



CSforCA 2019-2020 Priorities Aligned with California's Strategic Implementation Plan

Computer Science Education Vision

California's vision is to ensure that all students develop foundational knowledge and skills in computer science to prepare them for college, careers, and civic engagement.

Mission

All schools offer rigorous and relevant computer science education equitably and sustainably throughout grades K-12.

All teachers are adequately prepared to teach rigorous and relevant computer science aligned with California's K-12 computer science standards.

Computer Science Education Principles

These principles apply to all California schools (K-12) and the students they serve.

1. Every student and every teacher is capable of learning computer science.
Access to, and achievement in, computer science should not be predicated on the basis of race, ethnicity, gender identity, socioeconomic status, language, religion, sexual orientation, cultural affiliation, learning differences, or special needs.
2. Every student in California should have equitable access to high-quality computer science curriculum and instruction aligned to California's K-12 computer science standards.

3. Every student should have continuous opportunities and multiple entry points to engage in computer science education, including articulated pathways toward college, careers, and community engagement.
4. Computer science instruction should involve real-world, engaging, meaningful, and personally relevant activities for students that focus on problem-solving, critical thinking, and creativity while emphasizing the ethical impacts of computing.
5. Computer science should align with California's K-12 Computer Science Standards and be integrated, as appropriate, into other subject areas in grade bands K-2, 3-5, 6-8, and 9-12; computer science should be offered as standalone courses, from introductory to more advanced, in middle and high school.
6. All California schools should have the infrastructure to support computer science education (including hardware, software, and personnel).
7. Computer science content knowledge and relevant pedagogical practices should be included in all California teacher preparation programs, differentiated by multiple subject and single subject teaching credentials. The state budget should allocate funding for teachers to participate in ongoing, high-quality, and differentiated professional learning and support to assist them in implementing and integrating computer science education in their classrooms.
8. California should engage stakeholders including, but not limited to, members from K-12 education, higher education, industry, local communities, parent organizations, and policy makers, to implement computer science statewide.

Policy Recommendations

1. Professional Learning:

- a. Create a Regional Summer of CS program- Scale and sustain systems of support for educators including regional hubs providing professional development for teachers, counselors, and administrators modeled after UCLA and NSF research pilot "Summer of CS".

2. Pre-Service Teacher Education:

- a. Expand California Subject Matter Projects to include CS and add concurrent funding.
- b. Create pre-service incentive grant for schools of education to update curriculum and assist pre-service credentialed programs to teach CS.
- c. To create inclusion, CS teachers should receive instruction not just on the subject matter of CS, but on how to create inclusion in classrooms that helps underrepresented students belong and persist in the subject, and confront their own implicit bias about who can and should take CS.

3. Integrate College & Career Pathways

- a. Integrate college and career pathways to make CS available to all students by leveraging funding for CS courses, regardless of pathway and teacher credential.
- b. Include Computer Science in California Dashboard to ensure accountability.

4. Teacher Credentialing

- a. Ask the CTC review teacher credentials for CS and reconsider which credentials should authorize teachers to teach CS in short-term while developing a long-term CS credential pathway.

b. Create a single subject CS credential

**CSforCA Policy Priorities aligned with the California Computer Science Strategic Implementation Plan
Panel Recommendations**

Ensuring Access and Equity for All Students in California Schools

These strategies are aligned with both the Recommendations from the Computer Science Strategic Implementation Plan Panel and the California Computer Science Strategic Implementation Report.

Professional Learning:

Scale comprehensive regional hub of including in-service professional development and ongoing support for teachers, counselors, and administrators modeled after NSF research pilot, "Summer of CS"

California Computer Science Strategic Implementation Plan Recommendations (May 2019)

CDE could ensure adequate staff are available to support implementation activities and to provide technical assistance to LEAs. (Page 10)

Increase the number of teachers qualified to teach CS via new teacher recruitment, professional learning for teachers/administrators/counselors regarding the CA CS Standards, and institutional and financial support. (Page 15)

The state could expand the California Subject Matter Projects (CSMPs) with the addition of a new project focused on CS to provide a network of professional learning opportunities across the state. (Page 16)

The state could resource the creation of materials to support teachers when they return to their classrooms inspired and ready to engage their students in these types of activities. (Page 16)

Scaling up computer science (education coursework so that all high schools teach at least one computer science course [EC 53311.3a])

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
AE.A2 p. 6 in Implementation Report	Districts and/or COEs	Educators are provided professional development that explores the content knowledge and pedagogical practices in the California computer science standards.	Increase in teacher efficacy in delivering content aligned to the California computer science standards	Within 4 years

Increasing the participation of pupils traditionally underrepresented in computer science education

[EC 53311.3e]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
AE.E3	Districts or COEs	Identify teachers and teacher leaders committed to improving	Teachers and teacher leaders committed to improving access and	Within 3 years

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
p. 12 in Implementation Report		<p>access and equity in computer science education.</p> <p>Develop training materials and provide evidence-based professional development that prioritizes equity, engages diverse learners, and utilizes project-based activities with strong computer science content, collaborative learning, inquiry-based pedagogy, and culturally responsive teaching.</p>	<p>equity in computer science are identified. Districts train and provide continued support to teachers and teacher leaders at district and site levels.</p> <p>Training material addressing varied pedagogical techniques to engage diverse students that are culturally responsive are available to all teachers.</p> <p>Materials for access and equity in computer science are made available on the CDE web site.</p>	
AE.E4 p.17 in Implementation Report	Districts and COEs	Provide access to resources and professional development for school counselors to help guide underrepresented students into various computer science pathways.	Training materials are developed for awareness of computer science standards and pathways to assist counselors in identifying and eliminating potential bias of guiding students into different computer science pathways.	Within 3 years

Providing training and professional development for education in computer science [EC 53311.1a]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
ES.A1	Districts and COEs	Provide professional development to current CTE/ICT teachers to teach rigorous and relevant computer science.	Existing CTE teachers are identified and contacted through district coordinators. The number of CTE teachers who teach computer science increases.	4 years
ES.A3 p.17 in Implementation Report	Districts and COEs	<p>Create Communities of Practice (COPs) with computer science teachers and other teachers aiming to integrate computer science into their discipline.</p> <p>County offices create a COP for small districts to ensure they have colleagues with whom to share.</p> <p>All schools offer regular collaboration time during the year.</p> <p>Recruit a diverse pool of CS teachers.</p>	<p>Computer science teachers and teachers interested in integrating computer science into their discipline connect with professional colleagues with whom they can share information and experiences and learn from each other.</p> <p>Computer science teachers and other teachers integrating computer science into their discipline actively participate in the COPs.</p>	2-4 years
ES.A4	Districts and COEs	Engage teachers in excitement-generating, hands on experiences so they can see examples of	Increased funding for computer science materials and professional development.	2-4 years

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
p.17 in Implementation Report		activities they may want to do with students. Provide places and opportunities on sites or central locations for borrowing computer science materials.	Central locations for borrowing computer science materials are created and maintained.	
ES.A5 pp.16-17 in Implementation Report	Districts and COEs	Instructional leaders are well-prepared to offer equity-minded professional development to increase knowledge and confidence in teaching and/or integrating computer science and models of what this looks like in classrooms and provide the pedagogy so teachers can implement computer science confidently and effectively.	Increasing numbers of teachers attending professional learning opportunities. Self-efficacy surveys and/or administrator/peer observation to determine teachers' implementation of and confidence with teaching computer science.	2-5 years
ES.A6 p.16 in Implementation Report	Districts and COEs	Provide professional development programs for in-service teachers to learn how to teach concepts and practices aligned to the California computer science standards,	Teachers regularly integrate the California computer science standards in their classes as evidenced by student-developed artifacts or administrator/peer observations.	2-5 years

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
		differentiated for grade and skill levels.		
ES.A7 p.17 in Implementation Report	Districts, Schools, and COEs	Provide ongoing professional development for site and central office administrators and counselors to boost knowledge of what computer science is, why it is important, career and workforce demand, what effective computer science instruction involves, teacher certification requirements for computer science, equitable implementation practices, and ways they can support computer science education and increase participation by underrepresented populations.	Site district, county office administrators and counselors attend relevant computer science professional development to gain necessary knowledge to create and support effective computer science classes. Site administrators are knowledgeable of credential and authorization requirements for teaching computer science. Demonstrated distribution of information about career demands and labor opportunities related to computer science.	2-5 years
ES.A8 p.12 in Implementation Report	CDE or COEs	Develop computer science foundation toolkits for teachers in each grade band (i.e., K-2, 3-5, 6-8, 9-12) describing the California computer science standards and principles and how they can integrate computer science by	Computer science foundation toolkits are distributed to teachers and use is reported.	2-4 years

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
		<p>adapting current practice (adding onto or repackaging things they already do) to encourage implementation. Provide implicit bias training tools for teachers to help mitigate instances of predicting which students can be successful coders.</p>		
<p>ES.A10 p.16 in Implementation Report</p>	<p>IHEs</p>	<p>Create and/or curate professional development programs that result in college credit that could be applied towards meeting the supplementary authorization in computer science.</p>	<p>Growth in participation of programs throughout the state, including at community colleges, CSUs, UCs, and other IHEs.</p> <p>Emergence of new computer science teacher preparation programs.</p> <p>Computer science classes for professional programs will transfer for lower division computer science courses.</p>	<p>1-5 years</p>
<p>ES.A12</p>	<p>IHEs, Districts, COEs, and the CDE</p>	<p>Develop face-to-face professional development opportunities including computer science content and pedagogy for teachers.</p>	<p>All teachers who want to learn computational thinking and computer science content and pedagogy have access to either face-to-face or online</p>	<p>2-3 years</p>

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
p.17 in Implementation Report		Develop statewide online modules to increase access to computer science content and pedagogy for teachers when face-to-face programs are not accessible.	<p>professional development opportunities.</p> <p>Modules and professional development opportunities are made available to teachers. IHEs share with districts/COEs to disseminate the opportunities to teachers.</p>	

Long-term Goals to Scaling and Sustain K-12 Computer Science Education in California

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
SI.2	Legislature/CDE	The state should provide sustained funding to LEAs for the initial implementation period (eight years) and to support the professional development of teachers and school leaders to learn about the California K-12 computer science standards and to effectively integrate or offer as standalone computer science courses in K-12 education.	Funding will be available, with a priority for schools serving low-income students, to build capacity of teachers and administrators to implement computer science education in their schools. Stakeholder organizations will help amplify the state-provided communications toolkits, based on state-provided materials, to conduct further outreach within communities.	1-2 years
SI.3 p.12 in Implementation Report	SBE	State should develop criteria for local evaluation of computer science instructional materials, including but not limited to evaluating inclusiveness and relevancy for underrepresented students.	Criteria for computer science instructional materials are available.	2 years

Pre-Service Teacher Education:

Provide incentives for Schools of Education to develop pre-service credentialed programs to teach computer science. Expand Subject Matter Projects to include Computer Science.

California Computer Science Strategic Implementation Plan Recommendations (May 2019)

Support teachers to pursue the CS authorization by making it easier to identify institutions where they can complete coursework required for existing authorizations. (Page 16)

CTC could host a public portal that IHEs populate with their coursework that fulfills the supplementary authorization. (Page 16)

Dependent upon funding, the state could incentivize partnerships between CS and education departments at IHEs to develop programs for CS teacher preparation. (Page 16)

State could consider offering incentives for IHEs to offer credit-bearing courses or teacher preparation programs that satisfy the CS supplementary authorization and future CS teaching credentials to help teachers learn how to teach concepts and practices aligned to the CA CS Standards and differentiated for grade and skill levels. IHEs could work with CTC to establish course articulation agreements with CTC-approved teacher preparation programs. (Page 16)

Contingent upon the availability of state funds, a grant program could be established to support teachers to complete course work for the CS supplementary authorization, with additional incentives for teachers who work in low-income and underserved school districts and rural and urban school districts. (Page 16)

State could consider establishing a loan forgiveness program to incentivize clear credentialed teachers to teach CS in these schools. (Page 16)

State and IHEs can encourage individuals in industry to pursue a Business and Industry Partnership Teacher Authorization allowing them to teach for a year and then apply for a CTE credential. (Page 16)

Providing training and professional development for education in computer science [EC 53311.1a]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
ES.A2 p.16 in Implementation Report	State, Legislature, and Institutions of Higher Education (IHEs)	Establish partnerships with IHEs to recruit college students and new teachers to pursue credentials to teach computer science. State should incentivizes teacher preparation programs to integrate computer science aligned to the standards.	Increasing numbers of pre-service teachers who are student teaching in computer science classes, or integrating computer science into other classes.	4 years
ES.A9	Community Colleges	Offer credit-bearing computer science courses for teachers (content and/or	Increasing number of community colleges offering credit-bearing	3-5 years

p.16 in Implementation Report		pedagogy), particularly through community colleges. Community colleges establish memoranda of understanding for course articulation with California Commission on Teacher Credentialing (CCTC)-approved teacher preparation programs.	computer science courses to teachers.	
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Expanding scholarship eligibility and loan forgiveness programs for computer science teachers in low-income and underserved school districts and rural and urban school districts [EC 53311.1c]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
ES.C2 p.16 in Implementation Report	Legislature	Establish a loan forgiveness program to incentivize clear credentialed teachers to teach computer science in schools identified in statute.	Increased number of teachers awarded the computer science supplementary authorization in schools identified in statute.	2-3 years (in conjunction with establishing the computer science credential)

Integrate College & Career Pathways:

Integrate college and career pathways to make CS available to all students and schools can leverage Perkins funding for CS courses, regardless of pathway or teacher credential.

California Computer Science Strategic Implementation Plan Recommendations (May 2019)

Fund professional development events and workshops to build awareness of the CA CS Standards. These events could discuss how CS aligns with other content standards and with requirements for graduation and university admission. (Page 12)

The CTC could reevaluate subject matter requirements for CS to determine if existing credentials or supplementary authorizations could also authorize teachers to teach CS. (Page 15)

Scaling up computer science (education coursework so that all high schools teach at least one computer science course [EC 53311.3a])

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
AE.A3	Districts	Adopt a high school graduation requirement for computer science, aligned to the 9-12 core computer science standards that can be satisfied through standalone computer	Participating districts offer standards-based computer science to all students which can be satisfied through tests, coursework, portfolio(s), or other	Within 6 years

		science courses, interdisciplinary courses, or a portfolio of computational artifacts.	demonstrations of skills to all high school students.	
AE.A4 p.17 in Implementation Report	University of California (UC) and California State University (CSU) Systems	Incentivize students to take computer science courses by counting it towards college admission eligibility.	Board of Admissions and Relations with Schools designates computer science courses other than in area G—college preparatory electives.	Within 1 year

Providing access to computer science in both college and career pathways [EC 53311.3b]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
AE.B1 p.21 in Implementation Report	Districts and/or COEs	High schools offer “A-G” approved computer science course sequences that begin with an introductory level course and includes an Advanced Placement or college-level course.	All high schools offer a sequence of “A-G” approved computer science courses.	Within 5 years
AE.B2	CDE	CDE should ensure that the computer science courses to be offered statewide have options for both core academic/general education and Career Technical Education (CTE) course codes in the California Longitudinal Pupil Data Achievement System. This dual-coding option should be communicated to LEAs, along with where the primary computer science courses fit.	Computer science courses are dual-coded in both general education and CTE.	Within 1 year
AE.B3	CDE	California should reviews Perkins eligibility to follow the course content rather than a teacher’s credential.	All computer science courses receive Perkins funding regardless of the assigned teacher’s credential.	Within 3 years

Increasing the participation of pupils traditionally underrepresented in computer science education
[EC 53311.3e]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
<p>AE.E1</p> <p>p.13 in Implementation Report</p>	<p>Districts and CDE</p>	<p>Plan outreach events and develop and update materials to create awareness and advocacy for computer science education in their schools, especially with traditionally underrepresented groups, families, community members, and other stakeholders.</p>	<p>Events and outreach materials should be differentiated and translated into multiple languages for families of underrepresented students and community organizations that serve these students (i.e., after school clubs).</p>	<p>Within 3 years</p>
<p>AE.E2</p> <p>p.13 in Implementation Report</p>	<p>Districts or COEs</p>	<p>Identify community organizations that may partner with districts to create expanded learning opportunities or to develop scholarship, internship, and/or mentorship opportunities for students in underrepresented groups.</p>	<p>Partnerships and their roles in the district/local schools are described in the district's technology plan.</p> <p>Underrepresented students participate in opportunities of expanded learning, scholarships, internships and/or mentorships, as evidenced by data of</p>	<p>Within 3 years</p>

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
			student participation in computer science community partnerships.	
AE.E4 p.17 in Implementation Report	Districts and COEs	Provide access to resources and professional development for school counselors to help guide underrepresented students into various computer science pathways.	Training materials are developed for awareness of computer science standards and pathways to assist counselors in identifying and eliminating potential bias of guiding students into different computer science pathways.	Within 3 years

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
AE.F1	CDE	Computer science will be included into a future state system for collecting data on enrollment and achievement in education.	A body of stakeholders come together to determine data collection options and collection methods. Districts and COEs data reported to the state accurately.	Within 1 year
AE.F2 p. 13 in Implementatio n Report	CDE	Add computer science education as a college and career readiness indicator on the Local Control Accountability Plan (LCAP).	Inclusion in the college and career readiness indicator on the LCAP.	Within 1 year

Long-term Goals to Scaling and Sustain K-12 Computer Science Education in California

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
SI.1	Legislature/ CDE	Designate funding for a multi-faceted campaign to communicate the California K-12 computer science	Political leaders speak out about the importance of CS education and how it can be	1-2 years

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
p.12 in Implementation Report		standards and implementation plan to LEAs, families, and other stakeholders with an emphasis on the future of work, labor demand, and career opportunities requiring computer science.	implemented. Deliverables from communication campaign will be evident. Stakeholder organizations develop their own communications toolkits, based on state-provided materials, to conduct further outreach within communities.	
SI.4	CDE	The CDE should convene stakeholders to review computer science standards every seven years to evaluate whether or not they should be refreshed. If revision is recommended, legislative authority to update standards will be sought.	Stakeholders are convened to review standards for potential revision.	7 years
SI.5	Districts	Create four-year implementation and evaluation plans for helping all students achieve the K-12 standards (core for 9-12). Plans should be educator-driven and educator-focused, leveraging interest among teachers to pilot materials and disseminate	Support for computer science education is written into district LCAPs under Priority 7: Course Access (Pupil enrollment in a broad course of study that includes all of the subject areas). Plans	2 years

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
		information to colleagues rather than top-down mandates for all teachers to participate from the beginning.	developed by early adopter districts are used as models for other districts and/or legislation to support computer science education implementation.	
SI.6 p.21 in Implementation Report	Districts, COEs, and the CDE	State will identify model districts and schools that highlight successful implementation of the standards and best practices and share with the larger education community.	Recognition for early adopters and current successful models of California computer science implementation are highlighted on a statewide interactive map with symbolic recognition by CDE.	2-3 years
SI.7 p.21 in Implementation Report	Legislature, the CDE, with the University of California Office of the President	Dedicate funding for creation of integrated computer science courses through the University of California Course Integration (UCCI) program. Prioritize funding and opportunities for computer science and ICT integrated with other academic subject areas.	Creation of new UCCI courses that integrate both ICT and other academic subject areas.	2-5 years

Teacher Credentialing:

CTC to study teacher credentials for CS and reconsider which credentials should authorize teachers to teach CS in short-term while developing a long-term CS credential pathway

California Computer Science Strategic Implementation Plan Recommendation (May 2019)

Current authorization pathways for CS teaching in California require all CS teachers to first receive authorization to teach some other subject. California could consider developing a single-subject CS credential through legislation. If such legislation passes, the CTC would then engage in its standard processes for developing a credential, including convening a panel of experts to identify standards for the CS exam and creating a California Subject Examination for Teachers or considering the adoption of the CS PRAXIS exam from the Educational Testing Service (ETS) (Page 15)

Providing training and professional development for education in computer science [EC 53311.1a]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
ES.A2	State, Legislature, and Institutions of Higher Education (IHEs)	Establish partnerships with IHEs to recruit college students and new teachers to pursue credentials to	Increasing numbers of pre-service teachers who are student teaching in computer	4 years

p.16 in Implementation Report		teach computer science. State should incentivizes teacher preparation programs to integrate computer science aligned to the standards.	science classes, or integrating computer science into other classes.	
ES.A10 p.16 in Implementation Report	IHEs	Create and/or curate professional development programs that result in college credit that could be applied towards meeting the supplementary authorization in computer science.	Growth in participation of programs throughout the state, including at community colleges, CSUs, UCs, and other IHEs. Emergence of new computer science teacher preparation programs. Emergence of new computer science teacher preparation programs. Computer science classes for professional programs will transfer for lower division computer science courses.	1-5 years
ES.A11 p.16 in Implementation Report	CCTC	The CCTC provides a directory of IHEs that self-report coursework fulfilling the requirements for the	Teachers can easily identify which institutions provide programs that fulfill requirements leading to a	1-5 years

		computer science supplementary authorization.	computer science supplementary authorization.	
ES.A9 p.16 in Implementation Report	Community Colleges	Offer credit-bearing computer science courses for teachers (content and/or pedagogy), particularly through community colleges. Community colleges establish memoranda of understanding for course articulation with California Commission on Teacher Credentialing (CCTC)-approved teacher preparation programs.	Increasing number of community colleges offering credit-bearing computer science courses to teachers.	3-5 years
ES.B8 p.15 in Implementation Report	CCTC	Reevaluate subject matter requirements for computer science and determine which existing credentials and supplementary authorizations may authorize teachers to teach computer science.	Revised list of credentials and supplemental authorizations necessary for single-subject teaching of computer science (e.g., through CCTC coded correspondence). Increased number of teachers authorized to teach computer science.	1 year

Expanding scholarship eligibility and loan forgiveness programs for computer science teachers in low-income and underserved school districts and rural and urban school districts [EC 53311.1c]

Recs from CCSSIPP (December 2018)	Responsible Entity	Strategy	Evidence of Success	Timeframe
ES.C1 p.16 in Implementation Report	Legislature	Establish a grant program for teachers to support the completion of course work for the computer science supplementary authorization, with additional incentive for teachers who work in schools identified in statute.	Increased number of teachers awarded the computer science supplementary authorization in schools identified in statute.	2-3 years
ES.C2 p. 16 in Implementation Report	Legislature	Establish a loan forgiveness program to incentivize clear credentialed teachers to teach computer science in schools identified in statute.	Increased number of teachers awarded the computer science supplementary authorization in schools identified in statute.	2-3 years (in conjunction with establishing the computer science credential)