Item 4.C.1.

Attachment 1

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**Public Comment Responses for the California Computer Science Strategic Implementation Plan**

This table is a summary list of public comments received during the public review (October 2018 through November 2018). All comments are provided in their original form without editing.

| **Commenter** | **Plan Section** | **Comment** | **Response** |
| --- | --- | --- | --- |
| Allyson Knox,  Senior Director of Education Policy, Microsoft | General | Microsoft supports the draft Computer Science Strategic Implementation Plan and is ready to play an active stakeholder role in helping California improve access to Computer Science education. | No response required |
| Andrew Williams, Credentialed K–12 Teacher | Introduction | This leaves me unsure as to what Computer Science actually means. | Added definition of computer science used in the *Computer Science Standards for California Public Schools* to second paragraph of p. 3. |
| Esmeralda Tovar, Curriculum Specialist | Introduction | The introduction is strong in that it: • Points out that computer science (CS) allows students to be technology developers and not just consumers. • The plan encourages integration of CS in K-8, which is not only practical but also critical for students to see how CS is applied to real-world contexts/problems. | No response required |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Introduction | p. 3-4 When discussing the economic imperative for studying computer science, it's important to note that open jobs are not just in the tech sector but in every sector. Might be helpful to call out the importance of computing in agricultural occupations (especially since this is so vital to CA), music, film and other media entertainment (also vital to CA economy), banking, medical fields, automotive, research, etc. p.4 For additional data on California CS test-takers and participants, including unequal patterns which are important to include, please consult Allison Scott with Kapor Center for Social Impact. There is more up-to-date data on ECS in case you are interested. Feel free to verify with Christine Ong at CRESST or Joanna Goode at University of Oregon: ECS in LAUSD: • Over 4000 students were enrolled in ECS in LAUSD during the 2016-2017 school year in 44 schools. • In 2016-17, LA ECS students mirrored the school district demographics: students were 78% Latinx, 8% White, 5% African American, 6% Asian, and 1% other, and 42% were female. This is a huge accomplishment when considering the underrepresentation of females and students of color in Advanced Placement computer science courses. • In the Los Angeles Unified School District, the second largest school district in the country and where ECS got its | Expanded description of computing jobs to include agriculture, entertainment media, automobile industry, medicine, and finance. Added Beauty and Joy of Computing to list of AP CS Principles providers.  Updated throughout with more current statistics from AP data and Kapor Center. Updated data on Exploring Computer Science enrollment was not published on the ECS web site. |
| (continued) Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | (continued) Introduction | start, nearly 18, 800 students have enrolled in the course since the 2008-9 school year (up to 2016-2017). ECS Nationwide: • Over 40,000 students participated in ECS courses nationwide in 2016-17 with an additional 10,000 expected in 2017-18. • ECS is currently in 25 states and Puerto Rico, including the 7 largest school districts in the nation, as well as many small rural locations. ECS Professional Development: • Over 150 LA teachers have participated in ECS training since the 2008-9 school year (up to 2016-2017). • ECS provided professional development for 844 teachers in the 2016-17 school year across the country, 500 in 2017. • More than 2000 teachers have participated in ECS summer professional development across the nation in last 3 years (summer 2015, 2016, 2017). • There are over 40 PD facilitators nationwide who have been trained to lead ECS PD using a. An additional group of facilitators will be trained this spring. • ECS has also been piloting an online PD for 55 teachers in 2016-2017, with very positive reviews thus far. p.4 - might want to include Beauty and Joy of Computing as an example of new AP Computer Science Principles course. | (continued) |
| Alexis Harrigan, Computer Science Education Nonprofit | Introduction | Code.org appreciates the introductions recognition of integration of computer technology into aspects of daily life. Further, the need to clarify what the disciple of computer science constitutes lays the foundation of the importance of a strategic plan. | No response required. |
| Paula Ann Trevino, School Principal/Administrator/Vice Principal | Introduction | Congratulations on finally having a "recommendation" for CS Standards! It's long overdue! | No response required. |
| Andrew Williams, Credentialed K–12 Teacher | California’s Commitment to Computer Science Education | Why are there no plans to to develop a computer science curriculum framework or a state summative CS exam to accompany the standards. This is crucial to the existence of CS in CA schools. Schools will most likely not offer CS programs without this, or what they offer will be very (shall we say, niche) and not systematically respected. It indicates a significant lack of commitment to CS by California. | No response required. |
| Esmeralda Tovar, Curriculum Specialist | California’s Commitment to Computer Science Education | There are a few concerns in CA’s commitment to CS Education: • The timeline is ambitious – New York has a 10 year timeline for implementation. • There are a lot of items to be completed within 3 years of the implementation plan. • The plan rightly recognizes that schools may lack technology infrastructure and face many other priorities; however stating that “timeframes are offered as suggestions” implies that CS instruction is not critical and could further inhibit access to the growing number of unfilled technology positions. The Bureau of Labor Statistics predicts that by 2020 there will be “1.1 million CS related jobs and only 400,000 CS grads with skills.” In 2015, computer occupations made up 45% of STEM jobs. Instead of providing such ambitious timeframes and then calling them “suggested” there should be some basic realistic timeframes that are expected of all school districts in terms of basic infrastructure and teacher PD. | Rephrased so that timeframes are not mere “suggestions”, but text still acknowledges that different districts will require more or less time. |
| Alexis Harrigan, Computer Science Education Nonprofit | California’s Commitment to Computer Science Education | California's K-12 Computer Science Standards are among the highest quality in the country as they incorporate both the Computer Science Teachers Association Standards and the K-12 CS Framework. The alignment to computer science standards to other content areas highlights the importance of CS integration into the broader K-12 curriculum. | No response required. |
| Andrew Williams, Credentialed K–12 Teacher | Vision, Mission, and Principles | Computer Science isn't defined. CS pedagogy isn't well-defined, and what passes as acceptable pedagogy is very much linked to how Computer Science is defined. | Repeated comment. Separate response not required. |
| Robbie Selwyn, Student | Vision, Mission, and Principles | 1. I strongly support P4. Real-world engagement is extremely important for information retention and for real learning. 2. I strongly support P5. I believe that CS should be offered as a standalone course so that it receives total focus and is not a side lesson. 3. In P9, I believe that students should also be included in this list, because they are the ones whom the changes will affect. Many of us (students) have significant experience that can help with implementation. | Students added to the list of stakeholders in P9. |
| Alexis Harrigan, Computer Science Education Nonprofit | Vision, Mission and Principles | How the state defines computer science should be included in this section. We also recommend adding principles related to rigorous attainable computer science teacher certification as well as opportunities to support pre-service teachers. | Repeated comment. Computer science teacher certification is already addressed by P7 and on pp. 22-23. No additional response required. |
| Andrew Williams, Credentialed K–12 Teacher | Expanding Computer Science Course Offerings | Seeing as there are no plans to develop a CS framework, or state summative CS exam, I'm extremely unclear as to the point of trying to expand the course offerings. Where does CS fit in the A-G? Is it Math (C), Science (D), Elective (G), what? This is an implicit "throw things at the wall and see what sticks approach" and not a good approach. | Added language briefly explaining how computer science fits into a-g requirements to the end of this section. |
| Paula Ann Trevino, School Principal/Administrator/Vice Principal | Expanding Computer Science Course Offerings | Sadly, I don't see many districts making changes soon without funding as their FTEs are tied up in staff tht do not have CS Credentials. Funds will have to be provided for the specific use of expanding CS opportunities. | No response required. |
| Robbie Selwyn, Student | Expanding Computer Science Course Offerings | I strongly support the need for a CS graduation requirement so that all students graduate with some form of CS background. I disagree with the paragraph about an alternative to a high school graduation requirement -- if the requirement is not clear from the State, it won't be implemented. With the number of existing graduation requirements and the unfortunate divide between "STEM" and "non-STEM" students, the process of each district trying to get a graduation requirement approved would drag on too long and would be unlikely to finish or succeed. | No response required. |
| Esmeralda Tovar, Curriculum Specialist | Expanding Computer Science Course Offerings | Just as integration of CS benefits K-8 students in applying this skill-set to real-world contexts/problems and ensures equitable access for all students, so too is this important in high school. By focusing high school CS delivery on AP courses/ electives only, underrepresented high school students, will be at a disadvantage. ELL, RSP, and other students who don't self-select or don't have room in their schedule, won't have access to CS. Given that NGSS standards include computational thinking and computer modeling at the high school level, it’s logical that CS integration could, at a minimum, be integrated into high school science courses. At a time when CS skills are critical for all students to have some exposure, it's critical to emphasize the importance of not only offering CS electives/AP classes but also to incorporate CS into core high school instruction. | Introductory paragraph to this section expanded to include an example of how CS connects to *California Next Generation Science Standards* and to refer readers to the appendix of the CS standards for more detailed information. |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Expanding Computer Science Course Offerings | I appreciate the comparisons with AP CS and the other disciplines. Perhaps a chart would be effective to illustrate the disparity - also - if you have disaggregated data by race in these other exams that would be helpful. I also appreciate the caveat about the limitations of AP course data. I'm concerned about the assertion on p. 11 that "adopting a CS graduation requirements would ensure that all students at the high school level are exposed to computer science instruction." While the statement is factually true, it sounds like the strategic plan is making this recommendation. I think our recommendation was that all high schools OFFER computer science but that we don't have the necessary infrastructure yet to make it a graduation requirement. This could become problematic down the line. We need to emphasize the committee's recommendation to phase in CS and scaffold equitable teaching and learning opportunities across the state. I'm concerned that "flexible programming to allow students to demonstrate mastery through portfolios and tests" could further gaps between those who have access and those who don't - out of school. I'm not sure the CS course sequence should always end in AP - wouldn't we want more flexibility? I think the final paragraph on p. 11 could be strengthened in working with BOARS and allowing greater | Added chart to Section 1 showing comparison between the number of AP CS exam test takers and AP test takers in other subjects. Combined chart from section 2 showing demographics of AP test takers with table comparing demographics to state of California and added demographics for other AP exams for comparison. Updated all data for the 2017–2018 school year.  Removed language recommending a high school graduation requirement and updated language on BOARS and a-g.  Added language acknowledging teacher shortages.  Added recommendation for state-level CS supervisor position to section 4. |
| (continued) Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | (continued) Expanding Computer Science Course Offerings | flexibility for CS to count as math, science, elective, art or other? Is this a formal recommendation or just commentary? Under funding strategies, I think it's important to acknowledge the challenge of implementing quality CS when there are teacher shortages and not always a full-time CS teacher available. Also, it might be good to call out the need for a central statewide position to support the equitable expansion of CS and coordinate efforts across the state. Also, call out the need for schools of education to develop CS teacher certification pathways - should that be include here or elsewhere? | (continued) Teacher certification is addressed in section 3. |
| Alexis Harrigan, Computer Science Education Nonprofit | Expanding Computer Science Course Offerings | Code.org has recently collected data on the number of high schools offering comptuer science courses in the state. We recommend you consider using data from our 2019 CS Access Report (https://code.org/files/2018\_state\_of\_cs.pdf). We believe 32% of public high schools offer computer science in the state. 35% of urban public high schools offer CS. 25% of rural high schools offer CS. Schools under 50% underrepresented minority population offer CS at 44%, while public high schools with over 50% underrepresented minority population offer CS at 31%. The disparity becomes even greater for schools based on free and reduced lunch. Schools under 50% FRL offer CS at a rate of 48%, while schools over 50% FRL offer CS at a rate of 30%. The A-G computer science course sequence which recommends ending at AP or college-level course may limit opportunities for both a college and career pathway. We recommend offering students pathways which lead to advanced computing courses and industry certification in specialized computing fields. | No response recommended. The statistics supplied by Alexis Harrigan, Computer Science Education Nonprofit do not appear in Code.org’s California access report. The statistics that do appear in the report are from 2016–2017, the same year that is covered by the Kapor Center/ACCESS report currently cited in the strategic plan. Some of the numbers are different. For example, Code.org says 580 schools in CA offered an AP CS course in 2016-2017; the Kapor Center says 235 schools offered AP CS A and 71 schools offered AP CS Principles. |
| Josh Taylor, 9 Dots, Computer Science Education Nonprofit | Expanding Computer Science Course Offerings | 9 Dots is a non-profit that works to build complete K-5 pathways at elementary schools. We believe that building a strong foundational knowledge in computer science requires sustained exposure to rigorous and exciting computer science concepts. We have partnered closely with 20 Title 1 elementary schools in the LA area to develop complete pathways from Kindergarten to 5th grade. At these 20 partner schools, roughly 70% of all students are enrolled in weekly CS class and our hope is that by the 2019-2020 school year we will be at nearly 100%. | No response required. |
| Daniel Ryan, College/University Faculty | Expanding Computer Science Course Offerings | To facilitate a strong foundation in computer science, schools and districts should incorporate computer science into existing STEM courses. Computer science technologies are found across all disciplines and are becoming an increasingly integral part of academics and industry. Using these technologies as tools across all courses helps to prepare students for the interdependence of computing for their future studies and careers. | Repeated comment. Separate response not required. |
| Andrew Williams, Credentialed K–12 Teacher | Improving Access to Computer Science Education for All Students | The key here is funding. Schools will not spend money they do not have. It appears little thought has been given to the cost of support of CS programs - day-to-day or equipment replacement/refreshing. Also, what value will be placed by Universities on High School CS? By High Schools on Middle School CS? By Middle Schools on Elementary CS? The absence of a framework implies zero value. The key is the Universities. Unless they value CS in High Schools in their programs of study, it's all a house of cards. High School counsellors will categorically NEVER recommend taking CS if the Universities do not place a value on CS (for anything other than the AP). | No response required. |
| Paula Ann Trevino, School Principal/Administrator/Vice Principal | Improving Access to Computer Science Education for All Students | Incentivize CS for girls, minorities in under-represented students | No response required. |
| Esmeralda Tovar, Curriculum Specialist | Improving Access to Computer Science Education for All Students | Here are some concerns about CS education for all students: • While supporting families to advocate for CS classes, increasing counselor awareness of CS career pathways and improving access through expanded learning are good strategies for increasing access, to ensure equitable access it’s also critical for CDE to communicate the expectation that all students will experience integrated CS instruction K-12 at least one time each year. • It’s mentioned that industry, amongst community members and parents should be stakeholders. Industry involvement should be more proactive and active, such as partnering up with districts to support students. The plan could be strengthened by including strategies for systems that foster systemic industry connections with school districts. | No response required. CSSIPP did not make explicit that students should experience CS instruction “at least one time each year”; there may not be consensus that this level of exposure is sufficient or desirable.  Examples of how industry can partner with schools are provided in Section 2 and Section 3, Strategies for Recruitment. |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Improving Access to Computer Science Education for All Students | p. 16 - I think it is important to call out the disparity in access to CS among English Learners. Also, the challenge of meeting the needs of EL's when they don't have an available G-level opening in their schedule because it is taken up with EL requirements. This is a challenge we must address for English Learners. P. 16 - I wonder if the workforce gaps mentioned here should be moved to the introduction where workplace needs are mentioned? I really like including the importance of family and community support. When you talk about a toolkit being created, is that a recommendation to be made to the legislature? That seems like something a non-profit could tackle in partnership with the state for dissemination? | Added language describing challenges for English learners to introductory paragraph under “Strategies for Improving Access to Computer Science Education for All Students”.  Moved language on inequities in the workforce to the introduction.  Revised toolkit language to clarify that these could be products of partnerships between SEAs/LEAs and non-profits. |
| Alexis Harrigan, Computer Science Education Nonprofit | Improving Access to Computer Science Education for All Students | We commend the plan's use of the term Latinx. The sections listed under strategies are strong. We recommend reviewing the K-12 CS Framework's Chapter 2: Equity in Computer Science Education to consider other strategies to support access, inclusion, and equity. | The strategies described in this section were those emphasized by the CSSIPP. Added reference to Ch. 2 of the K-12 CS Framework. |
| Josh Taylor, 9 Dots, Computer Science Education Nonprofit | Improving Access to Computer Science Education for All Students | When 9 Dots first launched its initiative to build complete CS pathways, we faced 3 major barriers: 1) teacher time to develop the requisite content knowledge and pedagogical skills 2) teacher time to prep for weekly CS classes 3) teacher confidence in their ability to teach CS effectively. To address these barriers, we came up with a novel approach. Rather than just providing schools with curriculum and PD, we also decided to provide schools with a co-teacher. Placing a co-teacher in the classroom reduced the anxiety of starting to teach coding, provided on-the-job opportunities for professional development and learning, reduced the burden of planning and preparing for CS class, and offered an expertise “safety net” for teachers when they started taking on lead instructional roles. | No response required. |
| Andrew Williams, Credentialed K–12 Teacher | Supporting Educators to Teach Computer Science | Again, what is CS? Where is the framework? Unless they are defined, it is a stretch to see how any useful support can be developed. | Repeated comment. Separate response not required. |
| Justin Sewell | Supporting Educators to Teach Computer Science | I think it is important to build a pipeline within the community colleges since they tend to have more access to the students who are the most difficult to reach. They also make it more accessible for teachers to engage with the content as they may be willing to offer more online courses. | Unclear what this comment is suggesting. |
| Paula Ann Trevino, School Principal/Administrator/Vice Principal | Supporting Educators to Teach Computer Science | Teachers without a CS credential will need some serious PD. It would be nice to provide them a release time to "learn" CS so that they can apply their learning to the classroom. | No response required. Strategies for teacher professional learning are addressed on pp. 24–25. |
| Esmeralda Tovar, Curriculum Specialist | Supporting Educators to Teach Computer Science | The implementation plan is strong in identifying the importance of preparing teachers to teach CS and the possible mechanisms for doing so. The plan could be strengthened by emphasizing the importance of the pedagogy used to teach CS, particularly in teacher preparation programs. If teachers are provided a traditional lecture-based instruction in computer science, many in-service teachers may not participate nor be motivated to learn how CS can be learned and embedded into content for K-12 students (Isong, B., 2014). | No response required. Pedagogical approaches are not traditionally addressed in implementation plans. |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Supporting Educators to Teach Computer Science | p. 19 - ITE credential transcends both CTE and Gen. Ed. p.20 - the bold bar with "other" credentials is huge - can you give examples of the other credentials teaching CS? p. 21 - Calstate LA and Calstate Northridge might have integrated CS in teacher prep programs - not sure but worth inquiring. p. 24 - Strategies for teacher communities should include a recommendation for the development of a subject matter project in computer science to provide regional university and research -based programs to mentor, coach and provide ongoing support to teachers in the classroom. p.25 - there should be more incentive programs for schools of education to embed computer science in teacher education programs. This funding should prioritize schools that focus on underrepresented populations. | No response required. “Other” teaching credentials are as stated: anything that is not math, business, or ITE. California State University, Los Angeles and California State University, Northridge do not have information about integrated CS on their teacher preparation program websites. The California Subject Matter Projects are addressed in section 3, under Strategies for Teacher Training. Funding for teacher preparation programs is addressed in the same section. |
| Alexis Harrigan, Computer Science Education Nonprofit | Supporting Educators to Teach Computer Science | We are concerned the Supplementary Authorization in CS is overly burdensome for K-8 teachers, particularly K-5 teachers. The 20-semester units or ten upper division semester units in CS shouldn't be asked of an elementary or middle school teacher who is interested in teaching CS in their classrooms. Further, the grade 9 or below for teachers to receive an introductory supplementary authorization seems arbitrary. High school courses are not often limited to a single grade level, as such, we suggest removing the grade level within the "Introductory Supplementary Authorization". Finally, we would like to see language to grandfather in teachers who are currently teaching computer science but do not hold a supplementary authorization. | No response required. This type of change would be within the purview of the CTC and not the CDE. |
| Josh Taylor, 9 Dots, Computer Science Education Nonprofit | Supporting Educators to Teach Computer Science | This approach worked really well in getting our 20 schools off the ground in teaching CS. Based on feedback from teachers that emphasized the importance of logistical, technical and content knowledge support in the classroom over other forms of support, we have adjusted the responsibilities of our co-teachers and have discovered that recent college graduates with CS or engineering degrees have been able to achieve the same outcomes for partner teachers as our credentialed co-teachers. We now believe that regular on-site support is critical to achieving equitable and complete access to CS education in elementary school, so we’d recommend that strategies for on-site support be included in the plan. We’d also note that Cod.Ed, a non-profit based in Fullerton, has independently developed a similar model to support CS education in 3rd-8th grade, actively placing CS undergrads in schools throughout Fullerton to support CS education. | No response required. |
| Andrew Williams, Credentialed K–12 Teacher | Making Systemic Improvements in Computer Science Education | Again, define CS. Define the goals of a K to 12 CS program. Know the exit point. Why is this not defined? | Repeated comment. Separate response not required. |
| Paula Ann Trevino, School Principal/Administrator/Vice Principal | Making Systemic Improvements in Computer Science Education | Schools and districts need to have their own specific implementation plan | No response required. |
| Esmeralda Tovar, Curriculum Specialist | Making Systemic Improvements in Computer Science Education | A strength of the plan is identifying that access to technology and IT support is imperative to teaching CS. This infrastructure need deserves more analysis to better understand the size of this gap and the disparity across school districts throughout the state in order to ensure equitable access to all students. In 2016, Gao and Murphy stated that over 90% of schools would “need significant technological upgrades” in order to meet the 1,000 kbps speed per student that the State Educational Technology Directors Association (SETDA) recommended (Gao and Murphy, 2016). With that in mind, that means that nearly 90% of our schools are not prepared with technology to meet the needs of students. Realistic new funding sources need to be identified in order to address this critical need. Expanded learning will also require infrastructure access. Schools might be directed to make technology available to on-site expanded learning programs and/or funding might be identified to support technology infrastructure for expanded learning programs. | Added information from the Gao and Murphy report to the Strategies for Building IT Infrastructure section. |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Making Systemic Improvements in Computer Science Education | p. 26 - we want to include funding for personnel on a school, district, county level to be funded to provide ongoing IT support. This is especially problematic in rural communities that are hard to reach and the state could provide a program to meet the needs of rural communities with regards to IT support. I think it's worth calling out this specific need/challenge. p.26 - This section should include a recommendation to include computer science course availability and other indicators to be included on the CA Dashboard. "What gets measured, matters" p. 26-27 - perhaps this is the section where we want to make the recommendation for a statewide CS Director to coordinate CS efforts and implementation and policy across the state. We could point to the success of other states that have a person who reports to the Governor or SPI to make sure this happens and that funding supports the state goals (and this FTE). | Added text describing IT infrastructure challenges in rural schools; Gao and Murphy report recommended by another commenter suggests the magnitude of the challenge is not greater in rural schools, but is qualitatively different (i.e., density vs. bandwidth).  Added language suggesting the appointment of a state-level CS supervisor. |
| Alexis Harrigan, Computer Science Education Nonprofit | Making Systemic Improvements in Computer Science Education | We would like to see a greater focus on recruiting pre-service teachers. | No response required. Recruiting pre-service teachers is addressed in section 3 and does not need to be repeated in section 4. |
| Josh Taylor, 9 Dots, Computer Science Education Nonprofit | Making Systemic Improvements in Computer Science Education | Funding to schools to build capacity and sustain implementation is critical to ensuring access to CS education. In the vein of the Kids Code grant, we'd recommend that the state develops a pilot program to provide grants in the range of 50K-100K over 3 years to build schools' capacity to teach CS and grants in the range of 5K-10K per year to sustain CS education. Based on our experience, we'd also recommend that the state consider a matching program for funding. We have found that schools are more bought into coding and have more success when school site councils allocate funds for CS education. | No response required. This seems to be a recommendation for a specific way of implementing the “provide sustained, dedicated funding and staff at the state level and local level…” strategy. |
| Andrew Williams, Credentialed K–12 Teacher | Conclusion | I appreciate that it's an initial effort. But, why is CS not defined? Looking at the appendices, and what are counted as CS courses show, just a random bunch of historical artifacts that have no structure, sequence, or end goal. | Repeated comment. Separate response not required. |
| Esmeralda Tovar, Curriculum Specialist | Conclusion | The plan indicates CA has a comprehensive understanding of the steps that need to be taken to integrate CS into the school system. | No response required. |
| Robbie Selwyn, Student | Appendix A | I agree with the need to offer courses for students who are beyond the introductory courses. Many students will go into high school with some CS background, so it is important to be able to support them as well. | No response required. |
| Esmeralda Tovar, Curriculum Specialist | Appendix A | It’s great to have a series of high school CS courses, but if we really want all students to have a basic understanding of CS concepts we need to make sure they are exposed to CS in other content areas. If students self-select into CS courses they could be leaders within their classroom and they could apply their learning from their CS course into a new situation. We should provide real-world context whenever possible, because students will see the applicability of CS to life and not just games, or databases. | No response required. |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Appendix A | AP CSA is not an introductory course at the high school level. | Wording revised to reference “foundational” courses rather than “introductory” courses. AP CS A is described as “comparable to college-level introductory CS courses.” |
| Robbie Selwyn, Student | Appendix B | I disagree with the list of resources that are offered in Appendix B. I believe there needs to be a greater emphasis on text-based programming, and more resources should be provided for that. Not to say that graphical programming isn't real programming, but text-based programming is where everyone will go eventually. It is an extra, and in my opinion, unnecessary, step to walk them through graphical programming. | See response below re: vetting of list. |
| Esmeralda Tovar, Curriculum Specialist | Appendix B | These are some good resources, however, it is not a curriculum and there are no pedagogical strategies. The tips provided are based on experience, while pedagogical strategies should be based on research. Tips are not pedagogical strategies, tips should help teach the pedagogy behind CS. | Section re-titled to “Instructional Materials and Teaching Tips” |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Appendix B | Could you include a description of the vetting process for including these CS providers? | Added paragraph explaining that these resources are available free of charge, but that the list is not intended to be comprehensive nor does CDE endorse the resources. |
| Daniel Ryan, College/University Faculty | Appendix B | C-STEM http://c-stem.ucdavis.edu C-STEM is a UC Approved Educational Preparation Program for Undergraduate Admission for both K-12 to all UC campuses. C-STEM develops computing technology, curriculum, and pedagogical strategies, and provides professional development and support for STEM teachers, even those without any prior coding and robotics experience, to integrate hands-on computing and robotics into their classroom teaching. The rigorous C-STEM Math-ICT Curriculum provides K-12 students with up to 13 years of integrated learning of math and computer science. RoboBlockly http://www.roboblockly.org. RoboBlockly is a block-based computing environment for learning coding, robotics, Arduino, and math. In addition to nearly 500 ready-to-go coding and robotics activities, teachers and students can create their own activities. It also allows teachers to manage their classes, add student accounts, assign homework, grade student submitted homework, and provide feedback. | Added C-STEM to the list of free resources. Used C-STEM description from their web site (a portion of the text provided to the left). RoboBlockly is part of C-STEM. |
| Esmeralda Tovar, Curriculum Specialist | Appendix C | Many of the courses are very high level CS courses ideal for high school. What are the plans for students who are taking CS as a standalone course in middle school? Also, what if schools decide to do academies where they integrate CS, how will general content courses be coded since CS will be embedded throughout? | No response required. This section is merely a list of the codes. |
| Esmeralda Tovar, Curriculum Specialist | Appendix D | I appreciate the abbreviation appendix! | No response required. |
| Esmeralda Tovar, Curriculum Specialist | Overall Comments | inks to research: Bureau of Labor Statistics: https://obamawhitehouse.archives.gov/blog/2013/12/11/computer-science-everyone https://www.bls.gov/spotlight/2017/science-technology-engineering-and-mathematics-stem-occupations-past-present-and-future/pdf/science-technology-engineering-and-mathematics-stem-occupations-past-present-and-future.pdf Isong, B.: http://www.mecs-press.org/ijmecs/ijmecs-v6-n9/IJMECS-V6-N9-3.pdf Gao and Murphy: http://www.ppic.org/publication/upgrading-technology-infrastructure-in-californias-schools/#fn-4 | No additional response required. Document has been updated throughout with most current statistics. |
| Julie Flapan, Alliance for CA Computing Education for Students and Schools (ACCESS) | Overall Comments | The recommendations overall are strong. The one area that was not mentioned at all is articulation agreements between high school, community college and four-year schools. There is a lot of working that was done by "Doing what matters for jobs and the economy" with the community college system and I think it is worth mentioning here. Also, I did not see anything related to the expansion of dual -enrollment coursework that would provide a college level course to be taught at the high school and a student would receive dual credit. This might be worth exploring. | Recommendation for articulation agreements and/or dual-enrollment coursework added to end of Strategies for Expanding at the High School Level and mentioned in Strategies for Administrator and Counselor Training. |
| Alexis Harrigan, Computer Science Education Nonprofit | Overall Comments | We commend the work of the committee and the CDE staff in creating this comprehensive plan. If implemented, we believe students across California will have increased access and opportunity to computer science education. We encourage the State Board of Education to support and adopt the plan. | No response required. |

California Department of Education, January 2019