AIR®

Advancing Evidence.
Improving Lives.

JANUARY 2026

Case Studies of Computer Science in Six California Districts

Educator Workforce Investment Grant in Computer Science External Evaluation

Authors: Kenya Roy, Joel Knudson, and Marina Castro

Contents

Introduction

Through the Educator Workforce Investment Grant in Computer Science (EWIG: CS), California has funded a statewide effort designed to increase educator capacity to deliver equitable computer science education.[1] The American Institutes for Research® (AIR®) conducted a set of case studies to better understand how districts are implementing computer science, challenges they face, and ways in which professional learning provided through EWIG: CS is shaping local efforts. These case studies complement earlier evaluation reports on Summer of CS by shifting attention from individual educator experiences to the district-level conditions and implementation patterns that shape computer science learning opportunities.[2]

AIR has partnered with the EWIG: CS lead agencies to serve as the external evaluator for the grant. To inform its evaluation approach, the AIR team organized a set of research questions on the four components of the Capacity, Access, Participation, and Experience (CAPE) framework, which highlights *capacity* to deliver, *access* to, *participation* in, and *experiences* with computer science education.[3] Guided by the CAPE framework, the AIR evaluation seeks to address the research questions identified in Exhibit 1.

This report addresses Research Questions 5 and 6 by exploring how districts are incorporating computer science into curriculum and instruction, patterns in course offerings and enrollment, and the supports and barriers that shape district progress. Drawing from demographic and course data from the California Longitudinal Pupil Achievement Data System (CALPADS), as well as semi-structured interviews with district administrators and teachers, this report offers a system-level picture of computer science implementation in a range of California districts. Together, these findings deepen the evidence base on how the EWIG: CS initiative is influencing local capacity and highlight conditions that can facilitate or constrain equitable expansion of computer science opportunities across California.

[1] The EWIG: CS program is one of multiple investments the state of California has developed to foster professional learning opportunities for educators. For more information about this program, see https://www.cde.ca.gov/ci/pl/ewig.asp.
[2] For findings about Summer of CS and other reports from AIR's EWIG: CS evaluation, please visit https://www.air.org/project/evaluation-educator-workforce-investment-grant-computer-science.
[3] See https://ecepalliance.org/resources/models/cape/.

Exhibit 1. EWIG: CS Evaluation Research Questions

Research Question	CAPE Dimension
1. To what extent have EWIG professional learning activities reached and included their target audiences? a. To what extent does the pool of participants reflect the California K–12 teaching force? b. To what extent is participation in Seasons of CS orientation workshops associated with subsequent participation in other EWIG professional learning activities?	Capacity
2. How do EWIG workshop participants describe the quality of their professional learning experiences? a. What changes in knowledge and skills to teach CS do EWIG workshop participants report after their professional learning experiences? b. What changes in beliefs and confidence to teach CS do EWIG workshop participants report after their professional learning experiences?	Capacity
3. To what extent do CS Champions believe that the training and support they receive has adequately prepared them to carry out their work? What insights do CS Champions have about their role in equitably expanding CS education?	Capacity
4. What is the nature and frequency of interactions among CS Champions outside formal professional learning activities?	Capacity
5. To what extent have the numbers of discrete CS courses increased during the time period of the 2021 and 2023 EWIG grants?	Access
6. To what extent has participation in discrete CS courses increased during the time period of the 2021 and 2023 EWIG grants? To what extent has participation increased for historically underrepresented populations?	Participation
7. To what extent have teachers' instructional practices changed after participating in EWIG professional learning activities?	Experience

Case Study Methods

The case studies present the stories of six districts gathered through administrative data and educator interviews.

District Selection

Public schools in California are organized into more than 1,000 school districts that collectively represent a wide range of communities and student populations. These dynamics shape conditions under which computer science education might take hold. To better understand similarities and differences across district contexts, the research team partnered with the EWIG: CS planning team to identify a sample of six districts that reflects diversity in district size, regional representation, and student demographics. To explore the degree to which EWIG: CS has shaped educator capacity, AIR also targeted districts whose educators had participated in Summer of CS workshops. Exhibit 2 shares details about the student population in each district and Exhibit 3 shows their geographic distribution.

Exhibit 2. Case Study District Student Population, 2023–24

Student Body	California	Jurupa USD	Oakland USD	Shasta Union HSD	Tracy USD	Turlock USD	Upland USD
American Indian/Alaska Native	0%	0%	0%	4%	0%	1%	0%
Asian	10%	1%	9%	3%	16%	6%	5%
Black/African American	5%	2%	20%	2%	6%	2%	8%
Filipino	2%	1%	1%	0%	6%	0%	2%
Hispanic	56%	88%	50%	16%	50%	61%	64%
White	20%	6%	10%	68%	17%	27%	17%
Multiple Races	5%	1%	6%	4%	5%	1%	2%
Total Number of Students	5,837,690	14,906	45,086	2,415	10,020	9,543	6,829

Sources: CALPADS, DataQuest

Exhibit 3. Map of Case Study Districts

Quantitative Data Collection and Analysis

The research team collected CALPADS reports from each case study district that included student demographic and course-taking data to analyze enrollment in computer courses by gender, race/ethnicity, and grade level. Researchers worked with a representative from each district to identify

courses that deliver computer science content and exclude any courses whose titles might reference computers but do not align with state standards. (See Appendix A for a full list of computer science course names and codes from each district.) The research team examined the demographic characteristics of students enrolled in the computer science courses—including grade level, race/ethnicity, and gender and compared those percentages to the overall student population within each district. To explore potential changes over time, CALPADS data covered a 6-year period that covered the 2018–19 through 2023–24 school years.

Qualitative Data Collection and Analysis

The research team worked with district points of contact to recruit educators and administrators most closely involved with computer science instruction in the district for 60-minute semi-structured interviews conducted virtually using Microsoft Teams. The interview protocol asked participants to describe computer science course offerings, teacher capacity and credentialing, scheduling, recruitment practices, equity efforts, and the role of EWIG: CS-supported professional learning in their district (see Appendix B). Interviewers also presented results of the course-taking analyses to each respondent to gather insights about enrollment patterns in the district. A member of the research team reviewed transcripts and coded them thematically, then combined interview findings with CALPADS analyses to write case study reports of computer science implementation in each district.

Patterns in Computer Science Course Offerings

Case studies revealed a widespread decrease in computer science availability and enrollment that aligned with the COVID-19 pandemic, and otherwise found inconsistent patterns of growth over a 6-year period ending in 2023–24. Interview respondents identified key contributing factors that influence computer science growth.

Educator Skills and Interests Shape Course Availability

Across districts, teacher knowledge, skills, and interest played a central role in determining course availability. Most computer science courses in the six districts were taught by math and science teachers with full courseloads who made room for computer science sections when staffing allowed. In one district, however, middle school students enjoyed robust offerings due to philanthropic funding that supported full-time computer science educators. Teacher interest also played a major role in shaping course offerings, which tend to expand when teachers opt to teach them, promote them to students, or help develop pathways at their schools. Indeed, despite a system commitment to expanding computer science, several districts reduced offerings after key influential teachers retired or shifted roles. Counselors contributed to availability as well, particularly in districts where administrators and taskforces have encouraged them to steer students toward computer science courses.

Computer Science Often Falls Prey to Competing Priorities

District representatives consistently reported that course offerings have been constrained by demands from outside the computer science content area, particularly following the pandemic. As schools prioritized core academic recovery, they often squeezed computer science electives out of master schedules, leaving younger students with limited room to take optional courses. Teacher turnover further reduced course availability, especially when districts lost the few educators credentialed and willing to teach computer science. Recruiting new computer science teachers was difficult across the state, with districts citing competition from higher-paying industry jobs, the lack of a strong certification pipeline, and limited funding. Even when districts had interested teachers, resource constraints made it challenging to add new sections or protect computer science electives in tightly packed schedules. As a result, course offerings remained sensitive to staffing shifts, funding limitations, and scheduling pressures that restricted how many students can access computer science.

Standalone Course Availability Insufficiently Captures Access

Across all districts, an important limitation of this analysis emerged: Counting standalone computer science courses and enrollment numbers does not fully capture how many students are truly exposed to computer science. Districts reported efforts to integrate computer concepts into STEM electives, engineering courses, digital technology classes, or grade-level STEM units. This kind of exposure can represent a vital strategy for exposing a larger number of students to computer science material and to demonstrate its relevance in a wide range of domains. However, these opportunities will not appear in CALPADS course codes or course-count metrics. As a result, the quantitative patterns uncovered through this research understate the extent to which students access computer science content.

Patterns in Computer Science Course Enrollment

Case studies also suggested that longstanding disparities in computer science participation will require persistent attention to open doors for all students.

Integration of Computer Science Into Other Subject Areas Expanded Access

Incorporating computer science into other academic classes can be an effective tool for promoting computational thinking skills to a wide range of students (Yeni et al., 2024, Mabie at al., 2023). All six districts described progress with respect to computer science integration, but efforts remained uneven across grades and were often shaped by teacher initiative, staffing capacity, and schedule availability. The emphasis in elementary and middle grades often focused on providing early exposure through integrated instruction, followed by efforts to expand consistently available courses as part of high school pathways. Districts such as Tracy and Upland had explicit K–12 integration goals, embedding computer science into existing content to provide exposure to more students regardless of their later elective options. Other districts are in earlier phases of their journeys, working to rebuild or expand offerings post-pandemic declines, strengthen vertical alignment, and address disparities in enrollment.

Students in Upper Grades Participated at Higher Levels

Across districts, enrollment patterns reflected the traditional structure of secondary schedules: Because middle schoolers have varied access to electives based on their school or district and underclassmen have limited room for electives due to required coursework, most computer science participation clustered in Grades 11 and 12. Nevertheless, we saw exceptions where counselors actively placed ninth graders into introductory electives or when middle school exposure built early interest that carried over into high school. Indeed, district interview respondents often shared their belief that students who encounter computer science concepts before high school through integrated STEM units, robotics, or technology electives are more likely to enroll in high school computer science courses. Consistent with this perspective, respondents in every district described efforts to expand elementary and middle school exposure to ensure students enter high school better prepared and familiarized with computer science concepts.

Hispanic and Black Students Participated at Lower Levels

Patterns of computer science enrollment by race and ethnicity in many case study districts matched nationwide findings of underrepresentation among Hispanic and Black students (Code.org, 2025; U.S. Department of Education, 2024; Gangas, 2024). Although most districts did not identify explicit recruitment plans for underrepresented racial groups, some interview respondents described strategies like including culturally relevant material and exposing students to role models from underrepresented groups that aimed to make computer science feel more accessible. Representation improved in some sites and remained aligned with overall demographics in others, yet these district experiences suggest that equitable participation requires a deliberate strategy to achieve progress.

Women Participated at Lower Levels

Female students are underrepresented in computer science courses across nearly all districts, reflecting national trends and the stigma that computer science is male dominated (Code.org, 2025; Miller et al., 2024). Teachers noted that girls often feel like the “odd ones out” in classes. Districts have used strategies such as establishing Girls Who Code clubs, highlighting women in computing, and targeted recruitment to overcome this trend. As result, one district received a College Board Female Diversity Award for achieving at least 50% female exam taker representation in AP Computer Science Principles. Districts continued to emphasize intentional recruitment, representation in classroom examples, and scheduling practices that reduce barriers for girls interested in computer science.

EWIG: CS Supports for Computer Science

Interview respondents described ways in which EWIG: CS provided opportunities for teachers to build capacity that would otherwise not have been available to them, but also noted that knowledge and skills alone are insufficient for computer science to take hold in districts and schools.

Summer of CS Created Learning Opportunities Not Otherwise Available

Representatives from all six districts described ways in which professional development opportunities made possible by EWIG: CS played a critical role in growing computer science capacity by exposing teachers—many without prior computer science experience—to computer science concepts, tools, and instructional materials. During the summers of 2024 and 2025, 94 educators across the six districts attended a multiday Summer of CS workshop to build skills needed to integrate computer science into existing subjects, design new elective courses, and align instruction with California's computer science standards. Just as importantly, these workshops created collaborative spaces where often-isolated teachers could share resources and troubleshoot challenges while building a professional community. Interview respondents consistently described EWIG: CS as filling a major training gap that districts could not address independently due to budget constraints and limited internal expertise.

Professional Development Alone Leaves Important Challenges Unresolved

Despite its perceived usefulness, professional development alone could not overcome structural barriers that most districts faced. Staffing shortages driven by limited funding, recruitment challenges, and turnover restrict course availability. Even when more teachers gained computer science skills, packed student and teacher schedules left little room for additional computer science sections. These perspectives suggest that EWIG: CS played a valuable role in strengthening teacher capacity and enthusiasm, but needs to be one of multiple strategies to address the systemic issues that can enable computer science expansion districtwide.

AIR®

JURUPA UNIFIED SCHOOL DISTRICT

COMPUTER SCIENCE CASE STUDY

JANUARY 2026

Overview

Jurupa Unified School District (USD) is in the early stages of expanding computer science opportunities, offering an Advanced Placement (AP) Computer Science course, Chromebook repair education, and courses with introductory coding while weaving computer science concepts into other areas like engineering and digital technology. The district has embraced computer science more fully at the elementary level, where leaders believe that hands-on learning naturally aligns with the subject, but secondary offerings remain limited and vary by site. Access depends heavily on teacher initiative and site-specific programs, with only a fraction of potential students currently served. Support from district leadership, the IT department, and professional development funded through the Educator Workforce Investment Grant in Computer Science (EWIG: CS) has encouraged educators to bring more computer science into their classrooms. Leaders see computer science as part of a broader mission to promote future readiness. As one district leader noted, "We try to make sure that all of our students have access to courses of rigor that are going to prepare them for either college or career." Jurupa is focused on growing teacher capacity, leveraging technology investments, and sustaining programs that reach more students over time.

> **"We try to make sure that all of our students have access to courses of rigor that are going to prepare them for either college or career."**

Jurupa Unified School District

Jurupa USD serves approximately 18,000 K–12 students in Riverside County, California, across a mix of rural and suburban communities in the Inland Empire. A Title I district with a predominantly Hispanic student population, many English learners, and significant socioeconomic diversity, Jurupa USD operates with the motto "Learning Without Limits." All students in Grades 2–12 receive Chromebooks for use at home and in school. Middle and high school students can join programs like Dell Student TechCrew, an elective that provides students with professional skills and industry certification in IT repair. Although Jurupa USD has strong pockets of computer science activity—such as site-specific courses in robotics, esports, and animation—general access remains uneven and physical computing opportunities are limited. District leaders, school administrators, and teachers are collaborating to

expand offerings, build on early elementary successes, and make computer science a consistent, sustainable part of the student experience.

Computer Science Course Offerings

The number of standalone computer science courses in Jurupa has fluctuated, with spikes in 2018–19 and 2021–22 followed by declines in adjacent years. The first spike stemmed from the establishment of the Dell Student TechCrew program in middle schools, while the second coincided with its expansion to all high schools. Course availability depends on staffing, and numbers rise and fall with the presence or loss of key teachers and advocates. The district's high schools offer Introduction to Computer Science and AP Computer Science A.

Exhibit 1. Computer Science Course Enrollment in Jurupa USD

Year	Computer science students	Computer science courses
2018–19	471	18
2019–20	138	5
2020–21	189	6
2021–22	401	12
2022–23	159	7
2023–24	192	8

At the middle school level, elective courses supporting Dell Student TechCrew, robotics, animation, and esports expose students to computer science concepts, though offerings are shaped by site-specific priorities, teacher availability, and funding. Elementary schools sometimes feature Hour of Code and other coding activities, but integration into the existing curriculum is inconsistent and often dependent on individual teacher initiative.

Computer Science Course Enrollment

Mirroring the district's course availability, Jurupa's computer science enrollment experience peaks in 2018–2019 and 2021–2022 were followed by sharp declines. District leaders attribute these changes are related to staffing and to broader shifts in overall district enrollment. Access to courses varies widely by school and depends heavily on counselor assignments, student interest, and whether teachers with interest and knowledge in computer science are available to teach electives. Ninth graders are often overrepresented, partly because of entry-level pathways and counselor placement, while 10th and 11th graders appear less frequently in computer science classrooms. Although the course counts presented here do not include esports and digital technology courses, district leaders believe that student exposure to computer science concepts in these classes reveals a growing interest in the subject.

Enrollment by Grade Level

By grade level, participation reflects factors related to scheduling and course promotion in the district. At the middle school level, access happens primarily through Dell Student TechCrew, which draws high enrollment but is available only through a limited number of elective slots. At the high school level, counselors play a key role promoting computer science to incoming freshmen. One administrator explained, "You see such a high participation rate in 9th graders [. . .] because the counselors are enrolling the students." Teachers cited limited schedule flexibility and the prioritization of core courses as the main factors impacting enrollment among sophomores and juniors, who are often focused on meeting graduation requirements ahead of senior year.

Exhibit 2. Jurupa USD Computer Science Course Enrollment by Grade Level

Grade	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
7	18%	37%	0%	29%	45%	35%	41%
8	18%	37%	0%	26%	32%	7%	10%
9	13%	8%	41%	24%	11%	27%	19%
10	13%	3%	7%	4%	2%	2%	2%
11	17%	5%	25%	8%	7%	7%	10%
12	20%	10%	27%	8%	3%	22%	18%

Source: CALPADS.

Exhibit Reads: In 2023–24, 13% of students in Jurupa between Grades 7 and 12 were in Grade 10. In 2023–24, 2% of students enrolled in a computer science course in Jurupa were in Grade 10.

Enrollment by Race/Ethnicity

Representation by race and ethnicity in computer science courses largely mirrors the district's overall population. The majority of students in classes are Hispanic and the participation of White, Black, and Asian students shows slight variation from year to year.

Exhibit 3. Jurupa USD Computer Science Course Enrollment by Race/Ethnicity

Race/ethnicity	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Asian	1%	3%	4%	1%	1%	1%	1%
Black/African American	2%	1%	1%	1%	1%	0%	4%
Hispanic	88%	86%	80%	91%	89%	89%	83%
White	6%	9%	12%	7%	6%	9%	8%

Source: CALPADS

Notes. Demographic groups 'Missing,' 'American Indian/Alaska Native,' 'Native Hawaiian/Other Pacific Islander,' 'Filipino,' 'Multiple Races' are not included in the exhibit because the percentage of students in these groups is lower than 1%. The sum of the percentages may not equal 100%.

Exhibit Reads: In 2023–24, 88% of students in Jurupa were Hispanic. In 2023–24, 83% of students enrolled in a computer science course in Jurupa were Hispanic.

Enrollment by Gender

Male students are consistently overrepresented in computer science courses compared to their share of the overall student population, while female students remain underrepresented. District leaders are aware of this imbalance and described a desire to encourage girls, alongside other underrepresented groups, to enroll in computer science.

Exhibit 4. Jurupa USD Computer Science Course Enrollment by Gender

Gender	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Female	49%	24%	26%	27%	31%	32%	25%
Male	51%	76%	74%	73%	69%	68%	75%

Source: CALPADS

Exhibit Reads: In 2023–24, 49% of students in Jurupa were female. In 2023–24, 25% of students enrolled in a computer science course in Jurupa were female.

The Educator Workforce Investment Grant's Role in Supporting Computer Science Efforts

> **"Oftentimes with computer science, you're a department of one . . . [Summer of CS] is like a massive department meeting."**

Jurupa Unified has relied on opportunities created through EWIG: CS to strengthen teacher capacity in computer science—particularly for educators new to the subject or coming from non-traditional computer science backgrounds. Summer of CS registration records indicate that 19 Jurupa educators participated in an EWIG: CS-sponsored learning opportunity during the 2023–24 school year and 13 participated during the 2024–25 school year. EWIG: CS-funded programs like Summer of CS have introduced teachers across grade levels and subject areas to core computer science concepts and classroom strategies. These opportunities provide training that is otherwise difficult to fund, especially amid staffing reductions in the Education-Information Technology department. For some teachers, EWIG-sponsored professional development has equipped educators with knowledge and skills that enable them to offer new courses or integrate computer science into existing subject areas. Aside from skill-building, the trainings create a space for collaboration among Jurupa's often isolated computer science teachers—allowing them to share resources and feel part of a larger professional community. As one teacher described, "Oftentimes with computer science, you're a department of one . . . this [Summer of CS professional development] is like a massive department meeting."

The Path Ahead

Jurupa USD is looking to expand computer science access across all grade levels, emphasizing embedding computer science concepts into existing curricula while increasing standalone course offerings. Leadership knows that outreach and marketing will be key to increasing student awareness and interest, especially for students who may not currently see themselves in computer science. After reviewing participation data, leaders have begun to consider targeted recruitment strategies for underrepresented populations, including female students, while also working to build capacity among current teachers. As one administrator explained, “This is something that we need to continue to get better at—offering it more, and more integrated.” Efforts will focus on leveraging strong existing programs, like the Dell Student Tech Crew, and exploring industry partnerships and learning opportunities that prepare educators to teach computer science in engaging, culturally relevant way.

The American Institutes for Research (AIR) has produced this case study as part of its evaluation of California’s Educator Workforce Investment Grant in Computer Science (EWIG: CS). It is one of six case studies designed to illustrate the contextual details, strategies, successes, and challenges that shape efforts to expand computer science education in the state. For more information on the AIR evaluation, including additional findings about the EWIG: CS grant, please visit https://www.air.org/project/evaluation-educator-workforce-investment-grant-computer-science

AIR® | **AIR® Headquarters**
1400 Crystal Drive, 10th Floor | Arlington, VA 22202-3289 | +1.202.403.5000 | **AIR.ORG**

OAKLAND UNIFIED SCHOOL DISTRICT

COMPUTER SCIENCE CASE STUDY | JANUARY 2026

Overview

Oakland Unified School District (USD) has a long-standing approach to computer science education that embraces the exploration of new content areas and approaches to expanding access for students. The district offers computer science across multiple grade levels, with particularly strong middle school access and high school pathways that include Advanced Placement (AP) Computer Science courses and sequenced coursework in specialized academies. These efforts are supported by a small central computer science team and philanthropic partnerships that have enabled experimentation with emerging areas such as data science, robotics, and artificial intelligence (AI). Nevertheless, access remains uneven across schools, especially at the high school and elementary levels, where offerings depend on staffing capacity, site priorities, and pathway structures. As Oakland USD works to stabilize staffing, strengthen coherence, and expand access at schools that currently lack computer science, district leaders describe this period as one of refinement and sustainability, balancing innovation with more consistent and equitable implementation.

Oakland Unified School District

Oakland USD is a large, urban TK–12 district in the Bay Area serving more than 45,000 students. The district's computer science efforts are led by a small, centralized team that includes a computer science coordinator, a computer science specialist, and an engineering coach. These positions, along with dedicated full-time computer science positions in the middle schools are supported in part through a philanthropic partnership with Salesforce that launched in 2016. This funding enables the district to build and sustain capacity beyond the means of district resources alone. District leaders describe a "try it and see" approach that encourages innovation and responsiveness to student interests, shaped by the district's diverse student population and proximity to Silicon Valley. Computer science at the elementary level remains decentralized and dependent on individual teacher initiative, while high school access varies by site and pathway structure, with some schools requiring all ninth graders to take AP Computer Science Principles (CSP) and others offering computer science only through electives or within specialized academies.

Computer Science Course Offerings

Computer science offerings in Oakland USD vary by grade level and school site. At the elementary level, there is no districtwide computer science curriculum; access is ad hoc and depends on individual teacher interest or the presence of site-funded technology teachers, often supported through local budgets. Middle school students historically have had broader access through standalone computer science courses, with some schools offering a semester-long introductory course in sixth grade followed by full-year options in seventh and eighth grades. Middle school curricula emphasize foundational computer science concepts such as problem solving, decomposition, and debugging and include programming, physical computing with tools like Circuit Playground and LEGO robotics, animation and storytelling, emerging AI units, and a newly developed data science unit. To support coherence across multiple years of coursework, the district has developed scope-and-sequence guidance to reduce content repetition. High school offerings are more uneven and shaped by pathway structures and staffing. Some schools require all ninth graders to enroll in AP CSP, with exam participation varying by site, while others offer AP CSP as an elective or within specialized pathways. At Oakland Technical High School, for example, a dedicated CS academy offers a sequenced pathway in which sophomores code using JavaScript through Code.org curriculum, juniors transition to coding with Python, and seniors complete capstone projects in areas such as Unity game development or web design. Across grade levels, course availability fluctuates in response to staffing capacity, bell schedule configurations, teacher turnover, and dual enrollment decisions.

Exhibit 1. Computer Science Course Enrollment in Oakland USD

Year	Computer science students	Computer science courses
2018–19	2,285	92
2019–20	2,246	96
2020–21	1,227	54
2021–22	2,006	97
2022–23	1,720	83
2023–24	1,842	83
2024–25	2,283	97

Computer Science Course Enrollment

Computer science enrollment in Oakland USD reflects both broad early exposure and uneven access across later grades and school sites. Enrollment is highest in ninth grade, and enrollment patterns by race/ethnicity and gender largely mirror districtwide demographics. Nevertheless, disparities persist at

schools that do not offer computer science, many of which serve predominantly Black and Hispanic student populations.

Enrollment by Grade Level

Computer science participation in Oakland USD is highest in ninth grade, particularly at schools where AP CSP is required or widely offered. This structure creates broad early exposure but does not extend uniformly into upper grades. Enrollment drops sharply in Grades 10–12 as access becomes increasingly tied to pathway participation, with guaranteed opportunities largely limited to students enrolled in designated computer science or technical academies. Students outside these pathways often face scheduling constraints that limit continued participation.

Exhibit 2. Oakland USD Computer Science Course Enrollment by Grade Level

Grade	Overall enrollment 2024–25	Computer science enrollment						
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
6	13%	13%	13%	23%	21%	22%	18%	18%
7	12%	11%	10%	11%	8%	13%	12%	9%
8	13%	10%	12%	11%	9%	13%	14%	11%
9	15%	63%	37%	36%	36%	25%	26%	27%
10	15%	1%	14%	9%	11%	11%	13%	12%
11	15%	0%	6%	8%	9%	10%	11%	13%
12	13%	1%	9%	2%	7%	7%	8%	10%

Source: CALPADS, Oakland USD Department of Research, Assessment, and Data

Exhibit Reads: In 2024–25, 15% of students in Oakland between Grades 6 and 12 were in Grade 10. In 2024–25, 12% of students enrolled in a computer science course in Oakland were in Grade 10.

Enrollment by Race/Ethnicity

Enrollment patterns by race and ethnicity generally reflect districtwide demographic trends. Declines in Black student participation in computer science mirror overall decreases in Black student enrollment across the district, while Hispanic participation has increased alongside broader demographic growth. District leaders noted that access disparities persist across school sites, as several high schools serving predominantly Black and Hispanic student populations do not offer computer science courses due to structural factors such as staffing capacity and availability of full-time computer science teachers.

Exhibit 3. Oakland USD Computer Science Course Enrollment by Race/Ethnicity

Race/ethnicity	Overall enrollment 2024–25	Computer science enrollment						
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
Asian	10%	16%	18%	14%	15%	13%	15%	13%
Hispanic	48%	39%	39%	41%	40%	38%	41%	46%
White	12%	10%	10%	12%	11%	13%	12%	12%
Black/African American	19%	28%	25%	24%	23%	22%	21%	20%
Filipino	0%	1%	1%	1%	1%	1%	1%	1%
Multiple	7%	3%	4%	5%	7%	8%	8%	6%

Source: CALPADS, Oakland USD Department of Research, Assessment, and Data

Note. Demographic groups 'Missing,' 'American Indian/Alaskan Native,' and 'Native Hawaiian/Other Pacific Islander' are not included in the exhibit because the percentage of students in these groups is lower than 1%. The sum of the percentages may not equal 100%.

Exhibit Reads: In 2024–25, 48% of students in Oakland were Hispanic. In 2024–25, 45% of students enrolled in a computer science course in Oakland were Hispanic.

Enrollment by Gender

Female participation in computer science approximates overall district gender demographics. Educators attribute this pattern to intentional recruitment efforts and the presence of female computer science teachers, particularly in middle school, where access has historically been more consistent due in part to the availability of full-time computer science teachers. Despite this progress, leaders emphasized the need for continued attention to recruitment and scheduling practices to sustain participation beyond introductory courses.

Exhibit 4. Oakland USD Computer Science Course Enrollment by Gender

Gender	Overall enrollment 2023–24	Computer science enrollment						
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24	2024–25
Female	48%	43%	40%	41%	40%	39%	43%	43%
Male	52%	57%	60%	59%	60%	61%	57%	57%

Source: CALPADS, Oakland USD Department of Research, Assessment, and Data

Exhibit Reads: In 2024–25, 48% of students in Oakland were female. In 2023–24, 43% of students enrolled in a computer science course in Oakland were female.

In Oakland USD, professional learning supported through the Educator Workforce Investment Grant in Computer Science (EWIG: CS) played a targeted but important role in building teacher capacity for computer science instruction. District leaders described Summer of CS and related offerings as especially valuable after county offices stopped providing Code.org training, making EWIG: CS one of the few available avenues for curriculum-aligned computer science professional development. Most Oakland participants used EWIG: CS to access Code.org training, which supported inexperienced computer science teachers and reinforced instructional strategies focused on engagement and problem solving. Teachers also reported that EWIG: CS workshops helped them rethink how to design lessons for diverse learners and provided opportunities to connect with peers beyond the district. For a small central computer science team, this external professional development also reduced the burden of providing instructional support internally. Nevertheless, district leaders expressed concern about the sustainability of this support due to uncertainty about whether comparable training opportunities will be available once EWIG: CS funding ends.

> **“Summer of CS super helpful . . . it changed my perspective on how to approach [AP Computer Science Principles] lessons.”**

The Path Ahead

Looking ahead, Oakland USD leaders are focused on strengthening coherence and expanding equitable access to computer science across grade levels. A key priority is developing a more intentional elementary computer science strategy, potentially through targeted professional development and small-scale pilots, after earlier plans stalled due to funding constraints. At the secondary level, leaders aim to expand access at high schools that currently offer no computer science—many of which serve predominantly Black and Hispanic student populations—while maintaining or stabilizing middle school offerings through flexible staffing approaches. The district also plans to continue advancing curriculum in emerging areas such as AI, data science, robotics, and physical computing, reflecting changes in industry and student interest. Recruitment remains a focus, with leaders emphasizing the importance of teacher referrals, counselor engagement, and peer outreach, alongside investments in classroom equipment and infrastructure to ensure reliable instruction. One vehicle for raising awareness and fostering the growth of community partnerships is a districtwide STEM fair, which is expanding to a larger venue to showcase student projects and external collaborations.

> **“AI is here. Data Science isn’t happening in other districts, but it is happening here.”**

The American Institutes for Research (AIR) has produced this case study as part of its evaluation of California’s Educator Workforce Investment Grant in Computer Science (EWIG: CS). It is one of six case studies designed to illustrate the contextual details, strategies, successes, and challenges that shape efforts to expand computer science education in the state. For more information on the AIR evaluation, including additional findings about the EWIG: CS grant, please visit https://www.air.org/project/evaluation-educator-workforce-investment-grant-computer-science

AIR® | **AIR® Headquarters**
1400 Crystal Drive, 10th Floor | Arlington, VA 22202-3289 | +1.202.403.5000 | **AIR.ORG**

AIR

SHASTA UNION HIGH SCHOOL DISTRICT

COMPUTER SCIENCE CASE STUDY

JANUARY 2026

Overview

Shasta Union High School District (HSD) is broadening access to computer science (CS) by weaving content into courses like robotics and engineering while also offering standalone courses like Advanced Placement (AP) Computer Science A and Computer Science Principles. Some barriers to widespread participation persist: Not all schools offer the same classes, enrollment skews toward male and non-Hispanic students, and enrollment in elective courses depends on teachers actively promoting the computer science class. Nevertheless, support for professional learning through workshops provided by the Educator Workforce Investment Grant in Computer Science (EWIG: CS) has helped teachers feel more confident about bringing computer science into the classroom. The district is exploring schedule changes and expanding training to make room for more computer science as part of a broader effort to make it a lasting part of the student experience.

Shasta Union High School District

Shasta Union HSD serves approximately 4,200 students across three comprehensive high schools in a rural region spanning 1,800 square miles in Northern California. The district draws students from multiple different districts and other feeder schools and faces challenges related to geography, staffing, and course consistency. Although all three high schools have offered AP computer science courses at various points, current offerings are limited, with only one site consistently running both Computer Science A and Computer Science Principles. To broaden access, some Shasta teachers are integrating computer science into other subjects like robotics and manufacturing and piloting elective showcases and response to intervention (RTI) enrichment blocks to boost participation.

Before the 2018–19 academic year, district leadership set out to establish robust computer science programming, recruiting multiple educators to launch that effort. Staffing changes slowed that momentum, but renewed encouragement and support from the central office has helped get the program back on track. Enterprise High School is now at the center of this work, with one highly influential teacher teaching multiple classes that feature computer science content and encouraging colleagues to embrace opportunities to learn. This effort, backed by engaged site administrators, demonstrates the promise of what a sustained and expanding computer science approach could entail.

Computer Science Course Offerings

Shasta has offered AP Computer Science A and Computer Science Principles at various times across its three high schools, though offerings have changed from year to year and site to site. In 2023–24, two high schools each offered either AP Computer Science A or Computer Science Principles. Enrollment has shifted throughout the years, with noticeable declines following the COVID-19 pandemic.

Exhibit 1. Computer Science Course Enrollment in Shasta High Schools

Year	Computer science students	Computer science courses
2018–19	83	5
2019–20	78	4
2020–21	33	3
2021–22	18	1
2022–23	14	1
2023–24	32	2

Key challenges include staffing constraints and competition for limited elective space in students' schedules. Because computer science is taught by teachers with other primary assignments—often in math—course availability depends on whether those teachers have the interest and capacity to teach computer science. Moreover, students who choose to enroll in standalone computer science courses do so while faced with many other elective options. The result, in effect, is that computer science is competing with other classes for students' attention. As one district representative explained, "Kids need a little nudge . . . If you're not there to provide that nudge, maybe they won't select your course."

> **"Kids need a little nudge . . . If you're not there to provide that nudge, maybe they won't select your course."**

Two additional dynamics complicate this challenge. One is Shasta's status as a high school district. Because students enter the district from a range of different middle schools in multiple feeder districts, Shasta educators do not have the opportunity to build awareness and common experiences in the early grades that might spark interest in computer science when students arrive in high school. The second is Shasta's geographic setting. Because the community is physically distant from the technology hubs elsewhere in the state, students and families do not always see the value or practical application of computer science knowledge and skills in the context where they live. Despite these obstacles, district leaders are also working to embed computer science concepts into other subjects and electives, aiming to expand exposure beyond traditional course pathways.

Computer Science Course Enrollment

Shasta experienced a decline in computer science enrollment following the 2018–2019 school year, a trend district leaders attribute to staffing shortages that limited course availability. "I would say [the enrollment decline] is probably because of a teacher shortage—specifically math and science teacher shortage," one leader explained. Enrollment dipped further during and after the pandemic, and disparities remain across grade levels, gender, and race, with male and Asian students overrepresented and fewer female and Hispanic students participating.

Enrollment by Grade Level

Grades 11 and 12 students consistently made up the largest share of Shasta computer science course participants. These trends reflect scheduling constraints and limited elective flexibility in lower grades. Because Shasta high schools feature six periods and because of the other required coursework for underclassmen, many younger students simply do not have the option of taking computer science. As one district leader explained, "We're looking at [changing scheduling through options that could include] block schedule, 7-period day . . . because it's not good for kids. They need to have some choice."

> **"We're looking at [changing scheduling such as] block schedule, 7-period day . . . because it's not good for kids. They need to have some choice."**

Exhibit 2. Shasta Union HSD Computer Science Course Enrollment by Grade Level

Grade	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
9	25%	8%	13%	31%	5%	29%	13%
10	28%	12%	27%	24%	28%	0%	31%
11	24%	39%	33%	27%	39%	50%	28%
12	23%	41%	27%	18%	28%	21%	28%

Source: CALPADS.

Exhibit Reads: In 2023–24, 28% of students in Shasta were in Grade 10. In 2023–24, 31% of students enrolled in a computer science course in Shasta were in Grade 10.

Enrollment by Race/Ethnicity

Computer science course enrollment in Shasta reflects disparities by race and ethnicity. Asian students are consistently overrepresented in computer science courses—for example, they made up 8% of computer science students in 2023–24, compared to just 3% of the overall student population. Hispanic students participated at levels that were comparable to their overall representation in the student body from 2018–19 through 2020–21, but these percentages have dropped in recent years, at 9% of computer science students in 2023–24 despite making up more than 16% of the district. District leaders recognize these gaps and, according to one administrator, "We want our Hispanic students or Latina students to see adults that look like them." Leaders are also working to shift perceptions of computer science and make it feel more accessible and welcoming to students from all backgrounds.

Exhibit 3. Shasta HSD Computer Science Course Enrollment by Race/Ethnicity

Race/ethnicity	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
American Indian/Alaska Native	4%	1%	3%	0%	0%	0%	3%
Asian	3%	10%	9%	15%	6%	0%	9%
Hispanic	16%	16%	11%	18%	11%	0%	9%
White	68%	69%	76%	58%	72%	93%	63%
Multiple races	4%	2%	1%	6%	11%	7%	9%

Source: CALPADS

Notes. Demographic groups 'Missing,' 'Black,' 'Native Hawaiian/Other Pacific Islander' are not included in the exhibit because the percentage of students in these groups is lower than 2%. The sum of the percentages may not equal 100%.

Exhibit Reads: In 2023–24, 16% of students in Shasta were Hispanic. In 2023–24, 9% of students enrolled in a computer science course in Shasta were Hispanic.

Enrollment by Gender

Male students are consistently overrepresented in computer science courses compared to their share of the overall student population in Shasta, while female students remain underrepresented. District leaders are aware of this imbalance and have made efforts to encourage girls, alongside other underrepresented groups, to enroll in CS. As one administrator noted, "We've been purposeful in trying to encourage girls . . . but when I walk into classes, the numbers are even more skewed."

Exhibit 4. Shasta USD Computer Science Course Enrollment by Gender

Gender	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Female	49%	43%	36%	42%	33%	29%	44%
Male	51%	57%	64%	58%	67%	71%	53%

Source: CALPADS

Note. The sum of percentages for 2023–24 does not equal 100 because 3% of students in computer science courses were nonbinary.

Exhibit Reads: In 2023–24, 49% of students in Shasta were female. In 2023–24, 44% of students enrolled in a computer science course in Shasta were female.

The Educator Workforce Investment Grant's Role in Supporting Computer Science Efforts

The Educator Workforce Investment Grant in Computer Science (EWIG: CS) has played a key role in supporting teacher training and course sustainability in Shasta. Programs like Seasons of CS have provided hands-on professional learning that the district would not have been able to offer on its own; four Shasta educators attended CSPDWeek in 2025. These opportunities are especially valuable for instructional coaches, new hires, and teachers without prior experience in computer science, helping them build skills with tools like Scratch, Minecraft, and resources from Code.org with confidence. Leaders emphasized that teachers often need more than a single training. They need time and repetition to build comfort, and EWIG: CS has filled that gap. As one leader noted, "EWIG has done a very good job of creating a lot of opportunities for staff . . . There's a lot of different places for people to have that entry point." The grant has also helped scale computer science professional learning across the district by creating internal champions who model the integration of computer science material into other content areas and help sustain momentum. District leaders view EWIG: CS as a critical support in building the long-term capacity to cement computer science in instruction.

> **"EWIG has done a very good job of creating a lot of opportunities for staff . . . There's a lot of different places for people to have that entry point."**

The Path Ahead

Shasta district leaders are pursuing several strategies to expand computer science access. High school leaders are working to expand course availability by addressing schedule limitations and staffing shortages. The district is exploring structural reforms such as block scheduling and a 7-period day to increase access.

To build long-term teaching capacity, Shasta is prioritizing recruiting educators who are enthusiastic about computer science and committed to growing the program alongside existing champions. Central office support—described by teachers and administrators as a key factor in their willingness to take on computer science—remains strong, and instructional coaches and teachers continue to attend trainings like Summer of CS and site visits at regional schools with strong computer science programs. These attendees bring back ideas and practices to share across sites. Leadership modeling also plays a role: Administrators have incorporated coding activities into meetings to normalize participation. This combination of teacher interest, administrative support, and peer-to-peer recruitment contributes to growing optimism that computer science programming will become a part of Shasta's curriculum that is accessible to all.

The American Institutes for Research (AIR) has produced this case study as part of its evaluation of California's Educator Workforce Investment Grant in Computer Science (EWIG: CS). It is one of six case studies designed to illustrate the contextual details, strategies, successes, and challenges that shape efforts to expand computer science education in the state. For more information on the AIR evaluation, including additional findings about the EWIG: CS grant, please visit https://www.air.org/project/evaluation-educator-workforce-investment-grant-computer-science

AIR® | **AIR® Headquarters**
1400 Crystal Drive, 10th Floor | Arlington, VA 22202-3289 | +1.202.403.5000 | **AIR.ORG**

AIR

TRACY UNIFIED SCHOOL DISTRICT

COMPUTER SCIENCE CASE STUDY | JANUARY 2026

Overview

Tracy Unified School District (USD) is working to bring computer science to more students by embedding computer science content into STEM units in all grade levels. The overall number of standalone computer science courses available in Tracy USD is growing but features substantial variation, and those courses feature lower percentages of younger, female, and Hispanic than the district population. District leaders report that in a district that has committed to expanding computer science learning opportunities, support from the Educator Workforce Investment Grant in Computer Science (EWIG: CS) has helped teachers get more comfortable teaching the content. As it moves forward, Tracy USD is trying to make space in schedules and find teachers who are excited about computer science so more students have the chance to participate.

Tracy Unified School District

Tracy Unified School District is situated in a growing community of over 89,000 in San Joaquin Valley, California. The district serves nearly 16,000 students in three high schools, two middle schools, four K–8 schools, and seven elementary schools. Tracy recently rebranded as a Pre K–12 STEM district with a mission that one district leader described as using "engaging STEM experiences [to] connect each student to the real world and prepare them for college and career success through collaboration, critical thinking, and problem solving." To bring this new emphasis to life in classrooms, the district used a federal Education Innovation and Research grant to create four STEM units per grade level. Each unit is designed to reach all students in the district. Computer science is central to these units, which district leaders see as vehicles to expose all students to computer science knowledge and skills not just those who take standalone courses in high school. According to one administrator, "Our approach is, if we embed computer science opportunities [in] prekindergarten through [Grade] 12 in the general curriculum, then all students will have access."

> **"If we embed computer science opportunities PK through 12 in the general curriculum, then all students will have access."**

Computer Science Course Offerings

The number of standalone computer science courses in Tracy is growing but inconsistent; enrollment declined after the onset of the COVID-19 pandemic and rebounded in recent years. Introduction to Computer Science, Introduction to Computer Science: Java, and AP Computer Science are offered at Tracy high schools.

Exhibit 1. Computer Science Course Enrollment in Tracy High Schools

Year	Computer science students	Computer science courses
2018–19	53	3
2019–20	112	5
2020–21	62	2
2021–22	72	3
2022–23	141	5
2023–24	143	6

Challenges to maintain computer science enrollment include master scheduling constraints, limits on teacher capacity, and a lack of time for electives. Because the district has not hired teachers specifically to teach standalone computer science classes, course availability hinges on the availability of credentialed and engaged teachers—in Tracy, typically math teachers—at each site. Moreover, because computer science classes are electives, building courses into the schedule relies on student interest. According to one district leader, "You need to have a teacher that has a passion for computer science and then they need to promote it to students."

Because Tracy embeds computer science concepts into STEM units across all grade levels, the number of standalone courses and enrolled students does not necessarily reflect the district's efforts to expose K–12 students to computer science through integrated instruction.

> **"You need to have a teacher that has a passion for computer science and then they need to promote it to students."**

Computer Science Course Enrollment

Although enrollment in computer science courses has grown overall, there are disparities in access among students based on grade level, race, and gender. In addition to matters of teacher availability and student interest, district leaders suggested that school culture also impacts enrollment: Schools with STEM-focused academies such as the Space & Engineering Academy encourage students to enroll in computer science courses. Other schools might not emphasize the importance of computer science enrollment as much.

Enrollment by Grade Level

> **It's not that students don't want to take the class, but they literally can't make it work.**

The majority of students in computer science courses in nearly every school year are in Grade 12. In Tracy, sophomores rarely have space in their schedules for computer science electives; only 5% of students in 2023–24 were in Grade 10. As one district representative explained, "It's not that students don't want to take the class, but they literally can't make it work." Prerequisites also affect opportunities: Students in Grades 9 and 10 are less likely to have completed the required algebra courses to enroll in either introductory or Advanced Placement computer science courses. As a result, juniors and seniors compose a greater share of computer science students across all years.

Exhibit 2. Tracy USD Computer Science Course Enrollment by Grade Level

Grade	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
9	24%	6%	5%	34%	4%	14%	15%
10	25%	28%	3%	0%	5%	6%	5%
11	25%	21%	28%	40%	24%	30%	28%
12	26%	45%	64%	26%	67%	50%	52%

Source: CALPADS.

Exhibit Reads: In 2023–24, 24% of students in Tracy were in Grade 10. In 2023–24, 5% of students enrolled in a computer science course in Tracy were in Grade 10.

Enrollment by Race/Ethnicity

In addition to differences based on grade level, computer science course enrollment data in Tracy reveal disparities in participation based on race and ethnicity. The percentage of Asian students taking computer science courses is consistently higher than the percentage of Asian students in the district overall. The percentage of Hispanic students taking computer science courses is consistently lower than their representation in the general student body. The district is aware of low computer science enrollment among the Hispanic population and has specifically targeted Latina students using Technolochicas marketing materials such as posters on school grounds to showcase successful Latinas in computer science.

Exhibit 3. Tracy USD Computer Science Course Enrollment by Race/Ethnicity

Race/ethnicity	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Asian	16%	19%	41%	27%	39%	48%	48%
Black/African American	6%	7%	4%	5%	4%	5%	2%
Filipino	6%	23%	11%	21%	13%	10%	9%
Hispanic	50%	24%	16%	21%	29%	18%	19%
White	17%	25%	21%	16%	10%	15%	15%
Multiple races	5%	2%	6%	6%	3%	4%	5%

Source: CALPADS

Notes: Demographic group 'Missing' is not included in the exhibit. The sum of the percentages may not equal 100%.
Exhibit Reads: In 2023–24, 50% of students in Tracy were Hispanic. In 2023–24, 19% of students enrolled in a computer science course in Tracy were Hispanic.

Enrollment by Gender

In Tracy, the percentage of male students taking computer science courses is consistently higher than the percentage of male students in the district overall. The percentage of female students is consistently lower than the district overall. The district is working on improving female underrepresentation by supporting STEM clubs in middle and high schools. The district works with the nonprofit, Girls Who Code, via Lawrence Livermore National Lab to offer virtual support and mentorship in Grade 6–12 Girls Who Code clubs.

Exhibit 4. Tracy USD Computer Science Course Enrollment by Gender

Gender	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Female	48%	26%	20%	61%	32%	28%	17%
Male	52%	74%	80%	39%	68%	72%	83%

Source: CALPADS
Exhibit Reads: In 2023–24, 48% of students in Tracy were female. In 2023–24, 17% of students enrolled in a computer science course in Tracy were female.

The Educator Workforce Investment Grant's Role in Supporting Computer Science Efforts

As Tracy continues to build its identity as a PreK–12 STEM district, the administration has relied significantly on EWIG: CS to fill critical gaps in professional development—particularly for new teachers and those with limited computer science experience. Seasons of CS registration records indicate that 29 Tracy educators participated in an EWIG: CS-sponsored learning opportunity during the 2023–24 school year. Programs like Summer of CS and Seasons of CS serve as essential supplements to district-led training, providing hands-on learning opportunities that the district could not offer on its own due to budget limitations. As one administrator explained, "The district has a hard time providing enough training for all of our teachers . . . The EWIG grant allowed teachers to receive additional training." This extra training is especially valuable for newly hired math teachers to gain the skills and confidence needed to integrate CS tools into their classrooms. District leaders have found that the additional training often translates into a greater willingness to teach computer science courses.

> **"The district has a hard time providing enough training for all of our teachers . . . The EWIG grant allowed teachers to receive additional training."**

The Path Ahead

As Tracy continues to evolve as a STEM district, expanding access to computer science remains a central focus. At the middle school level, the district plans to increase the number of middle schools offering STEM electives—three of six campuses will introduce options next year. At the high school level, the district aims to grow its computer science course offerings by addressing current constraints: staffing limitations and scheduling challenges.

With respect to scheduling challenges, the district is exploring schedule reforms such as block scheduling and the implementation of a 7-period class day. These changes are designed to create more flexibility in students' schedules, allowing room for electives like computer science that are often out of reach due to core graduation requirements.

To overcome staffing challenges, the district plans to actively recruit and train teachers with a strong interest in computer science. District leaders view hiring educators who are excited about computer science as an instrumental step toward building a sustainable pipeline of computer science instruction. In addition to recruitment, Tracy is committed to building capacity by supporting current teachers through ongoing professional learning. Programs like Seasons of CS provide training that the district otherwise could not afford—particularly benefiting new teachers or those with limited experience in computer science.

Equity and inclusion are growing priorities in Tracy's approach to computer science in the district. District leaders are focused on culturally relevant and engaging projects that help students—particularly those from underrepresented backgrounds—see themselves in computer science. "When working with underrepresented populations. . . we need to provide even more support," one interviewee emphasized. These efforts aim to increase participation and to retain students through meaningful and affirming learning experiences.

> **"When working with underrepresented populations . . . we need to provide even more support."**

The American Institutes for Research (AIR) has produced this case study as part of its evaluation of California's Educator Workforce Investment Grant in Computer Science (EWIG: CS). It is one of six case studies designed to illustrate the contextual details, strategies, successes, and challenges that shape efforts to expand computer science education in the state. For more information on the AIR evaluation, including additional findings about the EWIG: CS grant, please visit https://www.air.org/project/evaluation-educator-workforce-investment-grant-computer-science

AIR® Headquarters
1400 Crystal Drive, 10th Floor | Arlington, VA 22202-3289 | +1.202.403.5000 | AIR.ORG

AIR

TURLOCK UNIFIED SCHOOL DISTRICT

COMPUTER SCIENCE CASE STUDY

JANUARY 2026

Overview

Turlock Unified School District (USD) is in the early stages of expanding computer science opportunities across grade levels. Both comprehensive high schools offer courses such as Advanced Placement (AP) Computer Science Principles and Game Development, but access varies and depends on individual teacher initiative. Historically, district priorities have centered on literacy and math recovery, but recent efforts, including forming a computer science and artificial intelligence (AI) task force, signal a shift toward coordinated computer science planning. As the district works to align programs across the board and increase teacher interest, leaders describe this period as a "building and planning" phase toward a systemic approach to K–12 computer science education.

Turlock Unified School District

Turlock USD serves a growing, diverse agricultural community in the Central Valley. In a district of nearly 14,000 students, two large comprehensive high schools each enroll around 2,000–2,500 students and are supported by one junior high school, one middle school, and several elementary schools. The central office oversees general curriculum and secondary programming, yet each high school operates a single-person computer science department that develops its own coursework. At the middle and junior high school levels, computer science exposure happens in STEM electives and modules of math and science courses. Elementary access is limited to select classrooms taught by teachers who are involved in computer science. The district's decentralized culture encourages teacher initiative and innovation but has led to uneven implementation across schools.

Before the COVID-19 pandemic, the district was ramping up elementary technology integration through Micro:bit training for sixth grade teachers. However, postpandemic emphases on literacy and math recovery put computer science and technology priorities on the back burner. Recently, leadership has reignited computer science planning through an internal computer science and AI task force and collaboration with partners at the Stanislaus County Office of Education. A district leader articulated the shared vision of the task force: "We believe we should teach

> **"We believe we should teach computer science to all students because the evolving workforce demands critical thinking, creativity, and problem-solving skills."**

computer science to all students because the evolving workforce demands critical thinking, creativity, and problem-solving skills."

This vision reflects a cultural shift in Turlock USD that acknowledges the importance of offering computer science education not only as a standalone elective, but as a foundation for college and career readiness. Seeing automation transform, local industries supported the district's consensus that Turlock USD students need computer science skills to keep up with workforce demands. In the meantime, leaders are working to create stronger alignment and expand opportunities so that computer science becomes an established part of the average Turlock student experience.

Computer Science Course Offerings

Current computer science courses in Turlock are all standalone and vary by site. Both high schools offer computer science courses based on teacher capacity and interest. One site offers four courses—AP Computer Science A, AP Computer Science Principles, Exploring Computer Science, and Game Development—taught by a single teacher. The other offers two introductory courses: AP Computer Science Principles and Game Development. Between the two sites, seven class periods are dedicated to computer science.

At its junior high school, Turlock offers a robotics and applied technology elective created by a nonprofit organization that provides hands-on, project-based STEM and career readiness programs for PreK–12 students. At the middle school level, students have access to the Integrated Technology course, which enrolled 241 seventh- and eighth-grade students across four classes in 2022–23 and 192 students across five classes in 2023–24, and significantly boosted overall computer science participation in the district.

Exhibit 1. Computer Science Course Enrollment in Turlock USD

Year	Computer science students	Computer science courses
2018–19	48	2
2019–20	184	7
2020–21	191	11
2021–22	21	2
2022–23	310	12
2023–24	311	14

District leaders are beginning vertical articulation work to align and integrate computer science standards across grade levels. Although district representatives characterize implementation as fragmented and dependent on teacher initiative, one administrator explained, "The goal is to try to keep that variety but have it in a streamlined pathway for students."

Computer Science Course Enrollment

Computer science enrollment in Turlock USD has grown steadily since 2021–22, when the district focused on pandemic recovery and temporarily prioritized core subjects over electives. Growth has been strongest at the high school level, but access varies by site and remains limited by staffing and scheduling—each high school has one computer science teacher, and class sections are capped within the master schedule.

Enrollment by Grade Level

Enrollment skews heavily toward upperclassmen at the high school level. Eleventh- and twelfth-grade students make up the majority of high school participants, while freshmen and sophomores face scheduling barriers due to required coursework in PE, science, and world languages. Seventh and eighth graders at the middle school have access to an Integrated Technology STEM elective serving roughly 100–120 students per grade, while seventh and eighth graders at the junior high enjoy robotics and applied technology through the Project Lead the Way elective. Elementary access remains minimal and dependent on teacher initiative. One exception is a magnet STEM elementary school, where a schoolwide effort incorporates coding and robotics into classroom instruction.

> **“The goal is to try to keep that variety but have it in a streamlined pathway for students.”**

Exhibit 2. Turlock USD Computer Science Course Enrollment by Grade Level

Grade	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
7	15%	0%	0%	0%	0%	28%	15%
8	15%	0%	16%	14%	0%	49%	47%
9	18%	12%	13%	28%	19%	3%	8%
10	18%	13%	12%	5%	0%	3%	4%
11	17%	29%	25%	28%	38%	7%	12%
12	15%	46%	33%	25%	43%	10%	14%

Source: CALPADS.

Exhibit Reads: In 2023–24, 18% of students in Turlock between Grades 7 and 12 were in Grade 10. In 2023–24, 8% of students enrolled in a computer science course in Turlock were in Grade 10.

Enrollment by Race/Ethnicity

Enrollment in computer science courses by race in 2022–23 and 2023–24 closely reflected percentages in the student body overall. This alignment in representation is a change over time; earlier years saw higher percentages of White students and lower percentages of Hispanic students taking computer science courses than their overall presence in Turlock schools.

Exhibit 3. Turlock USD Computer Science Course Enrollment by Race/Ethnicity

Race/ethnicity	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Asian	6%	13%	9%	10%	5%	7%	11%
Hispanic	61%	31%	48%	58%	43%	61%	59%
White	27%	42%	39%	30%	48%	28%	26%

Source: CALPADS

Notes. Demographic groups 'Missing,' 'Black,' 'American Indian/Alaska Native,' 'Native Hawaiian/Other Pacific Islander' are not included in the exhibit because the percentage of students in these groups is lower than 1%. The sum of the percentages may not equal 100%.

Exhibit Reads: In 2023–24, 61% of students in Turlock were Hispanic. In 2023–24, 59% of students enrolled in a computer science course in Turlock were Hispanic.

Enrollment by Gender

Male students are overrepresented in computer science courses across the district. Teachers note that female participation is improving in AP Computer Science Principles and Game Development, a development they attribute to teacher outreach. For example, one teacher who also coaches a female sports team successfully recruited team members to the AP Computer Science Principles course. As result, the comprehensive high school in which the teacher works received an AP Female Diversity Award for the 2024–25 academic school year. Recruitment efforts remain informal, but educators are aware of the need to encourage more girls to participate.

> **"Last year. . . I actually had more girls in [AP CS] than boys . . . I'm excited to get [the AP Female Diversity Award] and kind of push that out there."**

Exhibit 4. Turlock HSD Computer Science Course Enrollment by Gender

Gender	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Female	48%	13%	27%	18%	52%	21%	25%
Male	52%	87%	73%	82%	48%	79%	74%

Source: CALPADS

Exhibit Reads: In 2023–24, 48% of students in Turlock were female. In 2023–24, 25% of students enrolled in a computer science course in Turlock were female.

The Educator Workforce Investment Grant's Role in Supporting Computer Science Efforts

> **"The professional development . . . was not something that our district was offering, so to be able to send teachers to those trainings, it's just invaluable."**

The Educator Workforce Investment Grant in Computer Science (EWIG: CS) has supported Turlock USD's efforts to expand computer science by giving teachers access to professional development that the district could not provide on its own. Through programs such as Seasons of CS and Summer of CS, 10 educators learned about aligned curriculum models, tools, and instructional strategies for teaching coding and computational thinking. District leaders describe these opportunities as "invaluable" and say they fill a critical training gap, especially for teachers without computer science backgrounds.

During quarterly planning meetings held with faculty across Stanislaus County, administrators used EWIG: CS-supported professional learning to encourage middle-grade teachers to integrate computer science into their instruction. They report that it has strengthened collaboration between the district's teachers and administrators. Participation in Seasons of CS site visits inspired the district's two high schools to align course offerings, leading both to adopt AP Computer Science Principles and Game Development. The events also started conversations about building a vertical K–12 computer science pathway and increasing integration in noncomputer science subjects.

Teachers credit EWIG: CS workshops with building their confidence in teaching computer science and creating a sense of community across isolated programs. Although staffing and scheduling constraints have slowed implementation, leaders see EWIG: CS as a catalyst for long-term capacity building and a foundation for sustained computer science growth.

The Path Ahead

Turlock USD is focused on building a coherent K–12 computer science pathway and expanding equitable access across schools. Through district and county computer science and AI task forces, leaders are aiming to strengthen vertical alignment and create earlier access for younger students. Plans include balancing offerings between high schools, reinstating a computer science elective at the junior high school, hiring a full-time middle school computer science teacher and embedding computer science into existing STEM courses and Project Lead the Way at the elementary level.

To address student recruitment and inclusiveness, administrators, counselors, and teachers plan to actively encourage female and other underrepresented students to enroll in computer science through targeted outreach and by rebranding courses as creative and career-relevant. Moreover, the district expects counselors' involvement in the task force to ensure that outreach and scheduling decisions ultimately help the district bring enrollment numbers up across the board.

The American Institutes for Research (AIR) has produced this case study as part of its evaluation of California's Educator Workforce Investment Grant in Computer Science (EWIG: CS). It is one of six case studies designed to illustrate the contextual details, strategies, successes, and challenges that shape efforts to expand computer science education in the state. For more information on the AIR evaluation, including additional findings about the EWIG: CS grant, please visit https://www.air.org/project/evaluation-educator-workforce-investment-grant-computer-science

AIR® | **AIR® Headquarters**
1400 Crystal Drive, 10th Floor | Arlington, VA 22202-3289 | +1.202.403.5000 | **AIR.ORG**

AIR

UPLAND UNIFIED SCHOOL DISTRICT

COMPUTER SCIENCE CASE STUDY

JANUARY 2026

Overview

Upland Unified School District (USD) is working to bring computer science to more students by integrating it into elementary and middle grade instruction and offering a high school pathway that includes Essentials of Computer Science, Advanced Placement (AP) Computer Science Java, and Cybersecurity. The number of standalone computer science courses at Upland High School has varied over time, and enrollment data show lower participation among 10th-grade, female, and Hispanic students compared to their overall representation in the district. District leaders report that support from the Educator Workforce Investment Grant in Computer Science (EWIG: CS) has helped teachers build confidence and capacity to teach computer science. Moving forward, Upland is working to increase early exposure, expand teacher credentialing, and ensure more students feel prepared to pursue computer science in high school.

Upland Unified School District

Upland USD is a suburban TK–12 district located in the Inland Empire of California, serving students across 10 elementary schools, 2 junior high schools, a comprehensive high school, and a continuation high school. District representatives describe the community as tightly knit, with strong ties to Upland High School. As one district leader explained, Upland is "a proud community of Highlanders . . . [with a] mission to create excellence through all that we do, including our integration of educational technology." This vision of excellence is reflected in the district's recent efforts to expand access to computer science across all grade levels.

> **"We are a suburban K–12 district . . . a proud community of Highlanders . . . [with a] mission to create excellence through all that we do, including our integration of educational technology."**

In recent years, district leadership has prioritized increasing access to computer science across all grades. District leaders describe a two-pronged approach: providing foundational exposure through integrated instruction in elementary and middle grades and offering a formal computer science pathway at the high school level. This work is led by the Director of Data Assessment and Educational Technology and supported by coaching and modeling from teachers on special assignment (TOSAs).

Computer Science Course Offerings

The number of standalone computer science courses and student enrollment in them at Upland High School has fluctuated over the past 6 years. Exhibit 1 shows that computer science course offerings and student enrollment peaked in 2018–19, dropped significantly the following year, and oscillated between two and four classes in subsequent years. In 2023–24, 98 students enrolled in four different computer science courses—two Computer Science Essentials sections and two AP Computer Science A sections—a return to prepandemic levels of both access and participation.

Exhibit 1. Computer Science Course Enrollment in Upland High Schools

Year	Computer science students	Computer science courses
2018–19	109	4
2019–20	48	2
2020–21	53	4
2021–22	74	2
2022–23	63	2
2023–24	98	4

According to district leaders, two primary factors affect the number of computer science courses offered each year: the availability of credentialed or trained teachers and student interest. One administrator noted that a now-retired math and computer science teacher played a key role in boosting post-COVID enrollment by actively recruiting students—particularly girls and students from underrepresented backgrounds—into his courses. Without that kind of teacher-driven outreach, enrollment can dip even when courses are technically available.

Additionally, because computer science is offered only as an elective, students must forgo other courses to participate. "In order for them to take computer science, they have to not take something else," one leader explained, citing packed student schedules as a persistent barrier. Although Upland is in the early stages of fostering computer science exposure in the early grades, that approach is still concentrated in two elementary schools and supported by TOSA-led professional development efforts.

> **"In order for them to take computer science, they have to not take something else."**

Computer Science Course Enrollment

Enrollment in computer science courses at Upland High School has rebounded from its nadir in 2019–20, but disparities in access persist across grade level, race, and gender. District leaders emphasize that targeted recruitment and earlier exposure—particularly in elementary and middle school—are key to closing these gaps and expanding equitable participation.

Enrollment by Grade Level

Despite shifts in access to computer science, enrollment remains uneven across grade levels. Upland offered two computer programming courses to junior high students in 2018–19, but not in subsequent years. Since that time, seniors consistently make up the largest share of computer science students—52% in 2023–24—despite representing just 24% of overall enrollment. In contrast, only 12% of computer science students were sophomores, who comprise 26% of the student body. (See Exhibit 2.)

District leaders attribute low 10th-grade participation to scheduling constraints and graduation requirements. "Tenth grade is kind of that crunch year for students," one administrator explained. By senior year, students often have more flexibility to take electives like computer science and may be drawn in after connecting with a teacher in another subject. Another leader noted, "That's when they start to see . . . 'I might really be interested in computer science as well.' "

Exhibit 2. Upland USD Computer Science Course Enrollment by Grade Level

Grade	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
8	N/A	37%	N/A	N/A	N/A	N/A	N/A
9	25%	6%	23%	11%	11%	21%	13%
10	26%	2%	6%	8%	4%	6%	12%
11	25%	28%	21%	38%	14%	29%	22%
12	24%	28%	50%	43%	72%	44%	52%

Source: CALPADS.

Exhibit Reads: In 2023–24, 26% of students in Upland were in Grade 10. In 2023–24, 12% of students enrolled in a computer science course in Upland were in Grade 10.

Enrollment by Race/Ethnicity

Computer science enrollment in Upland shows consistent disparities by race and ethnicity. In 2023–24, Asian students represented 5% of the district but 16% of computer science enrollment. Hispanic students, who make up 64% of the student population, were underrepresented in most years, though the share in computer science courses rose to 50% in 2023–24. District leaders have emphasized the importance of early exposure to ensure all students feel prepared to pursue computer science in high school. One leader noted their hope that "every time we send students to our junior highs and high schools, they feel equipped with the skills needed to be successful in computer science."

A district leader hopes that

> **"every time we send students to our junior highs and high schools, they feel equipped with the skills needed to be successful in computer science."**

Exhibit 3. Upland USD Computer Science Course Enrollment by Race/Ethnicity

Race/ethnicity	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Asian	5%	16%	17%	17%	18%	17%	16%
Black/African American	8%	6%	4%	6%	7%	11%	5%
Filipino	2%	5%	2%	2%	5%	5%	7%
Hispanic	64%	44%	46%	38%	45%	33%	50%
Multiple races	2%	6%	2%	4%	3%	0%	2%
White	17%	21%	27%	20%	20%	33%	18%

Source: CALPADS

Notes. Demographic groups 'Missing,' 'American Indian/Native Alaskan,' 'Native Hawaiian/Other Pacific Islander' are not included in the exhibit because the percentage of students in these groups is lower than 2%. Sums of the percentages may not equal 100%.

Exhibit Reads: In 2023–24, 64% of students in Upland were Hispanic. In 2023–24, 50% of students enrolled in a computer science course in Upland were Hispanic.

Enrollment by Gender

Male students in Upland consistently outnumber female students in computer science courses. In 2023–24, males made up 76% of computer science enrollment but only 53% of the overall student population. Female participation has remained below the districtwide representation, with just 24% enrolled in computer science that year. Nevertheless, district representatives noted that one teacher had actively worked to recruit girls into his classes. In 2023, the district received the AP Computer Science Female Diversity Award, which recognizes institutions that achieved either 50% or higher female exam taker representation in an AP Computer Science course or a percentage of female computer science exam takers that meets/exceeds that of the school's female population. Leaders hope that earlier exposure and continued outreach will help close the gap over time.

Exhibit 4. Upland USD Computer Science Course Enrollment by Gender

Gender	Overall enrollment 2023–24	Computer science enrollment					
		2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Female	47%	32%	19%	21%	12%	33%	24%
Male	53%	68%	81%	79%	86%	67%	76%

Source: CALPADS

Note. Demographic group 'Nonbinary' is not included in exhibit because the percentage of students in this group is lower than 2%. The sum of the percentages may not equal 100%.

Exhibit Reads: In 2023–24, 47% of students in Upland were female. In 2023–24, 24% of students enrolled in a computer science course in Upland were female.

The Educator Workforce Investment Grant's Role in Supporting Computer Science Efforts

As Upland USD works to expand equitable access to computer science, district leaders credit EWIG: CS as a critical lever in building capacity—particularly in elementary and middle grades where integration is the focus. Seasons of CS registration records indicate that in both the 2023–24 and 2024–25 school years, eight Upland educators participated in a Summer of CS workshop. Leaders described EWIG-supported initiatives such as Summer of CS and Seasons of CS as "huge" in shaping both the district's strategic direction and individual teachers' instructional practices. These offerings provide essential professional learning experiences that the district does not have the resources to offer on its own.

> **"We attribute a lot of our success . . . or even having a plan and a framework and a map. . . to the resources we were able to access through the CS grant."**

Participation in EWIG: CS-sponsored training has helped teachers, especially those with backgrounds in other subjects, familiarize themselves with California's computer science standards and develop lessons that connect computing to core academic content. District leaders report that EWIG: CS opportunities have fostered teacher confidence and inspired early adopters to take on leadership roles. One educator noted that several teachers have gone on to pursue supplemental computer science authorizations through university partnerships.

EWIG: CS has also helped shift perceptions about who can and should teach computer science. According to one district leader, "We attribute a lot of our success . . . or even having a plan and a framework and a map . . . to the resources we were able to access through the CS grant." These supports have been especially valuable in introducing computer science to elementary teachers who previously assumed it was only relevant at the secondary level.

The Path Ahead

As Upland continues to build toward districtwide integration of computer science, leaders have established two strategic priorities: ensuring that all students arrive at high school with foundational computer science experience and preparing for a possible future state requirement for computer science. Rather than waiting to respond to policy mandates, district leaders are proactively laying the groundwork for a systemwide computer science infrastructure. "We don't want to wait until we have to—we want to wait until we get to," one administrator explained.

> **"We don't want to wait until we have to—we want to wait until we get to."**

To support early readiness, the district is working to embed computer science into the elementary and middle grades. TOSAs have created crosswalk documents that map computer science standards to core subjects like ELA and social studies, demonstrating that integration doesn't require teachers to "do anything really different" but simply expand on lessons they already teach. At the same time, Upland is encouraging teachers to pursue computer science credentials—often through grant-funded opportunities at local universities—to build long-term internal expertise.

Teacher leadership is also a key component of the district's strategy. Instructional leads who attend EWIG: CS-supported trainings like Summer of CS are encouraged to share new practices across sites. Teachers who once saw computer science as outside their role—particularly in the elementary grades—are increasingly engaging in computer science integration thanks to hands-on exposure, peer modeling, and structured support.

Along with building instructional capacity, Upland is investing in growing student interest in computer science. In 2025–26, the district will host its third districtwide Computer Science Night, where families from across TK–12 explore computer science activities and tour the high school's Career and Technical Education classrooms. District leaders describe the event as a cornerstone of Upland's community outreach strategy. The district is also exploring targeted recruitment strategies to increase participation among historically underrepresented students, including offering transportation and focusing outreach on school sites with lower attendance at past events.

District leaders hope these combined strategies—early exposure, integrated instruction, credentialed teachers, and sustained outreach—will ensure that all students see themselves as capable of succeeding in computer science, regardless of their background, schedule, or prior experience.

The American Institutes for Research (AIR) has produced this case study as part of its evaluation of California's Educator Workforce Investment Grant in Computer Science (EWIG: CS). It is one of six case studies designed to illustrate the contextual details, strategies, successes, and challenges that shape efforts to expand computer science education in the state. For more information on the AIR evaluation, including additional findings about the EWIG: CS grant, please visit https://www.air.org/project/evaluation-educator-workforce-investment-grant-computer-science

AIR® | **AIR® Headquarters**
1400 Crystal Drive, 10th Floor | Arlington, VA 22202-3289 | +1.202.403.5000 | **AIR.ORG**

References

Code.org. (2025). *2025 state of AI + CS education.* Author. https://advocacy.code.org/stateofcs/

Fletcher, C. L., & Warner, J. R. (2021). CAPE: A framework for assessing equity throughout the computer science education ecosystem. *Communications of the ACM, 64*(2), 23–25. https://doi.org/10.1145/3442373

Gangas, L., Tijerino, A., Salas, M., Davis, M., Koshy, S., Goins, R., Scott, A., & Novohatski, L. (2024). *State of tech diversity: The Latine tech ecosystem.* Kapor Foundation, Hispanic Heritage Foundation, Somos, and Congressional Hispanic Caucus Institute. https://kaporfoundation.org/latine-tech-ecosystem/

Mabie, A. K., McGill, M., & Hearta, B. (2023). *A systematic literature review examining the impacts of integrating computer science in K-5 settings.* Paper presented at the ASEE Annual Conference & Exposition, Baltimore https://doi.org/10.18260/1-2–42523

Miller, D. I., Lauer, J. E., Tanenbaum, C., & Burr, L. (2024). The development of children's gender stereotypes about STEM and verbal abilities: A preregistered meta-analytic review of 98 studies. *Psychological Bulletin, 150*(12), 1363-1396. https://doi.org/10.1037/bul0000456

U. S. Department of Education. (2024). *Student access to and enrollment in mathematics, science, and computer science courses and academic programs in U.S. public schools.* U.S. Department of Education Office for Civil Rights. https://www.ed.gov/sites/ed/files/about/offices/list/ocr/docs/crdc-student-access-enrollment.pdf

Yeni, S., Grgurina, N., Saeli, M., Hermans, F., Tolboom, J., & Barendsen, E. (2024). Interdisciplinary integration of computational thinking in K-12 education: A systematic review. *Informatics in Education, 23*(1), 223-278. https://doi.org/10.15388/infedu.2024.08

Appendix A. List of Computer Science Courses in Case Study Districts

After receiving CALPADS data from each case study district, the research team identified a subset of courses that it believed might incorporate computer science content. Researchers then shared this list with a contact at each district and requested that they confirm the courses that included computer science content, identify for removal any courses that did not include computer science content, and add any courses that included computer science content that had not been part of the original list. The research team then conducted its analyses based on the final list confirmed with each district. Through this process, we aimed to filter out classes that might involve the use of computers but not address California's computer science content standards (e.g., typing, computer literacy). Exhibit A-1 includes the full list of courses that, through consultation with the case study districts, the research team classified as a computer science course.

List of Computer Science Courses in Case Study Districts

District	Local course code	State course code	Course name
Jurupa USD	7856-Computer Programming Robotics	2458-Other computer education course	Computer Programming Robotics
Jurupa USD	7827-Computer Applications 7 8	2450-Computer literacy	Computer Applications 7/8
Jurupa USD	7827.7-Computer Applications 7	2450-Computer literacy	Computer Applications 7
Jurupa USD	7827.8-Computer Applications 8	2450-Computer literacy	Computer Applications 8
Jurupa USD	5075S1-Intro to Computer Science S1	8111-Intermediate Information Support Services (Concentrator)	Introduction to Computer Science S1
Jurupa USD	5075S1-Intro to Computer Science S1	8130-Introduction to Systems Programming	Introduction to Computer Science S1
Jurupa USD	5076S1-AP Computer Science Principle S1	8131-Intermediate Systems Programming (Concentrator)	AP Computer Science Principles S1
Jurupa USD	5085S1-AP Computer Science A S1	8132-Advanced Systems Programming (Capstone)	AP Computer Science A
Jurupa USD	7856-Computer Programming Robotics	9222-Applied Science Technology Engineering and Mathematics (STEM)	Computer Programming Robotics
Oakland USD	C0403-INTRO TO COMP	2450-Computer literacy	Introduction to Computers
Oakland USD	C3951-EXPL COMP SCI	2453-Computer science	Exploring Computer Science

District	Local course code	State course code	Course name
Oakland USD	YY527-CS DISCOVERY	2453-Computer science	Computer Science Discoveries
Oakland USD	YY528-CS DISCOVERY 1	2453-Computer science	Computer Science Discoveries 1
Oakland USD	C0411-INTRO COMP TECH	2453-Computer science	Introduction to Computer Technology
Oakland USD	C0515-CS PRINCIPLES	2453-Computer science	Computer Science Principles
Oakland USD	YY529-CS DISCOVERY 2	2453-Computer science	Computer Science Discoveries 2
Oakland USD	C3951-EXPL COMP SCI	9061-Exploring Computer Science	Exploring Computer Science
Oakland USD	C0701-COMP ART	9062-Computer Science	Computer Art
Oakland USD	YY527-CS DISCOVERY	9062-Computer Science	Computer Science Discoveries
Oakland USD	YY528-CS DISCOVERY 1	9062-Computer Science	Computer Science Discoveries 1
Oakland USD	R0602-AP CS PRINCIPLE	8130-Introduction to Systems Programming	AP Computer Science Principles
Oakland USD	R0604-MAKER SPACE CS	8131-Intermediate Systems Programming (Concentrator)	Maker Space Computer Science
Oakland USD	R0600-Comp SCI Senior	8132-Advanced Systems Programming (Capstone)	Computer Science (Senior Capstone)
Oakland USD	YY529-CS DISCOVERY 2	9062-Computer Science	Computer Science Discoveries 2
Oakland USD	R0601-AP COMP SCI A	8131-Intermediate Systems Programming (Concentrator)	AP Computer Science A
Oakland USD	R1301-COMP PROG 2	8131-Intermediate Systems Programming (Concentrator)	Computer Programming 2
Oakland USD	YYF511-INTRO CS MS F	9062-Computer Science	Introduction to Computer Science MS
Oakland USD	CF3951-EXPL COMP SCI F	9061-Exploring Computer Science	Exploring Computer Science F
Oakland USD	CF0702-COMP ART - YR F	9062-Computer Science	Computer Art YR
Oakland USD	YYQ528-CS DISCOVERY 1Q	9062-Computer Science	Computer Science Discoveries 1
Oakland USD	QF8501-AP CS PRIN CTE F	8130-Introduction to Systems Programming	AP Computer Science Principles F
Oakland USD	MF8501-AP CS A CTE F	8131-Intermediate Systems Programming (Concentrator)	AP Computer Science A
Oakland USD	YYF527-CS DISCOVERY F	9062-Computer Science	Computer Science Discoveries F
Oakland USD	MF8502-AP CS A F	9067-Advanced Placement (AP) Computer science A	AP Computer Science A
Oakland USD	YYQ529-CS DISCOVERY 2Q	9062-Computer Science	Computer Science Discoveries 2
Oakland USD	CQ0403-INTRO TO COMP Q	9060-Computer literacy	Introduction to Computers Q

District	Local course code	State course code	Course name
Oakland USD	Q8502-AP CS PRINC	9066-Advanced Placement (AP) Computer Science Principles	AP Computer Science Principles
Oakland USD	C0702-COMP ART - YR	9062-Computer Science	Computer Art YR
Oakland USD	Q8501-AP CS PRINC CTE	8130-Introduction to Systems Programming	AP Computer Science Principles
Oakland USD	M8501-AP CS A CTE	8131-Intermediate Systems Programming (Concentrator)	AP Computer Science A
Oakland USD	YY511-INTRO CS MS	9062-Computer Science	Introduction to Computer Science MS
Oakland USD	R0502-COMP APPL COMM	9060-Computer literacy	Computer Applications Communications
Oakland USD	M8502-AP CS A	9067-Advanced Placement (AP) Computer science A	AP Computer Science A
Oakland USD	C3901-COMP PROG	9063-Computer programming	Computer Programming
Oakland USD	YY530-COMP SCI 2 MS	9062-Computer Science	Computer Science 2 MS
Oakland USD	C0515-CS PRINCIPLES	9062-Computer Science	Computer Science Principles
Oakland USD	R0605-WEB SOC MED DES	8130-Introduction to Systems Programming	Web Social Media Design
Oakland USD	R0614-MAKER SPACE 6-8	8130-Introduction to Systems Programming	Maker Space 6-8
Oakland USD	CY555-CLG CTE CIS UC	8131-Intermediate Systems Programming (Capstone)	Computer Science Seminar
Oakland USD	B6302-VID GAME DES 2	8142-Advanced Games and Simulation (Capstone)	Video Game Design 2
Shasta Union HSD	2171-AP ComputerSciA	2470-AP Computer science A	AP Computer Science A
Shasta Union HSD	4546-Comp Sci Princ	8100-Introduction to Information and Communication Technologies	Computer Science Principles
Shasta Union HSD	DE4546-CompSciPrincDE	8100-Introduction to Information and Communication Technologies	Computer Science Principles Dual Enrolled
Shasta Union HSD	4655-IntroIntrntHTML	8111-Intermediate Information Support Services (Concentrator)	Introduction to HTML
Shasta Union HSD	DE4655-IntrIntntHTMLDE	8111-Intermediate Information Support Services (Concentrator)	Introduction to HTML Dual Enrolled
Shasta Union HSD	4546-Comp Sci Princ	8111-Intermediate Information Support Services (Concentrator)	Computer Science Principles
Shasta Union HSD	DE4646-CompSciPrincDE	8111-Intermediate Information Support Services (Concentrator)	Computer Science Principles Dual Enrolled

District	Local course code	State course code	Course name
Shasta Union HSD	4547-AP CompSciPrin	8111-Intermediate Information Support Services (Concentrator)	AP Computer Science Principles
Shasta Union HSD	2171-AP ComputerSciA	9067-Advanced Placement (AP) Computer science A	AP Computer Science A
Tracy USD	3317-AP Comp.Sci A	2453-Computer science	AP Computer Science
Tracy USD	2814-IntroCompSciJav	2453-Computer science	Introduction to Computer Science
Tracy USD	4558-Intro Comp. Sci	9062-Computer Science	Introduction to Computer Science
Tracy USD	3317-AP Comp.Sci A	9066-Advanced Placement (AP) Computer Science Principles	AP Computer Science
Turlock USD	BU370-AP Comp Sci Prn	2472-AP Computer Science Principles	AP Computer Science Principles
Turlock USD	BU0420-Computer Prog (P)	8131-Intermediate Systems Programming (Concentrator)	Computer Programming (P) / 8130- Introduction to Systems Programming
Turlock USD	BU380-Expl Comp Sc(P)	8131-Intermediate Systems Programming (Concentrator)	Exploring Computer Science (P)
Turlock USD	BU390-AP Comp Sci (P)	8132-Advanced Systems Programming (Capstone)	AP Computer Science (P)
Turlock USD	3501-Integrtd Tech	9060-Computer literacy	Integrated Technology
Turlock USD	ED7520-EDG Comp Sci A	9062-Computer Science	Edgenuity Computer Science A
Turlock USD	ED7540-EDG IntroCoding	9062-Computer Science	Edgenuity Intro to Coding
Turlock USD	BU0420-Computer Prog (P)	9063-Computer programming	Computer programming (P)
Turlock USD	3630-Adv Computers	9063-Computer programming	AP Computer Science (P) / (9067- AP Computer Science A)
Turlock USD	BU370-AP Comp Sci Prn	9066-Advanced Placement (AP) Computer Science Principles	AP Computer Science Principles
Turlock USD	BU1390-AP Comp Sci (P)	9067-Advanced Placement (AP) Computer science A	AP Computer Science (P)
Upland USD	J6814-Condensed Compu	2451-Computer programming	Condensed Computing
Upland USD	8243-AP CptrSci/Java	7721-Advanced Engineering Technology (Capstone)	Introduction to Computer Science Java
Upland USD	8058-Comp Sc Essen	8121-Intermediate Networking (Concentrator)	Computer Science Essentials
Upland USD	8058-Comp Sc Essen	8130-Introduction to Systems Programming	Computer Science Essentials

District	Local course code	State course code	Course name
Upland USD	8243-AP CptrSci/Java	8132-Advanced Systems Programming (Capstone)	Introduction to Computer Science Java
Upland USD	8058-Comp Sc Essen	9062-Computer Science	Computer Science Essentials
Upland USD	8243-AP CptrSci/Java	9067-Advanced Placement (AP) Computer science A	Introduction to Computer Science Java
Upland USD	8243-AP CptrSci/Java	9222-Applied Science Technology Engineering and Mathematics (STEM)	Introduction to Computer Science Java

Appendix B. Case Study Interview Protocol

[Background Information/Introductions]

Let's take a few moments for introductions.

- Please tell us about your current role: your title, how long you've held this position, and your responsibilities related to computer science (CS).
- (We'll have more specific questions for you later about computer science education in your district, but I'd like to ask broadly) How would you describe your district's approach to computer science education?

[RQ Strand 1: To what extent have the numbers of discrete CS courses increased during the time period of the 2021 and 2023 EWIG grants?]

Now that we understand your professional role and its relation to computer science, we are interested in learning more about your perceptions of CS course offerings in your district.

How would you describe the current CS course offerings across the schools in your district?

PROBE: Our discussion has primarily centered on high school computer science, can you provide some information and insight into CS education in the elementary and middle school grades?

PROBE: Are courses being offered as part of a sequence or are most CS courses standalone?

PROBE: What role has EWIG played in expanding or supporting the CS course offerings in your district?

[SHARE DATA: Based on data from your district, these are the trends that we see:]

What factors do you think have the impacted the number of CS courses offered in the last 4 years?

Now let's shift our conversation to be about CS teachers.

Are there any trends you notice about who makes up the pool of teachers teaching CS?

PROBE: Are teachers of CS normally teaching all CS courses or is it just a portion of their teaching courseload?

PROBE: Are teachers of CS normally starting as CS teachers or are they transitioning from other subject areas?

What preparation do educators receive to teach CS?

PROBE: We saw that (X Number) of teachers from your district have participated in EWIG workshops. What role has EWIG played in developing or supporting the CS educators in your district?

To what extent do you perceive that the number of teachers knowledgeable about CS impacts the number and quality of CS courses offered?

[RQ Strand 2: To what extent has participation in discrete CS courses increased during the time period of the 2021 and 2023 EWIG grants? To what extent has participation increased for historically underrepresented populations?]

We have talked some about the number of CS courses offered and the educators that teach CS. Now, we are going to discuss student participation in CS.

[Sharing from AIR quantitative analysis of district CS data: If we look over the last 4 years, here is how we see the CS course participations numbers changing over time…]

Now that we have reviewed some of the CS participation data, do you have any comments on it that would supply additional context? What do you attribute the changes to?

To what extent do you perceive there to be interest from students for CS classes?
- PROBE: Have there been efforts to increase interest for or participation in CS courses?
- PROBE: Does student interest vary from school to school? If so, what do you attribute those differences to?

Have there been intentional efforts to recruit or retain historically underrepresented populations in CS courses?
- PROBE: We've talked about {insert population description here} students. Would you consider any other students to be historically underrepresented in CS?
- PROBE: What barriers stand in the way to CS participation for these students?

[Anything else?]

We've covered a lot of ground in this conversation, but I always like to reserve a few minutes to let you drive the conversation.

Is there anything else you'd like to say? Anything that we missed that you think is important to capture?

[Closing Statement]

Thank you for your time today. This conversation has been very important to our research. I hope you have a great rest of the day!

About the American Institutes for Research®

Established in 1946, the American Institutes for Research® (AIR®) is a nonpartisan, not-for-profit institution that conducts behavioral and social science research and delivers technical assistance both domestically and internationally in the areas of education, health, and the workforce. AIR's work is driven by its mission to generate and use rigorous evidence that contributes to a better, more equitable world. With headquarters in Arlington, Virginia, AIR has offices across the U.S. and abroad. For more information, visit AIR.ORG.

AIR® Headquarters
1400 Crystal Drive, 10th Floor
Arlington, VA 22202-3289
+1.202.403.5000 | **AIR.ORG**

28098_01/26