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2025 Annual Report

Educator Workforce Investment Grant in Computer Science

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Executive Summary

California's Educator Workforce Investment Grant in Computer Science (EWIG: CS) aimed to address a statewide need for educators—including teachers, paraeducators, school leaders, and counselors—who have the knowledge and skills to create high-quality learning opportunities for students in computer science. The American Institutes for Research® (AIR®) serves as the external evaluator for this grant and has developed this annual report to share findings from data collected in 2025. The report examines experiences and outcomes associated with a key component of the EWIG: CS program, a collection of multiday workshops offered under the umbrella of Summer of CS. Survey and focus group data from participants in Summer of CS 2025 shed light on participant experiences in 2025, and a follow-up survey administered to participants in Summer of CS 2023 and 2024 offers insights into participant behaviors in the year(s) after their workshop experience. The report also explores district-level efforts to promote computer science education through a set of six case studies that analyze course availability and enrollment patterns over a period of six years.

Findings About Summer of CS

Key Finding #1: A total of 330 educators participated in a Summer of CS workshop in 2025, a third of whom had no prior experience with teaching computer science. The gender representation of these participants is similar to the overall California K–12 workforce.

Key Finding #2: Survey respondents and focus group participants reported positive impressions about Summer of CS workshop content, format, and usefulness. Positive features of the workshops from 2023, 2024, and 2025 identified through surveys and focus groups included opportunities for collaborating with other teachers, engaging in hands-on learning, working with high-quality instructors, and opportunities to receive ongoing support.

Key Finding #3: Survey responses revealed a positive and statistically significant change in participants' confidence in teaching computer science between the beginning of Summer of CS workshops in 2023 or 2024 and their return to the classroom 1–2 years later. This growth in confidence persisted despite a small drop between the end of the workshop experience and the time of the follow-up survey. Meanwhile, survey responses from Summer of 2025 mirrored findings of a positive and statistically significant change in participant's confidence in teaching computer science between the beginning and the end of Summer of CS workshops.

Key Finding #4: Survey responses revealed a positive and statistically significant change in beliefs about who can and should do well in computer science between the beginning of Summer of CS workshops in 2023 or 2025 and participants' return to the classroom 1–2 years later. These changes were smaller in magnitude than those for educator confidence, but the preworkshop values were also higher, suggesting that educators who chose to participate in Summer of CS workshops already had strong beliefs about the importance of computer science and the ability of all students to succeed. This growth in beliefs persisted despite a small drop between the end of the workshop experience and the time of the follow-up survey. Meanwhile, survey responses from Summer of 2025 mirrored findings of a positive and statistically significant change in participant's beliefs about who can and should do well in computer science between the beginning and the end of Summer of CS workshops.

Key Finding #5: Workshop participants delivered computer science instruction when they returned to their classrooms. Eighty-six percent of Summer of CS participants from 2023 or 2024 had taught computer science during the 2024–25 school year, and nearly two-thirds reported that they had taught computer science at least weekly. The average number of hours of instructional time for these participants ranged from 87 at the elementary level to 241 at the high school level.

Key Finding #6: The primary format of computer science instruction was the integration of content into another subject area; this was especially true in the elementary grades. Nearly two-thirds of follow-up survey responses reported teaching in this way, including 72% of respondents teaching students in Grades Prekindergarten–5. Roughly one-third of full-up survey respondents reported teaching a standalone computer science class during the school day.

Key Finding #7: Important needs remain for resources and support to enable computer science instruction to capitalize on positive changes in educator capacity. Follow-up survey respondents reported gaps in the availability of valuable tools like time, funding, and ongoing professional learning. Focus group participants during Summer of CS 2025 also identified obstacles that included inadequate administrator leadership, insufficient funding, and lack of state support for computer science.

Findings from Six District Case Studies

Key Finding #8: 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. Teacher knowledge, skills, and interest in teaching computer science played a central role in determining course availability, and computer science often confronted competing priorities for students' attention and space in the master schedule.

Key Finding #9: Integration of computer science content into other subject areas was a key strategy for expanding access to more students. However, because these learning opportunities do not appear in CALPADS course codes or course-count metrics, the quantitative patterns uncovered through this research understate the extent to which students gain exposure to computer science content.

Key Finding #10: Hispanic and Black students and women were underrepresented in computer science courses. Nevertheless, some districts have employed strategies with demonstrated success in improving participation among these students.

Key Finding #11: Interview respondents described EWIG: CS as playing a vital role in building computer science capacity by exposing teachers to concepts, tools, and instructional materials. Workshops offered through Seasons of CS provided training that districts could not deliver independently due to budget constraints and limited internal expertise.

Evaluation Next Steps

Building on evaluation findings from data collected in 2024, these data add to body of consistent promising evidence about the quality of EWIG: CS activities and supports. They speak to growth in capacity among California educators and the promise of this professional learning model. The AIR team has concluded its data collection analysis and activities for this project. A final project report will synthesize findings across the full evaluation. Meanwhile, further study is needed to better understand ways in which opportunities like those provided through EWIG: CS translate to improved learning experiences and outcomes for students.

Introduction

Digital technology shapes our lives in profound ways, as the tools employed in the workforce and our everyday lives increasingly rely on devices, hardware, and software that operate with efficiency that would have been unfathomable even a decade ago (Roser, 2023). Skills in computer science can often lead to lucrative career opportunities (Bureau of Labor Statistics, 2024; Carnevale et al., 2023; Strohl et al., 2024), but the ubiquity of technology in our everyday lives supports the idea that computer science education should not be for only a segment of our population but should be for all. Responsibly navigating a digital world requires everyone to understand the resources around us. The field of computer science, “the study of computers and all the phenomena surrounding them” (Newell et al., 1967), is more important than ever.

K–12 education represents fertile ground to build foundational skill sets and cultivate interest in further study and possible careers in computer science. Although opportunities to learn about computer science have unquestionably grown, they have not kept pace with the need (Code.org et al., 2025; Scott et al., 2019). The most recent data available in California show that only 39% of high schools offered computer science courses in 2016–17 and that only 3% of the state’s nearly 2 million high school students were enrolled in a computer science course during that year. Perhaps more importantly, those opportunities are not distributed equally. In 2017–18, only 30% of California students in Advanced Placement (AP) computer science courses were female, and just 497 Black and 76 Native American students took AP computer science courses (Scott et al., 2019). These disparities in access and participation may have roots that begin at an early age. A recent meta-analysis of gender stereotypes in science, technology, mathematics, and engineering found that, as early as age 6, 35% of 6-year-olds believed that boys were better at computing, compared to only 22% who believed that girls were better. This gap widens by age 18 (Miller et al., 2024).

Among the many root causes that contribute to these concerning outcomes, the state of California currently lacks the educator capacity to deliver high-quality computer science learning opportunities to all students in the state (Flapan, 2024). A statewide investment in in-service educator capacity building, initially launched in 2021 and expanded in 2023, is an opportunity to address this important obstacle to computer science teaching and learning. The lessons learned from this effort can help to inform future efforts to improve computer science education in California and across the country.

California's EWIG: CS Investment

The state of California established the Educator Workforce Investment Grant (EWIG) program to provide professional learning opportunities for teachers, paraeducators, administrators, and counselors across the state. Two investments established through this grant program specifically aimed to promote high-quality computer science instruction and learning experiences aligned to the Computer Science Standards for California Public Schools.[1] The Budget Act of 2021 provided $5 million in initial funding to support activities between 2022 and 2024; a subsequent $15 million investment established through the Education Omnibus Budget Trailer Bill for the 2022–23 California State Budget provided resources to build on and expand the initial effort.

The Sacramento County Office of Education (SCOE), Californians Dedicated to Education Foundation (CDEF), San Bernardino County Superintendent of Schools (SBCSS), and University of California at Los Angeles (UCLA) serve as the lead agencies for the EWIG grants in computer science (EWIG: CS). Members of the project leadership team have designed their work according to the following theory of action: By offering a series of capacity-building opportunities to educators free of charge,[2] leaders in California's computer science education community can increase exposure to computer science among the state's educators; build educator knowledge, skills, and confidence to embed computer science into classroom practices at all grade levels; and increase the volume and quantity of computer science learning opportunities for students.

One aspect of the EWIG: CS program is especially relevant for this report. A series of workshops, branded as Seasons of CS, aimed to provide exposure to and build knowledge and skill in computer science education. These professional learning opportunities took the form of brief orientation workshops throughout the school year, multiday workshops during the summer, and follow-up academic year workshops for summer participants. Collectively, the workshops sought to build the capacity of teachers and administrators to offer high-quality computer science content through dedicated computer science courses and by integrating that content into existing academic courses.

The AIR External Evaluation

The American Institutes for Research (AIR) has partnered with the EWIG: CS lead agencies to serve as the external evaluator for the grant. The evaluation, conducted under a subcontract to SCOE, operates as a required component of the overall EWIG: CS grant from the California Department of Education. To inform its evaluation approach, the AIR team organized a set of research questions around the four components of the Capacity, Access, Participation, and Experience (CAPE) Framework, which highlights *capacity* to deliver, *access* to, *participation* in,

[1] See https://www.cde.ca.gov/be/st/ss/documents/csstandards.pdf.
[2] Professional learning opportunities sponsored by EWIG: CS often also included a financial incentive for participants.

and *experiences* with computer science education.[3] The CAPE Framework directly addresses equity with each component and acknowledges the multiple layers of an educational approach required to equip students to thrive in computer science (Fletcher & Warner, 2021). Guided by this framework, the AIR evaluation seeks to address the research questions identified in Exhibit 1.

An evaluation of the 2021 grant, conducted by the Kapor Center, shared findings about the early stages of the EWIG: CS program. This report summarizes findings from data collection and analysis activities that took place in 2025. It addresses Research Questions 1 and 2 by examining participant experiences with the 2025 Summer of CS workshops. Results of pre-workshop and post-workshop surveys administered to workshop participants, as well as demographic and participation information collected from workshop registration data, provide insights into EWIG: CS efforts to improve computer science educator capacity. These insights about professional learning experiences in 2025 are supplemented by data from a follow-up survey administered in September 2025 to participants in Summer of CS workshops in 2023 and 2024; this survey also enables the research team to report findings associated with Research Questions 5 and 6.

This report also explores indirect outcomes associated with the state's EWIG: CS investment. Statewide data are not available that would enable an analysis of computer science course-taking over time. The research team therefore conducted case studies of six California school districts to better understand their approaches to teaching computer science. These case studies address Research Questions 5 and 6 through an analysis of computer science course availability and enrollment, supplemented by interviews with educators in each district.

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] See https://ecepalliance.org/resources/models/cape/.

Research Question	CAPE Dimension
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

Methods

The findings in this report draw on four key data sources. To address Research Question 1, Seasons of CS registration data collected by SCOE enable a descriptive analysis of workshop participation. Pre-workshop, post-workshop, and follow-up surveys of Summer of CS participants inform analyses of Research Question 2, which explore workshop quality and changes in participant confidence and beliefs with respect to computer science. Focus groups of Summer of CS participants in June 2025 offer further insights about Research Question 2, and the follow-up survey provides evidence about Research Question 7. Case studies of six California districts, which examine course availability and enrollment data from the California Longitudinal Pupil Achievement Data System and draw on interviews with representatives from each district, address Research Questions 5 and 6.

Seasons of CS Workshop Registration and Participation

SCOE administers a database in Airtable that tracks registration and participation for all Seasons of CS workshop participants. The database includes contact and basic demographic information for orientation workshop, summer workshop, and academic year workshop registrants. It also includes details about whether registrants have completed the required paperwork for participation and attendance data for each day of training. For orientation workshops, which are typically offered in a single session, participation is reflected by a single instance of attendance. For multiday Summer of CS workshops, the database captures attendance for each of the days during which the workshop takes place.

AIR researchers have access to this database and have used it to share information about Seasons of CS workshop participation (Research Question 1). For the purposes of this report, any registrant who attends at least 1 day of a workshop counts as a workshop participant.

Seasons of CS Workshop Participant Experiences and Behaviors: Surveys

The AIR research team administered three surveys in 2025, two in June to participants in the Summer of CS 2025 workshops and one in September to participants from the Summer of CS workshops in 2023 and 2024.

Survey Design

For the summer 2025 administration, AIR researchers used the same survey protocols as those administered to participants in the 2024 Summer of CS workshops; the research team originally developed those protocols in consultation with members of the EWIG: CS planning team from SCOE, CDEF, SBCSS, and UCLA. Most questions appeared in both a pre-workshop survey and a post-workshop survey. Survey items focused on key areas that EWIG: CS planning team members identified as important for the workshops, including participants' confidence in teaching computer science and their beliefs about what students can and should learn.

In addition, the post-workshop survey asked respondents about the overall quality of their workshop experiences. Survey items asked respondents to provide responses to 5-point Likert scales ranging from *Strongly disagree* to *Strongly agree*. See Appendix A for a full list of Summer of CS 2025 survey items.

The AIR research team also developed the follow-up survey in consultation with members of the EWIG: CS planning team. The subset of questions about confidence and beliefs with respect to computer science that appeared in both the Summer of CS 2024 and 2025 preworkshop and postworkshop surveys aimed to measure how respondents' answers changed over time; the follow-up survey enabled an analysis of further changes a year or more after the workshop concluded. Additional survey items focused on the overall workshop experience, the degree to which workshop participants delivered computer science instruction, and the resources and supports necessary for their success. See Appendix A for a full list of survey items in the follow-up survey instrument.

AIR's institutional review board reviewed the survey and data collection procedures to ensure that the survey data collection met high standards for human subjects participation.

Survey Data Collection

For the summer 2025 administration, AIR programmed and administered the pre- and post-workshop surveys using the online Verint Survey platform. AIR sent individualized survey links via email to participants on the first and last days of their workshop, using registration and contact information provided by SCOE. Each workshop provider designated time at the start of Day 1 for participants to complete the pre-workshop survey, as well as time at the end of the final day for the post-workshop survey. This approach was designed to reduce recall bias and ensure that any changes in participant perspectives could be more confidently attributed to the workshop itself rather than to intervening experiences or external influences. After the conclusion of each workshop, AIR sent a follow-up email to nonrespondents requesting that they complete the survey.

AIR programmed the follow-up survey using the survey platform Fillout. AIR then sent individualized survey links via email to Summer of CS 2023 and 2024 participants, using registration and contact information provided by SCOE. The survey was open for 3 weeks in September 2025, and nonrespondents received email reminders to complete the survey from both AIR and SCOE. Public school educators who completed the survey received a $50 gift card incentive.

Survey Responses

For Summer of CS 2025, slightly more than half of attendees across all summer workshops (54%) completed both surveys. In addition, 25% of attendees completed the pre-workshop survey only and 11% completed the post-workshop survey only. A total of 10% of attendees did not complete either survey. See Appendix B for a more detailed analysis of survey response rates.

To administer the follow-up survey, SCOE provided AIR a list of 1,205 educators who had participated in Summer of CS in 2023 and/or 2024. Email addresses for 85 of these educators were no longer active, leaving us with a sample of 1,120 educators. Of those, 681 completed our follow-up survey, for a response rate of 61%. Among the 681 survey completers, 28% attended a Summer of CS workshop only in 2023, 48% attended only in 2024, and the remaining 24% attended in multiple years. See Appendix B for a more detailed analysis of survey response rates.

Survey Analysis

Most of the analyses conducted for both surveys are descriptive. Our primary goal was to summarize patterns in educators' responses rather than make predictions or establish causal relationships. In this report, we share descriptive statistics, such as means and percentages, to provide an overview of responses to the follow-up survey.

The AIR research team converted all Likert scale responses into numerical values ranging from 1 to 5, where *Strongly disagree* = 1 and *Strongly agree* = 5. By assigning each survey response a numerical value, we can then present the average change between the pre-workshop and post-workshop survey responses for each item.

For the Summer of CS 2025 survey, assigning each survey a response a numerical value enables us to present the average change between the pre-workshop and post-workshop survey responses for each item. We conducted paired *t*-tests to understand within-person change scores and conducted significance tests for whether the mean change for all respondents differed from zero (Agresti, 2018). Analyses of change include only the respondents for whom we have both pre-workshop and post-workshop data; exhibits throughout the report include notes that list the number of respondents represented for each finding.

In addition, the research team conducted analyses to explore the relationship between respondent characteristics and the changes in self-reported confidence and beliefs. These analyses paid particular attention to aspects of participants' identities and professional history with computer science to explore the degree to which Summer of CS experiences might differ for respondents who have been historically underrepresented in the field. Using each measure of change as an outcome variable, analysts conducted multiple linear regression that included participant experience with teaching computer science, attendance at a previous Summer of CS workshop, gender, and racial identity as independent variables. The team selected this model because the dependent variable was continuous, and we wished to explore the relationship of multiple predictor variables simultaneously with the change in responses between workshops. We assessed statistical significance at the $p < 0.05$ level. Although the paired *t*-tests show whether within-person change occurred on average, regression analysis allows us to examine whether particular subgroups experienced changes significantly different from their counterparts after controlling for other characteristics. The text of this report highlights findings in which our regression models found the coefficients for any of these independent variables to be statistically significant.

To analyze responses to the follow-up survey, AIR expanded its analytic approach. Whereas analyses for the Summer of CS 2025 findings explored survey responses to 19 survey items individually to assess change over time, the research team converted most of these survey items into two scales to analyze follow-up survey results. One of these scales measured educators' confidence in teaching computer science, and a second measured educators' beliefs about who can and should learn computer science. See Appendix F for more details on the development of these survey scales.

AIR conducted a repeated measures ANOVA with follow-up survey data, a statistical method used to compare responses from the same group of people across multiple points in time. Instead of looking at each time point separately, ANOVA tests whether the average responses differ significantly across all time points, while accounting for the fact that the same individuals provided data more than once (Lund Research, 2018). This approach enabled us to determine whether educators' confidence and beliefs changed meaningfully across three points in time: before they took their 2024 Summer of CS workshop, directly after they took their 2024 Summer of CS workshop, and in our follow-up survey. See Appendix G for more details on this analytic approach.

Finally, as it did with the Summer of CS 2025 survey data, the research team conducted analyses to explore the relationship between respondent characteristics and changes in confidence and beliefs. These analyses paid particular attention to aspects of participants' identities and professional history with computer science to explore the degree to which Summer of CS experiences might differ for respondents who have been historically underrepresented in the field. Using the confidence and belief scales as outcome variables, analysts conducted multiple linear regression that included as independent variables participant experience with teaching computer science, gender, racial identity, the number of Summer of CS workshops attended between 2023 and 2025, academic year workshops attended, and grade level(s) taught before workshop participation. The team selected this model because the dependent variable was continuous, and we wished to explore the relationship of multiple predictor variables simultaneously with the change in responses between workshops. This analysis enabled us to examine whether particular subgroups experienced changes significantly different from their counterparts after controlling for other characteristics. We assessed statistical significance at the $p < 0.05$ level. The text of this report highlights findings in which our regression models found the coefficients for any of these independent variables to be statistically significant. See Appendix H for the full regression output.

The research team conducted all survey analyses using the statistical software platform Stata.

Seasons of CS Workshop Participant Experiences: Focus Groups

To supplement survey findings on Summer of CS workshop experiences, AIR conducted 12 focus groups with workshop attendees in June 2025.

Focus Group Protocol Design

The AIR team developed the focus group protocol in consultation with the EWIG: CS leadership team and grounded the questions in Research Question 2. Questions asked participants about their workshop experience overall, any changes in confidence or beliefs that they attributed to the workshop, and the degree to which they felt prepared to apply what they learned when they returned to school in fall 2025. The focus group protocol is available in Appendix E.

Focus Group Data Collection

The research team conducted 12 focus groups with 69 participants from the 2025 Summer of CS workshops. All workshop registrants received an email invitation to participate in a focus group, with opportunities allocated based on specific participant characteristics and workshop formats.

To ensure representation across different workshop modalities and participant backgrounds, we employed a stratified purposive sampling strategy. Six focus groups were offered to individuals who attended workshops in Anaheim, California, at the centralized Computer Science Professional Development Week (known as CSPDWeek) and six groups to educators who attended regional workshops offered elsewhere in the state. Based on findings that suggest a relationship between teaching experience and self-reported participant outcomes (Lee et al., 2024), the research team further grouped registrants as follows based on their prior experience with Summer of CS and with teaching computer science:

- Two focus groups included participants who had attended a Summer of CS workshop in a previous year.
- Two focus groups included first-time Summer of CS workshop attendees with prior experience teaching computer science.
- Two focus groups included first-time Summer of CS workshop attendees with no prior experience teaching computer science.

Focus group invitations were sent to all eligible participants within each stratum, and participation was determined on a first-come, first-served basis. This approach allowed for targeted recruitment while maintaining voluntary participation and ensuring diversity across experience levels and workshop formats. The six focus groups involving CSPDWeek attendees took place in person during breaks in the workshop sessions. AIR staff facilitated the six focus groups involving regional workshop participants virtually using the Microsoft Teams platform.

Focus Group Analysis

To analyze data, the AIR research team developed a codebook to identify themes aligned with the study's research questions and the focus group protocol. A single member of the research team coded the focus group transcripts. Although single-coder approaches may introduce bias, AIR selected this method to ensure interpretive depth and consistency, drawing on the coder's extensive contextual knowledge of EWIG: CS and computer science education in California. The research team then employed thematic analysis paired with quantitative counting of similar responses to determine not just what was said but also how often it was said in focus groups (Braun & Clark, 2006).

Course Availability and Enrollment: Administrative Records

The AIR team examined course availability and enrollment through case studies of six California school districts. 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.

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%	10%	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%	47%	16%	50%	61%	64%
White	20%	6%	11%	68%	17%	27%	17%
Multiple Races	5%	1%	7%	4%	5%	1%	2%
Total Number of Students	5,837,690	14,906	27,876	2,415	10,020	9,543	6,829

Sources: CALPADS, DataQuest

The research team collected reports from the California Longitudinal Pupil Achievement Data System (CALPADS) for each of the six case study districts. These reports 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 (e.g., computer literacy). (See Appendix K 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.

Course Availability and Enrollment: Interviews

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 L). 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.

Limitations

Any research approach features limitations that should shape the reader's interpretation of study findings. Here we highlight important implications of the methods employed for the EWIG: CS evaluation.

Self-Reported Data

First, the findings presented in this report rely heavily on self-reported data. The Summer of CS workshop participant surveys and focus groups both ask individuals who have been part of the EWIG: CS grant to share their perceptions and memories of their experiences. The resulting data are therefore subject to factors, such as recall bias and social desirability bias, that might shape their responses to survey and focus group questions.

Statements of Causal Inference

Second, the study design does not permit causal inferences on the impact of the EWIG: CS program. No comparison group exists that would enable us to analyze differences in outcomes reported by program participants to individuals who had not received the same opportunities as those provided by the grant. Although the use of preworkshop, postworkshop, and follow-up surveys enabled a comparison of perspectives in the same individual across time, we cannot claim that EWIG: CS *caused* the results reported here. Relatedly, if an educator had changed email addresses, names, and/or schools without notifying the organizers of Summer of CS, it is possible that educators may have been left out of the repeated measures ANOVA and regression analyses because we could not identify them as the same person who took our survey across three time points.

Limitations of Survey Data

Online surveys like those used to collect data from workshop participants provide several benefits. However, because the surveys use standardized language for all respondents, some respondents may interpret questions differently, and bounded response options may not fully capture the nuances of all interactions. On the other hand, the nature of a focus group that uses a semistructured data collection protocol can result in variation in data collected. The number of participants in a focus group, the conditions under which a focus group takes place (especially in person vs. virtual), and the backgrounds of focus group participants can all shape the conversation that takes place.

Findings About Summer of CS 2025 Workshop Participation

The Summer of CS effort supported through the EWIG: CS grant featured 17 different workshops delivered over the course of 3 weeks in a variety of locations in summer 2025. The flagship event among these offerings was CSPDWeek, a collection of concurrent workshops conducted June 23–27 in Anaheim, California. In addition, seven regional offerings enabled educators across the state to participate in professional learning about computer science. Workshops, which included anywhere from nine to 26 participants, ranged from 3 to 5 days in length. In some cases, workshops offer opportunities for ongoing engagement between facilitators and participants through follow-up workshops during the 2025–26 academic year. A total of 330 educators participated in one of the Summer of CS workshops in summer 2025.

Key Finding #1

A total of 330 educators participated in a Summer of CS workshop in 2025, a third of whom had no prior experience with teaching computer science.

Exhibit 3. Gender and Race of Summer of CS Participants and All California FTE Teachers

Category	Summer of CS participants (N = 330)	California FTE teachers 2023–24 (N = 312,219)
Woman	73%	73%
Man	24%	27%
African American	3%	4%
American Indian or Alaska Native	0%	1%
Asian, Filipino*	15%	8%
Hispanic or Latino	18%	26%
White	43%	55%
Two or More Racial Identities	12%	1%
Racial Identity Not Reported	8%	6%

Note. Percentages may not add to 100% due to rounding. Two percent of Summer of CS participants listed "Gender-fluid," "Non-Binary," or did not state their gender identity. Source for Summer of CS Participants: SCOE attendance records. Source for California FTE Teachers: Commission on Teacher Credentialing (2025).
*Here and throughout the report, Asian includes individuals who identified as Filipino, East Indian, or Indian.

Exhibit 3 displays the gender and racial identity of these educators, including a comparison with the overall, full-time equivalent (FTE) California K–12 teaching workforce. Workshop participants were more likely to be Asian and multiracial and less likely to be Hispanic or Latino and White than the statewide workforce.

Additional details about Summer of CS participants may also be instructive even when comparable statewide data do not exist. Because the state's EWIG: CS investment recognizes the importance of fostering computer science learning opportunities at all grade levels, Summer of CS organizers designed workshops for educators of Grades TK–12. Exhibit 4 demonstrates that workshop participants serve students across a range of elementary, middle, and high school grades. The exhibit also illustrates the range of prior experience with CS instruction among workshop attendees. Approximately one third of Summer of CS participants reported no prior experience with teaching computer science, a noticeable change from 2024 Summer of CS participants, when most had no prior experience.

Exhibit 4. Teaching Assignments and Experience for Summer of CS Participants

Category	Summer of CS participants
Grade Level: 9–12	37%
Grade Level: 6–8	45%
Grade Level: TK–5	39%
Years teaching computer science: 0	34%
Years teaching computer science: 1–2	28%
Years teaching computer science: 3–5	20%
Years teaching computer science: 6–9	8%
Years teaching computer science: 10 or more	10%

Note. Percentages for grade level do not add to 100% because respondents can teach more than one grade level.

One important design feature of the EWIG: CS grant is a series of orientation workshops conducted throughout the 2024–25 school year designed to introduce educators to computer science content and spark their interest in learning more. Such workshops, if successful, could help to demystify the content area and decrease anxiety about engaging with computer science. They might also motivate educators to learn more about computer science through Summer of CS professional development offerings. Workshop enrollment data demonstrate that of the 324 educators who participated in an orientation workshop in 2024–25, 151 (47%) registered for a Summer of CS workshop and 85 (26%) attended the full workshop. Those 85 participants who attended both an orientation workshop and a Summer of CS workshop represent 26% of the total Summer of CS participants in 2025.

Findings About Summer of CS Overall Workshop Quality

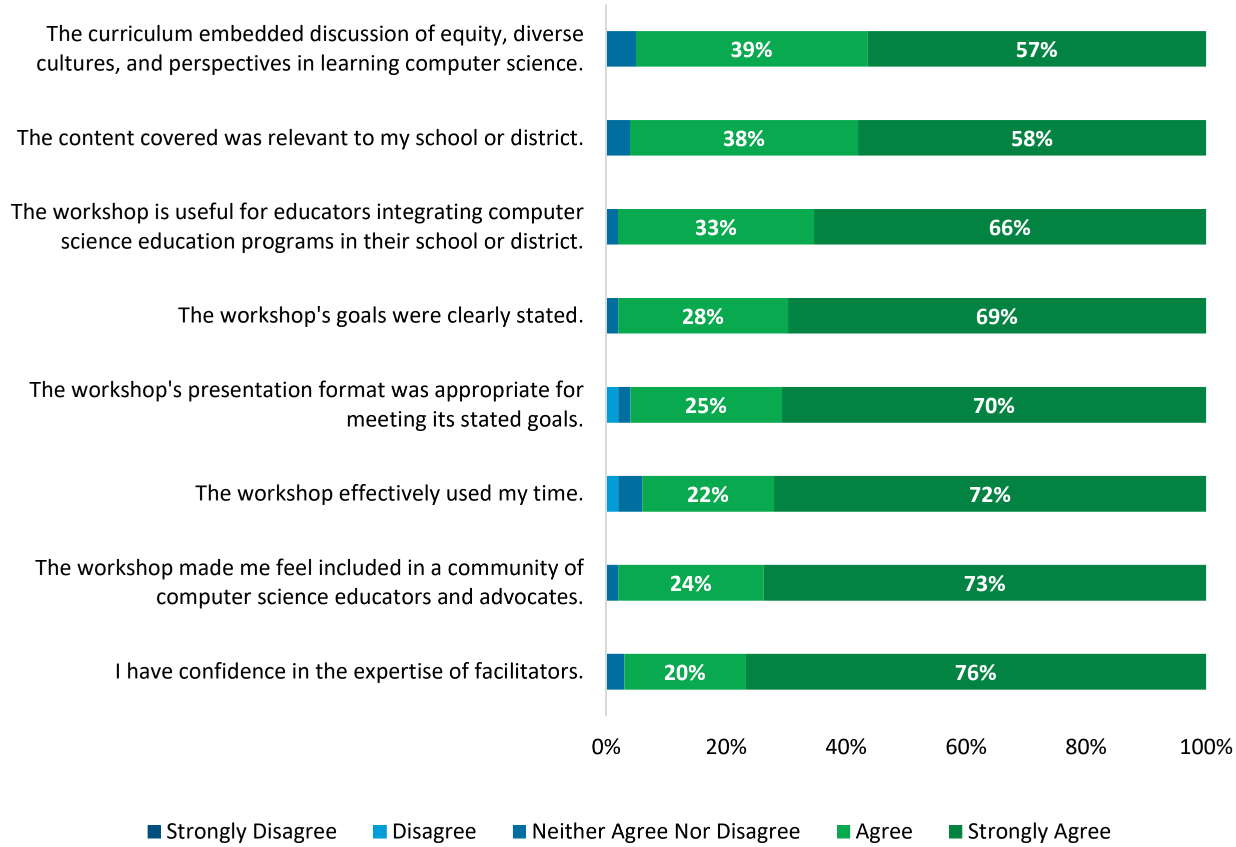
Beyond overall participation levels, a key measure of success for Summer of CS is participants' perspectives about the quality of their workshop experiences. AIR's report about Summer of CS participant experiences in 2024 shared high levels of agreement with statements about the quality and usefulness of their workshop (Lee, Knudson, & Roy, 2024). Perspectives from participants from Summer of CS 2023 and 2024—captured in a follow-up survey administered in fall 2024—and Summer of CS 2025—captured through focus groups and a survey administered at the completion of the workshop—reinforce these positive findings.

> **Key Finding #2**
>
> **Survey respondents and focus group participants reported positive impressions about Summer of CS workshop content format, quality, and usefulness.**

Findings from Summer of CS 2025

Exhibit 5 shows participant responses about workshop quality from the post-workshop survey. An overwhelming majority of respondents agreed or strongly agreed with statements that described the relevance, usefulness, and execution of their workshop. For example, 57% of respondents strongly agreed and 39% agreed that the curriculum embedded discussion of equity, diverse cultures, and perspectives in learning computer science. Similarly, 73% of respondents strongly agreed and 24% agreed that the workshop made them feel included in a community of computer science educators and advocates.

Exhibit 5. Participant Perceptions of Summer of CS Workshop Quality



*Note. n*s ranged from 212 to 214. Response categories with 5% or less do not have a data label. Categories may not add to 100% due to rounding.

High-Quality Pedagogical Strategies

Focus group participants offered their perspectives about aspects of the workshops that were valuable to them. The most frequent observations pointed to the quality of pedagogical strategies employed in their workshops. For example, multiple workshop attendees described the value of experiencing engaging strategies through the lens of a student. One CSPDWeek participant explained, “What I really like about it is we’re taught by teachers who make it engaging for us, so we could then turn around and make it engaging for our students.” An educator from a regional workshop added, “It felt really intimate, being able to walk through lessons and apply them like if I was a child … but also having that perspective of a teacher.” Some focus group participants further expressed appreciation for facilitators’ ability to differentiate their instruction and attend to a wide variety of background knowledge within the workshop. One regional workshop participant stated, “There’s no dumb question. They take all your skill levels into consideration when they’re planning, and so it’s almost like they’re differentiating with us what we do with our students, and that’s really awesome.”

Closely tied to the quality of instructional approaches were observations about the high quality of workshop trainers overall. “There are experts that I can ask questions to,” one participant reflected. Another shared, “The presenter was well prepared, they had all the materials, and overall, whenever we had to troubleshoot something, they were very knowledgeable about the content.” A third focus group member offered the following thought: “For me, what made it extra special was the presenters are very passionate about teaching computer science.”

Ongoing Sources of Support

An additional feature of some workshops that emerged in focus group conversation was the opportunity for ongoing support throughout the year. This support can take the form of the academic year workshops offered in the academic year after Summer of CS. One respondent who had attended a different workshop in the prior summer stated:

> Being able to meet with those people again and my presenters throughout the year really supported me in implementing what I learned last year. It kind of keeps you from going, “This is too hard,” as opposed to, “Well, this is hard, but I have somebody I can reach out to and somebody who I have to meet with and that’s going to check up with me,” and that really helped.

Focus group participants also mentioned the opportunities for continued communication with their peers and access to resources. One attendee shared, “It’s just that ongoing support. You feel like you’re in this together with someone else, not just by yourself.” Another teacher who had no prior experience with teaching computer science added, “It’s at least making me more comfortable knowing where to find resources.”

Additional Positive Workshop Features

Additional focus group responses focused on the format of the workshops. The opportunity for extended time with computer science content allowed for deeper engagement compared with many other professional learning opportunities. Some reflections suggested that the in-person nature of most workshops allowed for hands-on learning experience, although a small number of participants noted that having an option for virtual participation enabled them to attend learning opportunities that would otherwise have been impossible due to distance.

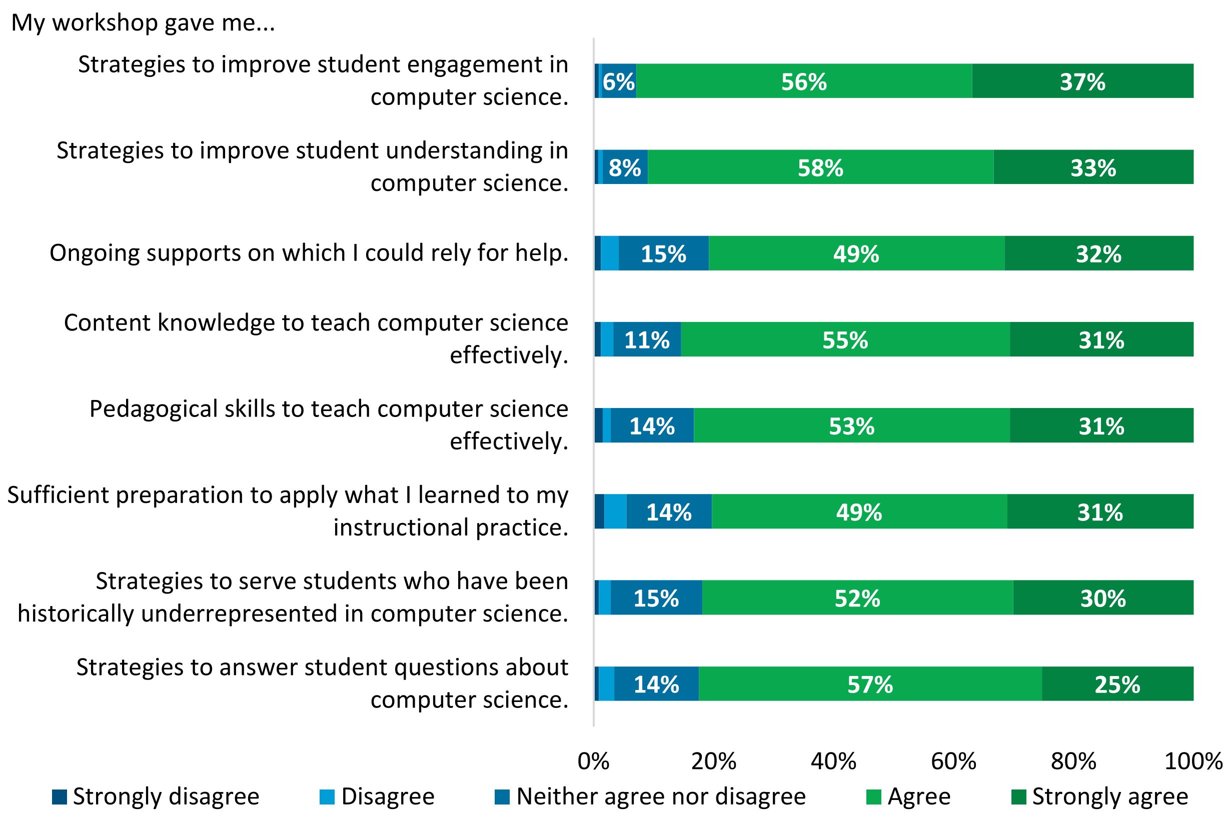
Opportunities for Improvement

The focus groups also created space for workshop participants to share recommendations for improvement. The volume of these responses was noticeably smaller and featured far less consensus versus the strengths. Nevertheless, some participants suggested that publicity and recruitment for the workshops could improve. Others noted that additional learning time, especially for the shorter regional workshops geared toward elementary teachers, could be helpful. One teacher explained, “Secondary [teachers] got five days. We only got three. I was just kind of curious on why the discrepancy on that one. Maybe having a couple of [extra] days would have been good.”

Findings from Summer of CS Follow-Up Survey

Exhibit 6 shows results from the follow-up survey administered in fall 2025, which found that a strong majority of respondents agreed or strongly agreed with statements that addressed the knowledge, skills, and resources that they had accessed through Summer of CS. For example, 37% of respondents strongly agreed and 56% agreed that their workshop had given them strategies to improve student engagement in computer science. Similarly, 31% of respondents strongly agreed and 55% agreed that the workshop had given them content knowledge to teach computer science effectively.

Exhibit 6. Perceptions of Workshop Quality



Note. n’s ranged from 670 to 676. Response categories with 5% or less do not have a data label. Categories may not total 100% due to rounding.

Write-in survey responses provided additional context about characteristics of the workshops that participants found valuable. When asked to identify the most helpful aspects of their workshop experience, respondents most frequently mentioned the opportunities to collaborate with peers, engage in hands-on learning experiences, and learn from high-quality instructors.

Collaboration and Networking With Other Teachers

The most common highlight of Summer of CS mentioned in the open-ended survey responses was the opportunity to connect with other educators through the workshop experience. As one participant explained, “Working alongside peers fostered a sense of community, encouraging knowledge sharing and teamwork, which enhanced both my technical and interpersonal skills.” Another respondent added, “Another highlight was collaborating with other educators. Hearing how others planned to apply these lessons gave me fresh perspectives and a sense of community, which is especially valuable since resources in my school are limited.”

Hands-On Learning Experiences

A comparable number of write-in responses referred to the pedagogical approaches to the workshop, with particular attention paid to the opportunities to engage in hands-on learning opportunities. “Getting to work on real coding projects,” one educator explained,” really helped solidify my understanding of programming concepts and gave me practical experience beyond just theory.” According to another respondent, “The most helpful aspect of Summer of CS was getting hands-on experience with computer science with help from the facilitator. This gives me experience and confidence to get started with my class.” Some participants further noted that the opportunity to experience the workshops through the lens of a student helped them appreciate and prepare for what their own students would need to navigate during the school year. One person described this strength as “being able to be taught some of the concepts as if I were a student, which I could then translate into me helping my own students.”

High-Quality Instructors

Participants also frequently drew attention to the quality of workshop facilitators who could provide expert guidance and support. One survey response described the instructor’s contributions in this way: “She modeled effective teaching strategies while providing excellent curriculum. Her support classes during the year enabled me to feel supported and teach the … curriculum to my students. I could not have done it without the support and encouragement that [the instructor] and the [workshop name] provided.” Another participant shared a similar sentiment: “Facilitator was knowledgeable and responsive. He provided clear explanations, scaffolds, and real-time feedback as I worked through coding tasks or lesson planning. It made the experience feel supportive and effective.”

Participation in Academic Year Workshops

Beyond the multiday summer workshops, participants had multiple opportunities throughout the subsequent school year to engage with their facilitator and colleagues in a series of structured learning opportunities known as “academic year workshops.” More than four in five respondents (82%) reported having attended at least one of these academic year workshops, and roughly half (51%) reported attending three or more. Among respondents who indicated that they had attended at least one academic year workshop, the average number of events attended was 4.3.

Although comments about the academic year workshops were not among the most common write-in survey responses, some respondents offered perspectives about the value of those experiences. One participant shared, “The format of having the bulk of the content taught in the summer, but with refreshers throughout the school year when I could implement with students, allowed me to process the content and then troubleshoot implementation issues.” Another person added, “Working with the same cohort and instructors the entire school year was very helpful.”

Findings About Summer of CS 2025 Changes in Workshop Participant Perspectives

Although it is instructive to learn about workshop attendees' perceptions of quality, a positive experience alone is insufficient for gauging success. An effective professional development effort should help participants grow their knowledge, understanding, and skills to effectively meet students' computer science learning needs. An analysis of survey responses reveals ways in which self-reported beliefs and levels of confidence increased from the beginning to the end of the Summer of CS workshops. Please note that all of the differences reported regarding pre- and post-workshop changes are statistically significant at an alpha level of 0.05.

Changes in Participant Confidence: Overall Results

The first set of survey items addresses participant confidence. Among these, participants reported the highest level of change for the statement, "I am confident in my ability to assess students' learning and performance in computer science." The difference of 0.91 indicates that respondents, on average, changed nearly a full response option between the beginning and the end of the workshop. The average level of confidence grew for each item in Exhibit 7, with the magnitude of change ranging from 0.60 to 0.91; all changes are statistically significant at the 0.001 level.

Exhibit 7. Changes in Summer of CS Participant Confidence With Respect to Computer Science

I am confident in my ability to…	Pre-workshop mean	Post-workshop mean	Mean change
Teach computer science.	3.46	4.27	0.81
Articulate to administrators why computer science is important.	3.82	4.44	0.63
Articulate to students why computer science is important.	3.94	4.54	0.60
Answer student questions about computer science material.	3.33	4.17	0.84
Teach a stand-alone computer science class.	3.17	3.86	0.69
Incorporate computer science content into another subject area.	3.55	4.33	0.78
Teach in alignment with California computer science standards.	3.47	4.31	0.84
Assess students' learning and performance in computer science.	3.33	4.24	0.91

*Note. n*s ranged from 171 to 176. For this analysis, the research team assigned a numerical value to each response option (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, Strongly disagree = 1).

Changes in Participant Confidence: Focus Group Findings

Focus group participants shared their perceptions of ways in which the workshop experienced shaped their confidence levels. “These workshops have been critical to just jump in and get the foundation and provide us with knowledge so we can see where our students should be,” one respondent explained. “Without these workshops, I don’t know where we would have gotten that experience or that hands-on confidence.” Another attendee shared, “I didn’t have a background in computer science. I had no real interest. I was intimidated by it, but now I feel confident about it.”

These reflections reinforce findings from the survey, but insights from the focus groups also reveal some nuance about the confidence generated through Summer of CS workshops. Some respondents noted that they gained valuable knowledge, but that part of their increased confidence came from growing more comfortable with an incomplete skill set. One person explained, “I think part of that is that you’re confident you don’t need to be the expert. You just need to bring that and let them explore and let them use the resource.” Another respondent shared a similar point of view: “I’ve achieved a level of comfort with being an idiot I didn’t have before. It's huge. I’m just a lot more comfortable with admitting, ‘Hey, I don’t have this now. Let’s figure it out.’” Other participants clarified that they were more confident in some areas but not all. One attendee without prior experience in teaching computer science noted, “I definitely feel like my confidence has gone up, and I’ll know how to navigate better. Am I 100% there? By no means … but I definitely feel like from [the start of the workshop], I felt a lot more comfortable using this.”

Changes in Participant Confidence: Subgroup Results

Just as efforts to support the equitable expansion of computer science seek to overcome historical trends of underrepresentation among students, so too do they aim to address the computer science teaching force. Computer science is a field primarily populated by men who identify as White or Asian (John & Carnoy, 2017; Zippia, 2023). Moreover, lack of preparatory privilege and confidence often create obstacles for people to pursue opportunities to learn and contribute to computer science education (Yadav et al., 2016). If EWIG: CS is to expand opportunities for historically underrepresented educators, it is important to understand the experiences of women, people of color, and educators who have not previously engaged with computer science.

Exhibit 8. Changes in Summer of CS Participant Confidence With Respect to Computer Science by Respondent Characteristic

I am confident in my ability to…	Pre-workshop to post-workshop mean change					
	Women	Men	Underrepresented racial group	White and/or Asian	CS teaching experience: 0 Years	CS teaching experience: 1+ Years
Teach computer science.	0.90	0.69	0.92	0.80	1.20	0.65
Articulate to administrators why computer science is important.	0.68	0.54	0.66	0.67	0.77	0.57
Articulate to students why computer science is important.	0.71	0.39	0.52	0.68	0.66	0.57
Answer student questions about computer science material.	0.98	0.65	0.96	0.87	1.17	0.69
Teach a stand-alone computer science class.	0.76	0.66	0.80	0.70	0.87	0.62
Incorporate computer science content into another subject area.	0.86	0.63	0.83	0.77	0.81	0.77
Teach in alignment with California computer science standards.	0.89	0.80	0.78	0.90	0.85	0.84
Assess students' learning and performance in computer science.	0.97	0.82	0.85	0.95	1.23	0.77

*Note. n*s ranged from 50 to 123. For this analysis, the research team assigned a numerical value to each response option (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, Strongly disagree = 1). The underrepresented racial group includes any individual who identifies with a race other than White or Asian.

Exhibit 8 displays the changes in confidence from the beginning of the workshop to the end of the workshop by gender, race, and prior computer science teaching experience. For almost all eight survey items, the average change for the historically underrepresented educator group—that is, women, members of an underrepresented racial group, and participants without any prior computer science teaching experience—exceeds that of their peers. For example, the increase in confidence in a respondent's ability to articulate to students why computer science is important was 0.71 for women and 0.39 for men. The main exceptions are four survey items where White and/or Asian educators experienced slightly more change compared with their underrepresented racial group counterparts. All but one change in Exhibit 8 is statistically significant at the 0.001 level (the exception being men's confidence to articulate to students why computer science is important, which is significant at the 0.01 level).

The results in Exhibits 7 and 8 indicate that on an individual level, educators tended to change their responses to greater levels of agreement between the pre- and post-workshop surveys. We also conducted regression analyses to understand the overall, average change across all respondents and whether any subgroups' changes were significantly different from another, holding all other factors constant. In addition to the groups shown in Exhibit 7, we also added a variable that indicated whether a participant had attended Summer of CS during summer 2023 and/or 2024, based on the rationale that the nature of an individual's learning experience might be different in their first workshop than in subsequent workshops. In our regression analyses, all confidence-related survey items had statistically significant levels of baseline change, but few predictors were significant. Thus, we found few survey items where any particular subgroup improved more or less than others or where respondents' background predicted how or if they changed. The two areas we did see significant results with subgroups were the following:

- Educators with less prior experience teaching computer science showed more change in their confidence to teach computer science compared with educators with more experience, even after accounting for other background characteristics.
- Compared with men, women increased their confidence to articulate to students why computer science is important and their ability to answer student questions, even after accounting for other background characteristics.

See Appendix C for the full regression output.

Changes in Participant Confidence: Variation in Results

The information presented in Exhibit 7 provides a useful overview of the individual-level change reported by workshop participants, but it does not tell us much about the *variation* in individual-level change. To illustrate the range of experiences reported by survey respondents, the *x*-axis of Exhibit 9 displays the number of points on the survey item Likert scale that a respondent's answer moved between the pre- and post-workshop surveys. If, for example, a respondent answered *Agree* to an item before the workshop and *Strongly agree* to the same item after the workshop, the value of the change would be 1. If they answered *Neither agree nor disagree* before the workshop and *Strongly disagree* after the workshop, the value would be –2. If they answered *Strongly agree* before the workshop and *Strongly agree* after the workshop, the value would be 0. The *y*-axis of Exhibit 9 shows the number of respondents that fall into each category.

Exhibit 9. Changes in Summer of CS Participant Confidence to Teach Computer Science

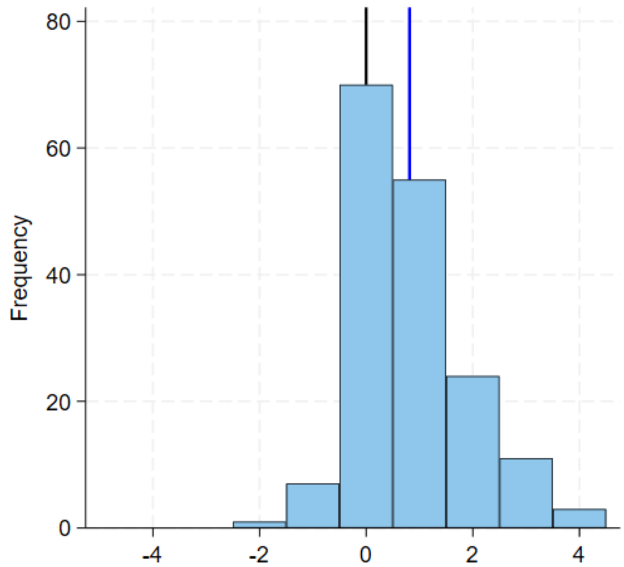


Exhibit 8 shows the changes in survey responses for the item, “I am confident in my ability to teach computer science.” The black vertical line is set at 0; 70 respondents reported no change from the beginning to the end of the workshop. The blue line represents the average change for this item; in this case, it matches the mean of 0.81 shown in Exhibit 7. This display demonstrates that 55 respondents reported an increase of 1 point on the Likert scale and 24 respondents reported an increase of 2. Very small numbers of participants reported changes as high as 4 or lower than 0. This exhibit shows that although the average change in participant response is slightly less than 1, most participants who reported a positive change had an increase of 1 point on the Likert scale, whereas smaller numbers of respondents indicated that their confidence grew by 2 or 3 points. A sizeable proportion of workshop attendees did not report any change in confidence for this item; very small numbers of participants reported a drop in confidence from the beginning to the end of the workshop. Similar histograms for all pre- and post-workshop survey changes are available in Appendix D.

Changes in Participant Confidence With All Students and With Historically Underserved Students: Overall Results

A second set of items asked about participant confidence in recruitment, retention, and creating a sense of belonging for students. The survey began with three questions about respondents’ level of confidence for *all* students. Exhibit 10 shows that between the pre- and the post-workshop survey, the average survey response increased by 0.61 points for the item, “I am confident in my ability to recruit more students to pursue computer science education.” All changes reported in the exhibit are statistically significant at the 0.001 level.

Exhibit 10. Changes in Summer of CS Participant Confidence With Respect to Serving All Students in Computer Science

Please indicate your level of disagreement or agreement with the following statements about ALL students in the school/organization where you work. I am confident in my ability to…	Pre-workshop mean	Post-workshop mean	Mean change
Recruit more students to pursue computer science education.	3.66	4.27	0.61
Encourage students to continue pursuing computer science education.	3.83	4.43	0.60
Create a sense of belonging for students in computer science education.	4.01	4.54	0.54

*Note. n*s ranged from 173 to 176. For the purpose of analysis, the research team assigned a numerical value to each response option (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, Strongly disagree = 1).

The EWIG: CS grant seeks not only to expand computer science education opportunities overall but also to do so in a way that promotes equity and increases access for students who have not historically participated at high levels. To better understand ways in which Summer of CS might contribute to improving opportunities for students who are women/girls, who come from low-income backgrounds, who live in rural areas, who are English learners, and who identify as Black, Latino/a/e, and/or Indigenous, the survey asked the same set of questions specifically about these students. Exhibit 11 shows that between the pre- and the post-workshop survey, the average survey response increased by 0.51 points for the item, “I am confident in my ability to recruit more underrepresented students to pursue computer science education.” All changes reported in Exhibit 11 are statistically significant at the 0.001 level.

Exhibit 11. Changes in Summer of CS Participant Confidence With Respect to Serving Historically Underrepresented Students in Computer Science

Please indicate your level of disagreement or agreement with the following statements about the historically underrepresented students in the school/organization where you work. I am confident in my ability to…	Pre-workshop mean	Post-workshop mean	Mean change
Recruit more underrepresented students to pursue computer science education.	3.83	4.33	0.51
Encourage underrepresented students to continue pursuing computer science education.	3.97	4.47	0.50
Create a sense of belonging for underrepresented students in computer science education.	4.09	4.55	0.47

*Note. n*s ranged from 174 to 175. For the purpose of analysis, the research team assigned a numerical value to each response option (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, Strongly disagree = 1).

Changes in Participant Confidence With All Students and With Historically Underserved Students: Subgroup Results

As with the first set of items about participant confidence, we examined differences among subgroups of participants through regression analyses that included racial identity, gender identity, computer science teaching experience, and prior Summer of CS participation as independent variables. Items about all students (shown in Exhibit 10) and historically underserved students (shown in Exhibit 11) were all significant at baseline levels, but none of the respondent subgroups were significant. In other words, no particular subgroup improved more or less than others. Thus, all survey respondents seemed to feel that their workshops gave them greater confidence to work with all types of students, regardless of the educator's personal background. (See Appendix C for the full regression output.)

Changes in Participant Beliefs: Overall Results

Another dimension of equity in computer science concerns educator beliefs. Research suggests that conscious and unconscious bias shape views among adults and students about who can be successful in computer science (Ashcraft et al., 2017; Margolis, 2008; Scott et al., 2019). Success in an equity-focused effort to build capacity, therefore, might improve educator beliefs about who belongs in computer science and who can benefit from computer science. The next set of survey items, displayed in Exhibit 12, examines changes in respondents' attitudes about their students between the pre- and post-workshop surveys. For example, the average change was 0.16 for the item, "All students can do well on computing tasks with the right teaching and supports." All of these changes are positive and statistically significant.

Note that all of the changes presented in Exhibit 12 are smaller in magnitude than the items shared in Exhibits 7, 8, 10, and 11. However, the pre-workshop average response is also higher; each exceeds 4, which places those responses between *Agree* and *Strongly agree* on the Likert scale. Thus, respondents came into their workshops already holding these beliefs, leaving less room for them to increase their agreement in their post-workshop surveys. These data suggest that survey respondents entered their workshop already having high levels of belief about what students can and should be able to do in computer science. Still, all changes reported in Exhibit 12 are statistically significant at the 0.01 level.

Exhibit 12. Changes in Summer of CS Participant Beliefs About Computer Science

Please indicate your level of disagreement or agreement with the following statements.	Pre-workshop mean	Post-workshop mean	Mean change
All students should learn the fundamentals of computer science.	4.43	4.64	0.21
All students can master the skills taught in computer science.	4.19	4.43	0.23
Learning computer science will help students succeed later in life.	4.47	4.60	0.14
All students can do well on computing tasks with the right teaching and supports.	4.39	4.54	0.16
All students can understand concepts underlying computer processes.	4.27	4.51	0.24

*Note. n*s ranged from 172 to 175. For the purpose of analysis, the research team assigned a numerical value to each response option (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, Strongly disagree = 1).

Changes in Participant Beliefs: Focus Group Findings

Once again, contributions from group participants shed additional light on beliefs about who can participate in and be successful in computer science. Participants stated consistently across focus groups that all students can and should benefit from computer science education. One person shared, “It needs to be accessible to everybody and it should be an opportunity to learn.” Multiple respondents specified that computer science is beneficial to students who have historically had limited opportunities to participate. One workshop attendee noted, “I work with special education students, K through 5 in particular, and even our most delayed students, our autistic students, students that have challenges, they’re all motivated by computer science.” Another respondent shared a similar perspective: “Everybody needs it. Everybody can do it. The kids that are low-performing in some regards, are on the spectrum in some regards, excel at it. Then, on the other hand, I had an after-school program for more gifted kids. They excelled at it.”

When asked about the degree to which the Summer of CS experience changed their beliefs, most respondents affirmed what we see in the survey results by noting that the workshop had reinforced preexisting views. “Inherently, my pedagogy and teaching is that all students deserve success at all levels, no matter what we’re doing—if it’s reading, if it’s math, if it’s computers. So I think I already had that,” one participant reflected. “I guess the difference is I came in thinking that things needed to be equitable, but I didn’t realize how important my role is in providing that to all my students.” One attendee who did change their mindset about computer science explained the shift they experienced by saying, “I always thought computer science people were all these super geeky people that talk a bunch of code, and I know nothing about whatever that world is. I’m realizing that’s really not what it is, and it really is an accessible thing to everybody.”

Changes in Participant Beliefs: Subgroup Results

As with previous items, we conducted regression analyses to examine the connection between participant characteristics and changes in beliefs. Compared with first-time attendees, educators who attended Summer of CS in a previous summer showed more change in their beliefs that all students can do well on computing tasks and can understand concepts underlying computer processes, even after accounting for other background characteristics. Thus, repeated participation may strengthen educators’ belief in students’ ability to succeed in computer science.

Changes in Participant Perspectives: Comparing 2025 to 2024

The survey results reported here use the same survey instrument that AIR administered to Summer of CS participants in 2024 (see Lee et al., 2024, for full results). In this section, we describe key differences between 2024 and 2025 survey results.

Workshop Participation

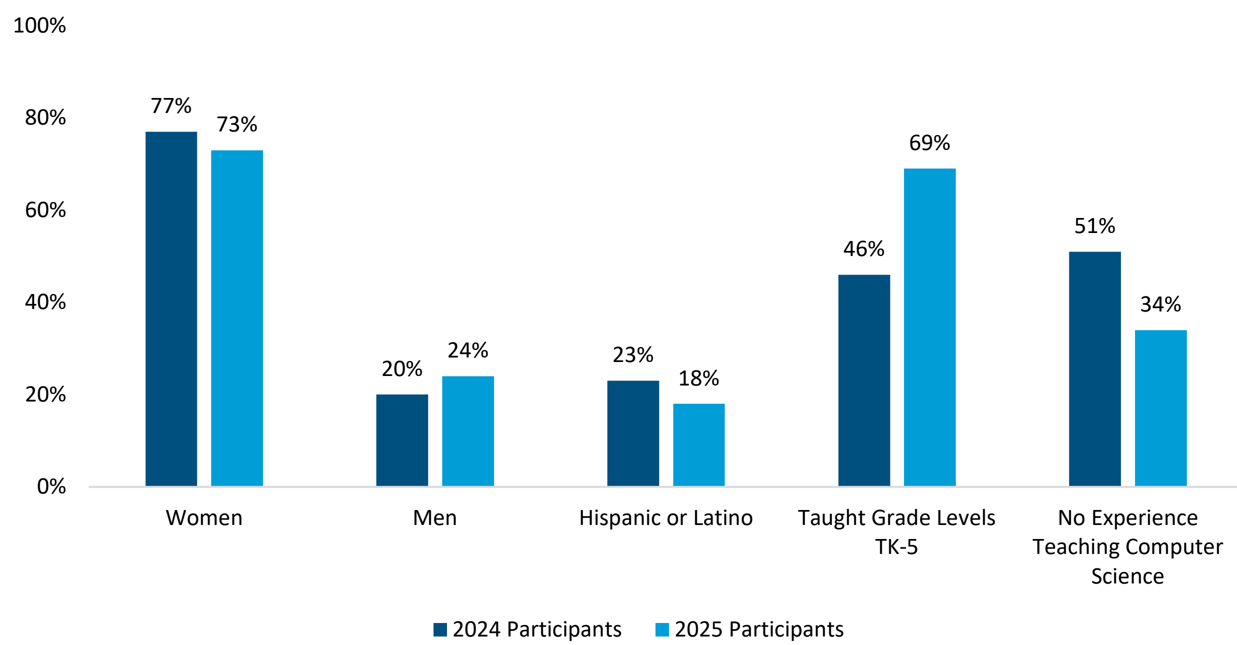
Summer of CS in 2025 featured fewer workshops (17) than in 2024 (44). Attendance also differed; 330 educators attended a 2025 workshop compared with 736 in 2024. This difference in overall workshop offerings—and therefore participation—is a direct reflection of the financial resources available to support Summer of CS in 2025, which were lower than in 2024. In addition, the following workshop participation data reveal differences among participants between the 2 years:

- Workshops in 2025 featured lower proportions of women and Hispanic or Latino educators. Almost three quarters (73%) of 2025 workshop attendees were women (compared with 77% in 2024), and 24% of 2025 attendees were men (compared with 20% in 2024). A slightly lower percentage of Hispanic or Latino educators attended workshops (18% in 2025 vs. 23% in 2024), but otherwise, racial identities of participants were similar.

- Attendees in 2025 were slightly less likely to work with elementary students. Slightly more than two thirds (39%) of attendees taught grades TK–5, whereas nearly half (46%) did the same in 2024.
- Educators' experience teaching computer science was also different between the 2 years. In 2025, a third of workshop attendees (34%) reported that they had never taught computer science. In 2024, more than half (51%) reported the same.
- Fewer educators took both pre- and post-workshop surveys in 2025. A total of 54% and 77% of attendees took both surveys in 2025 and 2024, respectively.

See Exhibit 13 for a visual representation of these differences.

Exhibit 13. Key Demographic Differences Between 2024 and 2025 Summer of CS Participants



Pre–Post Changes in Survey Responses

We also looked at how the mean change between pre- and post-workshop survey items changed between 2024 and 2025. Across all 19 survey items, mean changes were all statistically significant in both years. The magnitude of change was lower in 2025 than in 2024 for 16 of these items. However, these differences were very small; they ranged from 0.03 to 0.20.

Regression Results

We conducted similar regression analyses across both years using the same core model structure. This year's model included an additional predictor to capture prior workshop attendance; all other predictors remained the same. Readers may notice fewer statistically significant subgroup coefficients in 2025 than there were in 2024. However, we caution against making much meaning of differences between this year's and last year's regression results. Differences in results may reflect factors unrelated to the workshops, making direct comparisons potentially misleading. In addition, for items related to participant confidence, pre-workshop means were higher in 2025 than in 2024, meaning that there was less room to grow between the beginning and end of the workshop. Moreover, because the number of workshop participants—and therefore survey respondents—was smaller in 2025 than in 2024, our estimates may not be precise enough to detect statistically significant subgroup differences even if they do exist. We recommend further exploration of differential workshop experiences based on gender, race, and prior computer science teaching experience to better understand these dynamics.

Taking these differences and cautions together, our main takeaway from these comparisons is that both sets of workshop attendees showed substantial and positive pre-to-post changes in beliefs about computer science education. We also find that in both 2025 and 2024, the positive change in self-reported confidence is larger for educators with less prior computer science teaching experience. Although subgroup coefficients in 2025 are smaller and less significant than they were in 2024, we do not have sufficient evidence to draw conclusions about why that may be the case, given design and sample differences.

Findings About Changes in Summer of CS 2023 and 2024 Participant Perspectives

Workshop participant perceptions of quality provide useful evidence about the value of a professional learning experience, but these alone are insufficient for understanding the effectiveness of an effort like Seasons of CS. Teacher knowledge, understanding, and skills are critical to meet students' computer science learning needs effectively. Previous reports from the EWIG: CS evaluation have documented increases in participant confidence and beliefs from the beginning to the end of their workshop experience (Knudson, Castro, & Roy, 2025; Lee, Knudson, & Roy, 2024). The follow-up survey administered in fall 2025 enabled us to track changes in these areas a year after participants' summer 2024 workshop experiences.

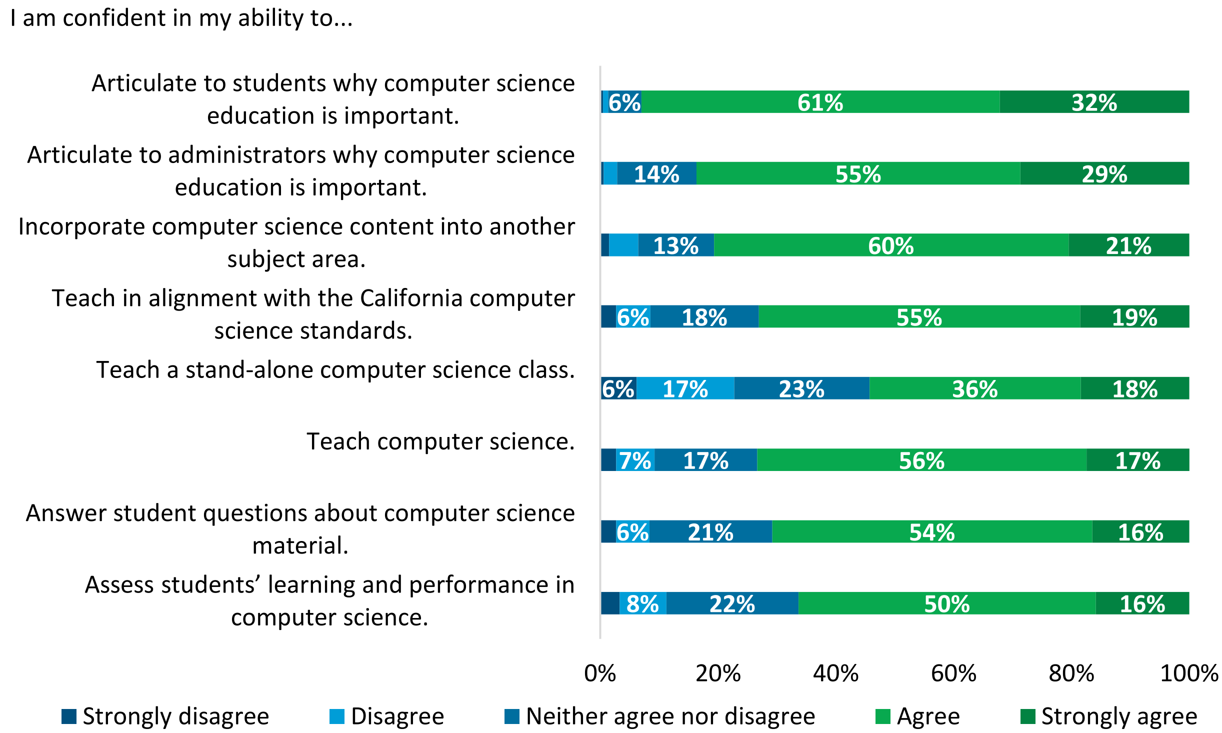
Changes in Participant Confidence

A set of eight survey items addressed participant confidence in teaching computer science. Exhibit 14 displays these items along with participant responses to them from the fall 2025 survey administration. For example, 16% of respondents strongly agreed and 54% agreed with the statement, "I am confident in my ability to answer student questions about computer science material." See Appendix I for a comparison of these responses across different survey administrations.

Key Finding #3

Survey responses revealed a positive and statistically significant change in participants' confidence in teaching computer science between the beginning of Summer of CS workshops in 2023 or 2024 and their return to the classroom 1–2 years later.

Exhibit 14. Follow-Up Survey Responses to Items in the Confidence Scale

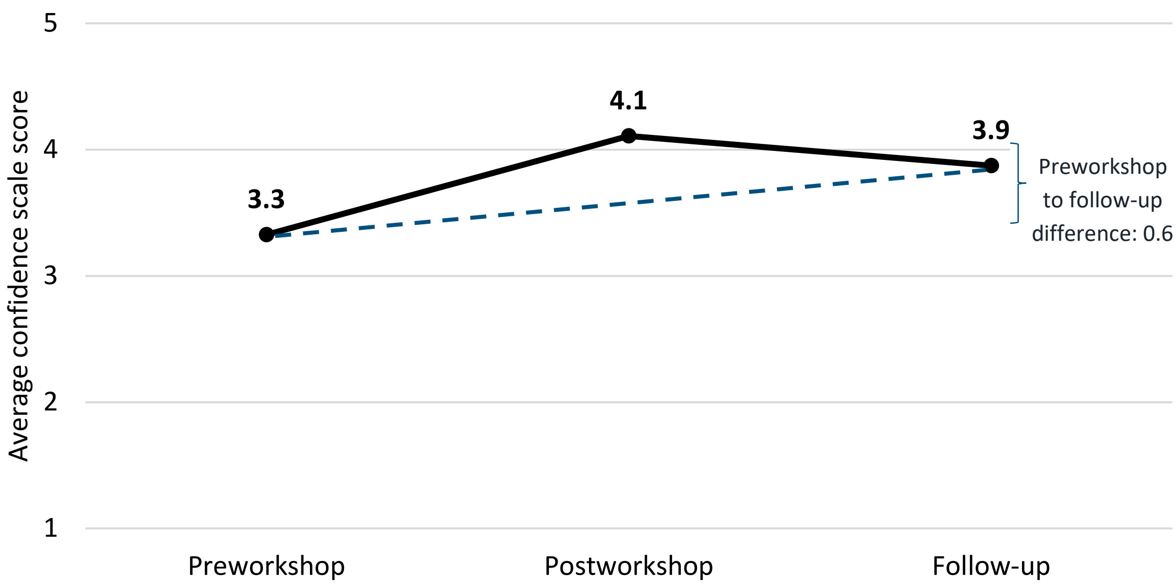


Note. *n*'s range from 663 to 671. Response categories with 5% or less do not have a data label. Categories may not total 100% due to rounding.

To describe participant confidence in a way that better captures the construct underlying individual survey responses and to facilitate clarity in interpretation, the AIR study team combined these items to create a single measure of participant confidence. (See Appendix F for a detailed description of this survey scale.) Using data from the subset of Summer of CS 2024 participants who responded to surveys at the beginning of their 2024 workshop, the end of their 2024 workshop, and in fall 2025, we then tracked changes in confidence over time.

Collectively, survey responses reveal an increase in average participant confidence following the Summer of CS workshop experience. Consistent with findings from Summer of CS in 2024 and 2025, we see a positive and statistically significant increase in self-reported confidence between the beginning and end of the workshop experience. With a difference of 0.8, the average magnitude of this change is nearly a full point on the 5-point Likert scale. However, between the end of the workshop and the administration of the follow-up survey a little more than a year later, respondents reported a drop in average self-reported confidence of 0.2 points. It may be that the experience of returning to the classroom introduced challenges that educators did not anticipate or fully appreciate during their workshop experience. The most important takeaway from these findings is nevertheless positive. From the beginning of the workshop experience, participants reported an increase in their confidence to teach computer science even after spending a full year back in the classroom. (See Exhibit 15.)

Exhibit 15. Changes in Average Confidence Scale Score



Note. *n* = 307. Survey scale scores have been rescaled to the original Likert range of 1–5 for ease of interpretation.

Changes in Participant Confidence: Subgroup Results

Just as efforts to support the equitable expansion of computer science seek to improve participation among students who have historically been underrepresented, they also seek to improve representation within the computer science teaching force. Most members of the computer science field are men who identify as White or Asian (John & Carnoy, 2017; Zippia, 2023). Moreover, people who lack the benefit of preparatory privilege—that is, people who enter educational environments primed to succeed in computing due to early exposure in their home lives—and have not yet developed confidence in the content area may struggle to learn about and contribute to computer science education (Yadav et al., 2016). If EWIG: CS is to expand opportunities for historically underrepresented educators, it is important to understand the experiences of women, people of color, and educators who have not previously engaged with computer science.

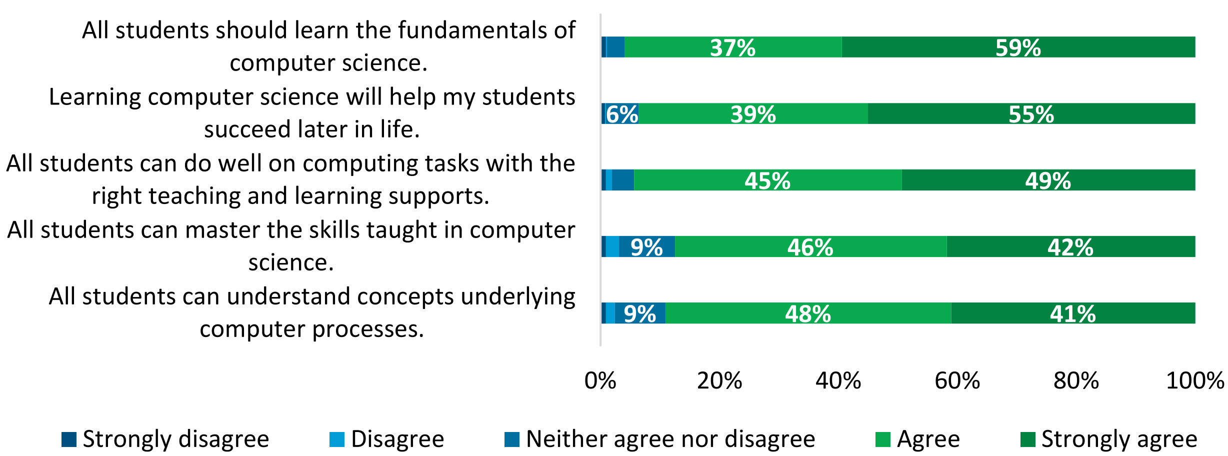
At the same time, we want to understand the dynamics of the working environment that shape educators' ability to be successful. Grade-level settings can shape the degree to which teachers and administrators can incorporate computer science into students' learning opportunities effectively, and an accumulation of professional learning opportunities might also contribute to their ability to do so.

A set of regression analyses explored the degree to which changes in confidence varied based on respondent characteristics, including racial and gender identity and grade level served; and level of professional preparation, including prior experience with teaching computer science, number of times attending a Summer of CS workshop, and attendance at academic year workshops in the subsequent school year. With respect to changes in confidence between the beginning of the Summer of CS 2024 workshop and the follow-up survey in fall 2025, we found no differences among participants associated with personal characteristics or professional preparation. However, holding these other characteristics constant, we observed that the average growth in confidence for respondents serving non–high school students exceeded that of their high school peers. See Appendix H for the full regression output.

Changes in Participant Beliefs: Overall Results

Similar to measures of confidence, a set of five survey items explored participant beliefs about who should experience and be successful with computer science education. Exhibit 16 displays these items along with participant responses to them from the fall 2025 survey administration. For example, 42% of respondents strongly agreed and 46% agreed with the statement, "All students can master the skills taught in computer science." See Appendix I for a comparison of these responses across different survey administrations.

Exhibit 16. Follow-Up Survey Responses to Items in the Beliefs Scale



Note. *n*'s range from 665 to 676. Response categories with 5% or less do not have a data label. Categories may not total 100% due to rounding.

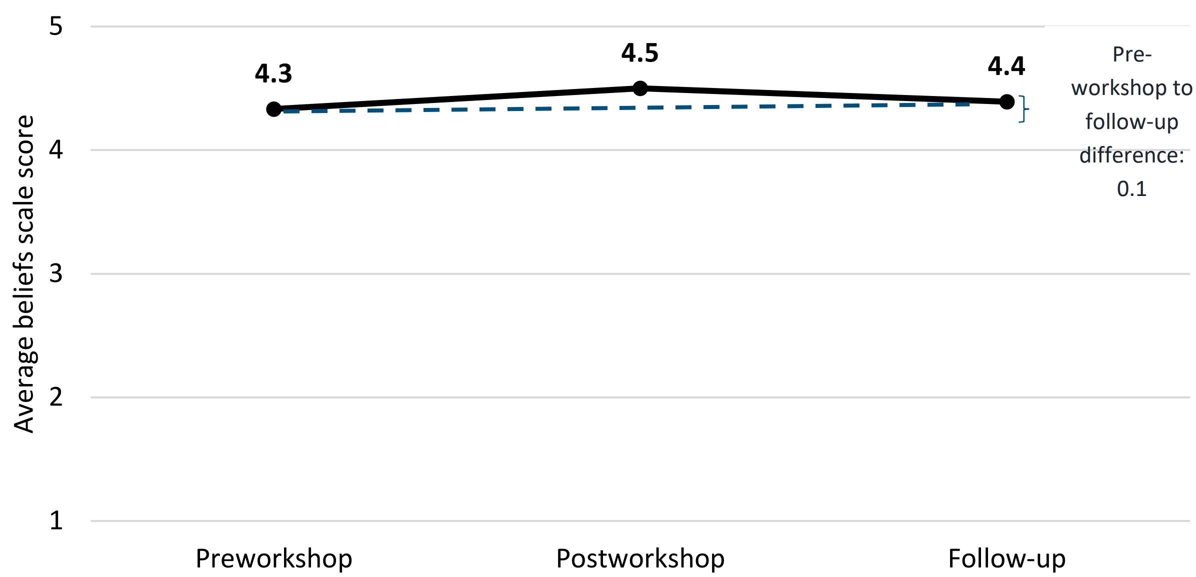
As for responses about confidence, the research team used the items from Exhibit 7 to construct a single survey scale that captured participant beliefs about computer science participation. (See Appendix F for a detailed description of the development of this survey scale.) Once again, we tracked changes in beliefs over time for the subset of participants from Summer of CS 2024 who responded to surveys at the beginning of their 2024 workshop, the end of their 2024 workshop, and in fall 2025.

Exhibit 17 shows results from this analysis. Consistent with findings from surveys administered before and after Summer of CS workshops in 2024 and 2025, the preworkshop beliefs scores for beliefs were higher than those for confidence, indicating that educators began their workshops already agreeing with these survey items at high levels. Despite these higher initial values for the beliefs scale, we still saw a positive and statistically significant change of 0.2 points between the beginning and end of the Summer of CS workshop in 2024. A year later, in fall 2025, self-reported beliefs about who can and should succeed in computer science had dropped, on average, by 0.1 points from the postworkshop levels. As with results about self-reported confidence, it is possible that the realities of classroom instruction in the year following the workshop tempered some of the positive feelings that respondents had reported immediately following Summer of CS. The overall finding nevertheless remains positive. From the beginning of the workshop experience to the follow-up survey administration after a year in the classroom, participants reported a positive and statistically significant average change in the beliefs scale. (See Exhibit 17.)

Key Finding #4

Survey responses revealed a positive and statistically significant change in beliefs about who can and should do well in computer science between the beginning of Summer of CS workshops in 2023 or 2024 and participants' return to the classroom 1–2 years later.

Exhibit 17. Changes in Average Beliefs Scale Score



Note. n = 353. Survey scale scores have been rescaled to the original Likert range of 1–5 for ease of interpretation.

Changes in Participant Beliefs: Subgroup Results

As with the scale measuring participant confidence, we examined differences among subgroups of participants through regression analyses that included racial identity, gender identity, computer science teaching experience, Summer of CS participation, and academic year workshop participation; grade levels served as independent variables. These analyses found only one consistent difference among subgroups: Members of the underrepresented racial identity group—that is, respondents who did not identify as White and/or Asian—had a lower level of change in beliefs between the beginning of their workshop in 2024 and the follow-up survey in fall 2025. See Appendix H for the full regression output.

Findings About Summer of CS 2023 and 2024 Participant Behaviors

As with perceptions of workshop quality, reports of changes in confidence and beliefs offer promising signals about the effectiveness of professional learning experiences provided through Seasons of CS. However, they provide incomplete information about the degree to which opportunities for computer science education have improved. Given the stated goal of the EWIG: CS investment of “providing high-quality CS instruction and CS learning experiences,” we need to understand the degree to which quality learning translates into practice when educators return to their classrooms, schools, and districts. Self-reported data from the fall 2025 follow-up survey offer a window into the nature of computer science learning provided by workshop participants following their summer experience.

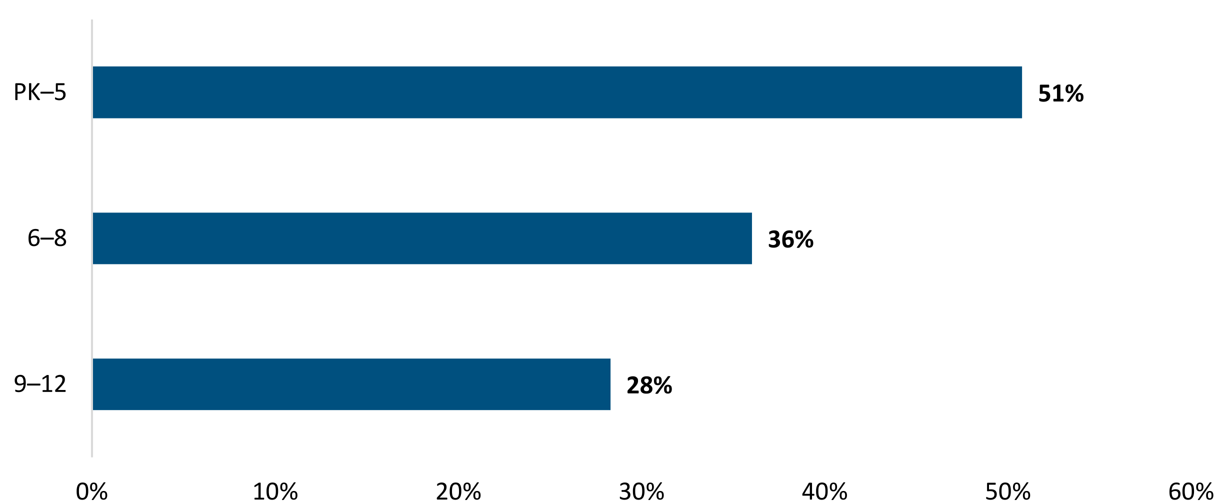
Students Taught

Key Finding #5

Workshop participants delivered computer science instruction when they returned to their classrooms.

Consistent with the aims of the workshop program, a strong majority of workshop participants went on to incorporate computer science content into their classroom instruction. Eighty-six percent of respondents reported teaching computer science in some capacity during the 2024–25 school year. Roughly half of these educators served students in Grades PK–5, more than a third served middle-grades students, and more than one quarter reported delivering computer science education to students in high school (see Exhibit 18).

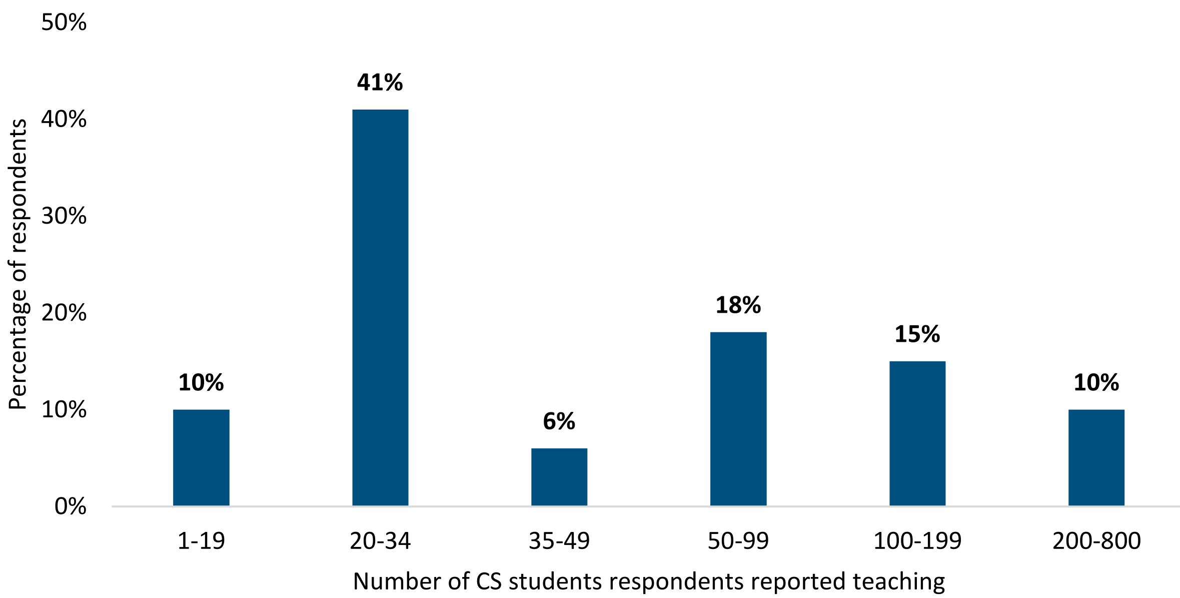
Exhibit 18. Grade Bands to Which Participants Taught Computer Science



Note. *n* = 583. Totals do not total 100% because this was a check-all-that-apply question.

Among educators who reported teaching computer science in 2024–25, survey respondents provided computer science learning opportunities for an average of 80 students. The average number of students served was highest for educators serving Grades 6–8 at 119. In contrast, educators who taught computer science to students in Grades Prekindergarten (PK)–5 taught an average of 72 students, and educators in Grades 9–12 taught an average of 83. Exhibit 19 shows the distribution of the number of students taught by grade level. For example, 10% of survey respondents taught computer science to between 1 and 19 students, whereas 41% of survey respondents taught between 20 and 34 students.

Exhibit 19. Number of Computer Science Students Taught



Note. *n* = 571.

Format of Computer Science Instruction

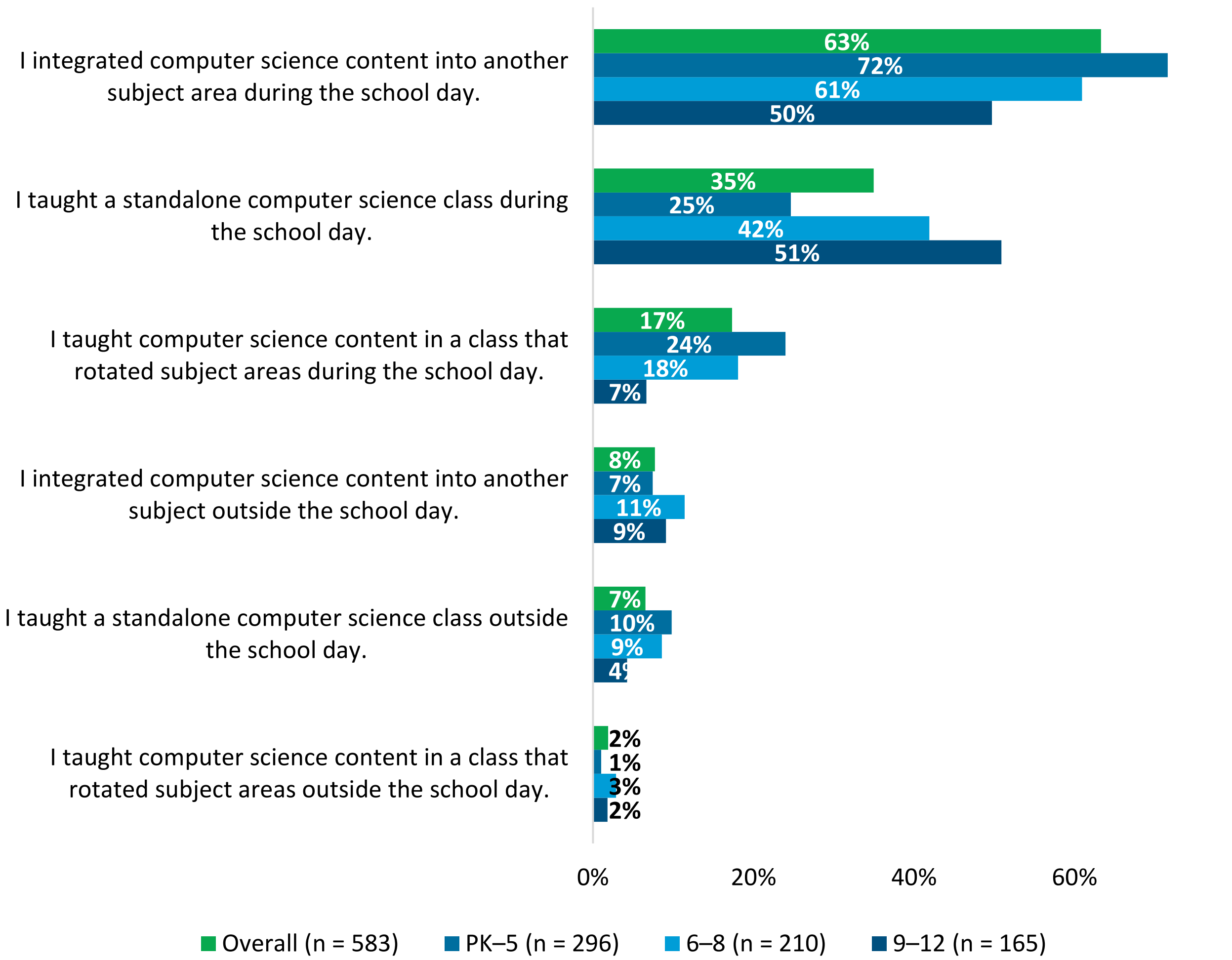
Survey responses also offer details about the format of computer science instruction delivered by workshop participants. More than two-thirds of respondents indicated that they had taught computer science by integrating computer science content into another subject during the school day, whereas nearly four in 10 reported that they had taught a standalone computer science course during the school day. The teaching format varied by grade band. Nearly three-quarters of respondents serving Grades PK–5 indicated that they had taught computer science through integration, whereas only a quarter of these educators had taught a standalone class. In contrast, roughly half of high school

Key Finding #6

The primary format of computer science instruction was the integration of content into another subject area; this was especially true in the elementary grades.

educators had taught a standalone computer science class; nearly the same percentage reported integrating computer science into other subject areas. (See Exhibit 20.)

Exhibit 20. Computer Science Formats for Respondents Who Reported Teaching Computer Science by Grade Band



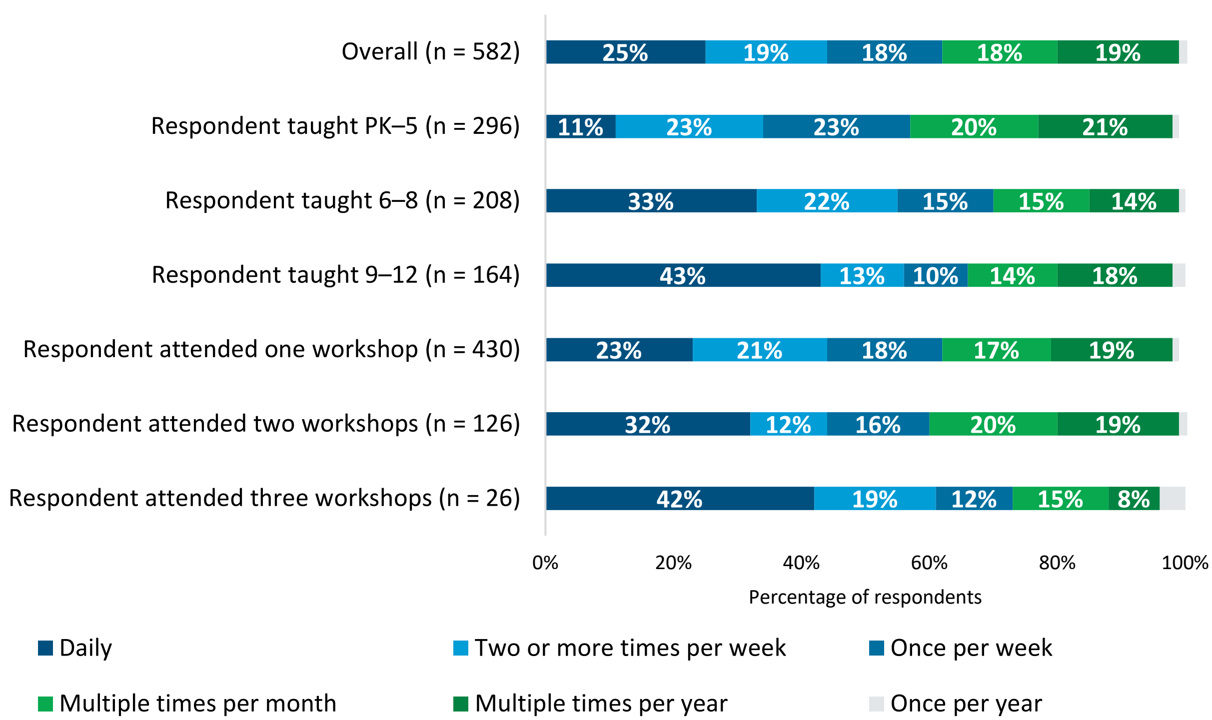
Note. Totals do not total 100% because both teaching format and grade level(s) taught were check-all-that-apply questions.

Dosage of Computer Science Instruction

Additional survey items revealed details about the frequency with which computer science instruction took place for workshop participants. Overall, one quarter of survey respondents reported teaching computer science daily in 2024–25, and nearly two-thirds reported teaching computer science at least weekly. However, frequency varied across several respondent characteristics. For example, 43% of respondents who had taught computer science to high school students did so on a daily basis, whereas only 11% of educators serving students in Grades PK–5 taught computer science every day.

We also see differences based on the level of engagement with Summer of CS. Among respondents who had attended Summer of CS in 2023, 2024, and 2025, 42% taught computer science daily, and nearly three-quarters did so at least weekly. In contrast, one quarter of respondents who had attended a single Summer of CS workshop taught computer science daily. Because of our research design, we were unable to determine whether educators' level of engagement with Summer of CS had caused them to implement CS instruction more frequently. For example, it is possible that educators who had experienced more professional development through multiple Summer of CS experiences felt better equipped to incorporate computer science into their instruction on a more regular basis. However, it is also plausible that educators who already had greater responsibilities for teaching computer science participated in the summer workshops to seek support for preexisting roles.

Exhibit 21. Frequency of Computer Science Instruction



Note. Grade level(s) taught was a check-all-that-apply question. Total workshops attended comes from SCOE registration data. Percentages may not total 100% due to rounding. Response categories with 5% or less do not have a data label.

In addition to measuring dosage through frequency, the survey also asked respondents to report their total number of hours of computer science instruction during the 2024–25 school year. As part of the workshop registration process, Summer of CS participants and an administrator in their organization both signed a participant agreement that stipulated that teachers and paraprofessionals would "implement CS instruction using curriculum and pedagogical strategies provided through this workshop during the school year" for a total of 30 hours in Grades PK–5, 50 hours in Grades 6–8, and 75 hours in Grades 9–12. Exhibit 22 displays the number of self-reported instructional hours in the 2025 follow-up survey. Across the 557 survey responses, participants reported teaching a total of 81,040 hours of computer science content in 2024–25. These educators had taught an average of 145 hours over the course of the school year, with higher average hours in higher grade bands. The exhibit also demonstrates that more than half of educators in each grade band, including nearly two-thirds of respondents in Grades 6–8, had met or exceeded the commitment in their participant agreement. Similar to the data presented in Exhibit 21, we saw higher average hours for educators who had attended more Summer of CS workshops.

Exhibit 12 Hours of Computer Science Instructional Time by Grade Band and Workshop Participation

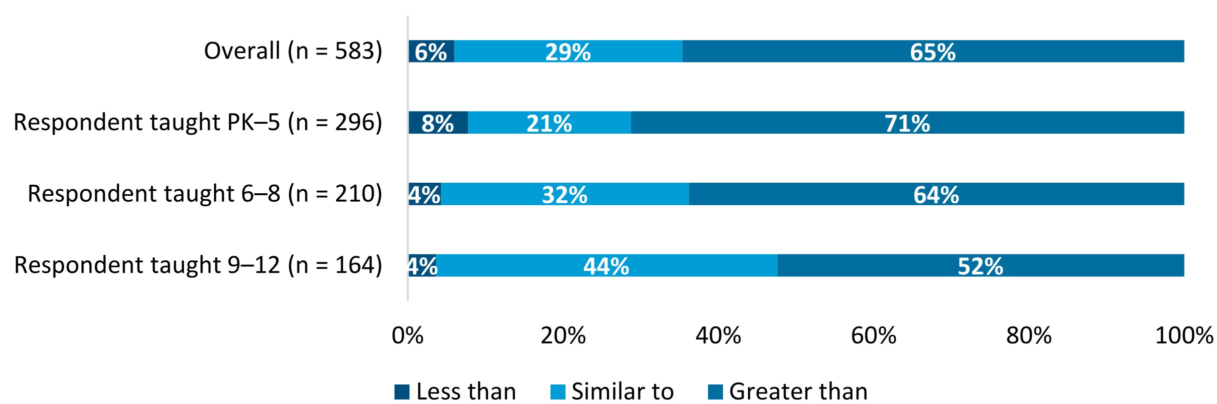
Grade band	Average hours	Grade band's expected hours	Percentage of respondents who met or exceeded expectation
Overall (*n* = 557)	145	N/A	N/A
PK–5 (*n* = 283)	87	30	55%
6–8 (*n* = 199)	199	50	62%
9–12 (*n* = 159)	227	75	55%
Respondent attended one workshop (*n* = 414)	126	N/A	N/A
Respondent attended two workshops (*n* = 118)	184	N/A	N/A
Respondent attended three workshops (*n* = 25)	292	N/A	N/A

Note. Grade level(s) taught was a check-all-that-apply question. Total workshops attended comes from SCOE registration data. Percentages may not total 100% due to rounding.

The preceding text and tables provide promising evidence that participants in Summer of CS workshops go on to deliver computer science instruction to students when they return to their schools. However, our study methods do not permit us to determine whether an increase in computer science teaching is caused by workshop participation. In addition, because factors like recall bias might have impaired our ability to capture data accurately, we did not attempt to measure the hours of instruction delivered in the year *before* workshop participation. Nevertheless, the survey did ask participants to indicate whether the number of hours taught in 2024–25 was greater than, similar to, or less than the hours in the year before they had first participated in a Summer of CS workshop.

Nearly two-thirds of respondents indicated that they had taught more hours of computer science after Summer of CS than they had before. This is especially true for educators in elementary grades, where 71% responded that their hours had increased. In contrast, 52% of high school educators reported teaching more hours of computer science in 2024–25 than in the year before their workshop. This is perhaps unsurprising. Standalone computer science courses are more common at the high school level and are more likely to have a standard number of hours dedicated exclusively to computer science content. Alternatively, educators who are integrating computer science content into other subject areas may have more room for growth as they become more comfortable with computer science content and pedagogical approaches. (See Exhibit 23.)

Exhibit 23. Comparison of Hours of Computer Science Teaching in 2024–25 to the School Year Before the First Summer of CS Workshop

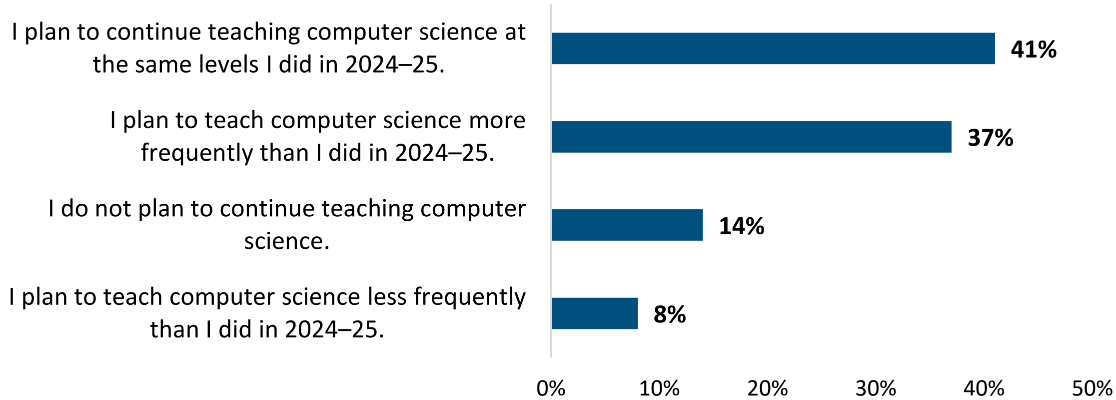


Note. Grade level(s) taught was a check-all-that-apply question. Total workshops attended comes from SCOE registration data. Percentages may not total 100% due to rounding.

Plans for the Future

Questions about participant behaviors concluded by addressing plans for the future. Approximately four in 10 respondents (41%) shared plans to teach computer science at the same frequency as they had in 2024–25, and nearly as many (37%) indicated that they planned to teach computer science more frequently. In contrast, 14% of respondents did not plan to continue teaching computer science. (See Exhibit 24.)

Exhibit 34. Respondents’ Plans for the Future



Note. *n* = 671.

Findings About Resources and Supports Needed

Educator knowledge, skills, dispositions, and behaviors play an instrumental role in shaping opportunities for students to learn computer science content. Indeed, survey results shared in this report provide some insight into the degree to which workshop participants grew professionally and created learning experiences for students in the year(s) following Summer of CS. However, many factors beyond teachers' control influence their ability to succeed in teaching computer science. A final set of survey questions sought to better understand the resources and supports needed for success.

The analytic approach and results described in this section of the report aim to highlight discrepancies between the importance and availability of key resources and supports for computer science education. Our goal is to draw attention to the tools that are currently insufficient to meet educators' needs.

Key Finding #7

Important needs remain for resources and support to enable computer science instruction to capitalize on positive changes in educator capacity.

Resources to Improve Computer Science Education

The first set of survey items asked respondents to assess the importance and availability of resources to improve computer science education—that is, the software, hardware, and instructional materials that educators can use as part of their instructional experience. The survey gathered respondent opinions about each of eight resources in two ways. First, the survey asked how important a given resource was. Next, the survey asked about the extent to which respondents had access to each resource. See Appendix J for participant responses to these individual items. To understand where respondents experienced discrepancies between important resources and the availability of those resources, the research team converted responses into numerical values by assigning to the questions about importance the response *Very important* as 4, *Moderately important* as 3, *Slightly important* as 2, and *Not at all important* as 1. Similarly, AIR converted responses about availability into numerical values, this time assigning *To a great extent* as 4, *To some extent* as 3, *To a small extent* as 2, and *Not at all* as 1. The team then calculated the average difference between each person's responses about importance and availability to identify the resources with the greatest discrepancies. A positive number indicates that the need for a given resource is greater than its availability; a negative number indicates that the availability of a resource is greater than its need.

Exhibit 25 lists each of the eight resources, along with the difference between importance and availability for all respondents and by grade band. The largest discrepancy was in resources for integrating computer science into other subjects; at 0.75, this difference was nearly a full point on the Likert scales that respondents used to answer these survey items. Although most responses were comparable across grade levels, responses for some resources revealed greater challenges at the elementary level. Teachers serving Grades PK–5 reported substantially larger needs for ready-to-use curricula or lesson plans and unplugged computer science learning resources than did other grade levels.

Survey responses about resources also suggested some areas in which teachers did not experience challenges in accessing tools critical for their success. Average responses for the importance and availability of student access to internet-connected devices, both at home and at school, were nearly identical.

Exhibit 45. Gaps in Resources for Computer Science Instruction

Resource	Average difference between importance level and availability level			
Grade band	**Overall**	**PK–5**	**6–8**	**9–12**
Resources for integrating computer science into other subjects	0.75	0.75	0.74	0.72
Software or platform licenses	0.59	0.57	0.54	0.56
Access to software or websites from within the district network	0.55	0.51	0.50	0.59
Ready-to-use curricula or lesson plans	0.54	0.72	0.46	0.28
Data and assessment tools	0.47	0.50	0.42	0.50
Unplugged computer science learning resources (i.e., activities that do not use digital devices)	0.42	0.49	0.38	0.31
Student access to internet-connected devices at school	0.03	-0.02	0.06	0.10
Student access to internet-connected devices at home	0.02	0.03	-0.09	0.14

Note. Overall, *n*'s ranged from 560 to 569 and include only respondents who reported teaching computer science in 2024–25. Grade PK–5 *n*'s ranged from 287 to 291. Grade 6–8 *n*'s ranged from 202 to 205. Grade 9–12 *n*'s ranged from 153 to 161.

Supports to Improve Computer Science Education

The second set of items asked respondents to assess the importance and availability of supports to improve computer science education—that is, the money and human connections that foster professional learning and engagement in computer science. As with items about resources, the survey asked respondents about each of 13 supports in two ways. First, the survey asked how important a given resource was. The research team converted responses to numerical values by assigning the response *Very important* as 4, *Moderately important* as 3, *Slightly important* as 2, and *Not at all important* as 1. Next, the survey asked about the extent to which respondents had access to each resource. See Appendix J for participant responses to these individual items. AIR researchers also converted these responses about availability into numerical values, this time assigning *To a great extent* as 4, *To some extent* as 3, *To a small extent* as 2, and *Not at all* as 1. The team then calculated the average difference between each person's response about importance and availability to identify the supports with the greatest discrepancies.

Exhibit 26 lists each of the 13 supports, along with the difference between importance and availability for all respondents and by grade band. Note that the needs identified for many of the supports listed in the survey are larger in magnitude than for items about resources: the discrepancy between importance and availability was larger for seven items in Exhibit 26 than any of the items in Exhibit 25. The largest of these was for an instructional materials budget for computer science; at 1.22, this difference was more than a full point on the Likert scales that respondents used to answer these survey items.

Exhibit 26. Gaps in Supports for Computer Science Instruction

Support	Average difference between importance level and availability level			
Grade band	**Overall**	**PK–5**	**6–8**	**9–12**
Instructional materials budget for computer science	1.22	1.31	1.19	1.05
Stipends or extra pay for professional development in computer science offered outside contract time	1.07	1.06	0.94	1.06
Time to plan computer science instruction	1.06	1.11	0.91	1.07
Content-focused coaching or mentoring in computer science	0.97	1.03	1.02	0.68
Relationships with external partners	0.88	0.89	0.83	0.85
District administrator support for computer science	0.85	0.85	0.85	0.85
A community of practice or professional learning community of other computer science educators	0.81	0.78	0.83	0.74
School administrator support for computer science	0.74	0.78	0.62	0.73
Parent and community engagement in computer science	0.72	0.68	0.73	0.74
Time to teach computer science content	0.69	0.87	0.49	0.59
Ongoing connections with other Summer of CS workshop participants	0.50	0.58	0.50	0.38

Support	Average difference between importance level and availability level			
Ongoing connections with my Summer of CS workshop facilitator	0.42	0.52	0.40	0.25
Student interest in computer science	0.42	0.26	0.45	0.62

Note. Overall, *n*'s ranged from 548 to 568 and include only respondents who reported teaching computer science in 2024–25. PK–5 *n*'s ranged from 280 to 291. Grade 6–8 *n*'s ranged from 197 to 207. Grade 9–12 *n*'s ranged from 153 to 159.

Some differences by grade level may merit further exploration. Once again, most responses were comparable across grade levels. However, responses for teachers from Grades PK–5 suggest a more intense need for time to teach computer science content. This is perhaps unsurprising, given the higher percentages of teachers at these grade levels who taught computer science by integrating it into other content areas rather than as a standalone class. Teachers serving Grades PK–5 and 6–8 also reported a greater discrepancy between importance and availability than did their peers in Grades 9–12 for content-focused coaching or mentoring in computer science. Another survey item suggested a more pronounced need at the high school level: Although the magnitude of the difference between importance and availability was lower than for most other items, teachers of students in Grades 9–12 reported a higher discrepancy than their counterparts in other grade levels for student interest in computer science.

Findings from Case Studies of Six California Districts

Findings about changes in educator capacity and behaviors speak to the promise of the EWIG: CS investment, but the ultimate outcomes of interest are improved opportunities and experiences for students with computer science. Unfortunately, statewide data about course availability and enrollment are not available to examine changes over the period of the EWIG: CS grant. We therefore developed a set of six case studies to explore efforts to promote computer science in six California districts (see Appendix M). 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, the text that follows 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.

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 are 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.

Key Finding #8

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.

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 et 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

> **Key Finding #9**
>
> **Integration of computer science into other subject areas was a key strategy for expanding access to more students.**

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 underclass students 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 the 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.

Key Finding #10

Hispanic and Black students and women were underrepresented in computer science courses.

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.

> **Key Finding #11**
>
> **Interview respondents described EWIG: CS as playing a vital role in building computer science capacity by exposing teachers to concepts, tools, and instructional materials.**

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.

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Appendix A. Survey Instruments

Preworkshop Survey

Q1: Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Teach computer science.					
Articulate to administrators why computer science education is important.					
Articulate to students why computer science education is important.					
Answer student questions about computer science material.					
Teach a stand-alone computer science class.					
Incorporate computer science content into another subject area.					
Teach in alignment with the California computer science standards.					
Assess students' learning and performance in computer science.					

Q2: Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more students from the **general student population** to pursue computer science education.					
Encourage retention from the **general student population** in computer science education.					
Create a sense of belonging for the **general student population** in computer science education.					

Q3: Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more **underrepresented students** to pursue computer science education.					
Encourage retention from **underrepresented students** in computer science education.					
Create a sense of belonging for **underrepresented students** in computer science education.					

Q4: Please indicate your level of disagreement or agreement with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
All students should learn the fundamentals of computer science.					
All students can master the skills taught in computer science.					
Learning computer science will help my students succeed later in life.					
All students can do well on computing tasks with the right teaching and learning supports.					
All students can understand concepts underlying computer processes.					

Postworkshop Survey

Q1: Did you take the preworkshop survey for this workshop?

- ☐ Yes (If yes, continue)
- ☐ No (If no, skip to the FLAG below)

Q2: Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Teach computer science.					
Articulate to administrators why computer science education is important.					
Articulate to students why computer science education is important.					
Answer student questions about computer science material.					
Teach a stand-alone computer science class.					
Incorporate computer science content into another subject area.					
Teach in alignment with the California computer science standards.					
Assess students’ learning and performance in computer science.					

Q3: Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more students from the **general student population** to pursue computer science education.					
Encourage retention from the **general student population** in computer science education.					
Create a sense of belonging for the **general student population** in computer science education.					

Q4: Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more **underrepresented students** to pursue computer science education.					
Encourage retention from **underrepresented students** in computer science education.					
Create a sense of belonging for **underrepresented students** in computer science education.					

Q5: Please indicate your level of disagreement or agreement with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
All students should learn the fundamentals of computer science.					
All students can master the skills taught in computer science.					
Learning computer science will help my students succeed later in life.					
All students can do well on computing tasks with the right teaching and learning supports.					
All students can understand concepts underlying computer processes.					

Q6: (IF Q1 = No) Please indicate your level of disagreement or agreement with the following statement: As a result of participating in the workshop, my confidence in my ability to do the following increased:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Teach computer science.					
Articulate to administrators why computer science education is important.					
Articulate to students why computer science education is important.					
Answer student questions about computer science material.					
Teach a stand-alone computer science class.					
Incorporate computer science content into another subject area.					
Teach the computer science concepts required by the curriculum.					
Assess students’ learning and performance in computer science.					

Q7: (IF Q1 = No) Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more students from the **general student population** to pursue computer science education.					
Encourage retention from the **general student population** in computer science education.					
Create a sense of belonging for the **general student population** in computer science education.					

Q8: (IF Q1 = No)Please indicate your level of disagreement or agreement with the following statements. I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more **underrepresented students** to pursue computer science education.					
Encourage retention from **underrepresented students** in computer science education.					
Create a sense of belonging for **underrepresented students** in computer science education.					

Q9: Please indicate your level of disagreement or agreement with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The content covered was relevant to my school or district.					
The curriculum embedded discussion of equity, diverse cultures, and perspectives in learning computer science.					
The workshop is a useful experience for educators integrating computer science education programs in their school or district.					
The presentation format for the workshop was appropriate for meeting the stated goals.					
I have confidence in the expertise of the facilitators.					
The workshop made me feel included in a community of computer science educators and advocates.					
The benefits of attending were worth the time I invested.					

Q10: What were the most helpful aspects of the workshop?

____

Q11: What were the aspects of the workshop that could be improved upon?

____

Q12: Is your school a participant of CS4NorCal?

- ☐ Yes
- ☐ No
- ☐ I don’t know

Follow-Up Survey

Thank you for taking this survey! Please note that when we refer to "Summer of CS" in this survey, we mean any Summer of CS workshop, including those that occurred during CSPDWeek, any time between 2023 and 2025.

Q1: Which of the following years did you participate in CSPDWeek or another Summer of CS workshop? *Select all that apply.*

- ☐ Summer 2023
- ☐ Summer 2024
- ☐ Summer 2025

Q2: [For respondents who participated in workshops in 2023.] Please indicate the type of workshop you attended in summer 2023:

- ☐ In-person workshop
- ☐ Virtual workshop

Q3: [For respondents who participated in workshops in 2024.] Please indicate the type of workshop you attended in summer 2024:

- ☐ In-person workshop at CSPDWeek in Anaheim, CA
- ☐ In-person workshop at another location
- ☐ Virtual workshop

Q4: [For respondents who participated in workshops in 2025.] Please indicate the type of workshop you attended in summer 2025:

- ☐ In-person workshop at CSPDWeek in Anaheim, CA
- ☐ In-person workshop at another location
- ☐ Virtual workshop

Q5: [For respondents who participated in workshops in 2023.] How many follow-up academic year workshops from your 2023 Summer of CS workshop did you attend during the 2023–24 school year? *If you are unsure, please share your best guess.* [Answer will be validated to accept positive, whole numbers only, including zero.]

____

Q6: [For respondents who participated in workshops in 2024.] How many follow-up academic year workshops from your 2024 Summer of CS workshop did you attend during the 2024–25 school year? *If you are unsure, please share your best guess.* [Answer will be validated to accept positive, whole numbers only, including zero.]

____

Please answer the following questions about your experience in the 2024–25 school year:

Q7: In which teaching format(s) did you teach computer science content during the 2024–25 school year? *Select all that apply.*

- ☐ I taught a standalone computer science class during the school day. [Go to Q9.]
- ☐ I taught a standalone computer science class outside the school day. [Go to Q9.]
- ☐ I integrated computer science content into another subject area during the school day. [Go to Q9.]
- ☐ I integrated computer science content into another subject outside the school day. [Go to Q9.]
- ☐ I taught computer science content in a class that rotated subject areas during the school day. [Go to Q9.]
- ☐ I taught computer science content in a class that rotated subject areas outside the school day. [Go to Q9.]
- ☐ I did not teach computer science content during the 2024–25 school year. [If this is the only option selected, go to Q8.]

Q8: Which of the following factors contributed to you not teaching computer science content during the 2024–25 school year? Select all that *apply.* [After answering, skip to Q14.]

- ☐ There was insufficient student interest for my school to offer a computer science class.
- ☐ There was insufficient space in the master schedule for my school to offer a computer science class.
- ☐ There was too much other content to cover in my class(es).
- ☐ I did not feel sufficiently prepared to incorporate computer science content into my instruction.
- ☐ My school did not have the technological resources to incorporate computer science content into my instruction.
- ☐ My school did not have the curricular resources to incorporate computer science content into my instruction.
- ☐ My administration discouraged me from teaching computer science.
- ☐ I did not hold the necessary credential required to teach computer science.
- ☐ My position did not involve direct instruction to students during the 2024–25 school year.
- ☐ Other: ____

Q9: To which grade level(s) did you teach computer science content during the 2024–25 school year? *Select all that apply.*

- ☐ Preschool, Pre-K, or Transitional kindergarten
- ☐ Kindergarten
- ☐ 1st
- ☐ 2nd
- ☐ 3rd
- ☐ 4th
- ☐ 5th
- ☐ 6th
- ☐ 7th
- ☐ 8th
- ☐ 9th
- ☐ 10th
- ☐ 11th
- ☐ 12th

Q10: How many students did you teach computer science content to during the 2024–25 school year? *If you are unsure, please share your best guess.* [Answer will be validated to accept whole numbers only, including zero.]

____

Q11: How often did you usually teach computer science content during the 2024–25 school year? *Please select one*.

- ☐ Daily
- ☐ Once per week
- ☐ Two or more times per week
- ☐ Multiple times per month
- ☐ Multiple times per year
- ☐ Once per year

Q12: How many total hours of computer science instructional time did you provide to students during the 2024–25 school year? *If you are unsure, please share your best guess.* [Answer will be validated to accept whole numbers only, including zero.]

____

Q13: Is the number of hours of computer science instructional time in 2024–25 greater than, similar to, or less than the hours of computer science instructional time you taught in the year before your first Summer of CS Workshop?

- ☐ Greater than
- ☐ Similar to
- ☐ Less than

Q14: How many other teachers at your school taught computer science content during the 2024–25 school year? *If you are unsure, please share your best guess.* [Answer will be validated to accept whole numbers only.]

____ [If > 0, move to Q15. If 0, skip to Q16.]

Q15: In which teaching format(s) did the other teachers in your school teach computer science during the 2024–25 school year? *Select all that apply. If you are unsure, please share your best guess.*

- ☐ They taught a standalone computer science class during the school day.
- ☐ They taught a standalone computer science class outside the school day.
- ☐ They integrated computer science content into another subject area during the school day.
- ☐ They integrated computer science content into another subject outside the school day.
- ☐ They taught computer science content in a class that rotated subject areas during the school day.
- ☐ They taught computer science content in a class that rotated subject areas outside the school day.

Q16: Please indicate your level of disagreement or agreement with the following statements:

I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Teach computer science.					
Articulate to administrators why computer science education is important.					
Articulate to students why computer science education is important.					
Answer student questions about computer science material.					
Teach a stand-alone computer science class.					
Incorporate computer science content into another subject area.					
Teach in alignment with the California computer science standards.					
Assess students’ learning and performance in computer science.					

Q17: Please indicate your level of disagreement or agreement with the following statements:

I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more students from the **general student population** to pursue computer science education.					
Encourage retention from the **general student population** in computer science education.					
Create a sense of belonging for the **general student population** in computer science education.					

Q18: Please indicate your level of disagreement or agreement with the following statements:

I am confident in my ability to …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Recruit more underrepresented students to pursue computer science education.					
Encourage retention from underrepresented students in computer science education.					
Create a sense of belonging for underrepresented students in computer science education.					

Q19: Please indicate your level of disagreement or agreement with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
All students should learn the fundamentals of computer science.					
All students can master the skills taught in computer science.					
Learning computer science will help my students succeed later in life.					

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
All students can do well on computing tasks with the right teaching and learning supports.					
All students can understand concepts underlying computer processes.					

Q20: Please indicate your level of disagreement or agreement with the following statements about your Summer of CS workshop(s). My workshop(s) gave me …

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Strategies to improve student understanding in computer science.					
Strategies to improve student engagement in computer science.					
Strategies to serve students who have been historically underrepresented in computer science.					
Strategies to answer student questions about computer science.					
Pedagogical skills to teach computer science effectively.					
Content knowledge to teach computer science effectively.					
Ongoing supports on which I could rely for help.					
Sufficient preparation to apply what I learned to my instructional practice.					

Q21: What were the most helpful aspects of your Summer of CS workshop experience(s)?

____

Q22: What were the aspects of the workshop(s) that could be improved upon?

____

This next set of questions will ask you about the resources and other supports you might need to teach computer science. First, we ask about importance of various *resources*, followed by the degree to which those resources are available to you. Second, we ask about the importance of various *supports*, followed by the degree to which those supports are available to you.

Q23: How important are the following resources for you to be able to teach computer science effectively?

	Not at all important	Slightly important	Moderately important	Very important
Ready-to-use curricula or lesson plans				
Student access to internet-connected devices at school				
Student access to internet-connected devices at home				
Software or platform licenses				
Access to software or websites from within the district network				
Data and assessment tools				
Unplugged computer science learning resources (i.e., activities that don't use digital devices)				
Resources for integrating computer science into other subjects				

Q24: To what extent do you have the following resources?

	Not at all	To a small extent	To some extent	To a great extent
Ready-to-use curricula or lesson plans				
Student access to internet-connected devices at school				
Student access to internet-connected devices at home				
Software or platform licenses				
Access to software or websites from within the district network				
Data and assessment tools				

	Not at all	To a small extent	To some extent	To a great extent
Unplugged computer science learning resources (i.e., activities that don't use digital devices)				
Resources for integrating computer science into other subjects				

Q25: How important are the following forms of support for you to be able to teach computer science effectively?

	Not at all important	Slightly important	Moderately important	Very important
Time to teach computer science content				
Time to plan computer science instruction				
Stipends or extra pay for professional development in computer science offered outside contract time				
Content-focused coaching or mentoring in computer science				
A community of practice or professional learning community of other computer science educators				
Ongoing connections with my Summer of CS workshop facilitator				
Ongoing connections with other Summer of CS workshop participants				
School administrator support for computer science				
District administrator support for computer science				
Student interest in computer science				
Parent and community engagement in computer science				
Relationships with external partners				
Instructional materials budget for computer science				
Other (please describe after answering)				

[Show if any answer in the "Other" above is selected.] Please describe the "Other" that you referenced above.

____

Q26: To what extent do you have the following forms of support?

	Not at all	To a small extent	To some extent	To a great extent
Time to teach computer science content				
Time to plan computer science instruction				
Stipends or extra pay for professional development in computer science offered outside contract time				
Content-focused coaching or mentoring in computer science				
A community of practice or professional learning community of other computer science educators				
Ongoing connections with my Summer of CS workshop facilitator				
Ongoing connections with other Summer of CS workshop participants				
School administrator support for computer science				
District administrator support for computer science				
Student interest in computer science				
Parent and community engagement in computer science				
Relationships with external partners				
Instructional materials budget for computer science				
(If applicable) the "Other" you described on the previous page				

Q27: Did you assume any additional professional responsibilities in computer science since participating in any Summer of CS workshop? If so, please describe.

____

Q28: Please select the option that best captures your plans for computer science moving forward.

- ☐ I plan to teach computer science more frequently than I did in 2024–25.
- ☐ I plan to continue teaching computer science at the same levels I did in 2024–25.
- ☐ I plan to teach computer science less frequently than I did in 2024–25.
- ☐ I do not plan to continue teaching computer science.

Q29: Please share any additional details that might help us understand your plans for computer science moving forward.

____

Appendix B. Survey Response Rate Analysis

Survey responses are most useful for understanding workshop participant experiences when we have reason to believe they reflect the broader group of attendees. The following response rate analyses help assess whether nonrespondents differ in meaningful ways from those who responded to at least one question in the surveys. If no such differences are found, we can be more confident that the survey results are representative of the full participant population.

Summer of CS 2025 Preworkshop and Postworkshop Surveys

Overall Summer of CS 2025 response rates—90% of participants completed at least one question on one survey, and 54% completed both the pre- and postworkshop surveys—strengthen our confidence in the generalizability of the findings presented in this report. Exhibit B-1 displays the results of an analysis of response patterns by participant characteristics.

Exhibit B–1. Gender and Race/Ethnicity of Educators Who Responded and Did Not Respond to Surveys

Category	All Summer of CS participants	Responded to pre- or postsurvey	Responded to both surveys	Did not respond to either survey
Woman	73%	74%	67%	70%
Man	24%	24%	29%	27%
African American	3%	3%	3%	3%
American Indian or Alaska Native	0%	0%	1%	0%
Asian, Filipino, East Indian, or Indian	15%	15%	18%	18%
Hispanic or Latino	18%	19%	19%	15%
Middle Eastern or North African	0%	0%	0%	0%
Pacific Islander	0%	0%	0%	0%
White	43%	43%	41%	42%
Two or More Racial Identities	12%	11%	10%	12%
Racial Identity Not Reported	8%	7%	9%	9%
Educators with no experience teaching CS	34%	34%	30%	33%
Educators with one or more years teaching CS	66%	66%	70%	67%

Exhibit B-2 displays the results of a nonresponse analysis examining response patterns for the Summer of CS follow-up survey by participant characteristics. Data on participant characteristics come from respondents' Summer of CS workshop registration. For example, those who attended Summer of CS only in 2023 would have provided this information toward the end of the 2022–23 school year, whereas educators who attended Summer of CS only in 2024 would have provided this information toward the end of the 2023–24 school year. Survey completers and noncompleters are alike in all ways but one: Educators who attended more Summer of CS workshops were more likely to complete the follow-up survey.

Exhibit B–2. Background Characteristics of Who Did and Did Not Respond to the Follow-Up Survey

Category	Full sample (n = 1,120)	Completed follow-up survey (n = 681)	Did not complete follow-up survey (n = 426)
Gender-fluid	0%	0%	0%
Man	20%	20%	19%
Nonbinary	0%	0%	1%
Preferred not to state or missing	7%	5%	9%
Woman	73%	74%	72%
African American	3%	3%	3%
American Indian or Alaska Native	1%	0%	1%
Asian, Filipino, East Indian, or Indian	14%	14%	13%
Hispanic or Latino	22%	22%	20%
Middle Eastern or North African	1%	1%	1%
Preferred not to state	6%	6%	6%
Racial identity not reported	4%	3%	7%
Two or more racial identities	9%	9%	8%
White	41%	41%	41%
Taught only Grades PK–5	38%	38%	37%
Taught only Grades 6–8	22%	20%	24%
Taught only Grades 9–12	21%	23%	19%
Taught multiple grade bands	16%	16%	16%
Missing grade level information or not a teacher	3%	3%	4%

Category	Full sample (n = 1,120)	Completed follow-up survey (n = 681)	Did not complete follow-up survey (n = 426)
Educators with no experience teaching computer science (CS)	40%	36%	45%
Educators with one or more years teaching CS	52%	57%	42%
Educator experience missing	9%	6%	13%
Public school educator	99%	99%	98%
Private school educator	1%	1%	2%
Attended Summer of CS one time	83%	76%	93%
Attended Summer of CS two times	14%	20%	6%
Attended Summer of CS three times	3%	4%	1%

Note. Percentages may not add up to 100% due to rounding.

Appendix C. Summer of CS 2025 Regression Analyses

Exhibit C-1 shows the output of the regression analyses for the Summer of CS 2025 surveys described in the body of the report. Each row of the table represents a different regression, with the survey item in the far left column representing the dependent variable in the equation. In each case, the research team has converted the Likert responses from categorical variables into a numerical variable in which *Strongly agree* = 5, *Agree* = 4, *Neither agree nor disagree* = 3, *Disagree* = 2, and *Strongly disagree* = 1. The dependent variable represents the difference between the postworkshop response and the preworkshop response for each respondent. The Baseline Change column displays the change for the reference group in the equation—that is, for respondents who have no prior CS teaching experience, have no prior Summer of CS workshop attendance, are male, and identify as White and/or Asian[4] but no other racial identity. A positive number in this column indicates that the average survey response has increased from the preworkshop survey to the postworkshop survey. A negative number indicates that the average survey response has decreased from the preworkshop survey to the postworkshop survey.

Subsequent columns show the coefficient, standard errors (in parentheses), and statistical significance (using asterisks) for the y-intercept, years of CS teaching experience, gender, racial identity, and prior workshop attendance, respectively. Years of CS teaching experience is a continuous variable, and the coefficient represents the change in response for each additional year of computer science experience beyond the baseline change, controlling for gender, racial identity, and prior attendance. Woman is a binary variable that equals 1 for respondents who identified as a woman and 0 for respondents who identified as a man; the coefficient represents the change in response beyond the baseline response for women respondents, controlling for CS teaching experience, racial identity, and prior attendance. Underrepresented racial identity is a binary variable that equals 1 for respondents who identified a racial category other than White or Asian as a racial identity and 0 for respondents who identified exclusively as White and/or Asian; the coefficient represents the change in response beyond the baseline response for respondents with an underrepresented racial identity, controlling for CS teaching experience, gender, and prior workshop attendance. Prior workshop attendee is a binary variable that equals 1 for respondents who attended Summer of CS in 2023 and/or 2024 and 0 for respondents who only attended Summer of CS in 2025.[5] The coefficient represents the change in response beyond the baseline response for respondents who have attended Summer of CS prior to 2025, controlling for CS teaching experience, gender, and race.

[4] Here and throughout the report, Asian includes individuals who identified as Filipino, East Indian, or Indian.
[5] To create the binary variable for prior workshop attendee, we used attendance records from SCOE for Summer of CS in 2023 and 2024. We matched these records to our 2025 survey respondents primarily by email address; four additional matches were made using first and last name.

Exhibit C–1. Regression Output for Subgroup Analyses of Survey Respondents

Survey item	Baseline change	Years of CS teaching experience	Woman	Underrepresented racial identity	Prior workshop attendee
I am confident in my ability to teach computer science.	0.721 (0.207) ***	–0.035 (0.018) *	0.285 (0.186)	0.068 (0.182)	0.093 (0.172)
I am confident in my ability to articulate to administrators why computer science is important.	0.650 (0.187) ***	–0.022 (0.017)	0.154 (0.171)	–0.025 (0.165)	–0.006 (0.156)
I am confident in my ability to articulate to students why computer science is important.	0.574 (0.173) **	–0.010 (0.015)	0.325 (0.156) *	–0.178 (0.152)	–0.142 (0.143)
I am confident in my ability to answer student questions about computer science material.	0.769 (0.188) ***	–0.030 (0.016)	0.365 (0.170) *	0.035 (0.166)	0.000 (0.157)
I am confident in my ability to teach a stand-alone computer science class.	0.577 (0.177) **	0.002 (0.015)	0.079 (0.160)	0.091 (0.155)	0.153 (0.146)
I am confident in my ability to incorporate computer science content into another subject area.	0.698 (0.192) ***	0.003 (0.017)	0.230 (0.174)	0.060 (0.169)	–0.186 (0.159)
I am confident in my ability to teach in alignment with California computer science standards.	0.875 (0.197) ***	0.003 (0.017)	0.013 (0.178)	–0.129 (0.173)	0.031 (0.163)
I am confident in my ability to assess students' learning and performance in computer science.	0.990 (0.216) ***	–0.035 (0.018)	0.119 (0.196)	–0.142 (0.191)	0.040 (0.179)
I am confident in my ability to recruit more students to pursue computer science education.	0.757 (0.171) ***	–0.013 (0.015)	0.024 (0.155)	–0.073 (0.151)	–0.113 (0.142)

Survey item	Baseline change	Years of CS teaching experience	Woman	Underrepresented racial identity	Prior workshop attendee
I am confident in my ability to encourage students to continue pursuing computer science education.	0.565 (0.154) ***	–0.002 (0.013)	0.156 (0.140)	–0.060 (0.136)	–0.063 (0.128)
I am confident in my ability to create a sense of belonging for students in computer science education.	0.692 (0.157) ***	–0.009 (0.013)	0.023 (0.142)	–0.146 (0.137)	–0.152 (0.130)
I am confident in my ability to recruit more underrepresented students to pursue computer science education.	0.770 (0.157) ***	–0.013 (0.014)	–0.024 (0.141)	–0.207 (0.138)	–0.210 (0.129)
I am confident in my ability to encourage underrepresented students to continue pursuing computer science education.	0.509 (0.153) **	–0.003 (0.013)	0.173 (0.138)	0.000 (0.134)	–0.210 (0.126)
I am confident in my ability to create a sense of belonging for underrepresented students in computer science education.	0.606 (0.144) ***	–0.011 (0.012)	–0.013 (0.130)	–0.080 (0.126)	–0.127 (0.119)
All students should learn the fundamentals of computer science.	0.372 (0.146) *	–0.009 (0.013)	–0.111 (0.132)	–0.229 (0.129)	–0.016 (0.121)
All students can master the skills taught in computer science.	0.389 (0.150) *	–0.005 (0.013)	–0.115 (0.136)	–0.167 (0.133)	0.039 (0.125)
Learning computer science will help students succeed later in life.	0.181 (0.132)	0.008 (0.011)	–0.064 (0.120)	–0.213 (0.117)	0.108 (0.110)
All students can do well on computing tasks with the right teaching and supports.	–0.035 (0.131)	0.001 (0.011)	0.153 (0.119)	–0.082 (0.116)	0.270 (0.109) *
All students can understand concepts underlying computer processes.	0.085 (0.147)	0.001 (0.013)	0.054 (0.134)	–0.104 (0.131)	0.318 (0.123) *

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Appendix D. Summer of CS Analyses of Variation in Preworkshop to Postworkshop Changes

Building on the information presented in Exhibit 9 of the report, the following charts display the changes in survey responses for each item that offers both preworkshop and postworkshop data. In each exhibit, the black vertical line is set at 0. The blue line represents the average change for this item.

Exhibit D–1. Changes in Summer of CS Participant Confidence to Teach Computer Science

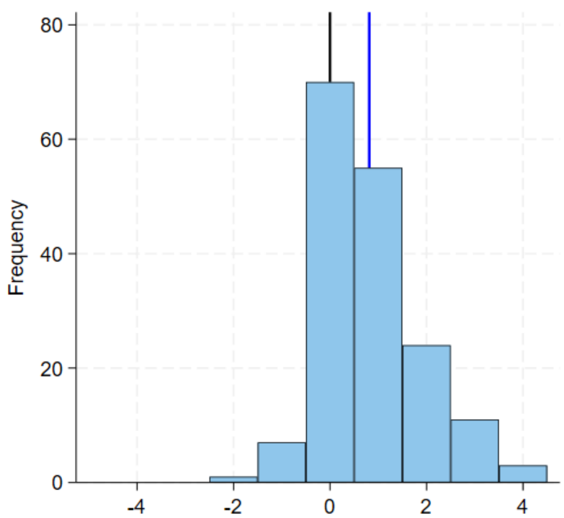


Exhibit D–2. Changes in Summer of CS Participant Confidence to Articulate to Administrators Why Computer Science Is Important

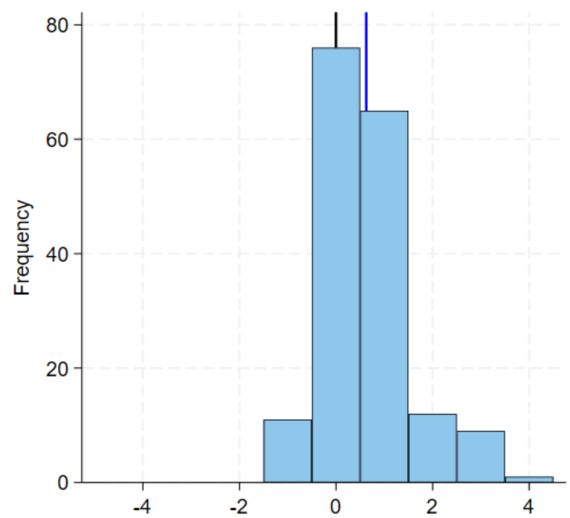


Exhibit D–3. Changes in Summer of CS Participant Confidence to Articulate to Students Why Computer Science Is Important

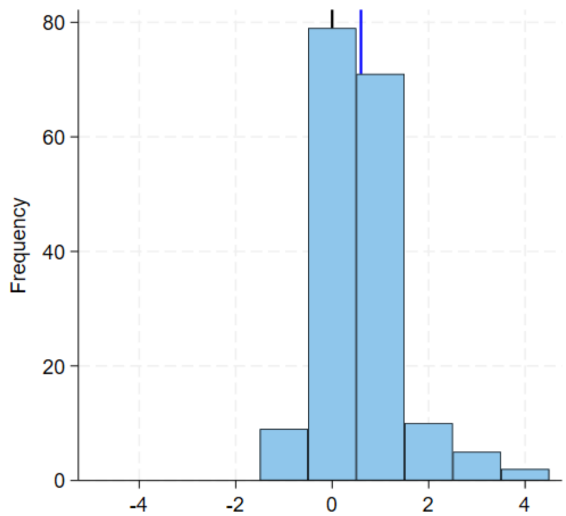


Exhibit D–4. Changes in Summer of CS Participant Confidence to Answer Student Questions About Computer Science Material

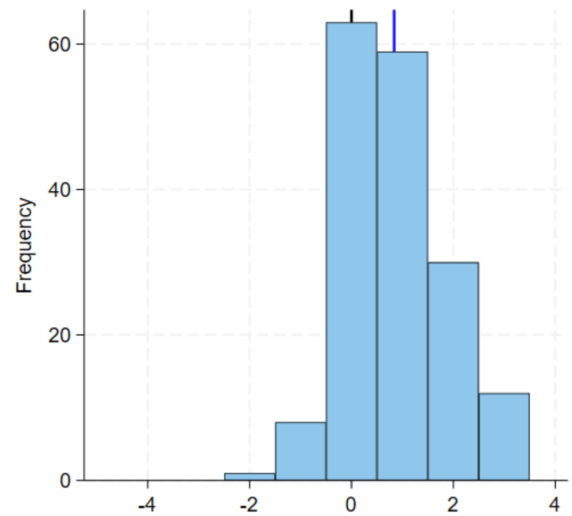


Exhibit D–5. Changes in Summer of CS Participant Confidence to Teach a Stand-Alone Computer Science Class

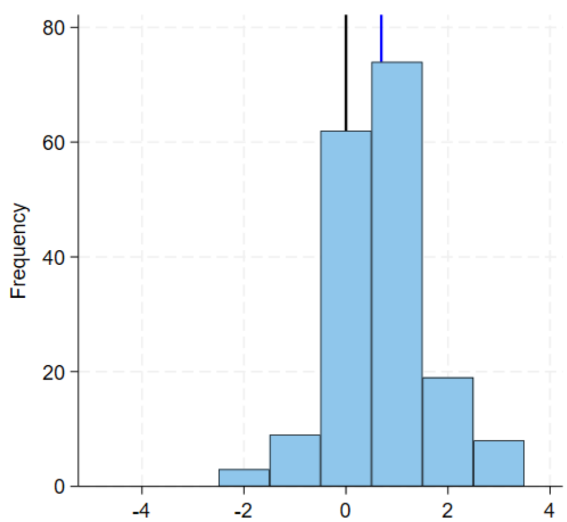


Exhibit D–6. Changes in Summer of CS Participant Confidence to Incorporate Computer Science Content Into Another Subject Area

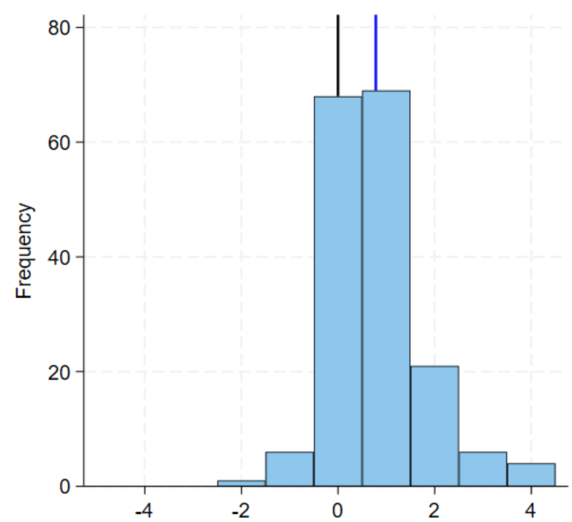


Exhibit D–7. Changes in Summer of CS Participant Confidence to Teach in Alignment With California Computer Science Standards

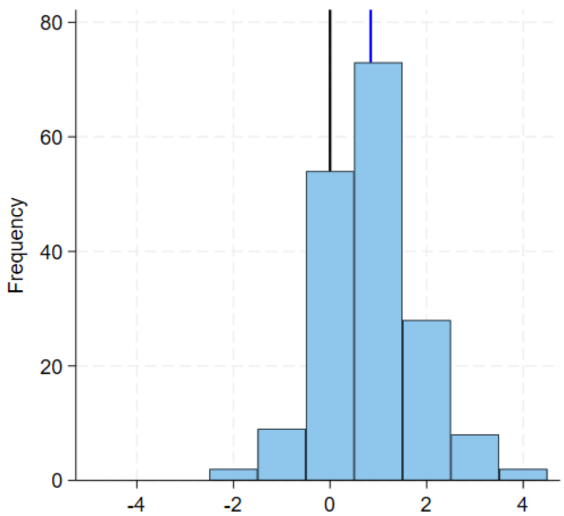


Exhibit D–8. Changes in Summer of CS Participant Confidence to Assess Students' Learning and Performance in Computer Science

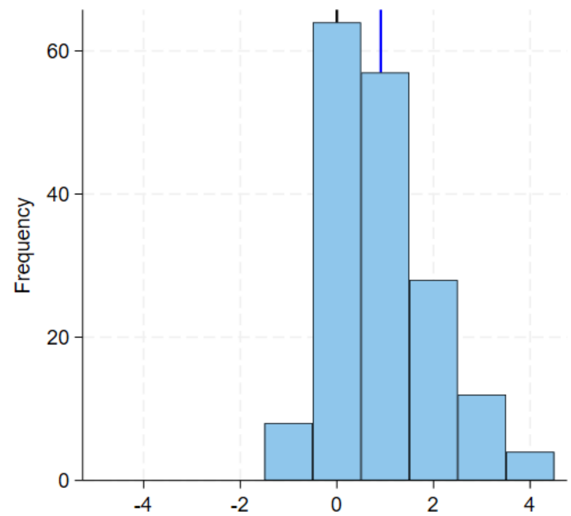


Exhibit D–9. Changes in Summer of CS Participant Confidence to Recruit More Students to Pursue Computer Science Education

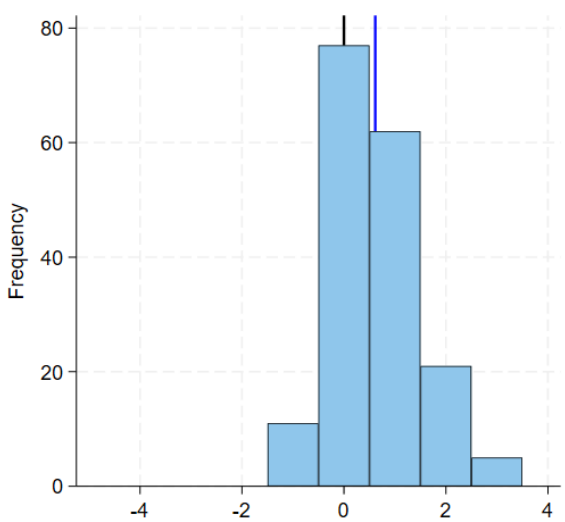


Exhibit D–10. Changes in Summer of CS Participant Confidence to Encourage Students to Continue Pursuing Computer Science Education

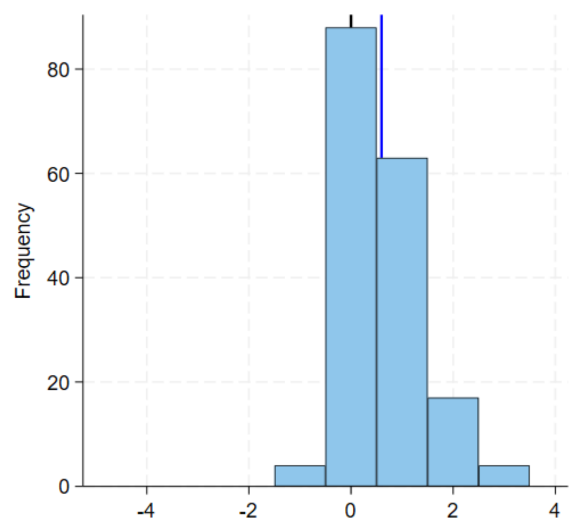


Exhibit D–11. Changes in Summer of CS Participant Confidence to Create a Sense of Belonging for Students in Computer Science Education

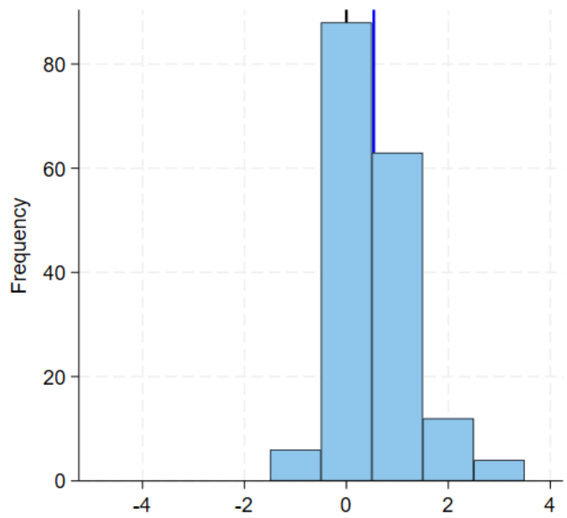


Exhibit D–12. Changes in Summer of CS Participant Confidence to Recruit More Underrepresented Students to Pursue Computer Science Education

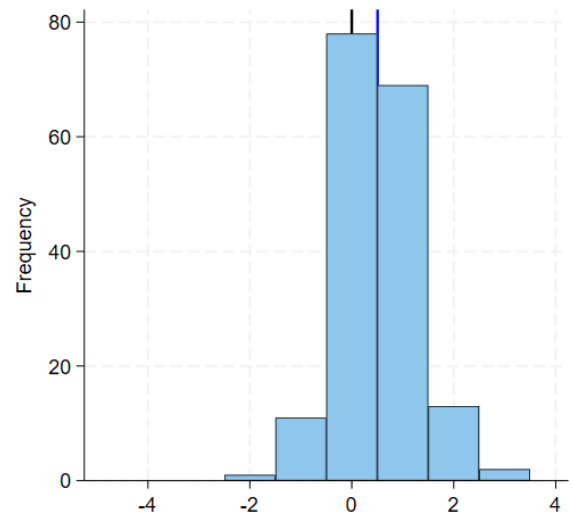


Exhibit D–13. Changes in Summer of CS Participant Confidence to Encourage Underrepresented Students to Continue Pursuing Computer Science Education

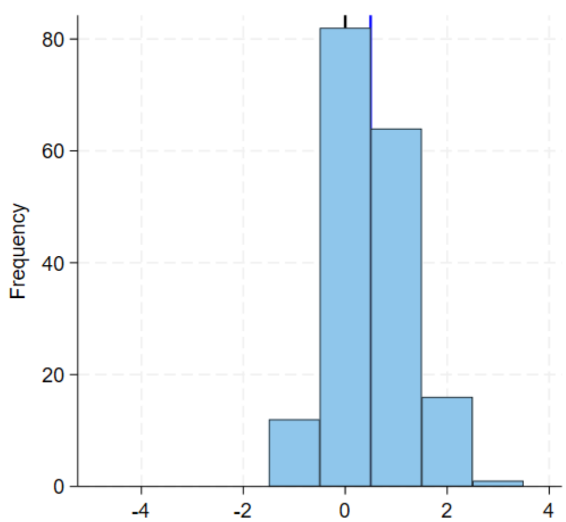


Exhibit D–14. Changes in Summer of CS Participant Confidence to Create a Sense of Belonging for Underrepresented Students in Computer Science Education

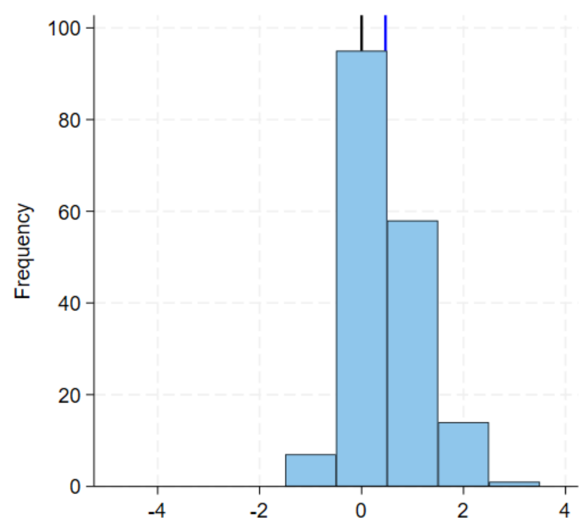


Exhibit D–15. Changes in Summer of CS Participant Beliefs That All Students Should Learn the Fundamentals of Computer Science

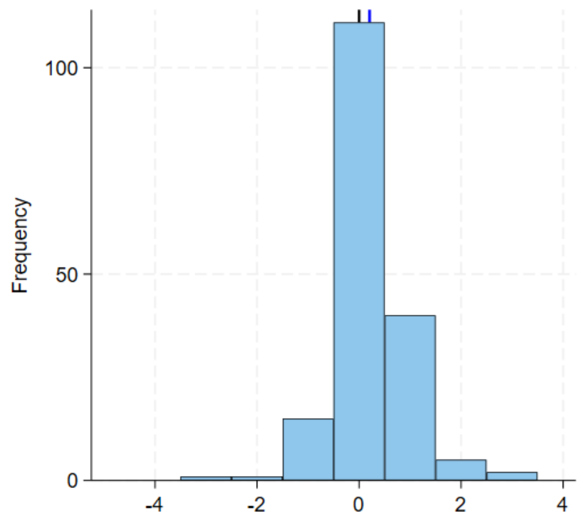


Exhibit D–16. Changes in Summer of CS Participant Beliefs That All Students Can Master the Skills Taught in Computer Science

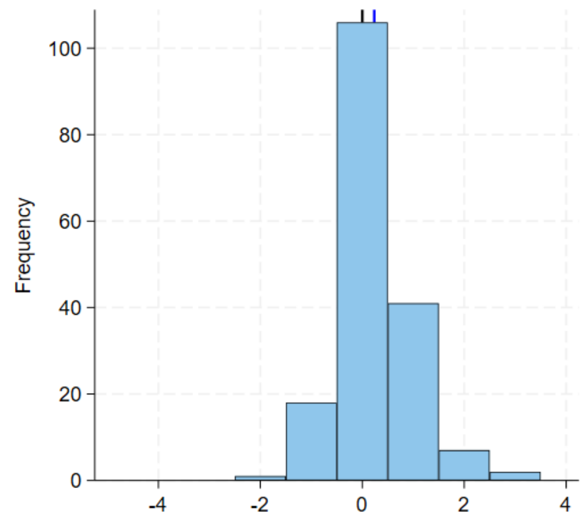


Exhibit D–17. Changes in Summer of CS Participant Beliefs That Learning Computer Science Will Help Students Succeed Later in Life

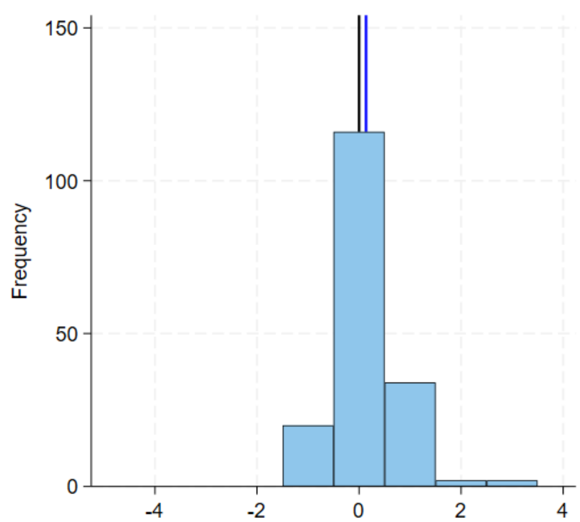


Exhibit D–18. Changes in Summer of CS Participant Beliefs That All Students Can Do Well on Computing Tasks With the Right Teaching and Supports

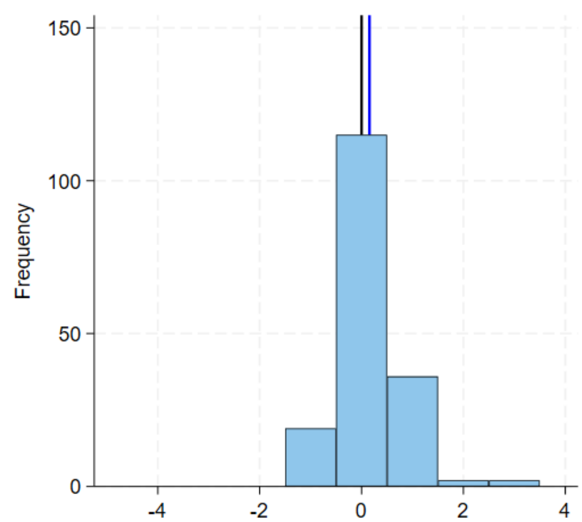
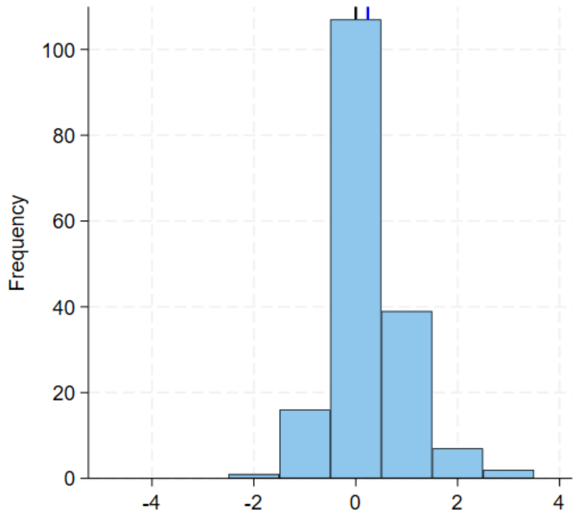


Exhibit D–19. Changes in Summer of CS Participant Beliefs That All Students Can Understand Concepts Underlying Computer Processes



Appendix E. Summer of CS 2025 Participant Focus Group Protocol

[Background Information/Introductions]

Let's take a few moments for introductions.

- Please tell us about your current role, including the grade levels and subject areas you teach and any prior experience you have with teaching computer science (CS).
- Can you also tell me how you heard about CSPDWeek and why you chose to attend?
  - *For repeat participants:* I understand that members of this focus group also participated in a workshop last summer. Why did you decide to come again?

[Workshop Experience]

Now that we understand your professional role and its relation to computer science, we are interested in learning about your experience with your CSPDWeek workshop.

- How would you describe your experience so far?
  - What have been the strengths of your workshop?
  - If you had the opportunity to change anything about your workshop, what aspect would you most like to change and why?
- One area of focus in our participant survey is confidence in teaching CS, and I'd like to ask my next question to better understand what we might see in our survey responses.
  - In what areas do you feel most confident with teaching CS? Least confident?
  - To what extent is your confidence in teaching CS changing as a result of your participation in this workshop? Why?
- I'm also curious about the students who participate in CS.
  - Who do you believe should participate in CS education, and who do you believe can be successful in CS education?
  - To what extent are those beliefs changing as a result of your participation in this workshop? Why?

[Application to Classroom Practice]

We have talked some about your experiences during the CSPDWeek workshops. I'd like to turn our attention now to the upcoming school year.

- In which specific class(es) in which you plan to use what you've learned from these workshops?
  - How, if at all, do you plan on implementing what you learned from the workshop in the classroom?
- How well prepared do you feel you are to apply what you're learning during this workshop to your classroom practice when school resumes this fall?
  - What aspects of the workshop experience help with this kind of preparation?
  - What obstacles might stand in the way of applying what you've learned here in the classroom?
- How would you describe the level of support for CS education in your district or school?
  - Does your district and/or school have (or recently had) objectives or plans for increasing CS learning opportunities (courses, extracurriculars) available to students?
  - How does that context shape your approaches to applying what you've learned in this workshop when you return to your job this fall?
  - What suggestions do you have for your district to improve CS education?

[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 work evaluating Seasons of CS. In the coming months, we'll administer a follow-up survey to Summer of CS participants from 2023 and 2024. The survey will be vital to helping us understand once workshop participants return to their schools for a new school year. Thanks again!

Appendix F. Summer of CS Follow-Up Survey Creation of Survey Scales

Factor analysis is a statistical method used to simplify and understand patterns in survey data. Factor analysis looks for trends in respondents' answers to determine whether there are groups of survey questions that measure a single, underlying construct. Instead of analyzing respondents' answers to dozens of individual survey questions, researchers can focus on a few meaningful dimensions or scales.

For the 19 items that appeared in the follow-up survey and the 2024 Summer of CS pre- and postworkshop surveys, the research team converted Likert responses from categorical variables into a numerical variable in which *Strongly agree* = 5, *Agree* = 4, *Neither agree nor disagree* = 3, *Disagree* = 2, and *Strongly disagree* = 1; this decision reflects an assumption that these variables could be treated as continuous. For a list of all 19 survey items, see Q16 through Q19 in Appendix A. The research team ran an exploratory factor analysis in which a statistical program assessed whether the survey items clustered into scales without any researcher-imposed structure. We began with responses from the 2024 pre-workshop survey because it was the largest dataset, providing the most stable foundation for detecting patterns.[6] After developing the initial factor model, we conducted cross-sample validation analyses to confirm that the data appeared to have a similar structure across the other survey administrations: 2024 post-workshop, 2025 pre-workshop, 2025 post-workshop, and the follow-up survey.

This process revealed three scales: confidence (i.e., all eight items in Q16), class recruitment and environment (i.e., all items in Q17 and Q18), and beliefs (i.e., all five items in Q19). For the purposes of this report, we focused the analyses on the confidence and beliefs scales because they were the most relevant to the goals of EWIG: CS. Factor loadings, which indicate how strongly each item relates to its underlying scale, ranged from 0.751 to 0.859 for confidence and 0.769 to 0.877 for beliefs, suggesting that items were highly representative of their respective scales. Eigenvalues (confidence = 5.19; class recruitment and environment = 4.60; beliefs = 3.44) indicate that each factor explained a substantial amount of variance. Reliability was strong for both scales (Cronbach's $\alpha = 0.93$ for confidence; 0.91 for beliefs).

We then imposed our two-factor model onto the respondents who took the 2024 preworkshop survey, the 2024 postworkshop survey, and the follow-up survey. Respondents who skipped four

[6] The factor analysis sample sizes for each survey administration are as follows (note that these numbers may be different than total response rates because factor analysis requires complete responses): 2024 pre-workshop survey: $n = 562$, 2024 post-workshop survey: $n = 560$, 2025 pre-workshop survey: $n = 111$, 2025 post-workshop survey: $n = 90$, follow-up survey: $n = 514$.

or more of the eight items on the confidence scale or two or more of the five items on the beliefs scale were excluded before computing scale scores for confidence and beliefs, respectively. Scale scores were calculated as the mean of the items within each scale. Upon creation, scale scores were standardized by default, but we rescaled them to the original Likert range of 1–5 for ease of interpretation.

Appendix G. Summer of CS Follow-Up Survey Repeated Measures ANOVA Results

We examined average changes in educators' confidence and beliefs scale scores across three points in time: before the 2024 Summer of CS workshop (via the preworkshop survey), immediately after the workshop (via the postworkshop survey), and in the follow-up survey. To do this, we used a repeated measures ANOVA, which lets us test whether the average survey score changed across survey administrations while accounting for the fact that measurements are linked to the same individuals. Respondents were first matched across survey administrations using email addresses. AIR made subsequent matches using the remaining respondents' first and last names. As stated in the body of the report, if an educator changed their email and/or name without notifying the organizers of Summer of CS, it is possible we missed some potential matches. Only respondents with data for all three administrations were included in these analyses. In other words, of the 681 participants eligible to be included by virtue of their participation in Summer of CS 2024 and completing the follow-up survey, 307 respondents completed enough confidence items across all three administrations to be included in the confidence scale and 353 respondents completed enough beliefs items across all three administrations to be included in the beliefs scale. If educators who completed all three surveys are systematically different than those who did not (e.g., perhaps this subgroup of respondents has higher levels of motivation to teach computer science), attrition bias could influence the degree to which reported results are representative of the average Summer of CS experience.

Confidence

Exhibit G–1. Descriptive Statistics for Confidence Scale ANOVA

Time	Total respondents	Mean	Standard deviation
2024 preworkshop survey	307	3.3	0.89
2024 postworkshop survey	307	4.1	0.53
Follow-up survey	307	3.9	0.64

On the confidence scale (n = 307), average scores increased from 3.3 on the preworkshop survey to 4.1 on the postworkshop survey and then decreased slightly to 3.9 on the follow-up survey. The changes in scores over time were significant ($F(2, 612) = 239.64$, $p < .001$). Pairwise comparisons with Sidak adjustment[7] confirmed that

- postworkshop scores exceeded preworkshop scores by 0.85 points (95% CI 0.75 to 0.94, $p < .001$),
- follow-up scores were 0.25 points lower than postworkshop scores (95% CI -0.35 to -0.16, $p < .001$), and
- follow-up scores exceeded preworkshop scores by 0.60 points (95% CI 0.50 to 0.69, $p < .001$).

In other words, confidence dipped slightly on the follow-up survey but remained above preworkshop levels. Results were substantively identical using Bonferroni adjustment. The effect of time accounted for approximately 44% of the variance in confidence scores (partial $\eta^2 = 0.44$), indicating a large effect.

Beliefs

Exhibit G–2. Descriptive Statistics for Beliefs Scale ANOVA

Time	Total respondents	Mean	Standard deviation
2024 preworkshop survey	353	4.3	0.54
2024 postworkshop survey	353	4.5	0.49
Follow-up survey	353	4.4	0.57

On the beliefs scale ($n = 353$), averages increased from 4.3 on the preworkshop survey to 4.5 on the postworkshop survey, and then decreased to 4.4 on the follow-up survey. The changes in scores over time were significant ($F(2, 704) = 21.31$, $p < .001$). Pairwise comparisons with Sidak adjustment showed that

- postworkshop scores exceeded preworkshop scores by 0.21 points (95% CI 0.13 to 0.28, $p < .001$) from preworkshop to postworkshop,
- follow-up scores were 0.11 points lower than postworkshop scores (95% CI -0.19 to -0.04, $p = .001$), and
- follow-up scores exceeded preworkshop scores by 0.10 points (95% CI 0.02 to 0.17, $p = .008$).

In short, beliefs decreased slightly on the follow-up survey but remained just above preworkshop levels. Results were substantively identical using Bonferroni adjustment. For beliefs, time accounted for about 6% of the variance (partial $\eta^2 = 0.06$), indicating a small-to-moderate effect.

[7] When we compare scores across three different time points, we are conducting three separate comparisons. Each comparison has a chance of producing a “false positive” or finding a difference just by random chance. If we do not adjust for this, the risk of making at least one false positive goes up for each comparison we make. Sidak and Bonferroni adjustments are ways to keep the overall risk of false positives low, no matter how many comparisons we make. Bonferroni is the most cautious, Sidak is a bit less strict.

Appendix H. Summer of CS Follow-Up Survey Regression Analyses

Exhibit H-1 shows the output of the regression analyses described in the body of the report. These models estimate how much survey responses from different subgroups of educators changed over time, while accounting for other background characteristics. Each row of the table represents a different regression, with the change in survey scale score in the far left column representing the dependent variable in the equation. For each scale, we modeled three changes in scale scores[8]: preworkshop to postworkshop, postworkshop to follow-up, and preworkshop to follow-up. Only educators who were included in the ANOVA were included in our regression analyses (see Appendix G for more details on the ANOVA). The baseline change column displays the change for the reference group in the equation—that is, for respondents who have no prior CS teaching experience, are male, identify as White and/or Asian but no other racial identity, [9] attended only one Summer of CS workshop, did not attend any academic year workshop (AYW) in any year, and educators who taught only high school grade levels (i.e., 9–12) before their workshop.[10] Please note that this baseline group is a statistical reference for modeling and may not represent a larger or typical subgroup of respondents. A positive number in the baseline change column indicates that the average scale score increased during the indicated time period. A negative number indicates that the average scale score decreased during the indicated time period.

Subsequent columns show the coefficient, standard errors (in parentheses), and statistical significance (using asterisks) for the *y*-intercept; and years of CS teaching experience, gender, racial identity, total workshop attendance, and AYW attendance, respectively. Years of CS teaching experience is a binary variable (0 for no experience, 1 for 1 or more years of experience). The coefficient represents the change in response beyond the baseline response for respondents with no computer science teaching experience, controlling for all other background characteristics. Woman is a binary variable that equals 1 for respondents who identified as a woman and 0 for respondents who identified as a man; the coefficient represents the change in response beyond the baseline response for women respondents, controlling for all other background characteristics. Underrepresented racial identity is a binary

[8] Scale scores were standardized and then converted back to the original 1 to 5 range before running the regression.
[9] Here and throughout the report, Asian includes individuals who identified as Asian, Filipino, East Indian, or Indian.
[10] Number of AYWs attended is self-reported. All other background characteristics come from Summer of CS workshop registration data, which may differ across respondents. For example, those who attended Summer of CS only in 2023 would have provided this information toward the end of the 2022–23 school year, whereas educators who attended Summer of CS only in 2024 would have provided this information toward the end of the 2023–24 school year.

variable that equals 1 for respondents who identified a racial category other than White or Asian as a racial identity and 0 for respondents who identified exclusively as White and/or Asian;[11] the coefficient represents the change in response beyond the baseline response for respondents with an underrepresented racial identity, controlling for all other background characteristics. Summer of CS attendance is a variable that ranges from 1 to 3 and indicates how many total Summer of CS workshops the respondent attended between 2023 and 2025. The coefficient represents the change in response beyond the baseline response for respondents who attended only one Summer of CS, controlling for all other background characteristics. AYW attendance is a continuous variable. It represents the number of AYWs the respondent reported attending in a single academic year. For those who reported attending AYWs in both 2023–24 and 2024–25, the variable reflects the count from the year in which they attended the most AYWs. The coefficient represents the change in response beyond the baseline response for respondents who attended one or more AYWs, controlling for all other background characteristics. To produce the results shown in the final three columns, we created a categorical variable that divides educators into four groups based on which grade levels they taught before attending their workshop: those who taught only elementary grade levels (i.e., Grades PK–5), those who taught only middle school grade levels (i.e., Grades 6–8), those who taught only high school grade levels (i.e., Grades 9–12), and those who taught across two or more grade bands. The coefficient for each group represents the difference in the outcome between that group and the reference group (high school only), controlling for all other background characteristics. We focus on statistical significance of coefficients rather than overall model fit, because our primary goal was to explore subgroup differences.

Exhibit H-2 presents sensitivity analyses for the regression model examining change in confidence from preworkshop to follow-up and change in beliefs from preworkshop to follow-up. Each column shows results from a different specification of the AYW covariate. Model A incorporates AYW as a continuous variable; this is the model whose results appear in Exhibit H-1. Model B treats AYW as a binary. It is coded as 0 for respondents who did not attend any AYWs and 1 for respondents who attended one or more AYWs in either academic year 2023–24 or 2024–25. Model C omits all AYW variables. Our rationale for conducting the sensitivity analysis is that AYW is the only covariate that did not come from SCOE registration records, and raw responses suggest that it may not be accurate for all educators. By presenting results of multiple specifications, we give readers the opportunity to assess the robustness of our findings to different coding decisions.

[11] As discussed in the body of the report, the decision to use a binary variable for racial identity stems from the overrepresentation within the computer science field of men who identity as White or Asian (John &Carnoy, 2017; Zippia, 2023).

Exhibit H–1. Regression Output for Subgroup Analyses of Survey Respondents

Scale score change comparison	Baseline change	Prior CS teaching experience	Woman	Underrepresented racial identity	Number of Summer of CSs attended	AYW	Taught only elementary grades	Taught only middle grades	Taught multiple grade bands
Change in confidence from pre- to postworkshop	0.94 (0.19) ***	-0.26 (0.11) *	0.15 (0.13)	0.07 (0.10)	-0.21 (0.09)*	0.00 (0.01)	0.38 (0.13) **	0.39 (0.14) **	0.33 (0.18)
Change in confidence from postworkshop to follow-up	-0.55 (0.12) ***	0.09 (0.07)	-0.04 (0.09)	-0.09 (0.07)	0.13 (0.06)*	0.02 (0.01)	0.09 (0.09)	0.09 (0.09)	0.14 (0.12)
Change in confidence from preworkshop to follow-up	0.39 (0.19)*	-0.18 (0.11)	0.11 (0.14)	-0.01 (0.11)	-0.08 (0.09)	0.01 (0.02)	0.47 (0.14) ***	0.48 (0.15) **	0.47 (0.19) *
Change in beliefs from pre- to postworkshop	0.29 (0.13)*	0.06 (0.07)	-0.01 (0.09)	-0.02 (0.07)	-0.04 (0.06)	-0.01 (0.01)	-0.02 (0.09)	-0.05 (0.10)	0.10 (0.12)
Change in beliefs from postworkshop to follow-up	-0.34 (0.13)*	0.10 (0.07)	0.01 (0.09)	-0.13 (0.07)	0.05 (0.06)	0.01 (0.01)	0.12 (0.09)	0.18 (0.10)	0.16 (0.13)
Change in beliefs from preworkshop to follow-up	-0.06 (0.15)	0.17 (0.08) *	0.00 (0.10)	-0.16 (0.08)*	0.01 (0.07)	0.01 (0.01)	0.10 (0.10)	0.13 (0.11)	0.26 (0.14)

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Exhibit H–2. Regression Output for Subgroup Analyses of Survey Respondents, Sensitivity Analysis

	Model A (AYW as continuous)	Model B (AYW as binary)	Model C (AYW omitted)
Change in confidence from preworkshop to follow-up			
Baseline change	0.39 (0.19)*	0.17 (0.21)	0.52 (0.17)**
Prior CS teaching experience	-0.18 (0.11)	-0.21 (0.11)	-0.22 (0.10)*
Woman	0.11 (0.14)	0.12 (0.13)	0.10 (0.12)
Underrepresented racial identity	-0.01 (0.11)	-0.03 (0.11)	0.01 (0.10)
Number of Summer of CSs attended	-0.08 (0.09)	-0.07 (0.09)	-0.08 (0.08)
AYW (continuous)	0.01 (0.02)		
AYW (binary)		0.34 (0.14)*	
Taught only elementary grades	0.47 (0.14)***	0.45 (0.13)***	0.35 (0.13)**
Taught only middle grades	0.48 (0.15)**	0.48 (0.15)**	0.33 (0.14)*
Taught multiple grade bands	0.47 (0.19)*	0.45 (0.19)*	0.35 (0.17)*
N	243	243	278
Change in beliefs from preworkshop to follow-up			
Baseline change	-0.06 (0.15)	-0.19 (0.16)	0.09 (0.14)
Prior CS teaching experience	0.17 (0.08)*	0.15 (0.08)	0.11 (0.08)
Woman	0.00 (0.10)	0.01 (0.10)	0.01 (0.10)
Underrepresented racial identity	-0.16 (0.08)*	-0.16 (0.08)*	-0.18 (0.08)*
Number of Summer of CSs attended	0.01 (0.07)	0.02 (0.07)	-0.04 (0.06)
AYW (continuous)	0.01 (0.01)		
AYW (binary)		0.19 (0.10)	
Taught only elementary grades	0.10 (0.10)	0.09 (0.10)	0.05 (0.10)
Taught only middle grades	0.13 (0.11)	0.13 (0.11)	0.05 (0.10)
Taught multiple grade bands	0.26 (0.14)	0.25 (0.14)	0.23 (0.13)
N	281	281	326

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Appendix I. Summer of CS Follow-Up Survey Descriptive Data on Confidence and Beliefs

Exhibits I-1 and I-2 show the preworkshop, postworkshop, and follow-up survey means for the individual items that contribute to the Confidence and Belief survey scales. To calculate these means, the research team converted Likert responses from categorical variables into a numerical variable in which *Strongly agree* = 5, *Agree* = 4, *Neither agree nor disagree* = 3, *Disagree* = 2, and *Strongly disagree* = 1.

Exhibit I–1. Changes in Participant Confidence With Respect to Computer Science

I am confident in my ability to…	2024 pre-workshop mean	2024 post-workshop mean	Follow-up survey mean
Teach computer science.	3.1	4.1	3.8
Articulate to administrators why computer science is important.	3.7	4.4	4.1
Articulate to students why computer science is important.	3.9	4.4	4.2
Answer student questions about computer science material.	3.1	4.0	3.8
Teach a stand-alone computer science class.	2.8	3.6	3.5
Incorporate computer science content into another subject area.	3.4	4.2	4.0
Teach in alignment with California computer science standards.	3.1	4.1	3.8
Assess students' learning and performance in computer science.	3.1	4.1	3.7

Note. *n* = 307 (Includes only respondents who were included in the repeated measures ANOVA described in Appendix G). For this analysis, the research team assigned a numerical value to each response option (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, Strongly disagree = 1).

Exhibit I–2. Changes in Participant Beliefs About Computer Science

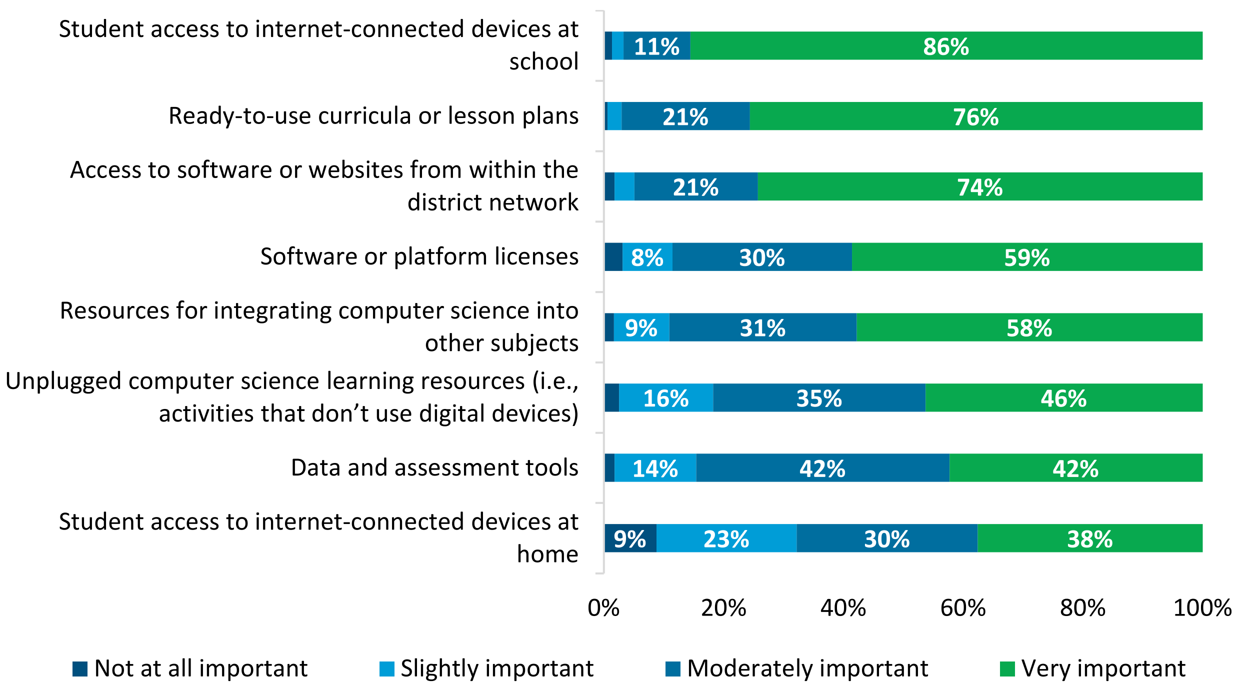
Please indicate your level of disagreement or agreement with the following statements:	2024 pre-workshop mean	2024 post-workshop mean	Follow-up survey mean
All students should learn the fundamentals of computer science.	4.4	4.6	4.6
All students can master the skills taught in computer science.	4.3	4.4	4.3
Learning computer science will help students succeed later in life.	4.4	4.6	4.5
All students can do well on computing tasks with the right teaching and supports.	4.4	4.6	4.4
All students can understand concepts underlying computer processes.	4.2	4.5	4.3

Note. *n* = 353 (Includes only respondents who were included in the repeated measures ANOVA described in Appendix G). For this analysis, the research team assigned a numerical value to each response option (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, Strongly disagree = 1).

Appendix J. Summer of CS Follow-Up Survey Descriptive Data About Resources and Support

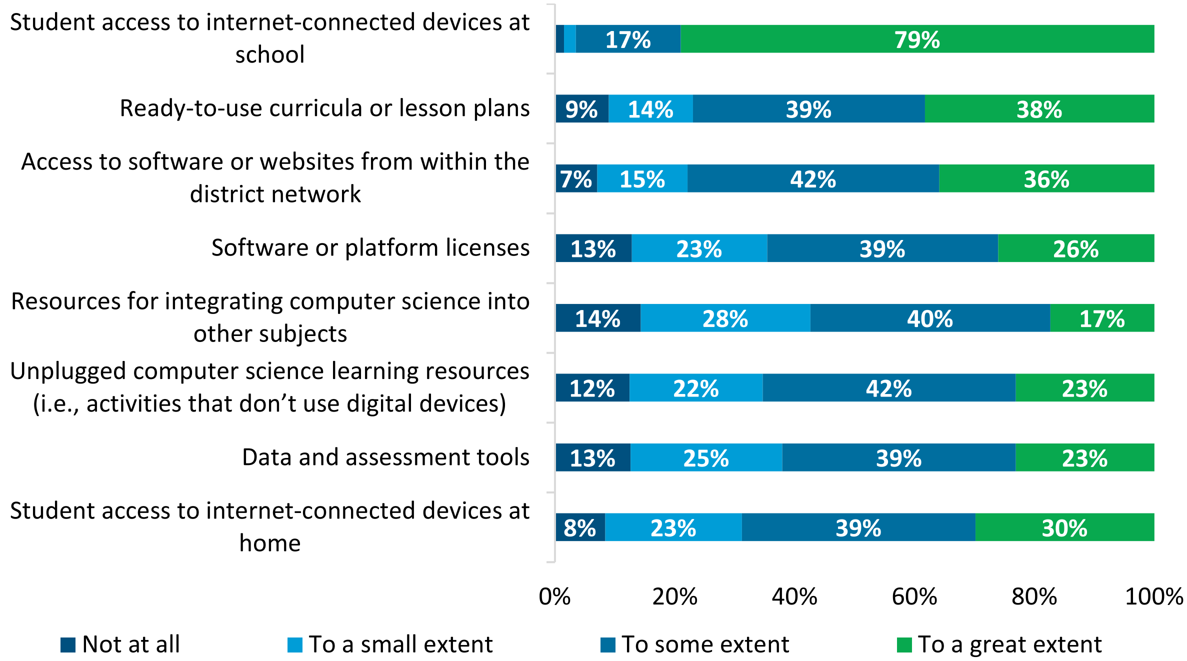
The exhibits in Appendix J share data for the individual survey items that inform the analysis presented in Findings About Resources and Supports Needed in the main body of the report. The first pair of exhibits addresses resources needed to support high-quality computer science instruction—that is, the software, hardware, and instructional materials that educators can use as part of their instructional experience. Exhibit J-1 shows descriptive results from survey items associated with the following question: “How important are the following resources for you to be able to teach computer science effectively?” Exhibit J-2 shows descriptive results from survey items associated with this question: “To what extent do you have the following resources?”

Exhibit J–1. Perceptions of Importance of Resources



Note. *n*’s range from 669 to 674. Response categories with 5% or less do not have a data label. Categories may not total 100% due to rounding.

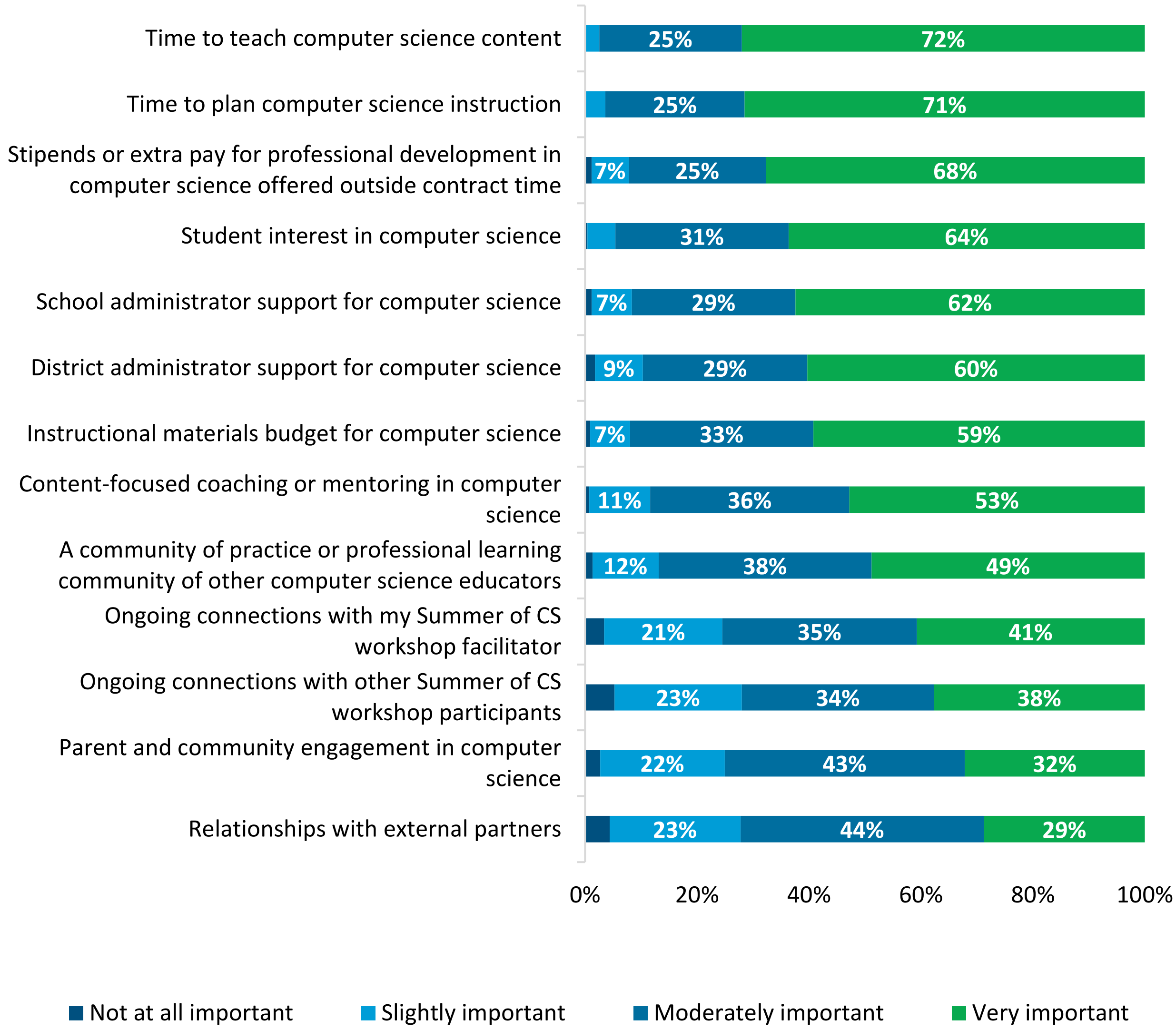
Exhibit J–2. Availability of Resources



Note. *n*'s range from 658 to 669. Response categories with 5% or less do not have a data label. Categories may not total 100% due to rounding.

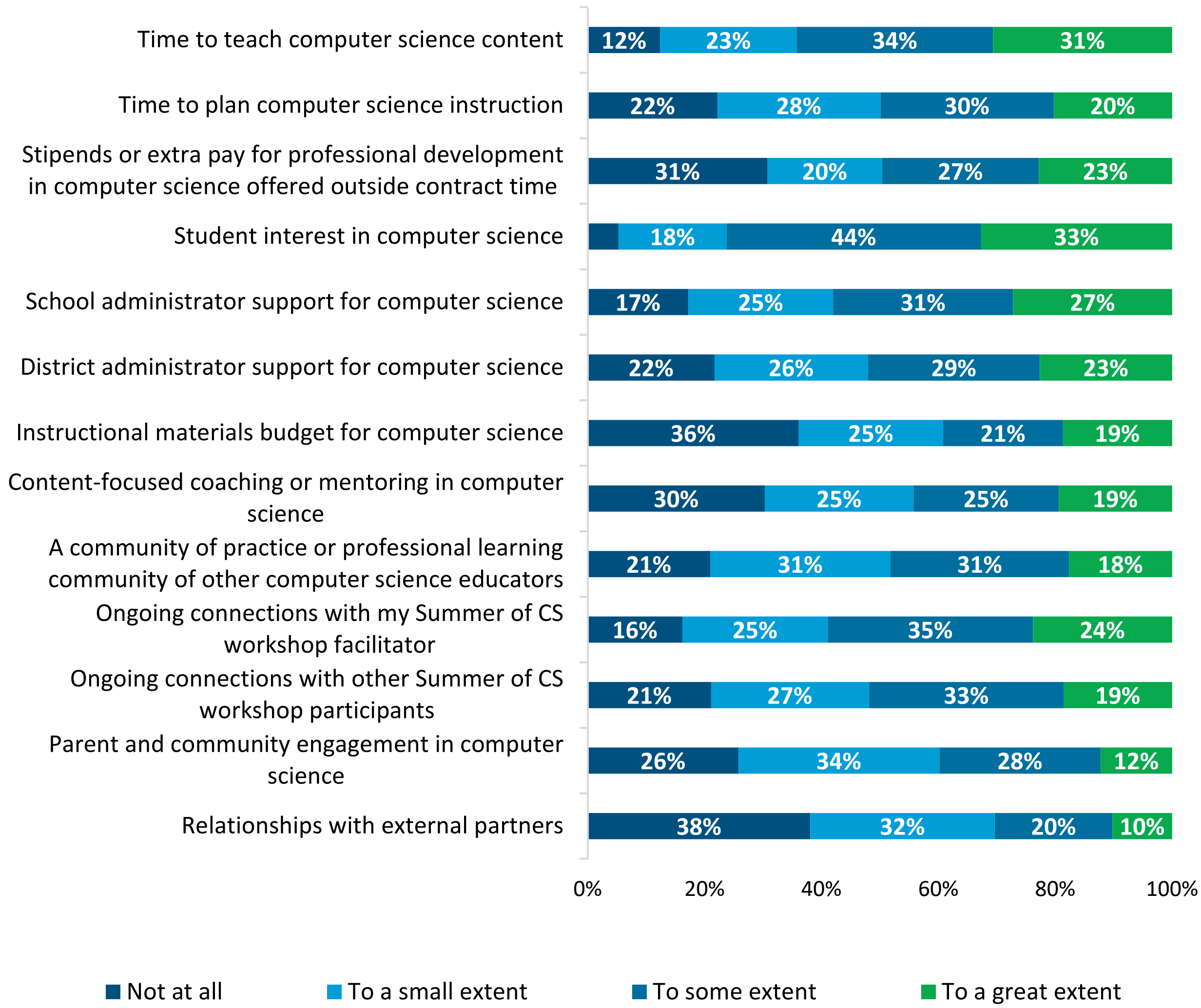
The second pair of exhibits addresses supports needed to support high-quality computer science instruction—that is, the money and human connections that foster professional learning and engagement in computer science. Exhibit G-3 shows descriptive results from survey items associated with the following question: "How important are the following supports for you to be able to teach computer science effectively?" Exhibit G-4 shows descriptive results from survey items associated with this question: "To what extent do you have the following supports?"

Exhibit J–3. Perceptions of Importance of Supports



Note. *n*'s range from 656 to 669. Response categories with 5% or less do not have a data label. Categories may not total 100% due to rounding.

Exhibit J–4. Availability of Supports



Note. *n*'s range from 648 to 664. Response categories with 5% or less do not have a data label. Categories may not total 100% due to rounding.

Appendix K. 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 K-1 includes the full list of courses that, through consultation with the case study districts, the research team classified as a computer science course.

Exhibit K–1. 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

District	Local course code	State course code	Course name
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	Explaining Computer Science
Oakland USD	YY527-CS DISCOVERY	2453-Computer science	Computer Science Discovery
Oakland USD	YY528-CS DISCOVERY 1	2453-Computer science	Computer Science Discovery 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 Discovery 2
Oakland USD	R0602-AP CS PRINCIPLE	8130-Introduction to Systems Programming	AP Computer Science Principles
Oakland USD	Q8501-AP CS PRINC CTE	8130-Introduction to Systems Programming	AP Computer Science Principles
Oakland USD	QF8501-AP CS PRIN CTE F	8130-Introduction to Systems Programming	AP Computer Science Principles F
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	R0604-MAKER SPACE CS	8131-Intermediate Systems Programming (Concentrator)	Maker Space Computer Science
Oakland USD	R0601-AP COMP SCI A	8131-Intermediate Systems Programming (Concentrator)	AP Computer Science A
Oakland USD	MF8501-AP CS A CTE F	8131-Intermediate Systems Programming (Concentrator)	AP Computer Science A

District	Local course code	State course code	Course name
Oakland USD	M8501-AP CS A CTE	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	CY555-CLG CTE CIS UC	8131-Intermediate Systems Programming (Concentrator)	
Oakland USD	R0600-Comp SCI Senior	8132-Advanced Systems Programming (Capstone)	Computer Science (Senior)
Oakland USD	B6302-VID GAME DES 2	8142-Advanced Games and Simulation (Capstone)	Video Game Design 2
Oakland USD	CQ0403-INTRO TO COMP Q	9060-Computer literacy	Introduction to Computers Q
Oakland USD	R0502-COMP APPL COMM	9060-Computer literacy	Computer Applications Communications
Oakland USD	C3951-EXPL COMP SCI	9061-Exploring Computer Science	Exploring Computer Science
Oakland USD	CF3951-EXPL COMP SCI F	9061-Exploring Computer Science	Exploring Computer Science F
Oakland USD	C0701-COMP ART	9062-Computer Science	Computer Art
Oakland USD	C0702-COMP ART - YR	9062-Computer Science	Computer Art YR
Oakland USD	YY527-CS DISCOVERY	9062-Computer Science	Computer Science Discovery
Oakland USD	YY528-CS DISCOVERY 1	9062-Computer Science	Computer Science Discovery 1
Oakland USD	YY529-CS DISCOVERY 2	9062-Computer Science	Computer Science Discovery 2
Oakland USD	YYQ528-CS DISCOVERY 1Q	9062-Computer Science	Computer Science Discovery 1Q
Oakland USD	YYQ529-CS DISCOVERY 2Q	9062-Computer Science	Computer Science Discovery 2Q
Oakland USD	YYF527-CS DISCOVERY F	9062-Computer Science	Computer Science Discovery F

District	Local course code	State course code	Course name
Oakland USD	YY511-INTRO CS MS	9062-Computer Science	Introduction to Computer Science MS
Oakland USD	YYF511-INTRO CS MS F	9062-Computer Science	Introduction to Computer Science MS
Oakland USD	CF0702-COMP ART - YR F	9062-Computer Science	Computer Art YR
Oakland USD	YY530-COMP SCI 2 MS	9062-Computer Science	Computer Science 2 MS
Oakland USD	C0515-CS PRINCIPLES	9062-Computer Science	Computer Principles
Oakland USD	C3901-COMP PROG	9063-Computer programming	Computer Programming
Oakland USD	Q8502-AP CS PRINC	9066-Advanced Placement (AP) Computer Science Principles	AP Computer Science Principles
Oakland USD	M8502-AP CS A	9067-Advanced Placement (AP) Computer science A	AP Computer Science A
Oakland USD	MF8502-AP CS A F	9067-Advanced Placement (AP) Computer science A	AP Computer Science A
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

District	Local course code	State course code	Course name
Shasta Union HSD	DE4646-CompSciPrincDE	8111-Intermediate Information Support Services (Concentrator)	Computer Science Principles Dual Enrolled
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)

District	Local course code	State course code	Course name
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
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 L. 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 about the number of CS courses offered and the educators who teach CS. Now, we are going to discuss student participation in CS.

[Sharing from AIR quantitative analysis of district CS data: Looking 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 these data that would supply additional context? To what do you attribute the changes?

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, to what do you attribute those differences?

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!

Appendix M. District Case Studies

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

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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

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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

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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

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

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."

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

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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

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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

> **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.**

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.

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

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

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.

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

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