Date of Hearing: April 12, 2023

ASSEMBLY COMMITTEE ON EDUCATION
Al Muratsuchi, Chair
AB 1251 (Luz Rivas) – As Amended March 16, 2023

SUBJECT: Teacher credentialing: computer science courses

SUMMARY: Authorizes a person who holds a single subject teaching credential in business, industrial and technology education, mathematics, or science, or a designated subjects career technical education (CTE) teaching credential, to teach courses in computer science to all students. Specifically, **this bill**:

1) Authorizes a person who holds a single subject teaching credential in business, industrial and technology education, mathematics, or science, or a designated subjects CTE teaching credential, to teach courses in computer science to all students.

2) States that this authorization does not prohibit a school district from employing a person who holds a single subject teaching credential in another subject with an authorization to teach computer concepts and applications to teach computer science.

EXISTING LAW:

1) Authorizes the CTC to issue single subject teaching credentials in agriculture, art, biological sciences, business, chemistry, dance, English, geosciences, health science, home economics, industrial and technology education (ITE), mathematics, music, physics, physical education, science (various subjects), social science, theater, and world languages (English language development and languages other than English). (Education Code (EC) 44257)

2) Through regulation, authorizes holders of credentials in mathematics, business, and ITE, as well as holders of supplementary authorizations in computer science, to teach computer science. (California Code of Regulations, Title 5, Section 80005)

3) Authorizes the CTC to issue a multiple or single subject teaching credential with a specified concentration in a particular subject based upon the depth of an applicant's preparation in an important subject of the school curriculum in order to ensure excellence in teaching in specific subjects.

4) Authorizes the CTC to issue credentials for teaching specialties, including bilingual education, early childhood education, and special education (education specialist). Requires education specialist teaching credentials to be based upon a baccalaureate degree from an accredited institution, completion of a program of professional preparation, and standards that the CTC may establish. (EC 44265)

5) Requires the Superintendent of Public Instruction (SPI) to convene a computer science strategic implementation advisory panel (panel) to develop recommendations for a computer science strategic implementation plan, and requires the panel to submit recommendations for a strategic plan to the State Board of Education (SBE) by January 15, 2019. Requires the plan to include, at a minimum, recommendations on all of the following:

a) Broadening the pool of teachers to teach computer science;

b) Defining computer science education principles that meet the needs of students in all grades; and

c) Ensuring that all students have access to quality computer science courses.

6) Requires the Instructional Quality Commission (IQC) to consider developing and recommending to the SBE, on or before July 31, 2019, computer science content standards for kindergarten and grades 1 to 12 pursuant to recommendations developed by a group of computer science experts. (EC 60604)

7) States that if a school district requires more than two courses in mathematics for graduation from high school, the district may award a student up to one mathematics course credit for successfully completing a "category C" approved computer science course. (EC 51225.35)

8) Requires the California State University (CSU), and requests the University of California (UC), to develop guidelines for high school computer science courses that may be approved for the purposes of recognition for admission. (EC 66205.5)

9) Establishes the Computer Science Supplementary Authorization Incentive Grant Program for the purpose of providing one-time grants to local educational agencies (LEAs) to support the preparation of credentialed teachers to earn a supplementary authorization in computer science and provide instruction in computer science coursework.

10) States that participating teachers are eligible to receive an award of up $2,500 through the program. Authorizes LEAs to use grant funding for the purpose of paying teachers' costs of coursework, books, fees, and tuition, as applicable. Requires applicants for the program to provide a 100% match of grant funding, which may be in the form of release time or substitute teacher costs.

FISCAL EFFECT: Unknown

COMMENTS:

Need for the bill. The author states, "California is in the process of potentially losing its position as a global leader in technology if we don't provide our students with computer science instructors to teach them coding, programming, and keyboarding skills. As a result, it will jeopardize thousands of jobs if we continue failing to properly prepare our students for a digital future. AB 1251 will give teachers with a science credential the option to teach computer science in schools."

Who is authorized to teach computer science in California? California has three single subject teaching credentials (mathematics, business, and ITE) which authorize teachers to provide instruction in computer science. The CTC issues supplementary authorizations in computer science which also authorize a teacher holding another credential to teach computer science.

In 2016 the CTC modified their Computer Concepts and Applications authorization to reflect a change in focus from teaching basic computer use, keyboarding, and software application to

broader preparation in computer science education. The CTC also changed the name of the authorization to "Computer Science."

To obtain a supplementary authorization in computer science, teachers must complete 20 semester units or 10 upper division semester units, or the equivalent quarter units, of non-remedial course work in computer science. They may also qualify by holding a collegiate major from a regionally accredited college or university in a subject directly related to the subject to be listed on the credential. The coursework must cover the following content areas:

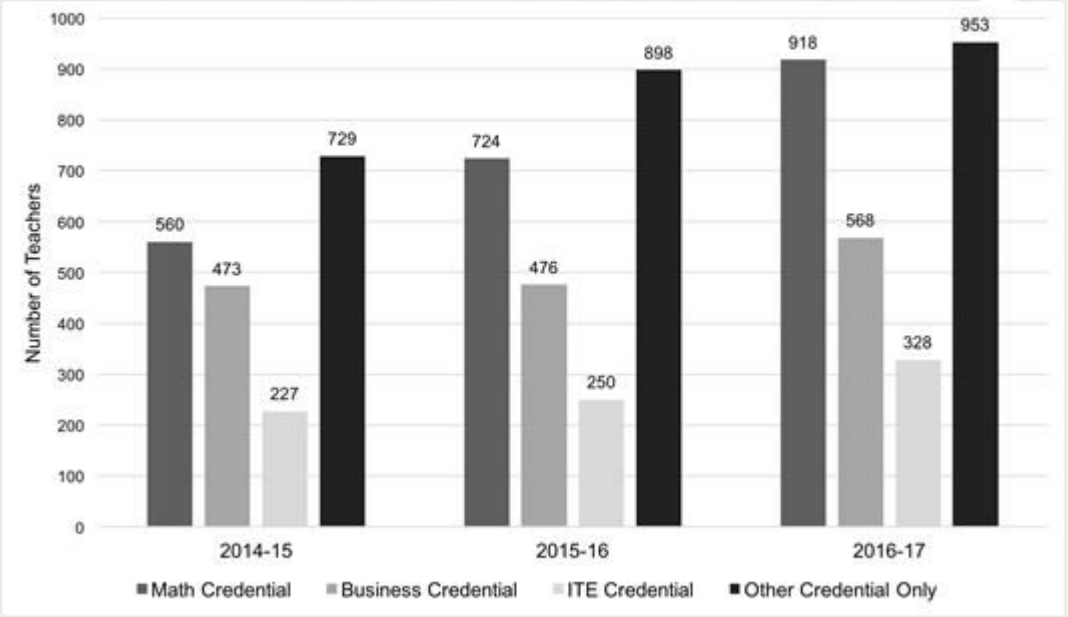
- Computer Programming
- Data structures and algorithms
- Digital devices, systems and networks:
- Software design
- Impacts of computing

The balance of the units may be in any course that falls within the academic department for that subject category.

Computer Science Strategic Implementation Panel recommends that the state increase the number of supplementary authorizations in computer science. Current law requires the SPI to convene a computer science strategic implementation advisory panel to develop recommendations for a computer science strategic implementation plan, and requires the panel to submit recommendations for a strategic plan to the SBE by January 15, 2019. In September, 2018, the panel submitted a draft strategic plan (draft plan) to the SBE for consideration, and the SBE adopted the California Computer Science Strategic Implementation Plan in May, 2019, which establishes a vision statement: "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."

The plan states that "to grow K–12 computer science education in California, the state will need to increase the number of teachers qualified to teach computer science. Supporting more educators to teach computer science would involve a multi-pronged approach that attends to credentialing, new teacher

Teachers of computer science courses, by authorizing credential, 2016-17 (Source: CS Strategic Implementation Panel)



recruitment, professional learning for teachers, administrators, and counselors regarding the California computer science standards, and institutional and financial support." The plan outlines several strategies for improving the availability of computer science instruction, including that a grant program could be established to support teachers to complete coursework for the computer science supplementary authorization, with additional incentives for teachers who work in low-income and underserved school districts and rural and urban school districts.

Who currently teaches computer science in California? According to the draft computer science strategic implementation plan, in the 2016-2017 academic year, approximately 2,273 teachers in California taught core academic computer science courses. This number grew steadily from 1,609 teachers in 2014-15 and 1,996 teachers in 2015-16.

As shown in the table on the previous page, most teachers teaching computer science courses are credentialed in subjects other than mathematics, business, or ITE and hold a supplementary authorization to teach computer science. Teachers credentialed in mathematics comprise the largest number of those authorized with a single subject credential to teach computer science.

The table below shows the issuance of supplementary authorizations in computer science issued by the CTC. The annual number issued has declined since the changes made to the authorization. The CTC notes that this is not an unduplicated count.

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Computer Concepts and Applications	177	229	158	111	100	120	109				
Computer Science and Introductory Computer Science	-	-	-	-	-	-	11	35	40	61	88

No preservice credential programs in computer science in California. The draft plan noted that there are no pre-service computer science teacher preparation programs in California. This is not surprising, since there is no computer science credential to earn through such a program. Some content on computational thinking and computer science have been added to some preparation programs in other disciplines, such as math and science. Some universities have created programs for in-service teachers to satisfy the course requirements for the supplementary authorization in computer science. The plan noted that there are programs at UC, Irvine and UC, Riverside.

Teachers currently authorized to teach computer science receive no training in computer science in their preparation programs. The draft computer science strategic implementation plan notes that "A major weakness of the existing situation is that single-subject credentialed teachers authorized to teach computer science (i.e., Math, Business, or ITE) do not have subject matter requirements that cover basic computer science content. Furthermore, they are not trained in pedagogical knowledge relevant to computer science, which is different from their core

subject. The supplementary authorizations in computer science, on the other hand, do require courses that cover computer science content knowledge. Yet, there are very few opportunities for credentialed teachers to enroll in such programs and these teachers will not necessarily have had practice teaching in a computer science classroom."

This bill would authorize teachers holding single subject credentials in science to teach computer science. ***The Committee may wish to consider*** that this could mean that current science teachers, who have no training in teaching computer science, could be assigned to teach that subject. It is also unclear if future holders of single subject science credentials would be trained in teaching this content in their preservice preparation.

Career technical education teachers. The Preliminary Designated Subjects CTE Teaching Credential authorizes the holder to teach in the subject or subjects named on the credential in grades twelve and below and in classes organized primarily for adults, in career technical, trade or vocational courses. The Clear Designated Subjects CTE Teaching Credential authorizes the holder to teach in the subject or subjects named on the credential in grades twelve and below and in classes organized primarily for adults. Available subjects, also known as industry sectors, are as follows:

- Agriculture and Natural Resources
- Arts, Media, and Entertainment
- Building and Construction Trades
- Business and Finance
- Education, Child Development, and Family Services
- Energy, Environment, and Utilities
- Engineering and Architecture
- Fashion and Interior Design
- Health Science and Medical Technology
- Hospitality, Tourism, and Recreation
- Information and Communication Technologies
- Manufacturing and Product Development
- Marketing, Sales, and Service
- Public Services
- Transportation

This bill would authorize individuals holding a Designated Subjects CTE teaching credential to teach computer science to all students. The bill does not specify that a teacher with this credential can only teach within a CTE context, or in a particular industry sectors. Therefore, individuals with a credential in any of the above industry sectors would be authorized to teach computer science courses. The ***Committee may wish to consider*** whether individuals with a Designated CTE Teaching Credential in each of the above fields will have the appropriate training or subject matter knowledge to teach computer science courses. It is also unclear whether this authorization could put CTE programs out of alignment with federal Perkins or state-funded CTE requirements.

What is the subject of computer science in grades K-12? Computer Science is a relatively new field of study for K-12 education. The Computer Science Strategic Implementation Panel's draft report notes that there is some confusion over what constitutes computer science instruction in K-12 schools: "computer science is often misconstrued with other technological terminology such as computer literacy, educational technology, digital citizenship, and information technology. These areas focus more on the use of computing systems (e.g., learning to use word processing software). In contrast, computer science calls upon students to understand why and how computing technologies work, and then to build upon that conceptual knowledge by creating computational artifacts."

The state's new computer science standards, adopted in 2018, define computer science education as "the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society." The core concepts in computer science instruction are:

- Computing systems
- Networks and Information systems
- Data and Analysis
- Algorithms and Programming
- Impacts of Computing

According to the International Society for Technology in Education's report, *ISTE Standards for Computer Science Education*, the field of computer science will continue to rapidly evolve in sometimes unpredictable ways, and as such, plans for teaching computer science will also need the flexibility to continuously adapt.

Access to computer science education in California schools. Access to, and enrollment disparities in, coursework in computer science has been a longstanding concern. Data on some computer science offerings in secondary schools is shown below for the 2018-19 school year.

Course Name	Number of Schools	Courses Taught	Number of UC/CSU Courses	Female Enrollment	Male Enrollment	Total Enrollment
AP Computer science A	199	329	302	2,324	5,508	7,832
AP Computer science AB	35	62	61	607	1,090	1,697
AP Computer Science Principles	152	265	249	2,123	4,527	6,650
Computer programming	194	468	80	2,865	5,315	8,180
Computer science	351	806	289	6,244	11,932	18,176
Exploring Computer Science	16	31	11	212	514	726
IB Computer science	7	18	16	102	328	430
Total	**954**	**1,979**	**1,008**	**14,477**	**29,214**	**43,691**

Source: CDE

As shown above, disparities in enrollment by gender were significant, with roughly half as many female as male students enrolled in many computer science courses.

According to a 2021 report by Code.org, the Computer Science Teachers Association, and the Expanding Computing Education Pathways Alliance, *2021 State of Computer Science Education*:

- In 2018-19, 41% of California high schools offered a foundational computer science course;

- 75% of California high school students attend a school that offers computer science;

- Of 32,263 total Advanced Placement (AP) computer science exams taken in California last year, 32% identified as female;

- Black/African American students and Native Hawaiian/ Pacific Islander students are both four times less likely than their white and Asian peers to take an AP computer science exam; and

- Hispanic students are three times less likely to take an AP computer science exam than their white and Asian peers.

Recommended amendments. Staff recommends that this bill be amended to delete its current contents and instead:

1) Require the CTC, by July 1, 2024, to establish of a workgroup to determine 1) whether and which credentials authorizing the teaching of science and designated subjects CTE should also authorize teaching of computer science, and 2) whether a single subject credential in computer science should be established. The workgroup would also be required to make recommendations on strategies to meet the workforce demands associated with expanding access to computer science instruction to all students.

2) Require that at least half of the workgroup be current classroom teachers with experience teaching computer science at the secondary level, and to include representatives from school administration, institutions of higher education involved in the preparation of teachers to teach computer science, and content experts in the field of computer science education.

3) Require the CTC, by July 1, 2025, to provide a report of the workgroup's findings and recommendations to the appropriate policy and fiscal Committees of the Legislature.

4) Make implementation of the measure contingent upon an appropriation for that purpose.

Related legislation. AB 1853 (Berman) of the 2021-22 Session would have established the Computer Science Preservice Teacher Grant Program, administered by the CTC to award competitive grants to institutions of higher education (IHEs) to develop or expand K–12 computer science and computational thinking coursework for individuals seeking specified teaching credentials. This bill was held in the Assembly Appropriations Committee.

AB 2187 (Luz Rivas) of the 2021-22 Session would establish a UC Subject Matter Project in computer science. This bill was held in the Assembly Appropriations Committee.

AB 130 (Committee on Budget), Chapter 44, Statutes of 2021, established the Computer Science Supplementary Authorization Incentive Grant Program for the purpose of providing one-time grants to LEAs to support the preparation of credentialed teachers to earn a supplementary authorization in computer science and provide instruction in computer science coursework.

AB 128 (Committee on Budget), Chapter 21, Statutes of 2021, appropriated $5 million on a one-time basis to establish the Educator Workforce Investment Grant: Computer Science, and required the CDE to select an IHE or nonprofit organizations to provide professional learning for

teachers and paraprofessionals statewide in strategies for providing high-quality instruction and computer science learning experiences aligned to the computer science content standards.

AB 498 (Quirk Silva) of the 2021-22 Session was substantially similar to AB 1932 of the 2019-20 Session. This bill was amended into a different jurisdiction and held in the Senate Appropriations Committee.

AB 1410 (Quirk Silva) of the 2019-2020 Session was substantially similar to AB 1932 of the 2019-20 Session. This bill was held in the Senate Appropriations Committee.

AB 1932 (Quirk-Silva) of the 2019-20 Session would have established the Computer Science Access Initiative, to improve students' access to instruction in computer science by increasing the number of teachers who are authorized and trained to provide computer science instruction in California public schools. This bill was held in the Assembly Education Committee.

AB 2309 (Berman) of the 2019-20 Session would have required the CTC to develop and implement a program to award competitive grants to postsecondary educational institutions for the development of preservice credential programs for individuals seeking a teaching credential, and the expansion of programs of study for single subject or multiple subject credentialed teachers seeking a supplementary authorization in computer science. This bill was held in the Assembly Education Committee.

AB 2274 (Berman) of the 2019-20 Session would have required the CDE to annually compile and post on its website a report on computer science courses, course enrollment, and teachers of computer science courses, for the 2019-20 school year and each subsequent school year. This bill was held in the Assembly Education Committee.

AB 1967 (Luz Rivas) of the 2019-20 Session would have established a UC Subject Matter Project in Computer Science. This bill was held in the Assembly Higher Education Committee.

AB 20 (Berman) of the 2019-20 Session would have established a Computer Science Coordinator position at the CDE. This bill was held in the Assembly Appropriations Committee.

AB 52 (Berman) of the 2019-20 Session would have required the computer science strategic implementation plan to be regularly updated. This bill was held in the Assembly Appropriations Committee.

AB 182 (Luz Rivas) of the 2019-20 Session would have required the CTC to establish a workgroup, comprised of certain members, to determine if the development of a single subject computer science credential is warranted and, if so, to consider requirements for that credential. This bill was held in the Assembly Appropriations Committee.

AB 1410 (Quirk-Silva and O'Donnell) of the 2019-20 Session would have established the Computer Science Access Initiative, to provide grants to LEAs for the purpose of increasing the number of teachers authorized and trained to instruct students in computer science. This bill was held in the Assembly Appropriations Committee.

SB 675 (Chang) of the 2019-20 Session would have enacted the Computer Occupations and Developing Education (CODE) Act, pursuant to which the SBE would administer a grant

program promoting the teaching of computer science courses in the public secondary schools. This bill was held in the Senate Governmental Organization Committee.

AB 2329 (Bonilla), Chapter 693, Statutes of 2016, requires the SPI to convene a computer science strategic implementation advisory panel to develop recommendations for a computer science strategic implementation plan.

AB 2275 (Dababneh) of the 2015-16 Session would have authorized a person who holds a single subject teaching credential in business, industrial and technology education, mathematics, or science or a designated subjects career technical education teaching credential to teach courses in computer science to all students. This bill was held in the Assembly Education Committee.

AB 1539 (Hagman, 2014), Chapter 876, Statutes of 2014, requires the IQC to consider developing and recommending to the SBE, on or before July 31, 2019, computer science content standards for kindergarten and grades 1 to 12, pursuant to recommendations developed by a group of computer science experts.

AB 1764 (Olsen), Chapter 888, Statutes of 2014, states that if a school district requires more than two courses in mathematics for graduation from high school, the district may award a student up to one mathematics course credit.

REGISTERED SUPPORT / OPPOSITION:

Support

None on file

Opposition

None on file

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