CS Champions Survey and Focus Group Findings

Educator Workforce Investment Grant in Computer Science External Evaluation

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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 2024. The report examines the role of Computer Science Champions (or CS Champions) within the EWIG: CS grant. CS Champions, each housed in one of the state's 58 county office of education, design and deliver workshops to computer science educators and provide guidance and support for computer science to districts and schools. Survey and focus group data from CS Champions highlight key findings about the CS Champion experience and the interactions among members of the CS Champion network.

Key Finding 1: CS Champions articulated a shared understanding of their role and perceived their activities as being pivotal to increasing teacher participation in computer science professional learning. Ninety percent of survey respondents strongly agreed or agreed that they understood their roles as CS Champions, and focus group participants' reflections aligned with the role definition articulated by members of the EWIG: CS planning team.

Key Finding 2: CS Champions rated the EWIG: CS grant as effective at addressing some of the most significant barriers to expanding opportunities for computer science education. The two barriers for which CS Champions indicated that EWIG: CS was most effective at addressing were insufficient (1) training or professional development for computer science educators and (2) funding. Among a list of barriers to computer science expansion that CS Champions ranked by significance in their survey responses, these were the third and fourth most significant barriers, respectively.

Key Finding 3: EWIG: CS has succeeded in creating a community of computer science education advocates and role models across California. Social network analyses reveal a robust community in which members are connected to multiple other CS Champions, and focus group responses describe the value of relationships among members of this network.

Key Finding 4: More than half of CS Champions express confidence about their ability to support computer science education after the EWIG: CS grant expires, but the dynamics of the county office of education system pose challenges for doing so. Fewer than half of survey respondents (48%) agreed or strongly agreed that computer science education is a priority within their county office of education, and only 36% agreed or strongly agreed that there is sufficient funding for their county office of education to support computer science education.

Taken together, these data offer promising evidence about the value of the CS Champion role and the infrastructure of support that EWIG: CS has helped to create. Moreover, these positive findings complement similarly promising evidence collected about the 2024 Summer of CS workshop experience (see *Summer of CS 2024 Survey Findings*). Nevertheless, we emphasize that our study design does not enable us to make statements of causality that connect these findings to computer science student learning outcomes. Moreover, important aspects of the EWIG: CS story still remain untold. Upcoming evaluation activities will aim to better understand changes in classroom behavior for workshop participants through a follow-up survey administered to Summer of CS participants in fall 2025. In addition, district case studies will explore changes in computer science course availability and participation over the life of the EWIG: CS grant. 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

The state of California launched the Educator Workforce Investment Grant in Computer Science (EWIG: CS) to build educator capacity to deliver computer science education. In a state that serves more than 6 million K–12 students, the county office of education system is a vital structure for providing guidance and support to the 1,000-plus districts where their students attend school. The organizers of EWIG: CS therefore built a network of Computer Science Champions (or CS Champions), each housed in one of the state's 58 county office of education, to support learning opportunities for computer science educators. CS Champions organize and lead workshops for educators and provide general support throughout the school year.

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, and *experiences* with computer science education.[1] 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.

This report addresses Research Questions 3 and 4 by examining the experiences of CS Champions and the nature and frequency of CS Champions outside of formal EWIG: CS activities. To do so, it shares the results of a survey administered to all CS Champions in fall 2024 and focus groups conducted with 19 CS Champions in summer 2024.

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

Exhibit 1. EWIG: CS Evaluation Research Questions

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

Methods

To produce this report, the AIR research team administered a survey to the full set of CS Champions in fall 2024 and conducted six focus groups in summer 2024 to collect data about the CS Champion Experience.

CS Champion Experiences, Perspectives, and Network Interactions: Survey

AIR designed and administered a social network survey that focused on CS Champion experiences in their role (Research Question 3) and the patterns of communication among members of the network (Research Question 4).

Survey Design

AIR collaborated with members of the EWIG: CS planning team from the Sacramento County Office of Education (SCOE), the Californians Dedicated to Education Foundation (CDEF), the San Bernardino County Superintendent of Schools (SBCSS), and the University of California at Los Angeles (UCLA) to understand the topics that were most important with respect to the accomplishments and needs surrounding EWIG: CS and its future. Survey items focused on a variety of topics related to CS Champion relationships, responsibilities, and supports, as well as opportunities and barriers that might shape the future of computer science education in California. See Appendix A for a full list of survey items.

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

Through consultation with the EWIG: CS planning team and regional leads for EWIG: CS activities, the research team identified a list of individuals in the CS Champion role. The composition of the group regularly evolves as people move in and out of positions in county offices of education. To ensure that respondents had sufficient experience in their roles to speak knowledgeably about them while capturing perspectives that were informed by the Summer of CS experience, we defined our sample as CS Champions who were active in their roles at any point during the window of June 2024 to August 2024. The AIR team collected survey data between October 2024 and December 2024 by sending individualized survey links via email to a final sample of 54 people. AIR staff encouraged participation in the survey through remarks at the monthly meetings of CS Champions in October and November 2024 and sent three email reminders to nonrespondents during the administration window. In addition, members of the EWIG: CS planning team engaged in individual outreach to nonrespondents to encourage their participation.

Response Rates

The CS Champions survey generated an overall response rate of 88%, as 48 of 54 eligible respondents provided answers to the survey.

Survey Analysis

The AIR team converted all Likert scales into numerical values and performed a social network analysis when assessing the topics communicated between CS Champions. This analysis included producing a sociogram and examining the proportion of communication ties that exist out of the ties that could have existed across a variety of different topics and the robustness of the overall communication network via its bi-component distribution. The research team conducted network inference via conditional uniform graph tests to examine if the various covariates (racial identity, gender identity, and years of experience) had an impact on a CS Champion's position in the network. The research team conducted all survey analyses using the statistical software platform R.

Although five people did not take the survey, other CS Champions nevertheless reported interactions with those nonrespondents. For analysis purposes, the research team assumed that any reported interaction was reciprocated because communication can be viewed as an undirected interaction (i.e., There is no directionality in the interaction, including relations such as who we spend time with, who we talk with, and so forth. This contrasts with interactions that are characterized by directionality, such as who we like, who we give gifts to, and so forth.). The survey question asked individuals to indicate who they communicated with outside of the formal context of EWIG: CS-led activities designed for all social activities and prompted individuals to select from a fixed list of topics they discussed with that particular individual. See Appendix A for the full survey item.

CS Champion Experiences and Perspectives: Focus Groups

To supplement survey findings about Research Questions 3 and 4, AIR conducted focus groups with a sample of CS Champions.

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 Questions 3 and 4. Questions asked participants about their role as CS Champions and the greater CS Champion network, the extent to which CS Champions and their work contributed to equitably expanding CS education, and ways in which EWIG: CS training and supports facilitated their success. Focus group participants also shared insights about efforts to sustain their work and how the state can best promote CS education. The focus group protocol is available in Appendix B.

Focus Group Data Collection

The focus groups employed a non-probabilistic convenience sampling approach. The team of researchers at AIR conducted six focus groups with a total of 19 participants in summer 2024: three in-person focus group sessions conducted during Computer Science Professional Development Week (known as CSPDWeek) in Anaheim, California, and three virtual focus group sessions facilitated over Zoom. AIR researchers and members of the EWIG: CS leadership team collaborated to recruit participants through email outreach and an invitation to participate delivered during a monthly virtual meeting of CS Champions. In-person opportunities were available to the subset of CS Champions who attended CSPDWeek; the research team opened opportunities for virtual focus group participation to all CS Champions. The final sample included participants from all seven of the state's regions as defined in the EWIG: CS grant.

Focus Group Analysis

To analyze data, the AIR research team developed a codebook (see Appendix C) to highlight themes related to the study's research questions. This codebook was also aligned to the focus group protocol, allowing for easier coding of the transcripts. Two AIR researchers each coded the same focus group and met to compare their codes, examining similarities and differences between their coding and establishing understood norms. These two AIR researchers then coded six transcripts each, conducting a thematic analysis of the content that was said by focus group participants, as well as quantifying responses to focus group questions. The research team 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. After coding was complete, a third AIR researcher joined a meeting with the two researchers who coded the transcripts, and together they analyzed themes within each section and across the sections as a whole.

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 here rely heavily on self-reported data. The Summer of CS workshop participant survey, CS Champions survey, and CS Champions focus groups all 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 about the impact of the EWIG: CS program. There is no comparison group that would enable us to analyze differences in outcomes reported by program participants to individuals who have not received the same opportunities as those provided by the grant. Summer of CS workshop participants completed a pre- and post-workshop survey, which enabled a comparison of perspectives within the same individual before and after a professional learning experience. Nevertheless, we are unable to claim that EWIG: CS *caused* the results we report here.

Additional Limitations

We also highlight additional details specific to the data collection approaches employed for this study.

Online surveys like those used to collect data from CS Champions 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.

The nature of a focus group that uses a semi-structured 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 versus virtual), and the backgrounds of focus group participants can all shape the conversation that takes place. For example, a participant in one focus group of more than four participants shared that they did not receive coaching from EWIG: CS activities and, in agreement, no other respondent in that same focus group spoke about coaching. However, in a smaller focus group, coaching became a main topic of conversation. However, because the number of participants speaking about coaching across focus groups was limited, coaching did not emerge as a major theme across EWIG: CS supports and trainings.

Finally, with respect to the social network analysis of CS Champions, the survey generated high response rates but nevertheless operated with missing data from the six survey nonrespondents. To appropriately aggregate the data, the research team coded the missing respondents as having reciprocated ties. That is, if Person A reported having a tie with Person B but Person B did not complete the survey, we analyzed the data as if Person B had also reported a tie with Person A. However, there are potential ties not captured through our analysis due to the incomplete complete network census of respondents reporting on their ties. For example, if Person B and Person C have ties to one another but neither completed their survey, our analysis will not capture that connection between two network members.

Findings About the CS Champion Experience

The workshops made available through the EWIG: CS grant are possible because of an infrastructure that is also supported by the state's computer science investment. Throughout the life of the grant, members of the planning team have recruited, onboarded, and provided ongoing trainings and supports for county office of education administrators to serve in a role they called CS Champions. These individuals coordinate and deliver Seasons of CS workshops themselves and also serve as a general source of support and expertise for computer science education for the regions in which they work.[2] This role is especially important, given the limited capacity that often exists within districts and schools and the limited capacity for building a computer science education field at the state level. The following findings highlight CS Champion insights about their roles.

CS Champions expressed a clear understanding of their role and believed it to effectively contribute to increased teacher participation in computer science professional learning. They also shared positive impressions of the trainings and supports available to them through the EWIG: CS grant. Survey and focus group data also highlighted the dynamics that shape the effectiveness of efforts to expand computer science education. Important barriers included competing priorities in K–12 education, educator capacity limitations, and funding, yet survey respondents also highlighted the effectiveness of EWIG: CS at addressing professional learning and funding needs. Survey respondents also expressed optimism about the sustainability of their efforts after the EWIG: CS grant ends, yet lingering concerns about funding and the structure of county offices of education warrant attention in preparing for the path forward.

The CS Champion Role

A role description developed by the EWIG: CS leadership team includes the following expectation for CS Champions supported through the grant: "Become an expert in at least one curriculum/grade span and build the capacity to support a relevant workshop for educators regionally and/or across California. Further, offer support of other efforts including contracted providers in offering sessions across grade bands to match local needs." The description goes on to identify five specific responsibilities for CS Champions:

1. Become familiar with grant objectives, goals, and parameters for expenditures.
2. Participate in monthly EWIG: CS COE Champion Forum Meetings.
3. Conduct ongoing district and community outreach and recruitment.

[2] For a full list of the 58 California county offices of education by region, as defined by the EWIG: CS grant, see Appendix D.

4. Coordinate regional and statewide CS workshops for K–12 teachers, paraeducators, counselors, and administrators.
5. Provide ongoing professional learning support.[3]

CS Champions' Understanding of Their Role

Through survey responses and focus group discussions, CS Champions articulated a shared understanding of their role and responsibilities that aligned with the description detailed above. The vast majority of respondents (90%) strongly agreed or agreed that they understood their role as a CS Champion (see Exhibit 2).

Focus group participants expressed a consistent vision of the CS Champion role as one that aligned with the foregoing description but often spoke to the bigger picture goals of the EWIG: CS program rather than the specific details that the program entails. Specifically, respondents noted that their responsibilities required them to connect with and know relevant computer science staff and experts, share computer science resources and activities, and advocate for the equitable expansion of computer science education in the state. At the end of one focus group session, participants collectively shared the following definition:

Key Finding 1

CS Champions articulated a shared understanding of their role and perceived their activities as being pivotal to increasing teacher participation in computer science professional learning.

> "CS Champions serve as liaisons from grant leads to educators and collaborative implementers of CS programs to provide high-quality professional learning for all educators to broaden participation in CS so that all students experience equitable and inclusive CS education."

Roughly half of focus group participants (*n* = 9) shared that their role as a CS Champion included acting as knowledge broker and relationship facilitator; respondents used terms such as "liaison," "point of contact," and "connector" of computer science experts, resources, and professional learning to describe this responsibility. One participant explained that, as a CS Champion, they were the "connective tissue" that brought relevant computer science information from the state to their region and county.

Seven participants explained that a key component of the CS Champion role included advocating for computer science education to be equitable and accessible for all students. Of those seven, three participants spoke specifically to strengthening educators' computer science content knowledge so that they are confident in providing computer science instruction. This

[3] COE CS Champion Roles and Workshop Checklist

responsibility often calls on CS Champions, in the words of one respondent, to "demystify what CS is," which often involves the understanding that the knowledge and skills associated with computer science extend beyond the ability to code and that careers in computer science often exist in fields outside of information technology.

Smaller numbers of respondents spoke to the specific expectations laid out in the official role definition. Six participants shared that CS Champions were responsible for EWIG: CS activities such as participating in monthly meetings and organizing and delivering professional learning sessions and that they were expected to share activities and updates with their county and/or region. For the CS Champion role, activities such as facilitating professional development or a workshop session, providing individual coaching, and sharing resources with teachers were examples of this professional learning responsibility. These reflections speak to a broader capacity-building role that CS Champions play in disseminating information and strengthening the community of computer science educators at the state, regional, and county levels.

CS Champions' Perceptions of Their Influence

CS Champions perceive their activities as being pivotal to increasing teacher participation in computer science professional learning. One of the most consistent perspectives across focus groups was a feeling of accomplishment in expanding teacher engagement in computer science learning opportunities. Thirteen of 19 focus group participants expressed their belief that their contribution to and connection with the CS Champions network contributed to increased teacher engagement with computer science learning opportunities. Several participants described an increase in teacher participation in workshops and training sessions offered at the county, regional, and state levels, noting an emphasis on teacher recruitment into computer science education.

> "We had monthly [professional learning] sessions, and we had people coming back month after month after month, and just eating it up and going, 'When's the next one? When's the next one?' And knowing that we did a really good job of getting them excited and wanting more. I mean, when a teacher wants to continue learning, then I think you've done a pretty good job."
>
> *– CS Champion Focus Group Participant*

Participants identified some of the characteristics that made these events successful. For example, seven focus group participants identified the recruitment of elementary school teachers and their exposure to computer science education as one of their greatest achievements. Although stand-alone computer science classes are common at the secondary level, the Computer Science Standards for California Public Schools (California Department of Education, 2018) emphasize learning opportunities for students in all grade levels. Such efforts aim to promote student interest at younger ages while also encouraging the integration of

computer science content and practices into other academic disciplines. Participants explained that workshops and trainings geared toward the implementation of computer science education in elementary schools drew in a large pool of elementary educators. One participant described a training that included K–5 teachers engaging in computer science standards and practices with considerations for implementing computer science education for English learners at the elementary level.

In addition, opportunities to collaborate contributed to the perceived successes of professional learning supports: Three CS Champion participants shared that their greatest accomplishment within the network was collaborating with other CS Champions to develop joint professional development sessions. In a growing field often characterized by educator isolation, a network of leaders in computer science can provide an opportunity for critical collaboration in counties and regions that would otherwise not be in touch.[4] Another participant referred to accessibility, noting that workshops in 2023–24 were available in more "centralized" locations, which allowed educators from more rural or isolated communities to meaningfully participate in professional learning and engage with other educators, computer science experts, and learning advocates in ways they had not previously.

Trainings and Supports for CS Champions

Members of the EWIG: CS planning team described multiple activities and resources designed to build the capacity of CS Champions. Monthly calls that bring together CS Champions across the state typically feature opportunities for leadership development. Examples of topics for this leadership development have included doing a deep dive into the Computer Science Teachers Association Coaching Toolkit and learning about the importance of representation and inclusion in computer science. In addition, several resources aim to provide CS Champions with the logistical details and ongoing supports needed to plan and lead Seasons of CS workshops. Among these resources are an annual facilitator training, access to information about stipends and participation requirements on a project Wiki and the Seasons of CS website, and ongoing communication between the CS Champions and an assigned leader for their region. In some cases, CS Champions also joined Seasons of CS workshops as participants themselves to expand their subject knowledge and observe models of professional learning in computer science.

The following sections describe CS Champion perspectives on these supports and other resources that inform them in fulfilling the responsibilities of their roles.

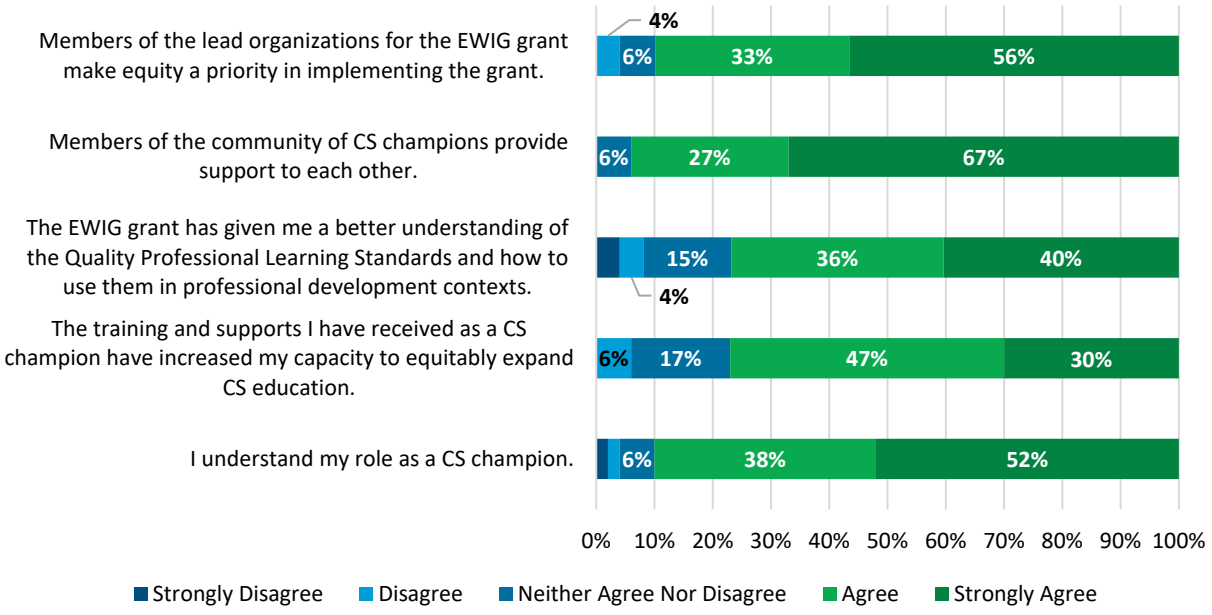
[4] For literature that explores the motivations and potential benefits of networks among computer science educators, see examples such as Cutts et al., 2017; Flapan et al., 2021; and Yadav et al., 2016.

Capacity-Building Efforts Available Through the EWIG: CS Grant

Although many survey and focus group findings speak to the quality of capacity-building efforts received by CS Champions, some focus group responses point to the possible need to improve CS Champions' understanding of certain elements of the grant, such as the trainings offered through their participation in EWIG: CS.

Overall, survey responses reveal positive impressions about the quality of supports received. For example, Exhibit 2 shows that 76% of CS Champions who responded to the survey strongly agreed or agreed that the EWIG: CS grant had given them a better understanding of the Quality Professional Learning Standards[5] and how to use them in professional contexts. Similarly, 77% of respondents strongly agreed or agreed that the training and supports they received had increased their capacity to equitably expand computer science education. With respect to the full group of CS Champions, 94% of respondents strongly agreed or agreed that members of the community of CS Champions provide support to one another. The next section of the report, Findings About the Network of CS Champions network, explores these issues in greater detail.

Exhibit 2. CS Champion Perspectives About Their Role and Supports Received



Note. n = 48. *Source:* CS Champion survey.

[5] The California Department of Education has developed a set of Quality Professional Learning Standards that "identify characteristics of professional learning that are most likely to support educators in building individual and collective capacity to meet professional, school, and student performance expectations." For more information, see https://www.cde.ca.gov/ci/pl/qpls.asp.

The survey also gave respondents the opportunity to write in a statement about the resources, supports, and/or strategies they received through EWIG: CS that will support them in equitably expanding computer science education. CS Champions most commonly identified community (*n* = 14) and professional development received through EWIG: CS (*n* = 9). Funding (*n* = 5) and receiving access to resources (*n* = 3) also appeared multiple times in these written responses, albeit with less frequency.

Nevertheless, when focus group participants were asked the question "Can you describe the trainings and supports you have received as a CS Champion?" some participants were able to identify and describe their training, whereas other participants either could not describe the training or struggled to articulate how they had been trained. The spectrum of responses may be a result of different interpretations of what is meant by the word "training." Because EWIG: CS facilitators embed these trainings in the context of other activities that take place during the monthly calls, those opportunities might also be less obvious to the CS Champion participants. Focus group responses could also be a reflection of the consistency or fidelity of the training experiences themselves. Further exploration is warranted to better understand these perspectives.

Although focus groups featured variation in the ability of CS Champions to identify training that they received in their roles, participants who did describe trainings most frequently identified a focus on instructional coaching in their responses; some CS Champions even recommended that coaching could be a potential solution to equitably expanding CS education. However, praise for the training about coaching was not universal. One focus group participant noted, "I had a slightly different experience. I often grappled with the connection between those particular coaching conversations directly to CS and the professional learning grant that we were delivering."

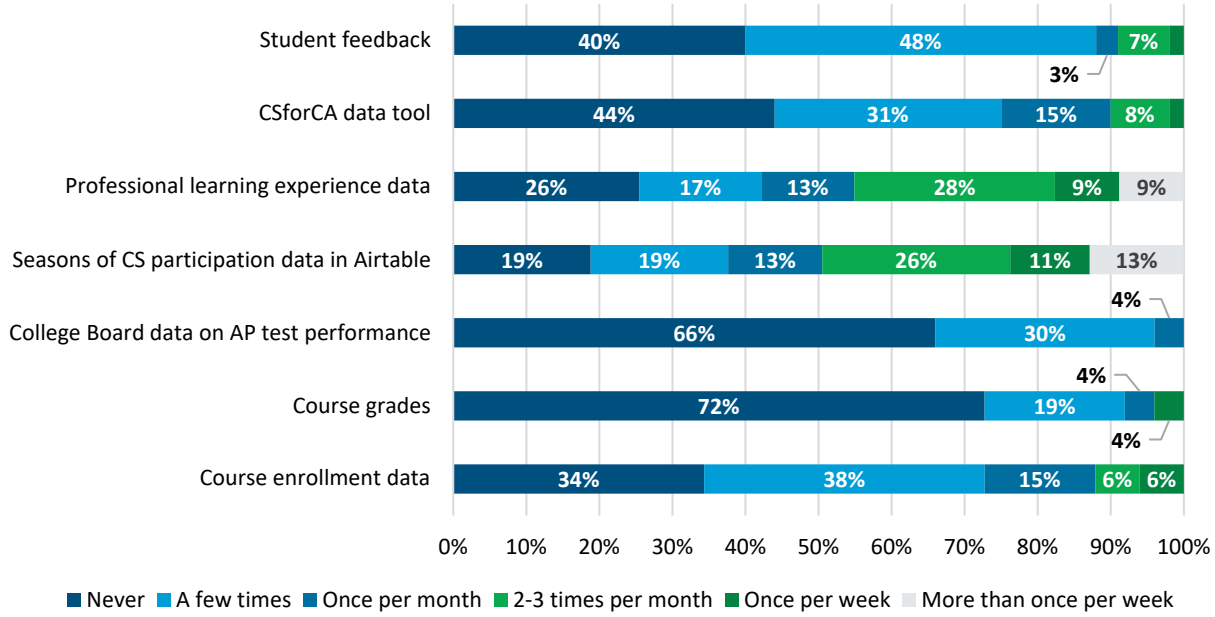
> "For the first hour, we have two representatives from UCLA, and they come in and they have a focus around coaching and give some practical examples of what it looks like. They engage us with some live examples of it. So they'll actually model whatever strategy that they are discussing for that day. And they ask for feedback from us around our thoughts and where we're seeing that in our work, maybe where we're not seeing that in our work."
>
> *– CS Champion Focus Group Participant*

> "I have not received trainings as a CS Champion. I have met with our regional people, and if I ever need any help or I'm confused or whatnot, I reach out to them. But in terms of training, it was just kind of laid out that 'here's what we do and here's your potential role, which is the disseminator of information.'"
>
> *– CS Champion Focus Group Participant*

Data Sources That Inform the Work of CS Champions

Data about computer science learning opportunities, computer science participation, educator preparedness, and student learning outcomes can be vital sources of information for CS Champions to identify strengths in their counties, highlight areas of need, and design supports to effectively target and address those needs. Survey responses point to the range of data sources from which CS Champions draw as they conduct their work. The data most frequently used by CS Champions were those related to professional learning: Half of survey respondents (50%) indicated they used Seasons of CS participation data at least two or three times per month, and nearly half of respondents (46%) reported they used professional learning experience data at least two to three times per month. In contrast, nearly three quarters of respondents reported they never look at course grades, and roughly two thirds of respondents reported they never access data on AP test performance (see Exhibit 3).

Exhibit 3. CS Champion Frequency of Data Use, by Data Source



Note. n = 48. *Source:* CS Champion survey.

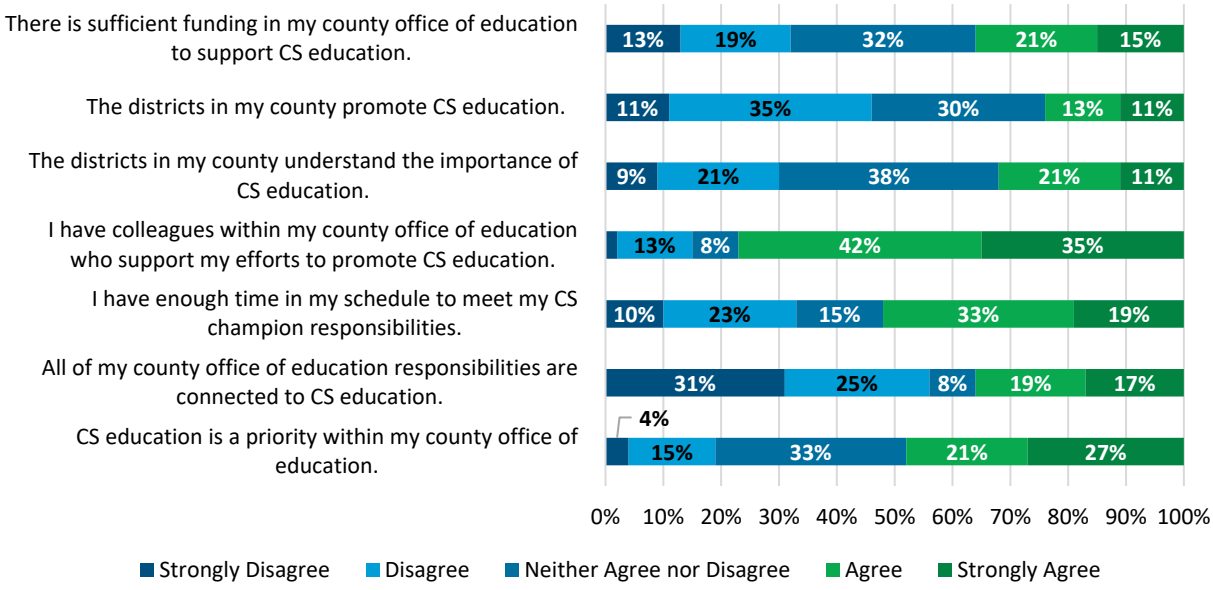
Capacity-Building Efforts Available Through the County Office of Education Structure

California's 58 county offices of education offer a structure for providing targeted support to districts and schools on a regional basis that might not otherwise be possible from a centralized state agency. However, these offices also operate according to their own priorities and funding environments. CS Champion survey items sought to better understand the degree to which county offices of education are well positioned to provide important capacity-building opportunities in computer science.

More than three quarters of respondents (77%) strongly agreed or agreed that they have colleagues within their county office of education who support their efforts to promote computer science education, and more than half of respondents (52%) strongly agreed or agreed that they have enough time in their schedule to meet their CS Champion responsibilities (see Exhibit 4).

However, survey responses displayed in Exhibit 4 also highlight concerns about the ongoing support available for computer science through the county office of education structure. Fifty-six percent of respondents strongly disagreed or disagreed that all their county office of education responsibilities are connected to computer science education, a reflection of the multiple hats that administrators often must wear. Moreover, little more than a third of respondents (36%) strongly agreed or agreed that there is sufficient funding in their county office of education to support computer science education. Slightly fewer than half of respondents (48%) strongly agreed or agreed that computer science education is a priority within their county office of education.

Exhibit 4. CS Champion Perspectives About County Office of Education Structure and Roles



Note. n = 48. *Source:* CS Champion survey.

Barriers to Progress

Despite the successes outlined in the previous sections, dynamics associated with the CS Champion role sometimes stand in the way of meeting its goals. For example, providing additional insights into the survey findings, five focus group participants suggested that the nature of county offices created challenges in their role as CS Champions. Three of those five

participants shared how roles and responsibilities within a county office of education change frequently to respond to internal priorities and external funding streams. The shifting landscape and ambiguity of roles often results in confusion and frustration. It can also mean limited agency for individuals within their county office of education structure: One participant relayed that, due to the nature of their organization, they were "volun-told" to take up the CS Champion position. Another participant shared how an organizational policy made it difficult to contact other stakeholders, and a third participant spoke to ways in which the independent leadership structures across the state's 58 county offices contribute to misalignment in management, leadership, and processes.

> "We need funding, but we also need time, and giant influxes of funding don't necessarily solve the problem . . . And so training someone from within or finding someone that's doing something in the classroom and creating that pathway and building the system is taking longer. The funding is one part, but we also need the time and to have reliable funding."
>
> *– CS Champion Focus Group Participant*

Beyond challenges associated with the county office of education system, CS Champions rated the significance of various barriers to progress on a scale from 0 to 10. Based on earlier EWIG: CS data collection from the Kapor Center and discussion with the EWIG: CS planning team, the AIR research team identified nine obstacles that stand in the way of computer science education. Among the options provided in the survey, CS Champions selected two of the three biggest challenges as issues related to educator capacity: The availability of qualified computer science educators emerged as the largest challenge, with training or professional development for computer science educators ranking third (see Exhibit 5). Survey respondents ranked competing priorities as the second most significant barrier, followed by funding at fourth and administrator or counselor buy-in and support at fifth.

Exhibit 5. Barriers to CS Education to Equitably Expanding Computer Science Education in California, on a Scale of 0 to 10

Barrier	Average Response	Standard Deviation
Availability of qualified CS educators	8.54	1.76
Competing priorities and initiatives	8.21	2.61
Training or professional development for CS educators	7.62	2.36
Funding	7.52	1.98
Administrator or counselor buy-in and support	7.48	2.51
CS education policies	6.52	3.00
Discrimination or bias related to student background or identity	5.90	2.94
Availability of instructional materials	5.33	2.50
Social familial influence	5.21	2.75
Access to devices and connectivity	4.90	2.72
Student interest in CS education	4.52	2.49

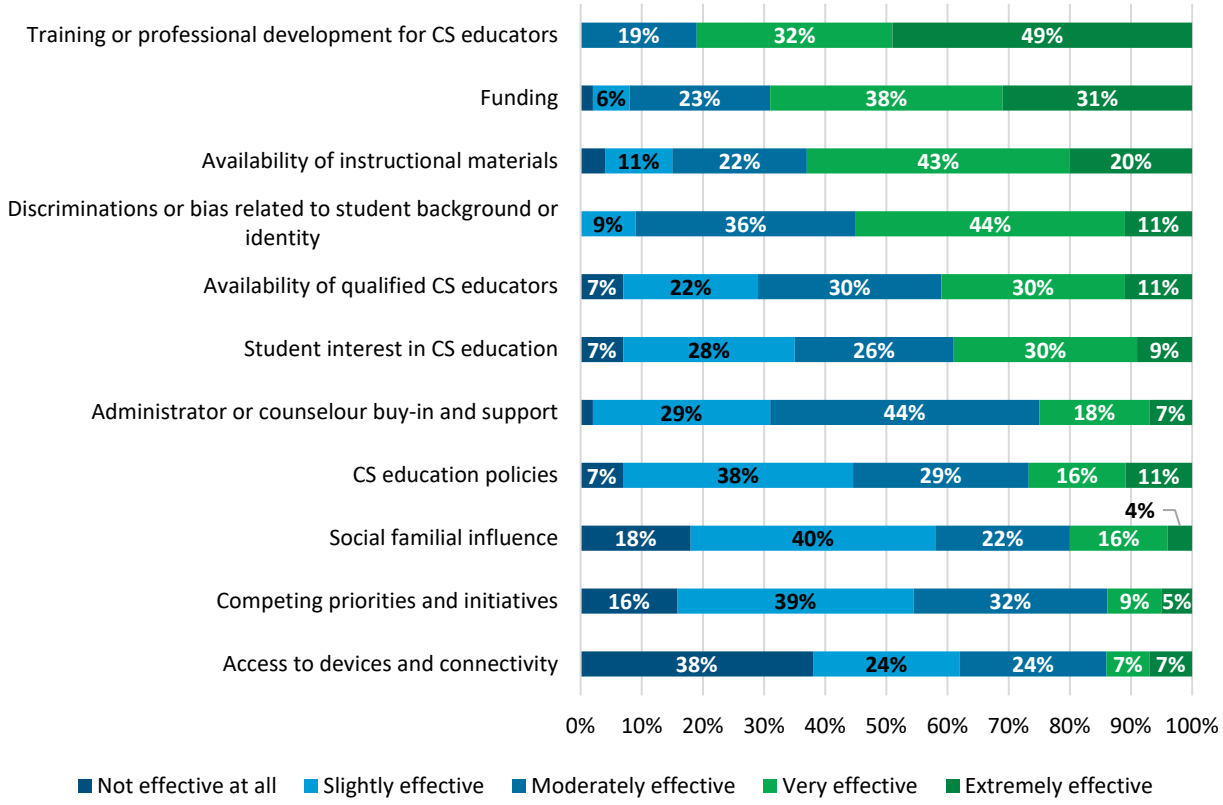
Note: n = 48. *Source:* CS Champion survey.

Key Finding 2

CS Champions rated the EWIG: CS grant as effective at addressing some of the most significant barriers to expanding opportunities for computer science education.

Respondents also rated how effective the EWIG: CS grant was in helping them address those barriers to progress on a scale from 1 (not effective) to 5 (very effective). Exhibit 6 demonstrates that the barrier for which CS Champions reported that the grant was most helpful was training or professional development of computer science educators; 81% of respondents rated it as extremely effective or very effective. This is perhaps unsurprising, given that the primary activities funded through the grant have been workshops designed to build educator capacity. Funding emerged as the second topic for which survey respondents reported that EWIG: CS was most helpful; 69% of respondents called it extremely effective or very effective. Again, given the multimillion-dollar investment to support educators in designing, facilitating, and participating in professional learning, this response aligns with the purpose and use of state grant funding.

Exhibit 6. Effectiveness of the EWIG: CS Grant at Addressing Barriers to CS Education to Equitably Expanding Computer Science Education in California, on a Scale of 1 to 5



Note. n = 48. *Source:* CS Champion survey.

Findings About the Network of CS Champions

The relationship between CS Champions and educators in districts and schools is a vital indicator of the successes and challenges associated with EWIG: CS implementation. Anecdotal accounts from leaders associated with the grant have also underscored the value of the CS Champions network as an outcome in its own right. Computer science education remains a nascent field in K–12 public education, and the small size of many programs and limited resources to support them mean that educators often operate in isolation from one another (Code.org et al., 2024). A network that enables colleagues across organizational lines to share knowledge and resources, coordinate improvement efforts, and find emotional support from one another can help to improve the quality of CS education efforts and promote the sustainability of programs and services (Cutts et al., 2017). To that end, it is important to understand the nature of the relationships among CS Champions as an indicator of EWIG: CS progress.

Key Finding 3

EWIG: CS has succeeded in creating a community of computer science education advocates and role models across California.

Social network analysis and focus group responses suggest that EWIG: CS has fostered a robust community of advocates and leaders who can guide and support the equitable expansion of computer science education in California schools. Connections are strong both within and across regions, suggesting that, even in a large and diverse state, EWIG: CS brings members of the computer science education community across geographic contexts. Interactions among network members are most common around EWIG: CS activities and capacity-building efforts. In contrast, CS Champions reported that, among a range of topics, discussions were least common around funding.

Connections Among CS Champions

Focus group participants described a statewide network of CS Champions that features both formal and informal interactions. Focus group responses suggest that one key outcome of the EWIG: CS grant has been the cultivation of a network of county-level administrators committed to promoting and supporting computer science education across the state. In some cases, that network enables individuals to connect across multiple programs and funding streams. For example, four focus group participants described how they interacted with other CS Champions outside of official EWIG: CS activities due to their association and responsibilities with other related CS grants in the state of California, such as CS for NorCal, the CS Supplemental Authorization grant, and a Math, Science, Computer Science (MSCS) grant. Focus group

participants described these opportunities to collaborate with computer science education activities that often "bleed into" those outlined in EWIG: CS.

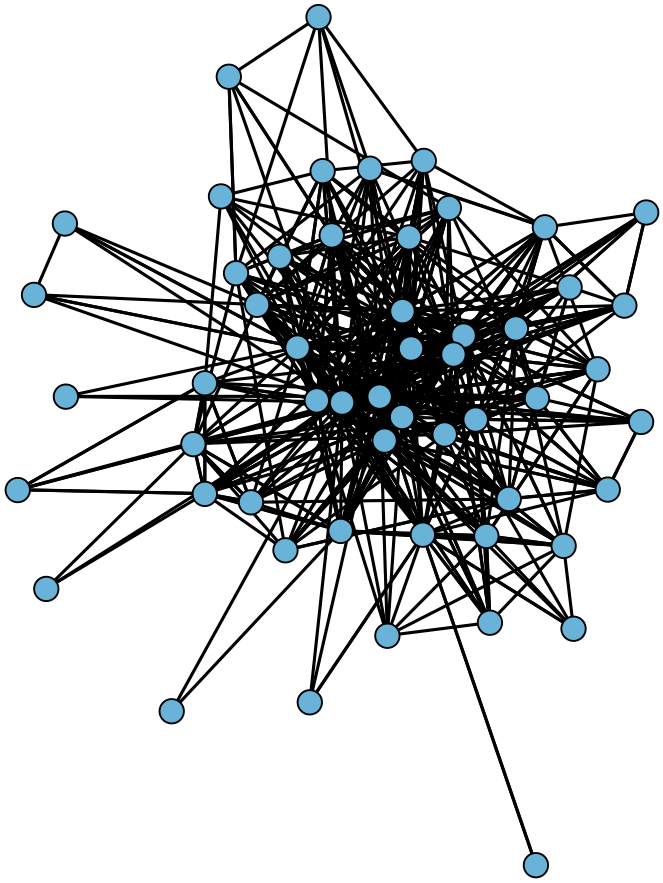
CS Champions also reported engaging with one another through informal interactions outside the formal monthly meetings and other EWIG: CS activities. Three focus group participants offered detailed descriptions of informal interactions and opportunities to network, such as introducing CS Champions to others who are knowledgeable in specific computer science content or processes. Only one focus group participant shared that they did not interact or collaborate with any other CS Champion outside of formal monthly meetings and other EWIG: CS activities. This person reflected, "I'm not feeling a network of CS Champions . . . I attend my regional meetings . . . and that's it. I don't see an opportunity for a network unless I initiate something."

Overall Network Strength

An analytic technique known as social network analysis enables researchers to describe interactions within social settings and how the structure of interactions relates to broader phenomena of interest. To assess how the CS Champions operated as a community around EWIG: CS goals, the AIR team created and analyzed a survey to examine their communication patterns as a social network, with the understanding that communication about these topics provided an opportunity for CS Champions to share their knowledge surrounding CS Champion work.

Networks are composed of two things, the nodes (the actors) and the edges (the relationships between those actors). We plot them in Exhibit 7, which presents the full network diagram, wherein each node (depicted as a blue circle) represents a CS Champion and the lines between them represent an instance of communication between the two individuals on at least one occasion outside the formal activities of the EWIG: CS grant.

Exhibit 7. CS Champions Network Diagram



Note. n = 48, reporting on the network of 54 CS Champions. *Source:* CS Champion survey.

There are 407 total relationships in this network, with an average of 15.1 communication ties. The plotting algorithm here is known as Fruchterman-Reingold (1991). It seeks to place actors who are more prominent in the network (assessed via the number of people who have relationships with them) toward the center and people who are less active toward the edges. Exhibit 7 demonstrates that there is a group of people who are more actively communicating; we found 85% of the network have at least five communication ties, but 26% of the network have at least 20 communication ties. Despite this variation among members of the network, it is noteworthy that the entire network is connected. That is, each CS Champion can "reach" any other member of the CS Champion network. Because there are other social environments characterized by sharp bifurcations or social divisions in communication among individuals, this is a nontrivial piece of evidence that suggests that the CS Champions are functioning as a cohesive group.

The bi-components visible in Exhibit 7 are an indicator of the strength of connections among members of the CS Champion network. In social network analysis, the term bi-component

refers to the existence of two paths from any one node to another node in the network. Bi-components are a key measure of robustness because the removal of any one tie or any one node still yields a connected network. In the context of EWIG: CS, for example, if one CS Champion leaves their position, other members of the network will still have a connection to other CS Champions in their absence. The fact that 53 individuals out of 54 are a part of the bi-component in the aggregated communication network suggests that the overall CS Champion community is robust to turnover for connecting about issues relevant to computer science education.

Characteristics of the CS Champion Network

Beyond overall findings about the CS Champion network, further exploration enables us to better understand the connections that exist among members based on their history with the grant and their geographical location.

Relationship Maturity

CS Champion descriptions of their roles highlighted the connections they have with peers through multiple channels, for example, through groups such as CS for NorCal or MSCS. We might reasonably wonder whether the EWIG: CS grant has fostered the development of new relationships or whether it primarily serves as a vehicle for maintaining existing relationships. In other words, is EWIG: CS contributing to a growing community of computer science educators and administrators? Our data do not allow for conclusions about the causality of the CS Champion network connections. However, survey data do reveal that 49% of the ties among CS Champions were formed prior to the EWIG: CA grant. More than half of the ties (51%) formed during the EWIG: CS life cycle, indicating that the grant period coincides with the development of new relationships among CS Champions.

Educator Characteristics and Computer Science Experience

Findings from Summer of CS participants in 2024 suggest that changes in confidence to teach computer science were greater for women, educators of color, and educators without any prior computer science teaching experience. We therefore tested the ties for each CS Champion based on their tenure working in computer science education. We find no statistical evidence ($p = 0.35$) that there is any relationship between one's experience as a computer science educator and one's position in the CS Champion communication network. This finding precludes any concerns that more junior or more senior educators would be more engaged in the CS Champion community and suggests a more egalitarian exchange of experiences. We also examined whether gender or having an underrepresented racial identity would have any relation with the number of ties CS Champions had in the network, and we find no statistical evidence that a CS Champion's gender ($p = 0.74$) or racial identity ($p = 0.85$) has any relationship with one's position in the CS Champion network.

Regional Connections

Survey responses also enable us to explore connections across the state of California. The EWIG: CS grant organizes county offices of education into seven regions.[6] Regions design professional learning opportunities together and often bring CS Champions together outside the context of statewide grant participant meetings. An examination of network ties enables us to explore the degree to which connections exist both within and across regions. To help us understand the regional context, Exhibit 8 displays the number of CS Champions within each region. Region 6, which is located in Southern California and includes many large urban school districts, has the highest number of CS Champions, with 12. Region 2, which features primarily small rural school districts along California's northern coast, has the lowest representation with 2 CS Champions.

Exhibit 8. Number of CS Champions, by Region

Region	Number of CS Champions
1	6
2	2
3	9
4	8
5	8
6	12
7	9
Total	**54**

Exhibit 9 provides a count of ties among members of the CS Champions network. Each tie represents a connection between two members. Therefore, the table displays these ties by showing the region to which one individual belongs in the columns across the top of the table and the region to which the other individual belongs in the row down the left side of the table.

[6] For a full list of the 58 California county offices of education and the regions with which they are associated within the EWIG: CS grant, see Appendix D.

Exhibit 9. CS Champion Network Ties Within and Across Regions

	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7
Region 1	11						
Region 2	3	1					
Region 3	9	3	23				
Region 4	0	3	10	15			
Region 5	9	0	22	7	24		
Region 6	4	3	29	8	18	35	
Region 7	11	5	33	20	33	36	32

Note. n = 48, reporting on the network of 54 CS Champions. *Source:* CS Champion survey.

As we might expect, connections among CS Champions are strong within regions. For example the highest number of ties for members of Region 1 is to other members of the same region; 11 of the ties that connect CS Champions in Region 1 are to other CS Champions within Region 1.

However, Exhibit 9 also reveals substantial communication across regions. For example, there are 29 ties between Region 3 and Region 6. Region 1 is one of the regions with the smallest number of CS Champions, yet survey results find 9 ties apiece between Region 1 and both Regions 3 and 5. CS Champions from Region 7 appear to be especially well connected. The number of ties with Region 7 is higher for five regions (Regions 2, 3, 4, 5, and 6) than the number of ties observed *within* those regions.

Topics That Connect the CS Champion Network

We can develop a more nuanced understanding of the CS Champions network by exploring not only *who* is connecting to one another but what they are connecting *about.*

Measures of communication density help us understand the relative frequency of different topics of communication. Communication density represents the fraction of communication ties that exist out of the total possible number of communication ties that could exist; Exhibit 10 shares the communication density for 12 different topic areas about which CS Champions might interact with one another. The most common topics for connection were EWIG-specific events and capacity building in computer science education. This is unsurprising because these are the primary areas of focus for grant funding overall. The least discussed topic among CS Champions was funding. Thus, although CS Champions identify funding as one of the most significant barriers to progress in computer science education (Exhibit 5 under Barriers to

Progress), it is not a topic about which members of the CS Champions Network engage at high levels.

Exhibit 10. Communication Density About Different Topics

Topic	Density
Any Interaction	0.284
EWIG-specific events	0.218
Capacity building in CS education (e.g., coaching, workshops)	0.212
CS content and/or state CS standards	0.169
CS instructional resources	0.154
Equity and inclusion in CS education	0.145
CS availability/access	0.124
CS student engagement/experience	0.115
CS enrollment/participation	0.114
Quality professional learning standards (QPLS)	0.109
Funding for CS education	0.104
Policies related to CS education	0.087
Other topics	0.036

Note. n = 48, reporting on the network of 54 CS Champions. *Source:* CS Champion survey.

Sustainability of the CS Champion Role

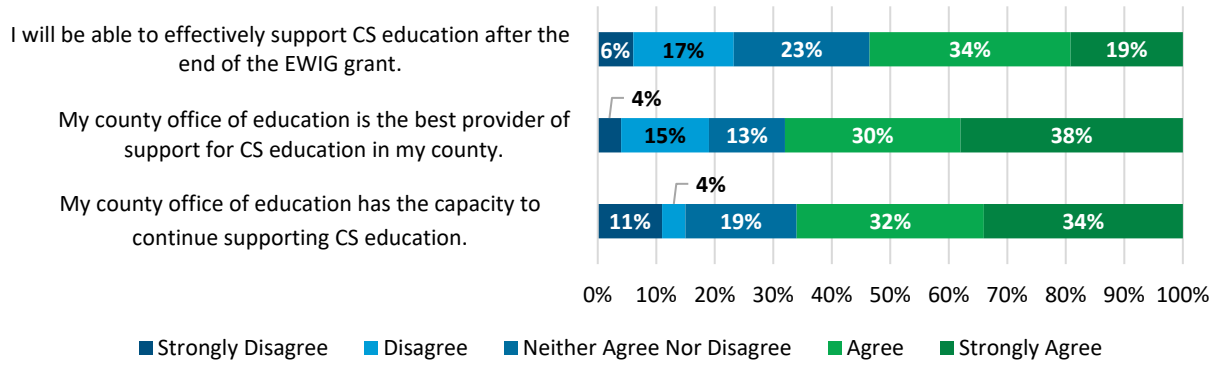
The EWIG: CS grant is a finite and short-term funding stream, and there is no indication that upcoming iterations of the state budget will reinvest in the activities that it supports. The CS Champion roles themselves, for example, which use grant funding to support percentages of individuals' time, may need to operate with different resources if they are to continue. Sustainability is therefore a key issue that will shape the approach to supporting computer science education once the grant expires.

Key Finding 4

More than half of CS Champions express confident about their ability to support computer science education after the EWIG: CS grant expires, but the dynamics of the county office of education system pose challenges for doing so.

The survey asked CS Champions about their ability to continue their work after the EWIG: CS grant ends by requesting respondents' levels of agreement with three statements. The responses reveal some level of optimism about the future. Roughly two thirds of respondents strongly agreed or agreed that their county office of education has the capacity to continue supporting computer science education. In addition, more than half of CS Champions who took the survey (54%) strongly agreed or agreed that they will be able to effectively support computer science education after the end of the EWIG: CS grant (see Exhibit 11).

Exhibit 11. Sustainability of Supports for Computer Science Education



Note. n = 48. *Source:* CS Champion survey.

However, the dynamics of the county office of education system might temper this optimism. Recall that a minority of survey respondents agreed or strongly agreed that computer science education is a priority within their county office of education and that there is sufficient funding

in the county office of education to support computer science education (see Exhibit 4). Questions about whether the capacity exists for continued support may merit further exploration.

When prompted to write in what resources, supports, or strategies are needed to continue efforts to promote computer science education after the EWIG: CS grant ends, CS Champions generated a wide range of responses. The most common theme in these responses echoed respondent reflections about barriers in Exhibit 11; 8 respondents identified funding as critical for sustainability. Other responses included community (*n* = 6), continued communication (*n* = 5), and continued training (*n* = 2).

Next Steps for the EWIG: CS External Evaluation

The AIR research team will continue collecting and analyzing data throughout 2025.

First, with respect to Research Question 2, previous evaluation reports have shared insights about the value of the 2024 Summer of CS experience. However, the ultimate goal of a capacity-building investment like EWIG: CS is to change the practices of educators in ways that better serve students. Our best measures of quality for Summer of CS, then, are not the impressions of participants during their attendance but rather their behaviors when they return to schools and classrooms. The AIR evaluation team plans to explore this issue through a follow-up survey to be administered to participants during the 2025–26 school year. This follow-up survey will ask respondents about the concrete steps they have taken in the months and years after their workshop participation. The data from this survey will have limitations because the data will rely on self-reported accounts of classroom behavior. Nevertheless, additional respondent perspectives captured a year after respondents' Summer of CS experience should provide valuable information to supplement the intermediate outcomes reported here.

Even changes in educator behavior, though vitally important, do not tell us about changes in student experiences. The CAPE Framework's emphasis on access and participation calls on us to better understand whether EWIG: CS has contributed to expanded computer science opportunities for students. Unfortunately, delays in accessibility to statewide data prevent us from analyzing these outcomes across the state of California. The evaluation team will therefore analyze computer science course availability and participation data in a small number of case study districts to address Research Questions 6 and 7. These data, supplemented by interviews with educators in each district, will help improve our understanding about the degree to which opportunities have changed throughout the life of the EWIG: CS grant and the factors that educators believe have contributed to these changes.

To continue our ongoing dialogue with members of the EWIG: CS planning team and contribute to the growing knowledge base of the computer science education community, AIR will release reports and summaries of our findings as each piece of data collection and analysis concludes. A summative annual report planned for January 2026 will summarize all findings from the upcoming year.

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