹ EBF tier is a way to group districts based on their funding adequacy. Lower numbered tiers (Tiers 1 and 2) include districts that need and receive more state assistance, while higher numbered tiers (Tiers 3 and 4) include districts

^b In this Series, we use the term "qualified" to mean teachers with a CS endorsement as required by the Illinois Administrative Code. See Part 3 of this Series for a fuller discussion on CS teacher licensure and endorsements in the state.

^c In Part 3 of this Series, we included information on teachers with CS endorsements who were either actively teaching or not actively teaching CS. In this report, we only include actively teaching CS teachers during SY 2018-SY2022.

that need and receive less state assistance.¹⁰ Including characteristics about districts like their EBF tiers allows us to examine potential gaps in offerings based on funding, student populations, and more. From NCES, we collected districts' locale codes as well as school district boundaries (through the use of shapefiles) for mapping purposes.^{11,12} In this report, we use the aggregated locale codes of rural, town, suburb, and city, where the spectrum of locale goes from least populous and furthest from populated areas to most populous and nearest populated areas. These data allow us to examine CS offerings geographically throughout the state and to explore whether or not an urban/rural divide exists in several aspects of CS education. See the Supplemental Materials for more information on these additional data sources.

In this report, we analyze all districts in the state that serve grades 9-12, which include unit or consolidated districts as well as high school districts. For brevity, we use the terms "high school districts" or "districts" throughout the report. Due to inconsistent data between our various data sources, charter school districts (N=8) and the Illinois Department of Juvenile Justice (N=1) were not included in these analyses.

Analyses in this report are descriptive. The descriptive analyses examine CS programming (including offering one or more CS courses, offering AP, CTE, or dual credit CS courses, and employing a CS-endorsed teacher), student enrollment rates in CS, and in-field rates for CS teachers by district characteristics (NCES locale, EBF tier, percentage of low-income students). With the exception of the first graph, all maps, tables, and graphs in this report display data only for SY 2022 as this is the most recent year within our dataset and the school year closest to the effective date of the CS state mandates. While not all tables and figures are included in this report for brevity, more detailed descriptive tables (including counts) are included in the Series Supplemental Materials. In this report, we adhere to ISBE and statewide longitudinal data systems disclosure-proofing best practices and round all reported values to the nearest whole number.¹³

Cases of Excellence

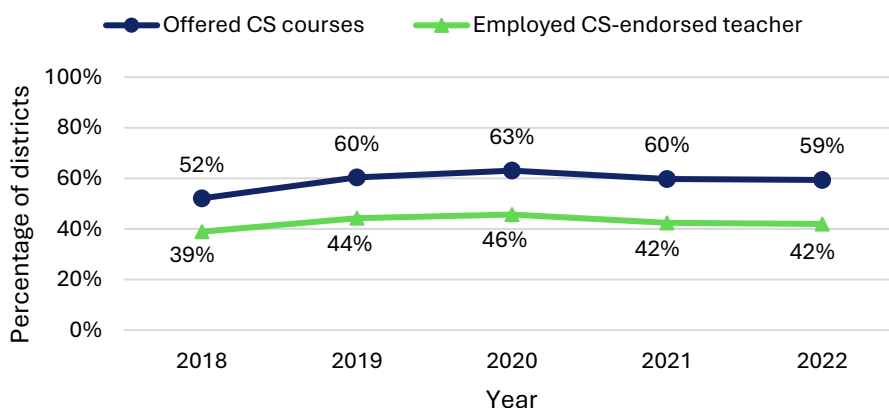
In addition to the descriptive analyses to examine differences between districts and their CS offerings, enrollment, and employment of qualified CS teachers, this report also highlights districts throughout the state that have robust and equitable CS education programs. The purpose of these *Cases of Excellence* is to amplify exemplary programs of CS education and to provide districts with models by which to grow their CS programs. To do this, we created a rubric to assess districts' CS programs for capacity for, access to, participation in, and experiences in CS education. The rubric was developed using the CAPE framework¹³ and reviewed by IWERC's CS Advisory Board across two meetings. See the Supplemental Materials for more information on the development of the rubric. We applied the rubric to district data synthesized from the ISBE dataset noted above, as well as data from the Illinois Report Card, to determine which districts in the state are CS Cases of Excellence.

Once these districts were determined, all Cases of Excellence districts were sent a survey with open-ended questions to elicit more detailed information about their districts' CS offerings, hiring practices, funding models, and more. Survey responses were collected from May 2025 to July 2025 and qualitatively analyzed in the form of thematic analysis. See the Supplemental Materials for the full survey.

How prepared are districts to meet Public Act 101-0654's CS mandate?

What the data tells us. As noted above, all Illinois districts were required to offer high school students the opportunity to enroll in at least one CS course by SY 2024. The data shows that the percentage of districts offering at least one CS course rose significantly through SY 2020 but had since declined. As of SY 2022, out of 482 districts serving grades 9-12 in the state, 286 high school districts (59%) offered a CS course, in compliance with the then-forthcoming mandate in Public Act 101-0654 (see Figure 1). However, the percentage of districts that employed a CS-endorsed teacher was much lower, with 202 high school districts (42%) having at least one qualified CS teacher. The gap between districts offering a CS course and employing a qualified teacher remained mostly stagnant since SY 2020 at about 17%, indicating districts without qualified CS teachers may not be actively recruiting or supporting teachers to earn a CS endorsement. While employing a CS-endorsed teacher was not part of the Public Act 101-0654 mandate, all high school teachers are required to hold the appropriate endorsement for their teaching assignment per the Illinois Administrative code.¹⁴ Part 3 of this Series found that about half of all current CS teachers held a CS endorsement, indicating a state-wide lack of qualified teachers.⁶ That said, qualified CS-endorsed teachers are associated with better student outcomes in CS and may improve equitable outcomes for students as well.⁷ See Parts 3 and 4 of this Series for more detail on CS teacher licensure and endorsements as well as the relationship between qualified teachers and student outcomes.^{6,7}

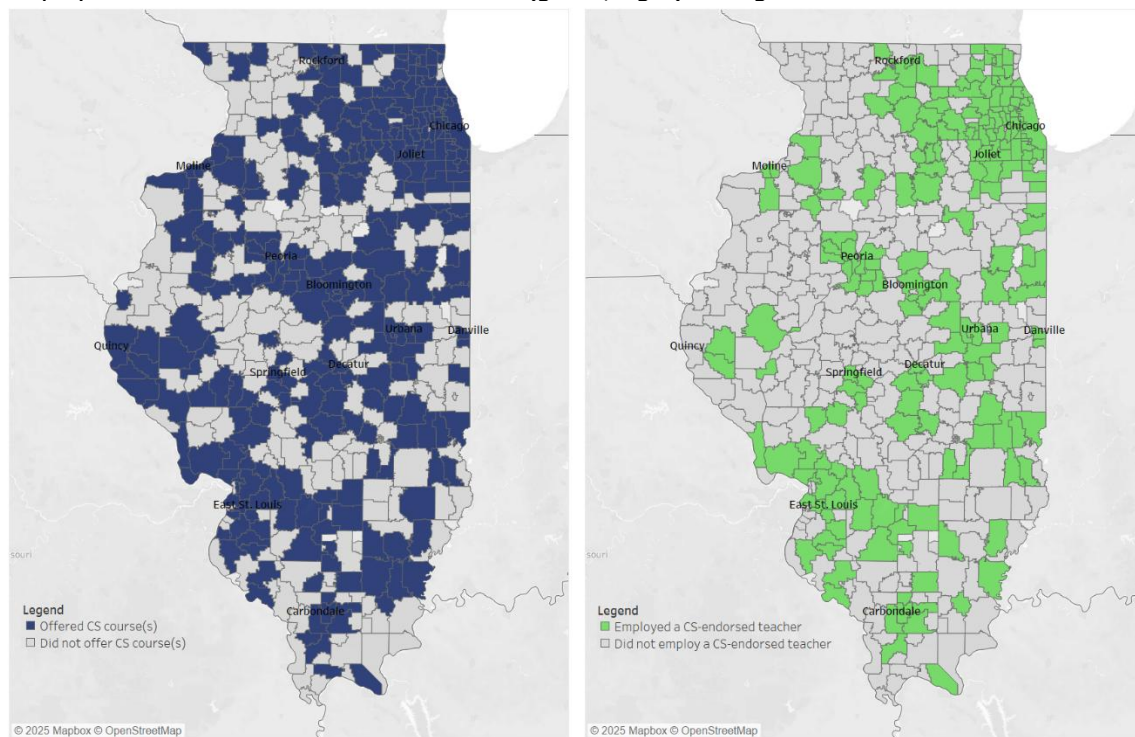
Figure 1. Percentage of high school districts that offered at least one CS course (blue, top line) and employed at least one CS-endorsed teacher (green, bottom line) between SY 2018-2022.



When this data is depicted geographically (see Figure 2), districts offering CS courses were dispersed throughout the state. Notably, most districts that did not offer a CS course in SY 2022 were in rural

areas. Districts that employed a CS-endorsed teacher were more concentrated near urban centers as shown in the map on the right. Moreover, districts that offered CS but did not have a CS-endorsed teacher were also concentrated in rural districts. These maps show geographic discrepancies between districts that offered CS courses and those that employed a CS-endorsed teacher.

Figure 2. Maps of Illinois showing high school districts that offered at least one CS course (blue, left) and employed at least one CS-endorsed teacher (green, right) during SY 2022.



Note: Elementary districts or districts with no data are not shown.

Summary. Two years before the state mandate of offering CS courses to all high school students, 59% of all districts met this requirement. The districts that did not offer CS courses were concentrated in rural areas of the state and districts that did offer CS but did not employ a CS-endorsed teacher were also concentrated in rural areas, indicating more support is needed in these areas. Moreover, only 42% of districts employed at least one qualified CS teacher, highlighting the gap between CS offerings and equitably staffing said offerings.

How does CS programming differ by district?

What the data tells us. Of the 482 districts in Illinois that serve grades 9-12, 59% offered at least one CS course, 39% offered two or more CS courses, 19% offered AP CS courses, 52% offered CS CTE courses, 10% enrolled students in dual credit CS courses, and 42% employed at least one CS-endorsed teacher (see Table 1). Each of these six aspects of CS programming were analyzed by disaggregating districts by the following characteristics: NCES locale, EBF tier, and percentage of student body that is low-income, Black/African American, and Hispanic/Latino.^d The following sections are separated by district characteristics and include a discussion of the trends observed for each of these six aspects of CS programming.

^d In previous reports, we analyzed CS course data by other student characteristics such as binary gender, English Learner (EL) status, and disability status (IDEA). Binary gender is not detailed in this report since most districts reach gender parity in their overall student enrollment. EL and disability status were not included here due to low representation in the overall high school and CS student populations and data availability. Both EL and disability status are discussed later in the Cases of Excellence to account for their missingness here.

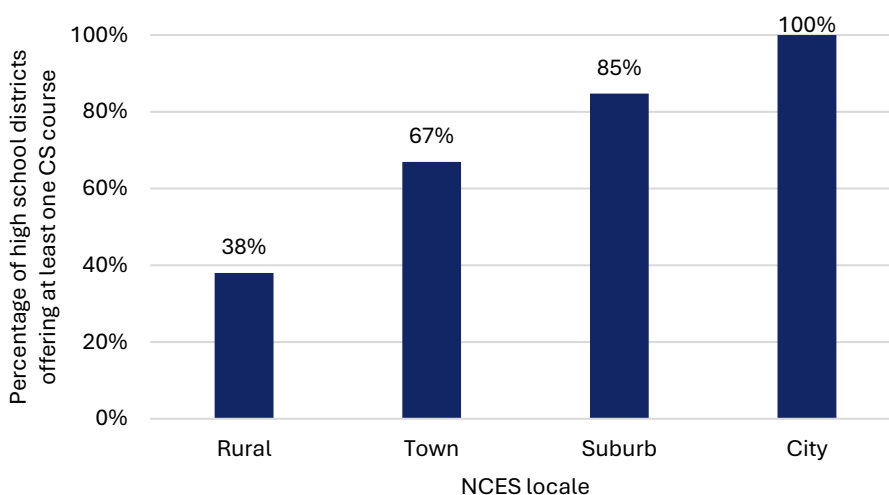
Table 1. Percentage of high school districts within each category (NCES locale, EBF tier, and proportion of student body that is low-income, Black/African American, and Hispanic/Latino) that offered various CS courses and employed a CS-endorsed teacher during SY 2022.

	Percentage of high school districts within each category that...					
	Offered at least 1 CS course	Offered 2 or more CS courses	Offered AP CS courses	Offered CS CTE courses	Enrolled students in dual credit CS courses	Employed CS-endorsed teacher
All districts (N = 482)	59%	39%	19%	52%	10%	42%
District NCES locale						
Rural (N = 221)	38%	16%	4%	31%	2%	22%
Town (N = 124)	67%	38%	6%	61%	7%	43%
Suburb (N = 118)	85%	73%	55%	77%	25%	72%
City (N = 19)	100%	90%	47%	90%	32%	84%
District EBF tier						
Tier 1 (N = 186)	63%	42%	15%	57%	12%	47%
Tier 2 (N = 201)	56%	34%	16%	46%	9%	36%
Tier 3 (N = 25)	64%	40%	20%	56%	8%	40%
Tier 4 (N = 70)	57%	43%	34%	56%	10%	47%
Percentage of district student body that is low-income						
0-25% (N = 101)	81%	60%	39%	75%	15%	69%
26-50% (N = 254)	54%	30%	12%	46%	8%	35%
51-75% (N = 102)	55%	38%	13%	48%	10%	36%
76-100% (N = 25)	40%	36%	28%	40%	20%	28%
Percentage of district student body that is Black/African American						
0-25% (N = 450)	58%	37%	16%	51%	9%	40%
26-50% (N = 19)	95%	68%	47%	79%	26%	68%
51-75% (N = 5)	80%	80%	80%	80%	40%	80%
76-100% (N = 8)	38%	25%	38%	38%	12%	25%
Percentage of district student body that is Hispanic/Latino						
0-25% (N = 420)	56%	34%	14%	50%	8%	39%
26-50% (N = 44)	80%	57%	46%	64%	32%	61%
51-75% (N = 13)	100%	92%	69%	85%	15%	77%
76-100% (N = 5)	80%	80%	60%	80%	20%	60%

NCES locale

As shown in Figure 3, more than 85% of districts classified as a suburb and all city districts offered at least one CS course in SY 2022. Town and rural districts were the least likely to offer CS courses, with only 67% of town districts and 38% of rural districts doing so.

Figure 3. Percentage of high school districts within each NCES locale that offered at least one CS course during SY 2022.



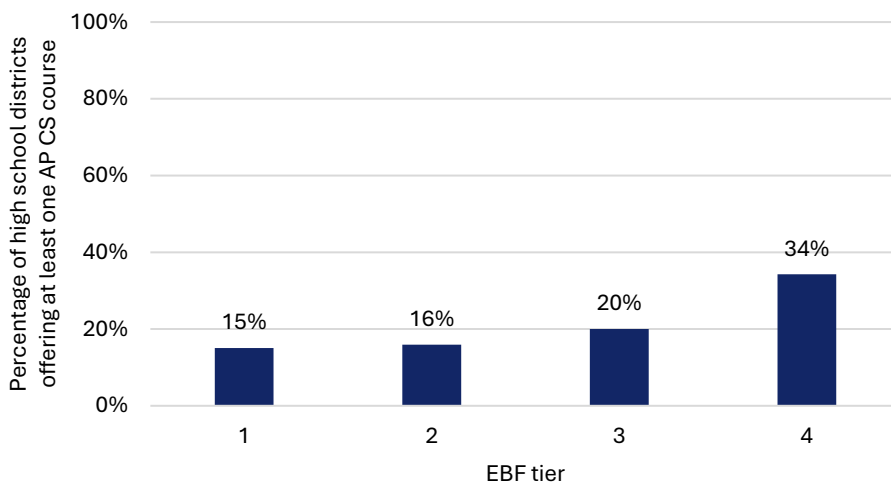
Similar trends were observed for other aspects of CS programming including offering two or more CS courses, offering CS CTE courses, enrolling students in dual credit CS courses, and employing a CS-endorsed teacher. For each aspect, rural districts were the least likely to offer such CS programming and city districts were the most likely. Within this linear trend of increased programming with more populous districts, city and suburban districts were closely aligned, often within 10 percentage points of one another. Town districts followed and were often 15-30 percentage points lower than suburban districts. Rural districts were last, with percentages between 5-30 percentage points lower than town districts. These trends indicate not just an overall urban/rural divide within the state for CS programming, but they also signal that rural districts, in particular, need more targeted support when it comes to CS education. A previous landscape report on K-12 CS education in the state mirrors some of these findings, particularly rural districts being less likely to staff a qualified CS teacher.¹⁵

One aspect of CS programming, offering AP CS courses, defied this linear trend. Suburban districts were the most likely to offer AP CS courses (55% of all suburban districts doing so) compared to 47% of city districts, 6% of town districts, and 3% of rural districts. A similar trend, nationally, was observed for AP CS course offerings within schools where 46% of suburban schools, 33% of city schools, 16% of town schools, and 13% of rural schools had students enrolled in AP CS coursework.¹⁶

EBF tier

There were minimal differences (3-11 percentage points) between EBF tiers in offering one CS course, two or more CS courses, CS CTE courses, dual credit CS courses, and employing a CS-endorsed teacher. Moreover, differences were not apparent between tiers of differing state assistance (i.e., Tiers 1 and 2 vs. Tiers 3 and 4). This indicates that a district's EBF tier may have little to do with their elective CS course offerings and how they adequately staff with endorsed teachers for those courses. The only aspect of CS programming to show a trend by EBF tier was offering AP CS courses (see Figure 4). Here, districts within Tier 4 (the least in need of state funding and therefore receiving the least) were the most likely to offer AP CS courses (34%) followed by Tier 3 districts (20%). Tier 1 and 2 districts (districts who need and receive the most state assistance) had similar odds of offering AP CS courses, about 15% of those districts.^e

Figure 4. Percentage of high school districts within each EBF tier that offered at least one AP CS course during SY 2022.



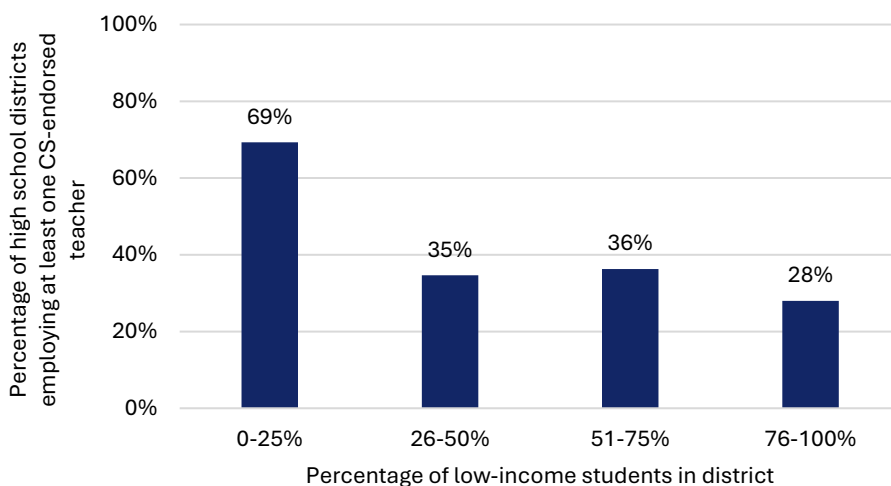
Percentage of low-income students

As shown in Figure 5 below, only 28% of districts that enroll the highest percentage of low-income students employed a CS-endorsed teacher. Districts with student bodies between 26%-75% low-income students were not far off with about one-third of those districts employing a CS-endorsed teacher. That said, 69% of districts with lower percentages of low-income students in their student body (0-25% of student body) employed a CS-endorsed teacher. A similar trend was observed in districts offering at least one CS course, where districts with the highest percentage of low-income students were the least likely, districts with mid-range percentages of low-income students were slightly more likely, and districts with the lowest percentage of low-income students were the most likely to offer at least one CS course. This is consistent with national data that shows high schools with 50% or more low-income students were less

^e For more information on how districts use their EBF funds, see ISBE's Fiscal Year Spending Plan Report.¹⁷

likely to offer foundational CS coursework.¹⁸ Another trend was observed for districts that offered CTE, AP, and multiple CS courses. Here, districts with 26-100% of their student body being low-income students were grouped together more tightly and districts with the lowest percentage of low-income students had significantly higher chances of offering CTE, AP, and multiple CS courses. Together, these trends highlight a stark disparity in CS programming and income inequities.

Figure 5. Percentage of high school districts within each range of percentage of low-income students in the district that employed at least one CS-endorsed teacher during SY 2022.



Offering dual credit CS courses showed an opposite trend with 20% of districts with a large percentage of low-income students offering such courses, followed by districts with the lowest percentage of low-income students (15%), and districts with mid-range populations of low-income students the least likely to offer dual credit CS courses.

Percentage of Black/African American and Hispanic/Latino students

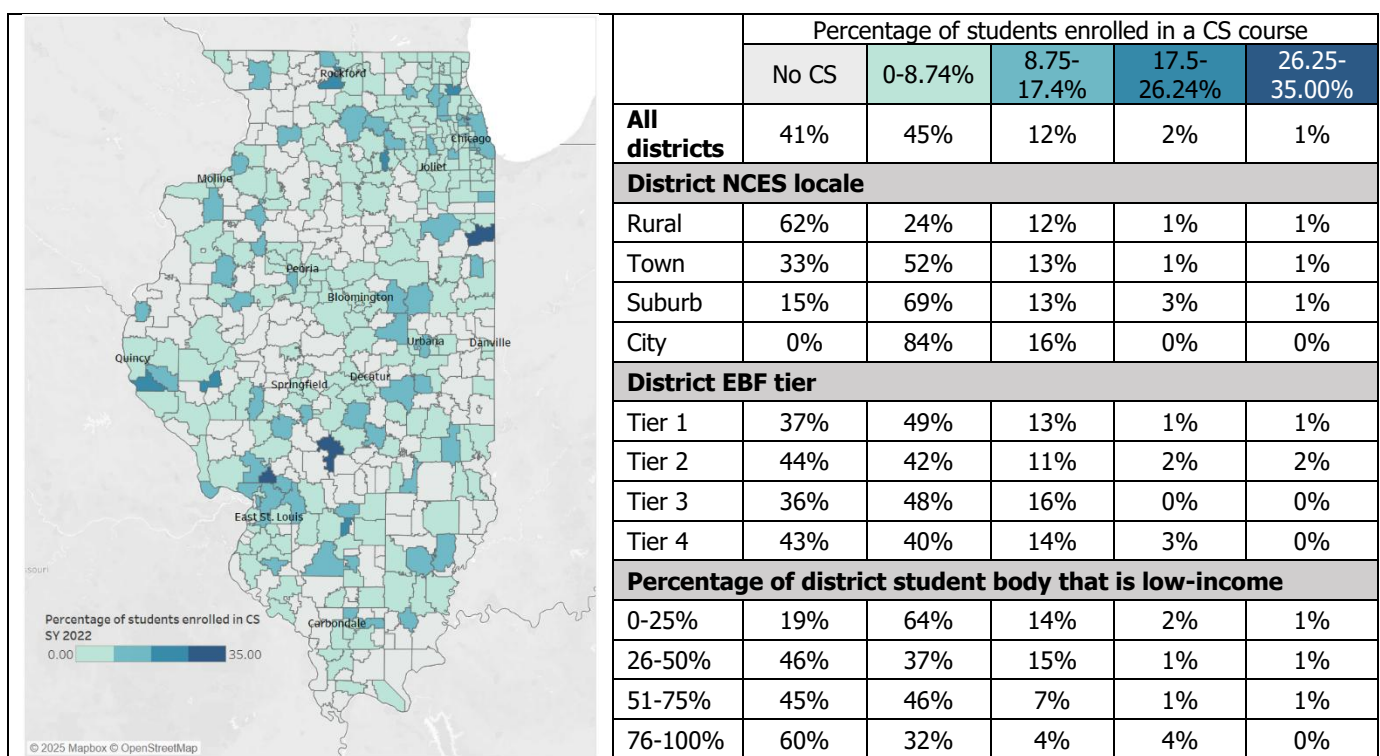
The vast majority of districts serving grades 9-12 in the state were within the 0-25% range of their population identifying as Black/African American (93%) and Hispanic/Latino (87%). As such, these districts closely aligned to overall state-wide rates of offering CS education and staffing CS-endorsed teachers. While some differences were observed between districts with higher populations of Black/African American and Hispanic/Latino students and CS programming, they may not provide enough information to understand whether or not disparities exist along these lines.

Summary. There is a divide in CS programming in Illinois along geographic and income lines, where rural and town districts as well as districts that have a high percentage of low-income students offered fewer CS courses and were less likely to employ a CS-endorsed teacher. These stark differences signal the need for increased support for rural and low-income districts as the state expands its CS offerings.

How does student enrollment in CS differ by district?

What the data tells us. Table 2 shows student enrollment in CS courses by NCES locale, EBF tier, and percentage of student body that is low-income. Overall, the majority of districts who offered CS are within the first color step (45%), indicating less than 9% of their high school student body was enrolled in a CS course during SY 2022. This aligns with findings from Part 1, where the state average was 7.4% of all high school students enrolled in at least one CS course in a given school year.⁴ Only a handful of districts (about 3%) enrolled more than 17.5% of their student body in a CS course during SY 2022.

Table 2. Map showing high school districts by percentage of students enrolled in a CS course (left) and table showing percentage of districts in each bracket of percentage of students enrolled in a CS course by district locale, EBF tier, and percentage of low-income students (right) during SY 2022.



*Note: Gray districts do not offer CS courses. The exact range for percentage of students enrolled in a CS course was [0.38%, 34.33%]. For proportion of district student body that is low-income, exact ranges were as follows: 0-25.9%, 26.0-50.9%, 51.0-75.9%, 76.0-100%.

NCES locale

In terms of locale, the majority of city and suburb districts enrolled up to 8.74% of their student body in CS coursework, whereas half of all town districts and a quarter of rural districts were within the same range. Between 11-16% of all districts, regardless of locale, enrolled between 8.75-17.4% of their student body. The handful of districts that had more than 17.5% of their student population enrolled in CS courses were more likely to be suburban, town, or rural districts.

The map in Table 2 visualizes these findings with darker shades of blue (indicating higher student enrollment in CS coursework) near some urban areas in the state such as Chicago, East St. Louis, Moline, Rockford, Urbana, and Carbondale. Four districts were within the highest enrollment range and were geographically spread throughout the state: Bunker Hill Community Unit School District 8 (rural), Nokomis Community Unit School District 22 (town), Ridgewood Community High School District 234 (suburb; and explored further in Cases of Excellence), and St. Anne Community High School District 302 (rural). Across these four districts, total district enrollment varied between 180 and almost 800, indicating it is not just small districts that are able to attain higher enrollments in CS coursework.

EBF tier

There is little spread in percentage of student body enrolled in CS when disaggregating the data by EBF tier. While higher percentages of students enrolled in CS were seen in Tiers 1 and 3, gaps between these tiers and Tiers 2 and 4 were within 8 percentage points. A higher percentage of Tier 3 (16%) and Tier 4 (14%) districts enrolled between 8.75-17.4% of their student body in CS coursework, compared to Tiers 1 (13%) and Tier 2 (11%). Similarly, almost 3% of Tier 2 and Tier 4 districts enrolled more than 17.5% of their students in CS coursework. Similar to the findings above on CS programming and staffing, this indicates that EBF Tiers may have little to do with CS enrollment.

Percentage of low-income students

Above we noted that districts with the lowest percentage of low-income students were the most likely to offer various CS programming and employ CS-endorsed teachers. However, as seen in Table 2, the majority of districts with the lowest percentage of low-income students enrolled up to 8.74% of their student body in CS coursework. While most districts that had more than three quarters of their student body as low-income did not have CS courses, those that did offer CS enrolled at varying rates, with 8% of these districts enrolling more than 8.75% of their student population, more than the state average.^f

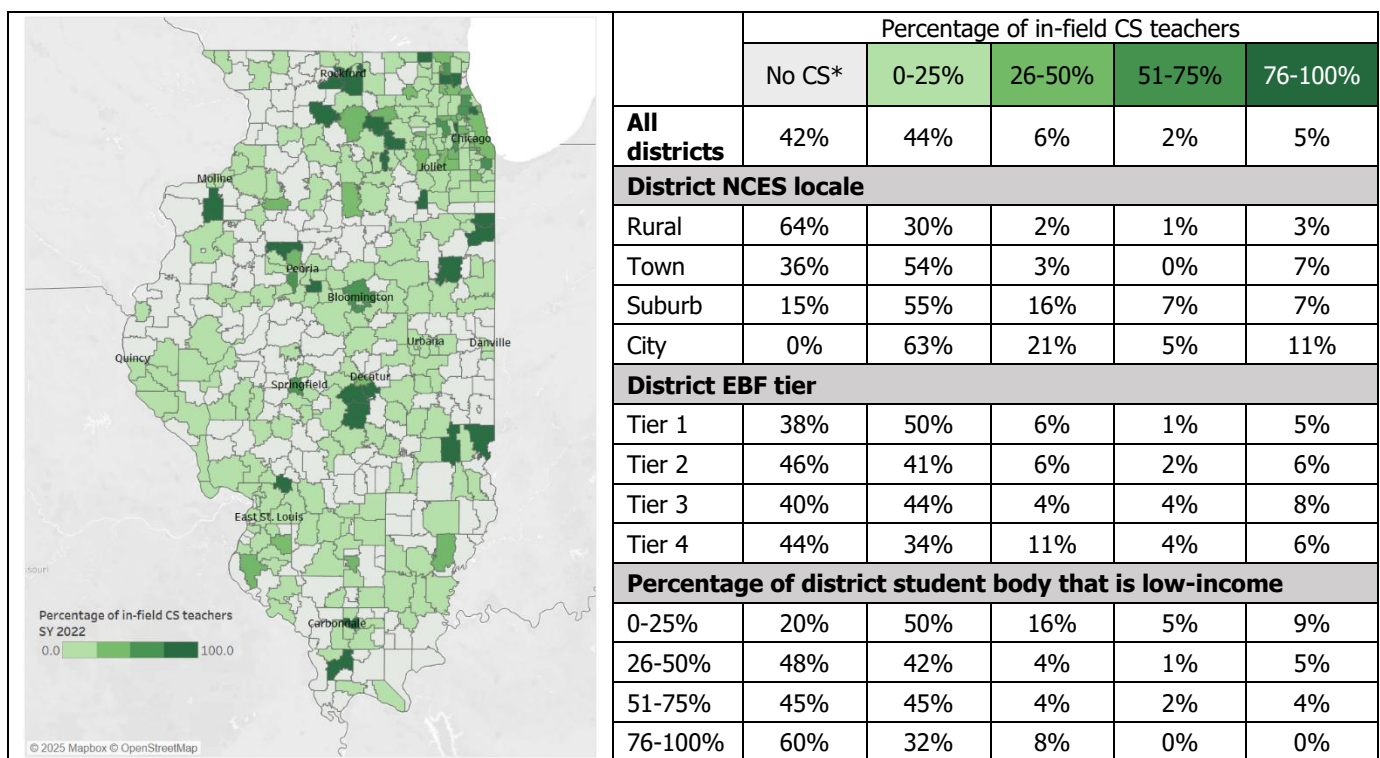
Summary. The majority of districts enrolled up to 8.74% of their student body in CS coursework, mirroring findings from Part 1 of this Series. However, districts that enrolled between 8.75-35.00% of their student body in CS coursework were diverse in their characteristics but more likely to be suburban, town, or rural districts, EBF Tiers 3 and 4, and have low percentages of low-income students. Part 2 of this Series showed disparities in state-wide CS enrollment along gender, racial, disability, linguistic, and economic lines, some of which are apparent here at the district level too.

^f As noted above, due to the small number of districts that enroll more 26% or more Black/African American and Hispanic/Latino students, respectively, we do not include these into our discussion enrollment in this section or in-field rate of CS teachers in the next section. See Tables 35 and 36 in the Supplemental Materials for counts for these groups and all other group categories displayed in Tables 2 and 3 here.

How does the in-field rate for CS teachers differ by district?

What the data tells us. Table 3 shows in-field rates of CS teachers by NCES locale, EBF tier, and percentage of student body that is low-income. Here, in-field CS teachers (1) hold a CS endorsement and (2) are appropriately assigned to the CS course that aligns with their CS endorsement.⁹ In-field teachers are qualified to teach the course, and the districts appropriately assigned them to the recommended course. Similar to CS student enrollment, the majority of districts who offered CS are within the first color step (44%), indicating less than 25% of their CS teachers were considered in-field. Nearly 13% of all districts in the state had between 26-100% of their qualified CS teachers appropriately assigned to CS coursework. As noted in Part 3 of this Series, state-wide in-field rates for the most enrolled CS courses ranged between 34-71% depending on the course.⁶ So, while in-field rates varied greatly from course to course, in-field rates were more uniform at the district level and overall remained low.

Table 3. Map showing high school districts by percentage of in-field CS teachers (left) and table showing percentage of districts in each bracket of percentage of in-field CS teachers by district locale, EBF tier, and percentage of low-income students (right) during SY 2022.



*Note: Gray "No CS" districts include districts that do not offer CS courses (N=196) and those that had no data for CS teachers (N=8). For proportion of district student body that is low-income, exact ranges were as follows: 0-25.9%, 26.0-50.9%, 51.0-75.9%, 76.0-100%.

⁹ See Part 3 of this Series for more information on the CS teacher workforce in Illinois and more detailed definitions of endorsements and in-field designations.

NCES locale

For locale, beyond the majority of rural, town, suburb, and city districts that offered CS who had an in-field rate for their CS teachers up to 25% (lightest shade of green), proportionally city and suburb districts had higher rates of in-field CS teachers compared to rural and town districts. The map above shows the variation in in-field rates geographically. While districts with the highest in-field rates (darkest shade of green) were near urban centers, districts were clustered in central and northern parts of the state. Twenty-six districts were within the 76-100% in-field range. These districts represented all locales: 7 rural districts, 9 town districts, 8 suburb districts, and 2 city districts. Across these districts, the total number of CS teachers was between 1 and 5. While most of these 26 districts had only one CS teacher who was appropriately assigned (and considered in-field), four districts had larger CS departments with 80-100% of CS teachers considered in-field: Elmhurst School District 205 (suburb, 3 teachers), Libertyville Community High School District 128 (suburb, 4 teachers), Niles Township Community High School District 219 (city, 5 teachers), and Rockford School District 205 (city, 5 teachers).

EBF tier

Over half of all Tier 1 districts had in-field rates below 25% compared to 34-44% of Tier 2, 3, and 4 districts. When looking at the districts that had in-field rates greater than 25%, we see a linear trend between EBF tiers and in-field rates. For example, 16% of all Tier 3 districts and 21% of all Tier 4 districts had in-field rates greater than 25%, compared to 12% of all Tier 1 districts and 14% of all Tier 2 districts.

Percentage of low-income students

In previous sections, we noted the stark differences in more CS offerings and better staffing for districts with fewer low-income students. This trend holds here for percentage of CS teachers considered in-field. Half of all districts with lower percentages of low-income students (0-25% of student body) had in-field rates less than 25% with another 30% of these districts holding in-field rates between 26-100%. In contrast, 10% or less of all districts within each low-income bracket greater than 25% had in-field rates also greater than 25%. Combining this with the findings above further amplifies the disparities in not only CS offerings and enrollment, but in employing qualified CS teachers and appropriately assigning them to CS courses.

Summary. Most districts had an in-field rate between 0-25% for their CS teachers. Districts with in-field rates greater than 25% were more likely to be city or suburb districts, EBF Tiers 3 and 4, and had low percentages of low-income students in their overall student body. While previous reports provided insight into the need for qualified CS teachers, the findings in this report now highlight disparities in where these in-field CS teachers were located.

Cases of Excellence in CS Education

In Parts 1-4 of this Series, each report concluded with a section assessing equitable CS education in the state of Illinois using the CAPE framework² of capacity for, access to, participation in, and experiences in CS education. While we found aspects of CS education that were positive, overall, the state of Illinois still has a way to go to reach equitable CS education. As such, part of the purpose of The State of Computer Science in Illinois High Schools Series was to find districts throughout the state that already had robust and equitable CS education programs, districts we call Cases of Excellence. To learn more about these districts, we engaged in a two-step method. The first step was to create and apply a rubric by which to assess each district for aspects of the CAPE framework with regard to their CS offerings and employment. Once the districts were selected, the second step of the process was to elicit more detailed information from them via a survey with open-ended questions. We detail the two steps and their findings below while highlighting the Cases of Excellence in CS education.

Cases of Excellence Rubric

To determine which districts in the state have robust and equitable CS programs, we selected data available to us in our ISBE dataset that aligned with each aspect of the CAPE framework. We compared districts within the same locale (rural, town, suburb, and city) to ensure that districts of similar sizes and structures were compared to one another. The complete rubric is included in Table 4.

Capacity for CS education includes resources such as teachers, funding, and policies that help to support and maintain high-quality and inclusive CS instruction.² In order for districts to be considered as having capacity for CS education, we instituted a prerequisite that the district had to employ at least one CS-endorsed teacher. Several findings from this Series point to a lack of CS-endorsed teachers in the state and across district types despite endorsements having a positive relationship with student outcomes.^{6,7} In addition to the prerequisite, districts had to meet one of two required evidence-based indicators (EBIs): either districts had to be within the top quartile of their locale of employing a high percentage of CS-endorsed teachers (C1) or districts had to be within the top quartile of employing a high percentage of in-field CS teachers (C2). As noted above and in Part 3, endorsed teachers have a CS endorsement but in-field teachers have both a CS endorsement and are appropriately assigned to the aligned CS course for that endorsement. Given the varied rates in both endorsed teachers and in-field teachers, selecting districts in the top quartile of either ensures that students at those districts have a better chance of receiving high-quality, content-appropriate instruction in their CS course compared to those with non-endorsed out-of-field CS teachers. We did not have data for aspects of capacity such as mechanisms for training and supporting teachers, policies for equitable access and participation, resources for teaching CS, or funding for teachers and general CS education. As such, these topics were included in the survey and will be discussed later.

Access to CS education includes CS course offerings, other learning experiences, admission policies, and more.² Similar to capacity, we instituted a prerequisite for access: districts had to offer multiple CS courses (i.e., multiple state course codes). While state mandates required that districts only had to offer one CS course in SY 2024, to be considered exemplary we wanted to highlight districts that were ahead of the mandate but also offered their students choice in their CS offerings. In addition to the prerequisite, districts had to meet one EBI (A1) of offering two or more levels (remedial, general, honors, enriched, AP) and/or kinds (e.g., dual credit or CTE) of CS courses. This EBI would ensure Cases of Excellence not only offered students choice in course content but also in rigor and opportunities for college credit. Aspects of access to CS education that we did not have data for included elementary and middle school learning opportunities, extracurricular activities, and district policies for access. These topics were included in the survey and will be discussed below.

Participation in CS education includes enrollment into CS coursework and understanding disparities in enrollment based on gender, race, socioeconomic status, or geography.² For participation, districts had to meet two EBIs: districts had to be within the top quartile of enrolling a high percentage of their student body in CS coursework (P1) and districts had to be within 5% of enrolling at least two historically marginalized groups (i.e., girls, Black/African American, Hispanic/Latino, low-income, and English Learner students) into CS relative to their overall representation at the district (P2).^h As noted in Part 1 and earlier in this report, the majority of districts enrolled less than 9% of their student body into CS coursework in any given year.¹⁷ P1 would highlight districts that were above this enrollment rate and possibly signal districts that have made CS a priority in their district. P2 accomplishes the equitable participation aspects of the CAPE framework. In Part 2, we found that each of these groups were underrepresented state-wide in CS coursework.¹⁸ As such, if a district made effort to equitably enroll students of various backgrounds and identities, it would highlight districts committed to equity. As to not penalize districts that have lower representation of some of these groups (particularly racial groups) due to locale because of the segregated nature of our state and education system, we lowered the number of groups needing equitable representation in CS to two, so even if a district is, for instance, mostly White, they could still achieve representational equity with girls, low-income students, or ELs. Aspects of participation not covered in this dataset but covered in our survey of districts included representation of students in extracurricular activities.

Experiences in CS education includes outcomes such as final grades, knowledge gained, sense of belonging, and more.¹⁹ There was one EBI for experiences that districts had to meet: district pass rates for CS coursework had to be within 5% of district average for at least two historically marginalized groups (i.e., girls, Black/African American, Hispanic/Latino, low-income, and English Learner students). Parts 2

^h Despite previous reports in this Series including students with disabilities with these other groups, they were omitted from the rubric here due to lack of data. The Illinois Report Card did not provide percentage of student body with disabilities in SY 2022 and thus the relative population between district and CS enrollment could not be determined. Inclusive practices for students with disabilities is discussed below as part of experiences to account for their missingness in the CAPE rubric.

and 4 of this Series found disparities among pass/fail rates for CS coursework across most student groups. Cases of Excellence would demonstrate equitable outcomes for students in addition to equitable access and participation. Aspects of experiences not covered in this dataset but covered in our survey of districts included inclusive practices for students with disabilities and multilingual students and methods for maintaining student interest in CS. A major limitation here is our inability to link to student data that could provide insights into their lived experiences in high school CS including their sense of belonging, identity as computer scientists, knowledge gained, and other attitudinal measures of experience.

Table 4. The rubric for assessing Cases of Excellence using ISBE data, including prerequisite and required evidence-based indicators for each component of the CAPE framework.

Capacity

Prerequisite: District employs a CS-endorsed teacher

C1: District is within top quartile of employing a high percentage of CS-endorsed teachers **OR**

C2: District is within top quartile of employing a high percentage of in-field CS teachers

Access

Prerequisite: District offers multiple CS courses

A1: District offers two or more levels (remedial, general, honors, enriched, AP) and/or kinds (dual credit, CTE) of CS courses

Participation

P1: District is within top quartile of enrolling a high percentage of their students in CS coursework

P2: District is within $\pm 5\%$ of enrolling at least two historically marginalized student groups into CS coursework relative to the groups' overall representation in the district

Experiences

E1: District pass rates for CS coursework for at least two historically marginalized student groups are within $\pm 5\%$ of district average

In summary, for a district to be considered a Case of Excellence they had to meet the prerequisite and either C1 or C2 for capacity, the prerequisite and A1 for access, both P1 and P2 for participation, and E1 for experiences. Table 5 shows the number of districts that offered CS in SY 2022 for each locale (and therefore were eligible for Cases of Excellence assessment) and the number of districts that met the EBIs for each aspect of the CAPE framework. Across locales, the Experiences EBI retained the greatest number of districts, followed by the Access EBIs and Capacity EBIs, and the Participation EBIs retained the least number of districts.

Table 5. Number of high school districts that (1) offered CS, (2) met the evidence-based indicators for each category of the CAPE framework, (3) were considered Cases of Excellence (COE), and (4) responded to the Cases of Excellence survey for their NCES locale.

	Districts offering CS	Districts meeting Evidence-based Indicator Categories				District COEs	District COE survey responses
		Capacity	Access	Participation	Experiences		
Rural	84	43	33	17	61	6	2
Town	83	45	46	15	75	7	4
Suburb	100	42	85	24	87	12	3
City*	19	10	17	3	17	11	4

*Note: No city district met all four categories of EBIs and thus city Cases of Excellence only met three of the four categories.

Notably, no city district met all four EBI categories. The majority of city Cases of Excellence met the Capacity, Access, and Experiences EBIs, but not the Participation EBI. The remaining city Cases of Excellence met the Access, Participation, and Experiences EBIs, but not the Capacity EBIs. As such, the threshold to achieve a Case of Excellence as a city district was lowered to meeting three of the four categories. This is a finding in and of itself that while city districts were shown to be more likely to have many CS offerings, they may lack qualified teachers or equitable participation in CS coursework.

Rural, town, and suburb district Cases of Excellence represent between 7-12% of all districts that offered CS during SY 2022. Because of the city districts' lowered threshold, 58% of city districts were noted as Cases of Excellence.

In the end 36 districts across the state met the requirements to be considered Cases of Excellence including 6 rural districts, 7 town districts, 12 suburb districts, and 11 city districts (see Table 6).

Table 6. Districts that met the requirements of Cases of Excellence for CS education.

Cases of Excellence			
Rural	Town	Suburb	City
<ul style="list-style-type: none"> • Hinckley-Big Rock Community Unit School District 429 • Iroquois County Community Unit School District 9* • Liberty Community Unit School District 2* • Meredosia-Chambersburg Community Unit School District 11 • Ridgeview Community Unit School District 19 • Sandoval Community Unit School District 501 	<ul style="list-style-type: none"> • Carlyle Community Unit School District 1 • Casey-Westfield Community Unit School District 4C • Eldorado Community Unit School District 4* • Mascoutah Community Unit School District 19* • North Mac Community Unit School District 34* • Shelbyville Community Unit School District 4 • Tuscola Community Unit School District 301* 	<ul style="list-style-type: none"> • Adlai E. Stevenson High School District 125* • DeKalb Community Unit School District 428 • Evergreen Park Community High School District 231 • Granite City Community Unit School District 9 • Huntley Consolidated School District 158 • Lake Park Community High School District 108 • Lemont Township High School District 210 • Libertyville Community High School District 128 • Lyons Township High School District 204* • Ridgewood Community High School District 234* • Riverside Brookfield Township School District 208 • Winnebago Community Unit School District 323 	<ul style="list-style-type: none"> • Carbondale Community High School District 165* • Chicago Public School District 299* • Danville Community Consolidated School District 118 • Decatur School District 61 • Evanston Township High School District 202 • Moline-Coal Valley School District 40* • Naperville Community Unit District 203 • Niles Township Community High School District 219 • Rock Island-Milan School District 41 • Springfield School District 186 • Valley View Community Unit School District 365U*

*Asterisks note which districts responded to the survey for additional information on their CS education program.

Cases of Excellence Survey Responses

Each of the 36 Cases of Excellence were sent a survey composed of 12 open-ended questions to learn more about CS education in their district. See the Supplemental Materials for the full survey. Thirteen districts responded to the survey including 2 rural districts, 4 town districts, 3 suburban districts, and 4 city districts (marked with an asterisk in Table 6). Respondents included CS teachers, CS and CTE department chairs and directors, directors of curriculum and instruction, a principal, a district assistant superintendent, and district superintendents. In the sections below, we detail the themes that emerged from the 13 districts by capacity, access, participation, and experiences.

Capacity for CS education

As noted previously, capacity for CS education includes resources such as teachers, funding, and policies that help to support and maintain high-quality and inclusive CS instruction.^{20,21} In terms of capacity, the Cases of Excellence survey asked districts about (1) established mechanisms for recruiting, hiring, training, and supporting teachers; (2) external partnerships for teacher training; (3) ongoing learning resources for teachers; (4) Policies and strategies for equitable access and participation; and (5) funding for teacher training and general CS education.

Mechanisms for recruiting, hiring, training, and supporting teachers

Nine districts (2 rural, 3 town, 3 suburb, 1 city) offered information on mechanisms to recruit and train CS teachers. Two districts (both suburban) noted that their districts focus on hiring teachers with a CS background and needed endorsement, or those close to attaining their CS endorsement. One respondent, a CS teacher, from a town district was unaware of district mechanisms but they themselves were hired with both a BS/MS in CS and the Business/CS endorsement, indicating this district also hires those with specific CS backgrounds. Recruitment efforts were typically through local networks such as Computer Science Teacher Association (CSTA) email lists, local teacher job posting sites, and word-of-mouth. These three districts were the only districts to explicitly mention hiring teachers with the needed endorsements, whereas other districts discussed current teachers either switching or adding subjects, attaining the CS endorsement while teaching CS (and offering tuition reimbursement for endorsement coursework), or training CS teachers in other ways not including the CS endorsement. Types of training included working with instructional coaches, participating in clubs or Hour of Code, partnering with non-profit organizations to teach a specific curriculum, offering general computer science and computational thinking training for PK-12 teachers, as well as offering and supporting other unspecified local, regional, state, and national CS professional development (PD) opportunities. Notably one district remarked "*training for CS teachers in this district is available as readily as it is in any other subject area*" (Computer Science Teacher at Ridgewood Community High School District 234), highlighting the importance the district places on training and supporting CS teachers.

Lastly, two districts (both towns) noted their CS students are enrolled through dual credit opportunities at local colleges/universities such as Southeastern Illinois College (SIC) or career centers and did not specify mechanisms for recruiting or supporting CS teachers within district.

"We have an Instructional Technology Coach who has partnered with current teachers to co-teach CS classes in an effort to "grow our own" CS teachers."
– Curriculum, Title, and Grant Director at Iroquois County Community Unit School District 9

External partnerships for teacher training

Eight districts (1 rural, 3 town, 1 suburb, 3 city) offered information on who they partner with on training teachers, which included (1) local partners such as other schools within their district, clubs, and career centers such as LIFT in Mattoon, IL; (2) higher education partners such as Northeastern Illinois University (NEIU), SIC, and University of Illinois Urbana-Champaign (UIUC); and (3) non-profit and industry partners such as Hour of Code, Project Lead the Way (PLTW), BootUp, Lego Education, John Deere, and Amazon's Project STEM.

Ongoing learning resources for teachers

Eleven districts (2 rural, 2 town, 3 suburb, 4 city) provided information on resources available to CS teachers in their district. The majority of districts noted some type of traditional PD, with one district noting PD was available in-school for teachers during their department's late arrival times. Specific trainings included enrollment in endorsement programs or support for teachers to enroll in local community colleges for CS coursework, course-specific training (such as AP CS), course-specific professional learning communities (PLCs), teacher leadership tracks where teachers are trained to lead PD or PLCs, and opportunities provided by non-profit and industry partners such as John Deere, Lego, BootUp, SkillStruck, Define STEM, CompTIA, Uncharted Learning, and PLTW. Districts also partnered with institutions of higher education (such as Black Hawk College and Western Illinois University (WIU)) to support their teachers. Some districts also provided personnel to work with CS teachers such as instructional coaches, CS specialists, and tech coordinators. District-wide resources included equipment purchases and lending libraries for physical computing devices.

"[We] also purchase programming software and ensure regular cyclical replacement of computers in the CS classrooms to ensure the courses are current." – Director of Curriculum and Instruction at Lyons Township High School District 204

Several districts noted other unspecified workshops, trainings, and PDs for their teachers, but all noted their districts were "highly supportive" of teachers taking advantage of these opportunities when they arose.

Policies and strategies for equitable access and participation

All 13 districts noted they had policies to provide opportunities and "every effort is made to eliminate barriers" for all students. Districts also shared specific strategies they employ to make equitable access a reality. One such strategy included targeted programming to encourage equitable access including CS courses and extracurricular activities being offered to all students grades 6-12 and offering college-level course options. Two districts (1 suburb, 1 city) with CS course requirements noted their requirements aid in ensuring equitable access to all students, since all students must enroll. Chicago Public School District 299 offers all their schools free curriculum and a free lending library, provides out-of-school time programming, and only offers programs that can be used at every school regardless of funding. Other districts ensure equitable access by providing transportation to activities, including one district, Carbondale Community High School District 165, who provides a late bus 3 times a week for tutoring and extracurricular activities. Districts also provide financial assistance to their students, including no course fees and paying for students' tuition at area career centers. Another strategy for ensuring all students have the opportunity to enroll in CS comes in the form of communication with partners. Tuscola Community Unit School District 301 syncs their district calendar to that of their local area career center (LIFT) so that students have the opportunity to take dual credit and credentialing courses at LIFT while also completing their required courses at their home district.

Funding for teacher training and general CS education

Questions of funding were asked in several places throughout the Cases of Excellence survey. These questions were sometimes asked in connection with specific questions such as funding related to teacher training, extracurricular activities, or general operating funding for CS education and programs. Below we detail the funding mechanisms districts provided for teacher training as well as general operations of a CS program. Funding mechanisms specifically tied to CS-related extracurricular activities are discussed in the next section on Access.

Seven districts (1 rural, 1 town, 2 suburb, 3 city) offered information on funding specifically for teacher training and recruitment. These included: (1) local, district, and/or regional funds including Title I fundsⁱ and PD funds, with one district (suburb) noting this funding was only available if teachers participated during school hours; (2) state funds such as ISBE's CS Equity Grant that districts (1 rural, 1 suburb) used to help offset salary expenses, tech upgrades, and PD; (3) higher education funding through NIU's EdSystems AMP-IT program participation and individual teacher scholarships from UIUC's CSTED program; (4) industry grants such as John Deere and Amazon; and (5) other unspecified grants.

Nine districts (1 rural, 2 town, 2 suburb, 4 city) offered information on funding regarding supporting teachers with resources. This funding included (1) local sources such as districts building it into their budgets; (2) state grants such as ISBE's CS Equity Grant, Teacher Vacancy Grant, CTEI grants, and Regional Office of CTE funding; (3) federal grants such as Title I and Perkins grants; (4) industry funding through Amazon and John Deere; and (5) other unspecified grants.

Five districts (1 rural, 1 town, 1 suburb, 2 city) provided more information on funding their CS programs that were not already discussed previously in relation to teacher training, teacher resources, or extracurricular activities (more on the latter below). Sources included state grants such as CTEI Grant, Three Circle (FFA and SAE) Grant, Agriculture Incentive Grant; federal funds such as Perkins Grants, US Department of Defense grants, US Department of Education grants, National Science Foundation grants (through higher education partners); and industry funds such as Amazon's Future Engineer Program Grant and other corporate partners.

Lastly, one district (city) noted they had no partners, funding, or mechanisms for training or recruiting CS teachers.

ⁱ Title I funds are federal funding given to local education agencies with the purpose of improving basic programs for schools with a high percentage of low-income students.

Access to CS education

Access to CS education includes CS course offerings, other learning experiences, admission policies, and more.²² In terms of access, the Cases of Excellence survey asked districts about (1) methods and timing of informing students of CS opportunities; (2) CS-related extracurricular activities; (3) elementary and middle school CS learning opportunities; (4) methods for informing parents and district and school administrators of CS learning opportunities; and (5) other funding for learning opportunities.

Methods and timing of informing students of CS learning opportunities

All 13 districts provided information on how and when their students are informed of CS learning opportunities. While many districts noted the use of course catalogs, printed materials to be sent home, counselors, and student services, many districts also rely on activities to promote CS course offerings. Such activities included activity fairs, elective fairs, club meet-and-greets, freshman open houses, and school open houses. Adlai E. Stevenson High School District 125 hosts school-wide Let's Talk About Your Future nights, where CS courses are highlighted. In-class announcements were also popular strategies where CTE and other teachers would share CS course offerings during lunch periods, CTE courses, math courses, and more.

Two districts (1 suburb, 1 city) noted CS requirements for their district, with one district detailing:

"Upon entry into 9th grade, all students in our district take a one-semester, dual-credit foundational computing course. Students there are provided an overview of other subsequent CS offerings." - Computer Science Teacher at Ridgewood Community High School District 234

Five districts (2 town, 1 suburb, 2 city) offered information on the timing at which students are advised of CS course offerings. The majority of districts make courses known to students about a month before registration for the following term. That said, Valley View Community Unit School District 365U begins informing students of high school CS coursework during middle school and Tuscola Community Unit School District 301 brings their sophomore students to tour LIFT Area Career Center where they can begin enrolling in dual credit CS courses their junior and senior years.

CS-related extracurricular activities

All districts noted current (or former) CS-related clubs at their districts. Popular clubs or extracurricular activities included Esports (7 districts), robotics clubs/teams (5 districts), cyber defense clubs (4 districts), girl inclusive clubs such as Girls Who Code and GEMS (Girls in Engineering, Math and Science; 3 districts), CS/tech clubs (2 districts), Future Business Leaders of America (2 districts), and other clubs such as SkillsUSA, Science Olympiad, and ACES (Academic Challenge in Engineering and Science) Team (1 district each). Several districts noted these opportunities existed for both their high school students as well as elementary and middle school students in their district.

"[W]e have a robotics club, an Esports video game program, and students have had opportunities with Cyber Patriot through Scott Air Force Base." – CTE Department Chair/Business Teacher at Mascoutah Community Unit School District 19

While most districts noted more frequent opportunities, not all districts have the support for regular extracurriculars and thus offer standalone opportunities:

"Through [ISBE's] After School [Programs] Grant, we were able to provide students with a STEM night that included coding activities." – Curriculum, Title, and Grant Director at Iroquois County Community Unit School District 9

While these activities may not be available all the time, events such as the one above provide engagement opportunities for students and their families to be introduced to CS. This is particularly important as several districts noted short lifecycles of clubs and extracurriculars, with some noting little to no funding or support for them. Two districts (both towns) noted that the only CS-related clubs in their districts no longer existed due to lack of support.

Lastly, in addition to more traditional clubs and extracurricular activities noted above, one district shared they also provided work experience opportunities for their high school students:

"We also hire [Lyons Township] students as interns for summer tech work that requires students to pass the same test any hired Tech worker must pass in order to work with the District equipment and network." – Director of Curriculum and Instruction at Lyons Township High School District 204

Elementary and middle school CS learning opportunities

Ten (2 rural, 3 town, 2 suburb, 3 city) of the 13 districts were aware of CS learning opportunities in their district before high school, with the remaining 3 districts (1 town, 1 suburb, 1 city) noting either no such opportunities exist, or they were unaware if there were. No districts noted a requirement of CS coursework in K-8 and as such are electives for students. Most districts noted that CS learning opportunities were more formal in middle school than in elementary school, with middle schools offering introductory or exploratory standalone courses or CS integrations within other subjects. For example, Valley View Community Unit School District 365U offers an elective to 6-8th grade students called Applied Tech, which introduces students to Windows based machines, Google Apps, AI, keyboarding, and coding. Another district, Chicago Public School District 299, operates a device lending library open to all elementary teachers to integrate CS into core subjects. Other specific K-8 learning opportunities included the use of technologies like Bee-Bots, curriculum like HelloWorld, and after-school camps for feeder schools.

"We also have students in 8th grade who are a year ahead in math take the course at the high school, students are given an elective option, most choose AP Computer Science Principles. This course's software is funded through the Amazon grant and the lab is supported through local district funds." – Director of CTE at Valley View Community Unit School District 365U

Two districts (1 town, 1 city) noted their districts' middle schools use the same curriculum as their high schools, indicating within-district alignment: *"We have exploratory courses at the middle schools. They also utilize Project STEM and Project Lead the Way to have a seamless transition to high school"* (Assistant Superintendent for Secondary Teaching and Learning at Moline-Coal Valley School District 40).

Methods for informing parents and district and school administrators of CS learning opportunities

All 13 districts used a variety of methods to inform district and school administrators, counselors, and parents about CS offerings including course catalogs and program guides, elective fairs and Course Nights at orientations or open houses, online curriculum materials, planning tools like SchoolLinks, emails, newsletters, and other communications using tools like ParentSquare. One district, Ridgewood Community High School District 234, noted that this information typically comes from the CS teachers in the district, indicating the teachers are likely to be the most knowledgeable about CS education and CS offerings.

However, getting buy-in from district leaders for CS education is not always easy, as one district noted:

"This is still a struggle. Communication on all that is available seems to get lost in the noise of a large district. We have access to district newsletters [...] but it is still the case that often CS is not the priority. It is still the case that in elementary school, math and ELA get all the attention of administrators. We go through school administrators to get to parents, so this filter often reflects the school priorities. We invite parents and communities to our [out-of-school time] programming as a way to go direct[ly] to the community. In the [high school] space, [course] programmers often struggle with CS programming. They aren't sure where to fit it in. We do best in schools where the administration has made room for CS freshman year." – Director of Computer Science at Chicago Public School District 299

Other funding for learning opportunities

Four districts (1 town, 3 city) offered information on funding of elementary or middle school CS learning opportunities. Three districts noted the funds are local, one noted Amazon funding, and another did not specify source of funding other than it existing.

Besides ISBE's After School Program Grant listed above, no other district provided details on how their clubs and extracurricular activities were financially supported.

Participation in CS education

Participation in CS education includes enrollment into CS coursework and understanding disparities in enrollment based on gender, race, socioeconomic status, or geography.¹⁹ In terms of participation, the Cases of Excellence survey asked districts about the characteristics of students in their extracurricular activities. Other ways to measure or assess equitable participation qualitatively would entail classroom observations to examine equitable course participation and learning opportunities, but that was outside the scope of this work.

Characteristics of students in extracurricular activities

Many districts commented that their CS extracurricular activities typically reflect their overall student body demographics. Several districts (1 suburb, 2 city) noted that while their courses and extracurricular activities were well represented by some student groups (e.g., some racial/ethnic groups and all income levels), they also noted there is more work to be done to have girls, students with disabilities, and Black/African American students better represented in CS.

"Students who participate in our CS Extracurriculars are typically representative of our student body. I am continually trying to recruit more girls and African American students into the program." – Business & Computer Science Teacher at Carbondale Community High School District 165.

Other student characteristics noted by districts included participating students' high interest in CS but perhaps students' underestimation of their own potential in CS.

"[W]hen I was initially hired I formed a CS club, had students prepping for a CS competition. At the last minute, I was informed the event was cancelled. Students were absolutely disappointed [...] we do have some really sharp students here; they don't even realize how smart they are." – Business/Computer Teacher at North Mac Community Unit School District 34

One district, Lyons Township High School District 204, noted that while their CS students tend to be more male, they have reached gender parity within their CS faculty and that their four CS teachers are covering sections equally. As noted in Part 3, while gender parity has been reached state-wide for CS teachers, certain course levels and types are skewed more male.⁶ So, this district may be ahead of the state in ensuring gender equity in teachers' assignments as well.

Experiences in CS education

Experiences in CS education includes outcomes such as final grades, knowledge gained, sense of belonging, and more.^{21,22} In terms of experiences, the Cases of Excellence survey asked districts about maintaining students' interest in CS and inclusive practices for students with disabilities and multilingual CS students. Again, this data does not include students' views on their district's CS program, which may

provide additional insights into equitable experiences for students' CS education.

Methods for maintaining students' interest in CS

All districts provided a plethora of ways they keep students interested in CS education. The most cited avenue (5 districts) was to retain enthusiastic and knowledgeable CS teachers who want to continue learning. Along these lines, two districts also noted that their CS teachers are their biggest advocates for CS education and typically provide “PR [or public relations] about cool things going on in [CS] classes” to get students excited about CS, even if they do so while teaching their Business class. Another frequently noted way to maintain interest with students (4 districts) was to regularly update curriculum to be relevant and rigorous, as well as reflect student interests and industry changes. Districts also noted making relevant updates to their CS course hardware and software to keep things interesting. Other mechanisms included offering dual credit opportunities, buildable classes (e.g., course sequences or other ways of courses building upon one another), ISBE's college and career pathway endorsement (CCPE), and work opportunities in the district's IT department. School-based activities to drum up interest included surveying students to gauge interest, hosting a preview of CS courses during lunch, and recognizing students for their CS achievements.

“[T]he district is intentional about recognizing CS as equally foundational to other academic disciplines, and we see this play out in such ways as a dedicated “CS Department” annual award for seniors and for students of the semester. We also spotlight for the entire school community specific projects and achievements our CS students complete.” – Computer Science Teacher at Ridgewood Community High School District 234

Lastly, districts made use of field trips or experiences at colleges and universities such as Spotlight days, going to the Esports facility and attending Day of AI at University of Illinois Springfield.

Inclusive practices for students with disabilities and multilingual CS students

While all 13 districts noted their CS courses were open to all students and would provide appropriate accommodations as needed, 3 districts (1 suburb, 2 city) provided additional information on such support structures. Valley View Community Unit School District 365U has dedicated special education (SPED) teachers that work with the CS department to support students. Additionally, the Multilingual department helps with translating texts and supporting teachers with instructional methods supportive of multilingual students. Similarly, CS teachers at Ridgewood Community High School District 234 regularly engage with PD opportunities to support CS multilingual students that help to “*identify and use appropriate instructional tools to meet needs of our ML student community.*” This district also allocated dedicated support staff to CS classrooms to meet the needs of students with disabilities. Lastly, Chicago Public School District 299 is working with CS education researchers to be more inclusive of students with disabilities:

"We have a special program for our cluster teachers (self-contained, low incidence disability classrooms). Last year we had 80 cluster teachers in a robotics4all yearlong professional learning experience with [a CS education researcher who specializes in K-12 CS learning strategies for students with disabilities]. It was amazing. We are one of 2 districts that is working on this program of using robotics with students with disabilities for authentic computer science education." – Director of Computer Science at Chicago Public School District 299

A few districts left **final thoughts** surrounding their CS programs, hiring concerns, and the future of CS. Two districts' final thoughts were around hiring new CS teachers, with one district noting, *"We hope to find a CS teacher who can teach more advanced CS. Our efforts were to start in the lower grades and build interest and knowledge. My concern is not being able to offer higher level courses because of staffing"* (Curriculum, Title, and Grant Director at Iroquois County Community Unit School District 9). This is a testament that even districts who have established robust CS offerings and programs also have concerns related to finding qualified CS teachers. In the end, most districts left comments of pride and accomplishment about their CS programs, noting the significant work that has been done to reach this point in CS education.

Amongst the 36 Cases of Excellence and the 13 districts that responded to our survey, below we spotlight two districts that are reimagining CS education and utilizing state supports to expand opportunities for their students. Even though other Cases of Excellence districts used innovative ways to bring equitable CS education to their districts (as noted extensively above), we highlight a rural and town district below because of the geographic disparities observed in CS education (also extensively noted above).

District Spotlight: Tuscola Community Unit School District 301

Tuscola CUSD 301 is a town district of about 900 students in central Illinois on the eastern side of the state. Tuscola CUSD 301 partners with LIFT, an Area Career Center in Mattoon, IL to offer CS learning opportunities to their students. Area Career Centers are recognized by ISBE and offer Career and Technical Education (CTE) to high schools in their region. Through LIFT's Information Technology pathway, students can earn industry certificates and dual credit with the CS courses offered.²³

The partnership between Tuscola CUSD 301 and LIFT highlights an alternative pathway for districts to offer CS learning opportunities without the structures and mechanisms needed at their home district. For example, because most district CS coursework is done at LIFT, the district has no formal recruiting or training methods for CS teachers, alleviating possible strains on resources, time, and funding. The district informs the community of CS opportunities through orientation nights and email communications; however, LIFT also plays a critical role in maintaining students' interest in CS. The district takes students in their sophomore year to tour LIFT and learn of the opportunities to which they have access before they can start enrolling in courses their junior and senior years. Tuscola CUSD 301 works to align their

master schedule to LIFT's schedule so that all required courses can be taken at the students' home district but can still ensure access to the CS courses offered at LIFT. Lastly, there is a cost associated with attending LIFT; however, Tuscola CUSD 301 removes that barrier for students and pays their students' tuition.

Even though Tuscola CUSD 301 offers the majority of their CS learning opportunities outside their district, they make an incredible effort to provide equitable CS education through early recruitment and interest, ensuring access with schedule alignment, and removing financial barriers for students. Moreover, the CS learning opportunities offered provide students with the opportunity to gain college credit and/or work experience.

District Spotlight: Liberty Community Unit School District 2

Liberty CUSD 2 is a rural district of about 600 students in central Illinois on the western side of the state. The district offers mainly CS CTE courses as well as an Esports club to their students. To help with igniting interest in their students with CS coursework, the district is connected with a Vocational Center in Quincy, IL, but also relies on the talents of staff (such as counselors and teachers) who have great relationships with students and may be from the business world or tech-related vocations. When it comes to staffing their CS offerings, Liberty CUSD 2 looks to their current staff to see what they are able to teach. As their Superintendent said, they try to "put the right teachers in the right spot."

In addition to the ways this district is working with their teachers and other local resources to offer CS education to their students, we are highlighting this district because Liberty CUSD 2 shared a lot of their funding mechanisms that make their district's CS education possible. Funding is a barrier many districts may be facing when expanding CS opportunities. For teacher training, Liberty CUSD 2 utilizes funding from ISBE's Teacher Vacancy Grant for teachers to gain endorsements or other additional training. This pilot program is meant for districts with chronic teacher shortages and provides financial help in hiring, supporting, and retaining teachers.¹⁹ Early evaluations of this program show districts using the funds to help staff difficult-to-fill positions like STEM coursework and to help improve teacher retention.^{20,21}

Liberty CUSD 2 also helps fund their CS CTE programming through ISBE's Career and Technical Education Improvement (CTEI) grant, which provides funding to improve CTE and administration including funding for planning, developing, and evaluating CTE and PD opportunities for teachers.²² In Part 1 of this Series, we noted the prevalence of CS CTE coursework in much of the state⁴, and this report found that more than half of all districts in the state currently offer CS CTE coursework to their students, indicating a strong relationship between CTE pathways and CS coursework.

Other funding Liberty CUSD 2 utilizes for CS education comes from state and federal funds such as the Three Circle (FFA and SAE) grant, the Agricultural Education Incentive Funding grant, and the Perkins grant. The district also recently applied for an Educational Pathway grant.

Beginning or expanding CS offerings is a daunting task when the provisions in Public Act 101-0654 are essentially unfunded mandates. However, as this district highlights, local, state, and federal resources and grants are available to help offset costs associated with maintaining robust and equitable CS programming.

Key Takeaways from Part 5

This was the fifth and final report in **The State of Computer Science in Illinois High Schools Series**. This report analyzed the differences in CS programming including offerings and staffing by district characteristics and an analysis of equitable CS education (using the CAPE framework) for all districts highlighting Cases of Excellence in CS education for the state. Key takeaways from this report include:

1. As of SY 2022, 59% of Illinois high school districts offered a CS course, meeting compliance with the then-forthcoming mandates (beginning in SY 2024) from Public Act 101-0654. However, only 42% of Illinois high school districts employed at least one qualified CS teacher that same year.
2. There is a divide in various CS offerings and employing a CS-endorsed teacher along geographic and income lines, where rural and town districts as well as districts that have a high percentage of low-income students offered fewer CS courses and were less likely to employ a CS-endorsed teacher.
3. Districts across the state that have robust and equitable CS programming, called Cases of Excellence, were diverse in their hiring, training, and supporting of CS teachers, their methods of advising, enrolling, and igniting interest in their students, and their policies and strategies for providing equitable CS education.

Conclusion of the Series

Each report in this Series noted areas where the state was doing well, such as steady enrollment, offering diverse and flexible pathways via CS CTE courses, and increased capacity for CS education with an increase in the CS teacher workforce. At the same time, each report also noted areas where the state can improve. 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

In short, the state still has a way to go for CS education to be equitable and accessible to all Illinois students. This Series will hopefully serve as a baseline for the anticipated growth and expansion of CS education for many years to come.

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