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Information/Action

Credentialing and Certificated Assignments Committee

Proposed Amendments to Title 5 of the California Code of Regulations Pertaining to the Supplementary Authorization in Computer Concepts and Applications and a Review of Regulations and Policy for the Single Subject Teaching Credential Content Area Authorizations for Teaching Computer Science

Executive Summary: This agenda item is divided into two parts. Part I presents proposed amendments to regulations pertaining to the Supplementary Authorization in Computer Concepts and Applications. Part II provides a review of regulations and policy for Single Subject Teaching Credential Content Area Authorizations for teaching a range of courses in computer science.

Policy Questions:

- 1) Do the proposed and amendments to regulations provide sufficient required content and depth for teaching a range of computer science classes offered in California public schools?
- 2) Should established policy be revised to align with the specific language in regulations for teaching computer science or should regulations and subject matter requirements be revised to align with the range of computer science courses authorized by specific content areas listed on Single Subject Teaching Credentials?

Recommended Actions:

- 1) That the Commission approve the proposed regulations for the purpose of beginning the rulemaking file for submission to the Office of Administrative Law and scheduling a public hearing.
- 2) That the Commission provide guidance and/or direction to staff as appropriate concerning alignment of regulations and previously established policy that authorizes holders of a Single Subject Teaching Credential in Business, Math, and Industrial Technology Education to teach a range of courses in Computer Science.

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Strategic Plan Goal

I. Educator Quality

- a) Maintain expectations for educator preparedness and performance that are responsive to the needs of California's diverse student population and promote 21st century teaching and learning.

Proposed Amendments to Title 5 of the California Code of Regulations Pertaining to the Supplementary Authorization in Computer Concepts and Applications and a Review of Regulations and Policy for the Single Subject Teaching Credential Content Area Authorizations for Teaching Computer Science

Introduction

This agenda item is divided into two parts. Part I presents proposed amendments to Title 5 of the California Code of Regulations pertaining to the Supplementary Authorization in Computer Concepts and Applications (CCA) as directed by the Commission in February 2015. Part II, beginning on page 17, provides a review of current regulations, policy and subject matter requirements related to the Single Subject Teaching Credential content area authorizations for teaching the range of courses in computer science.

Supplementary Authorizations are limited subject area authorizations for departmentalized instruction that may be added to a general education teaching credential (i.e., Multiple Subject, Single Subject, or older equivalent). The Supplementary Authorizations are based on the completion of coursework (10 upper division/graduate or 20 lower division semester units) in the subject area from a regionally accredited college or university. These authorizations and the units required are specified in statute. The Commission establishes the specific content areas of study for the coursework that must be completed within regulations.

The proposed amendments to regulations in Part I of the item reflect a change in focus for the Supplementary Authorization in Computer Concepts and Applications from content preparation for teaching basic computer use, keyboarding, and software applications to more relevant 21st century content preparation inclusive of the range of Computer Science courses taught in California public schools. The proposed amendments include revised Content Areas of Study for the supplementary authorizations in order to serve as a basis for increasing the capacity of teachers prepared to provide instruction in the range of K-12 Computer Science courses in California public schools. The proposed regulations also include changing the name of this Supplementary Authorization from Computer Concepts and Applications to Computer Science as well as general clean-up of outdated language within the same sections of these regulations.

Part II of the item examines the alignment between regulations, policy, and subject matter requirements pertaining to Single Subject Teaching Credential content areas authorized to teach courses in the range of K-12 Computer Science courses in California public schools. Staff provides two options for Commission consideration and direction.

Background

Discussion at the February 2015 Commission meeting (<http://www.ctc.ca.gov/commission/agendas/2015-02/2015-02-6B.pdf>) regarding the

requirements for the Supplementary Authorization in Computer Concepts and Applications (CCA) considered how coursework offered in Computer Science in California public schools has evolved rapidly in recent years while the required Content Areas of Study for the Supplementary Authorization in CCA have remained the same since first developed in 1987. To address concerns that educators receive the appropriate preparation to teach a range of relevant computer science courses to California students beyond basic computer functions and applications, Commissioners provided staff direction to bring forward proposed amendments to Title 5 regulations pertaining to the Supplementary Authorization in CCA.

The proposed regulations strengthen the required Content Areas of Study for the Supplementary Authorization to ensure holders have the requisite content knowledge to teach the scope of Computer Science classes now offered in California public schools. To reflect the broader approach to this content area, the proposed regulations include changing the name of this Supplementary Authorization to Computer Science.

Proposal for a Supplementary Authorization in Computer Science

Over the past year, Commission staff has engaged in a series of conversations with representatives from the Alliance for California Computing Education for Students and Schools (ACCESS) and the Computer Science Teachers Association (CSTA) about the current preparation and authorizations for teaching the range of K-12 Computer Science classes in California schools. It is important to note that what is encompassed by the discipline of Computer Science for K-12 students has changed. The broad Scope of Computer Science today is reflected in the following definition:

*Computer Science is the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society.*¹

As a result of those conversations, the proposed regulations were developed modifying both the current Content Areas of Study requirements and the new title for the Commission's Supplementary Authorization, Computer Science rather than Computer Concepts and Applications.

As specified in statute, all teachers who are currently authorized to teach the range of courses in Computer Science will remain authorized (e.g., holders of a Supplementary Authorization in CCA or a Single Subject teaching credential in Mathematics, Business, or Industrial Technology Education) even if the proposed amendments are adopted within regulations.

Only teachers initially earning one of these supplementary authorizations in the future would be required to satisfy the revised Content Areas of Study and be issued the Supplementary Authorization in Computer Science. The proposed regulations include an effective date of April 1, 2016 in order to provide transition time for teachers currently pursuing a Supplementary Authorization in CCA.

Current and Proposed Content Areas of Study Required for a Supplementary Authorization in CCA

The Supplementary Authorization in CCA may be obtained by both Multiple Subject (elementary) and

¹ CSTA K-12 Computer Science Standards, 2011, <http://www.csta.acm.org/Curriculum/sub/K12Standards.html>

Single Subject (secondary) Credential holders. The current Content Areas of Study coursework requirements vary based on the type of prerequisite credential held.

California Education Code section 44256 specifies the types of supplementary authorizations that may be added to elementary and secondary teaching credentials, grade level limitations, and the units required so those specific elements remain the same as the current requirements. However, this section of statute also provides that the Commission, by regulation, may require evidence of additional competence as a condition for instruction in particular subjects. The change of the Supplementary Authorization name to “Computer Science” reflects the breadth and depth of the content required in the proposed modifications to the required Content Areas of Study.

The chart below provides the scope of the current Supplementary Authorizations in CCA and Content Areas of Study now required and the proposed modifications for the new Supplementary Authorizations in Computer Science, in the far right-hand column indicated by underlined text.

| Authorization | Unit Requirements | Content Areas of Study- Computer Concepts and Applications | |
|---|--|---|---|
| | | Current | Proposed |
| <p><i>Introductory Supplementary Authorization</i></p> <ul style="list-style-type: none"> Listed on Multiple Subject/Elementary Credentials for teaching grades 9 and below Listed on <u>Single Subject/Secondary Credentials for teaching curriculum level grade 9 and below; students may be in grades K-12</u> | 20 Semester Units ¹ or 10 Semester Units of Upper Division or Graduate Level Coursework | <p>Requires coursework covering each content area:³</p> <ul style="list-style-type: none"> software evaluation and selection hardware operation and functions² classroom uses of computers | <p>Requires coursework covering each content area:³</p> <ul style="list-style-type: none"> <u>computational thinking</u> <u>computing practice and programming</u> <u>computers and communication devices</u> <u>impacts of computing⁴ (e.g., social, ethical, legal)</u> |
| <p><i>Specific Subject Supplementary Authorization</i></p> <ul style="list-style-type: none"> Listed only on Single Subject/Secondary Credentials for teaching content in grades K-12 | 20 Semester Units ¹ or 10 Semester Units of Upper Division or Graduate Level Coursework | <ul style="list-style-type: none"> Specific Subject Supplementary Authorizations have no required content areas. All coursework must fall within the academic department for the subject category. | <p>Requires coursework covering each content area:³</p> <ul style="list-style-type: none"> <u>computer programming</u> <u>data structures and algorithms</u> <u>digital devices, systems and networks</u> <u>software design</u> <u>impacts of computing⁴ (e.g., social, ethical, legal)</u> |

¹ All lower division units or a combination of upper and lower division units.

² An Introduction to Data Processing may be used for hardware operations and functions. Java, Cobol, Basic, and Pascal are examples of computer languages and do not apply to hardware but are acceptable as electives toward the overall unit requirement.

³ The balance of the units may be in any course that falls within the academic department for that subject category. Computer classes in the Education Department may be used **including a pedagogy course in computer science from either department.**

⁴ These topics may be included within courses covering the other content areas.

For the Introductory Supplementary Authorization in Computer Science, coursework completed must cover the following content areas:

- **Computational thinking:** involves solving problems and designing systems, using fundamental computing concepts such as decomposition, data representation, generalization/abstraction, and algorithms.
- **Computing practice and programming:** includes expertise in at least one block--- based, visual (drag-and-drop) programming language (e.g., Alice, Blockly, Kodu, Logo, Scratch, Snap!) or a modern, high-level programming language.
- **Computer and communications devices:** covers the major components and functions of digital devices and the computing systems they compose.
- **Impacts of computing:** includes the social and ethical issues and impacts of computing, as well as the contributions of computer science to innovations in other fields. These topics may be included within courses covering the other content areas.

For the Specific Supplementary Authorization in Computer Science, coursework completed must cover the following content areas:

- **Computer Programming:** includes expertise in at least one modern, high-level programming language (e.g., Python, Java, C/C++/C#).
- **Data structures and algorithms:** covers data representation, abstraction, searching and sorting in the context of solving problems using programming and computational tools.
- **Digital devices, systems and networks:** covers computer and communication devices and the systems they compose, including the concepts and abstractions that enable stand-alone, networked, and mobile digital devices to operate and communicate.
- **Software design:** covers the process of planning, engineering and implementing a software system to solve a problem, typically using both a design and a programming methodology, such as object-oriented and functional approaches.
- **Impacts of computing:** includes the social, ethical, and legal issues and impacts of computing, as well as the contributions of computer science to current and future innovations in the arts, business, humanities, medicine, and science. These topics may be included within courses covering the other content areas.

The Content Areas of Study coursework requirements for the Supplementary Authorization in CCA currently in regulations specifies coursework in content that has now become primarily addressed within the preliminary preparation program standards for all general and special education teaching credentials (i.e., software evaluation and selection, hardware operation and functions, and classroom uses of computers) in Program Standard 11: Using Technology in the Classroom (*Appendix A*). The proposed modifications shown to the Content Areas of Study for the Supplementary Authorization in Computer Science reflect a more comprehensive preparation with direct relevance to the range of K-12 Computer Science courses offered in California public schools today.

As an addition to the initial proposal in the February agenda item, the chart now includes the bifurcation of the required Content Areas of Study for the Introductory and Specific Subject Supplementary Authorizations in Computer Science. Presently, the holder of a Single Subject Teaching Credential may only obtain the Specific Subject Supplementary Authorization in CCA, which authorizes departmentalized teaching in the subject area in grades K-12 but does

not require any specific Content Areas of Study within the semester units completed. As some Single Subject Credential holders with the Supplementary Authorization are teaching at the elementary and middle school level, the addition of an Introductory Supplementary Authorization in this content area for these teachers provides more flexibility to choose the level of Supplementary Authorization (Introductory or Specific) that is most appropriate. The addition of this new option provides for a thorough but introductory level of content for teaching computer science intended for students through grade 9 and also aligns with the Content Areas of Study coursework requirements for holders of a Multiple Subject Credential teaching computer science to students in the same grade levels.

Summary of Proposed Amendments

80057.5

(b)(1): Proposes deletion of outdated information that refers to examinations no longer administered and no longer valid for certification use. Proposes adding passage of the appropriate the CSET examinations that are the current examinations valid for certification may be used as verification of proficiency for individuals seeking certification in a language other than English.

(b)(2): Proposes deletion of outdated information that refers to examinations no longer administered and no longer valid for certification use. Proposes adding that language assessments approved for certification use may be used as verification of proficiency for individuals seeking certification in a language other than English.

(b)(3): Proposes deletion of outdated information no longer used for certification. Proposes adding possession of a degree from a foreign institution may be used as verification of proficiency for individuals seeking certification in a language other than English.

(b)(4): Proposes deletion of outdated information that refers to programs no longer available for certification use. Proposes adding language that the assessment used in the current bilingual programs approved by the Commission may be used as verification of proficiency for individuals seeking certification in a language other than English.

(c)(4): Proposes changing the name of the supplementary authorization from Computer Concepts and Applications to Computer Science. Proposes changing the content areas of study to reflect the broader focus of coursework required to obtain the revised Computer Science supplementary authorization.

(f): Proposes deleting the text currently in subsection (f) as it will be moved to subsection (g) to retain a logical order of the subsections listing the requirements for the supplementary authorization. Proposes adding definitions of the course content required to align with the proposed modifications in changing the Computer Concepts and Applications supplementary authorization to Computer Science.

(g): Proposes adding the text previously found in subsection (f) to subsection (g) to retain a logical order of the subsections listing the requirements for the supplementary authorization. Proposes deleting the language previously found in subsection (g) as it refers to an option that has expired and

no longer available to individuals seeking a supplementary authorization.

(h): Proposes the addition of subsection (h) to provide a date of April 1, 2016 to allow transition time for teachers currently pursuing a supplementary authorization in CCA to complete those requirements.

80089

Proposes deleting subsection (c) as it refers to an option that has expired and is no longer available to individuals seeking a supplementary authorization.

80089.1

(a): Proposes changing the name of the supplementary authorization in Computer Concepts and Applications to Computer Science to more accurately reflect the proposed additions of content areas of study and coursework required to obtain the supplementary authorization. Proposes removing one of the instances of the subject area Metals (Industrial Arts) from the list of specific supplementary authorizations as duplicative.

(e): Proposes the addition of subsection (e) to provide definitions for the course content required to obtain the supplementary authorization in Computer Science.

(f): Proposes the addition of subsection (f) to provide a date of April 1, 2016 to allow transition time for teachers currently pursuing a supplementary authorization in CCA to complete those requirements.

80089.2

(a)(1): Proposes deletion of outdated information that refers to examinations no longer administered and no longer valid for certification use. Proposes adding passage of the appropriate the CSET examinations that are the current examinations valid for certification may be used as verification of proficiency for individuals seeking certification in a language other than English.

(a)(2): Proposes deletion of outdated information that refers to examinations no longer administered and no longer valid for certification use. Proposes adding that language assessments approved for certification use may be used as verification of proficiency for individuals seeking certification in a language other than English.

(a)(3): Proposes deletion of outdated information no longer used for certification. Proposes adding possession of a degree from a foreign institution may be used as verification of proficiency for individuals seeking certification in a language other than English.

(a)(4): Proposes deletion of outdated information that refers to programs no longer available for certification use. Proposes adding language that the assessment used in the current bilingual programs approved by the Commission may be used as verification of proficiency for individuals seeking certification in a language other than English.

(b)(13): Proposes changing the word “on” to “one” to correct a typographical error.

(b)(14): Proposes the addition of subsection (14) to add an Introductory Supplementary Authorization in Computer Science for Single Subject Credential holders. The addition of this new supplementary authorization provides for a more basic level of content for grades 9 and below to match the level of content taught at the elementary and middle school levels by holders of the Multiple Subject Credential.

(e): Proposes the addition of subsection (e) to provide definitions for the course content required to obtain the supplementary authorization in Computer Science.

(f): Proposes the addition of subsection (f) to provide a date of April 1, 2016 to allow transition time for teachers currently pursuing a supplementary authorization in CCA to complete those requirements.

Next Steps

Staff recommends approval of the proposed amendments to Title 5 of the California Code of Regulations pertaining to the Supplementary Authorization in Computer Concepts and Applications in order to schedule a public hearing, following the required 45-day response period.

CALIFORNIA CODE OF REGULATIONS
TITLE 5. EDUCATION
DIVISION 8. COMMISSION ON TEACHER CREDENTIALING

§ 80057.5. Adding Supplementary Authorizations to Teaching Credentials Used Predominantly in Elementary Schools.

- (a) The holder of a valid teaching credential specified in Education Code Section 44256(b) may have one or more of the subjects listed in subsection (c) added as a supplementary authorization. The candidate or an approved institution shall verify completion of either (1) or (2) below:
- (1) 20 semester hours or 10 upper division semester hours of non-remedial collegiate course work in each subject from subsection (c) to be listed, or
 - (2) a collegiate major in a subject directly related to each subject from subsection (c) to be listed.

A "C" grade or above in any course used to meet the provisions of this section shall be required. Non-remedial coursework for the purposes of this section shall be defined as coursework that is applicable toward a bachelor's degree or a higher degree at a regionally accredited college or university.

- (b) Candidates seeking supplementary authorization in any language other than English shall, in addition to requirements specified in subsection (a), submit verification of having either (1), (2), (3), or (4) below:
- (1) ~~passed the oral language portion of the Bilingual Certificate of Competence Examination in the language to be listed on the credential. Such verification shall be in the form of a letter from any institution or other educational agency, approved by the Commission as an assessor agency for the Bilingual Certificate of Competence. Whenever a written assessment instrument for a language other than Spanish is not available, a panel may be used by assessor agencies to assess a candidate's knowledge of the target language competencies, in accordance with Commission guidelines regulating assessment for languages other than Spanish, passed the Language and Communication/Listening and Oral Communication section (Test II or III depending on the specific language) of the CSET: World Languages Examinations in the target language verified by an official score report. Passing examination scores are valid for certification use for five years from the individual test date; or~~
 - (2) ~~passed the speaking and listening sections of Test 6 of the Crosscultural Language and Academic Development/Bilingual Crosscultural Language and Academic Development (CLAD/BCLAD) Examinations described in Section 80015.3 in the language to be listed on the credential if no CSET: World Languages Examination is available in the target language, evidence of having passed an assessment performed by an approved organization covering the integrated communication skills of listening, speaking, reading and writing in the target language; or~~
 - (3) ~~oral proficiency in the language to be listed on the credential at a level equivalent to that of a person with a bachelor's degree with a major in that language. This level of proficiency shall be~~

~~verified by a letter from the Chair of the Language Department of a regionally accredited four year college or university~~ possession of a three-year or higher degree from a foreign institution in which all instruction was delivered in the target language. The foreign institution must be equivalent in status to a regionally-accredited institution of higher education in the United States; or

(4) ~~oral proficiency in the language to be listed on the credential at the level required to complete a Bilingual Emphasis or Bilingual Crosscultural Language and Academic Development (BCLAD) Emphasis Credential Program as verified by a letter from a person authorized to issue such verification by the college or university that offers such a program~~ passed an assessment covering the integrated communication skills of listening, speaking, reading and writing administered by a California college or university as a part of its Commission-approved bilingual authorization program in the target language.

(c) The following subjects may be added as supplementary authorizations to a valid teaching credential specified in Education Code Section 44256(b):

(1) Agriculture, including at least one course in each of the following areas: animal science, plant science, and agricultural mechanics;

(2) Art, including at least one course in each of the following areas: drawing and painting, art history or appreciation, and crafts;

(3) Business, including at least one course in each of the following areas: business management, business marketing or introduction to business, computer concepts and applications, economics, business communications or business English, and accounting;

(4) ~~Computer Concepts and Applications Science~~, including at least one course in each of the following areas: ~~software evaluation and selection, hardware operation and functions, and classroom uses of computers~~ computational thinking; computing practice and programming; computer and communications devices; and impacts of computing. The course of study must cover all content areas but impacts of computing may be met within a single course also used to meet one of the other required content areas;

(5) English, including at least one course in each of the following areas: grammar or language structure, composition, and literature;

(6) A Language Other Than English (Specify), including at least one course in the language covering each of the following areas: grammar, composition, conversation, and literature;

(7) Health Science, including at least one course in each of the following areas: substance abuse (including alcohol, drug, and tobacco), family life education (including human sexuality, HIV/AIDS, and sexually transmitted diseases), nutrition, comprehensive school health systems or programs, and health education theory, behavior, or foundations;

(8) Home Economics, including at least one course in each of the following areas: food and nutrition, clothing, child development, and family life and parenting;

(9) Industrial Arts, including at least one course in each of the following areas: drafting or graphic arts, woods or metals, and electricity or electronics;

(10) Mathematics, including at least one course in each of the following areas (all course work shall

be at least at a level for which intermediate algebra is a prerequisite): algebra, geometry, and development of the real number system or introduction to mathematics; or three courses in calculus or other mathematics courses for which algebra and geometry are prerequisites;

- (11) Music, including at least one course in each of the following areas: vocal music, instrumental music, music history or appreciation, and music theory;
 - (12) Physical Education, including at least one course in each of the following areas: team sports and games, fundamental and creative movement skills (such as dance and gymnastics), human movement, motor development, and/or motor learning, and individual, dual, nontraditional and global sports and games (such as aquatics, conditioning, and archery);
 - (13) Science, including at least one course in each of the following areas: biological sciences, chemistry, geosciences, and physics; and
 - (14) Social Science, including at least one course in each of the following areas: United States history, California history, world history, geography, and United States government.
- (d) Home Economics Supplementary Authorizations must include a laboratory component in one of the listed subject areas. The course of study must cover both subject areas of food and nutrition but a single course may be used to meet the requirement. The course of study must cover both subject areas of family life and parenting, but a single course may be used to meet the requirement.
- (e) Science Supplementary Authorizations Authorized by 80057.5((c)13) shall include a one-year sequence of courses in at least two of the listed subject areas. At least one course must include a laboratory component.
- (f) ~~A subject specified in subsection (c) and listed on a teaching credential specified in Education Code Section 44256(b) as a supplementary authorization shall authorize the teaching of courses related to that subject in departmentalized classes in grades 9 and below.~~ The course of study for the Computer Science Supplementary Authorization authorized by 80057.5(c)(4) must include coursework aligned with the following definitions:
- (1) Computational thinking— includes solving problems and designing systems, using fundamental computing concepts such as decomposition, data representation, generalization/abstraction, and algorithms.
 - (2) Computing practice and programming—includes expertise in at least one block-based, visual (drag-and-drop) programming language, or a modern, high-level programming language.
 - (3) Computer and communications devices—covers the major components and functions of digital devices and the computing systems they compose.
 - (4) Impacts of computing—includes the social and ethical issues and impacts of computing, as well as the contributions of computer science to innovations in other fields. These topics may be covered within any of the courses covering content areas (f)(1) through (f)(3).
- (g) ~~Applicants who are progressing toward completion of supplementary authorization requirements as they existed on July 1, 1996, shall have until July 1, 1998, to apply for said authorizations. A~~ subject specified in subsection (c) and listed on a teaching credential specified in Education Code

Section 44256(b) as a supplementary authorization shall authorize the teaching of courses related to that subject in departmentalized classes in grades 9 and below.

(h) Applicants progressing toward completion of requirements for the Supplementary Authorization in Computer Concepts and Applications must complete the required coursework and submit an application for this supplementary authorization no later than April 1, 2016. After that date, applicants must complete coursework for the Supplementary Authorization in Computer Science that meets the definitions listed in (f)(1) through (f)(4).

Note: Authority cited: Section 44225(b), Education Code. Reference: Section 44256(b), Education Code.

§80089. Adding Supplementary Authorizations to Teaching Credentials Used Predominantly in Secondary Schools.

(a) The holder of a valid teaching credential specified in Education Code Section 44256(a) may have one or more of the subjects listed in Sections 80089.1 and 80089.2, added as a supplementary authorization. The candidate or an approved institution shall verify completion of either (1) or (2) below:

- (1) 20 semester hours or 10 upper division semester hours of non-remedial collegiate coursework in a subject listed in Sections 80089.1 or 80089.2, or
- (2) a collegiate major in a subject directly related to each subject listed in Sections 80089.1 or 80089.2. A "C" grade or above in any course used to meet provisions of this section shall be required. Non-remedial coursework for the purposes of this section shall be defined as coursework that is applicable to a bachelor's degree or a higher degree at a regionally accredited college or university.

(b) Authorization.

- (1) A supplementary authorization added under the provisions of Section 80089.1 authorizes the holder to teach that subject at any grade level; preschool, kindergarten, grades 1-12, or in classes organized primarily for adults;
- (2) A supplementary authorization added under the provisions of Section 80089.2 authorizes the holder to teach at any grade level (preschool, kindergarten, grades 1-12, or in classes organized primarily for adults) only the subject matter content typically included for that subject in curriculum guidelines and textbooks for study in grades 9 and below.

~~(c) Applicants who are progressing toward completion of supplementary authorization requirements as they existed on July 1, 1996, shall have until July 1, 1998, to apply for said authorizations.~~

Note: Authority cited: Section 44225, Education Code. Reference: Sections 44256 and 44349, Education Code.

§80089.1. Subjects Added as Supplementary Authorizations (Specific Subjects).

(a) The following listed subjects may be added as supplementary authorizations to a valid teaching credential specified in Education Code Section 44256(a):

| | |
|---|---|
| Accounting (including Finance) | Forestry and Horticulture |
| Agricultural Mechanics | Geography |
| Animal Science | Geosciences |
| Anthropology | Graphic Arts |
| Auto Mechanics | Industrial Crafts and Plastics |
| Biological Sciences | Instrumental Music |
| Chemistry | Interior Design (Home Economics) |
| Child Development (Home Economics) | Journalism |
| Clothing and Textiles (Home Economics) | Literature |
| Comparative Political Systems and International Relations | Marketing/Entrepreneurship |
| Computer Concepts and Applications <u>Science</u> | Metals (Industrial Arts) |
| Consumer Education (Home Economics) | Office Technologies including Word Processing and Business Communications |
| Crafts, including Jewelry and Ceramics (Art) | Ornamental Horticulture |
| Dance | Painting and Drawing |
| Drafting | Photography |
| Drama | Physics |
| Economics | Plant Science |
| Economic and Consumer Education | Plastics (Industrial Arts) |
| Electronics | Psychology |
| English Composition | Sociology |
| Family Life and Parenting (Home Economics) | Speech |
| Family Life Education including Drug, Alcohol and Tobacco Use Prevention (Health Science) | US Government and US Civics |
| Food and Nutrition (Home Economics) | US History and California History |
| | Vocal Music |
| | Woods (Industrial Arts) |
| | World History |

(b) A supplementary authorization in a specific subject of Science may be added to a valid teaching credential specified in Education Code Section 44256(a). The course of study for Biological Sciences or Chemistry or Geosciences or Physics must include each of the components for that area. One of the courses must include a laboratory component.

(1) Biological Sciences, including: Molecular and Cellular Biology, Biology of Organisms, and Evolution.

- (2) Chemistry, including: Structure and Stability, and Chemical Reactions.
 - (3) Geosciences, including: Astronomy, Geology, Meteorology and Oceanography.
 - (4) Physics, including: Energy - Mechanics, Energy - Heat Energy - Electricity and Magnetism, Wave Motion and Atomic and Nuclear Physics
- (c) A supplementary authorization in each of the specific subjects of Child development (home economics), Clothing and textiles (home economics), Food and nutrition (home economics), and Interior design (home economics) must include a laboratory component.
- (d) A supplementary authorization in the subject of Family life education including drug, alcohol, and tobacco use prevention (health science) must include the following components: sexually transmitted disease including HIV/AIDS, human development and human sexuality, parenting education, violence prevention, and drug, alcohol and tobacco use, prevention and cessation.
- (e) A supplementary authorization in the specific subject of Computer Science may be added to a valid teaching credential specified in Education Code Section 44256(a). The course of study must include coursework covering the following components:
- (1) Computer Programming: including expertise in at least one modern, high-level programming language;
 - (2) Data structures and algorithms: data representation, abstraction, searching and sorting in the context of solving problems using programming and computational tools;
 - (3) Digital devices, systems and networks: covers devices and the systems they compose, including the concepts and abstractions that enable stand-alone, networked, and mobile digital devices to operate and communicate;
 - (4) Software design: the process of planning, engineering and implementing a software system to solve a problem, typically using both a design and a programming methodology. Programming methodologies that facilitate design include object-oriented and functional approaches; and
 - (5) Impacts of computing: including the social, ethical, and legal issues and impacts of computing, as well as the contributions of computer science to current and future innovations in sciences, humanities, the arts, and commerce. These topics may be included within any of the courses covering content areas (e)(1) through (e)(4).
- (f) Applicants progressing toward completion of requirements for the Supplementary Authorization in Computer Concepts and Applications must complete the required coursework and submit an application for this supplementary authorization no later than April 1, 2016. After that date, applicants must complete coursework for the Supplementary Authorization in Computer Science that meets the definitions listed in (e)(1) through (e)(5).

Note: Authority cited: Section 44225, Education Code. Reference: Sections 44256 and 44349, Education Code.

§80089.2. Subjects Added as Introductory Supplementary Authorizations.

- (a) Candidates seeking supplementary authorization in any language other than English shall, in addition to the requirements specified in Section 80089, submit verification of having either (1), (2), (3), or (4) below:
- (1) ~~passed the oral language portion of the Bilingual Certificate of Competence Examination in the language to be listed on the credential. Such verification shall be in the form of a letter from any institution or other educational agency, approved by the Commission as an assessor agency for the Bilingual Certificate of Competence. Whenever a written assessment instrument for a language other than Spanish is not available, a panel may be used by assessor agencies to assess a candidate's knowledge of the target language competencies, in accordance with Commission guidelines regulating assessment for languages other than Spanish, passed the Language and Communication/Listening and Oral Communication section (Test II or III depending on the specific language) of the CSET: World Languages Examinations in the target language verified by an official score report. Passing examination scores are valid for certification use for five years from the individual test date; or~~
 - (2) ~~passed the speaking and listening sections of Test 6 of the Crosscultural Language and Academic Development/Bilingual Crosscultural Language and Academic Development (CLAD/BCLAD) Examinations described in Section 80015.3 in the language to be listed on the credential if no CSET: World Languages Examination is available in the target language, evidence of having passed an assessment performed by an approved organization covering the integrated communication skills of listening, speaking, reading and writing in the target language; or~~
 - (3) ~~oral proficiency in the language to be listed on the credential at a level equivalent to that of a person with a bachelor's degree with a major in that language. This level of proficiency shall be verified by a letter from the Chair of the Language Department of a regionally accredited 4-year college or university possession of a three-year or higher degree from a foreign institution in which all instruction was delivered in the target language. The foreign institution must be equivalent in status to a regionally-accredited institution of higher education in the United States; or~~
 - (4) ~~oral proficiency in the language to be listed on the credential at the level required to complete a Bilingual Emphasis or Bilingual Crosscultural Language and Academic Development (BCLAD) Emphasis Credential Program as verified by a letter from a person authorized to issue such verification by the college or university that offers such a program passed an assessment covering the integrated communication skills of listening, speaking, reading and writing administered by a California college or university as a part of its Commission-approved bilingual authorization program in the target language.~~
- (b) The following listed subjects may be added as introductory supplementary authorizations to a valid teaching credential specified in Education Code Section 44256(a).
- (1) Introductory Agriculture, including at least one course in each of the following areas: animal science, plant science, and agricultural mechanics;
 - (2) Introductory Art, including at least one course in each of the following areas: drawing and painting, art history or appreciation, and crafts;

- (3) Introductory Business, including at least one course in each of the following areas: business management, business marketing or introduction to business, computer concepts and applications, economics, business communications or business English, and accounting;
- (4) Introductory English, including at least one course in each of the following areas: composition, literature, and grammar or language structure;
- (5) Introductory Language Other Than English (Specify), including at least one course in the language covering each of the following areas: grammar, composition, conversation, and literature;
- (6) Introductory Health Sciences, including at least one course in each of the following areas: substance abuse (including alcohol, drug, and tobacco), family life education (including human sexuality, HIV/AIDS, and sexually transmitted diseases), nutrition, comprehensive school health systems or programs, and health education theory, behavior, or foundations;
- (7) Introductory Home Economics, including at least one course in each of the following areas: food and nutrition, clothing, child development, and family life and parenting;
- (8) Introductory Industrial Arts, including at least one course in each of the following areas: drafting or graphic arts, woods or metals, and electricity or electronics;
- (9) Introductory Mathematics, including at least one course in each of the following areas (all course work shall be at least at a level for which intermediate algebra is a prerequisite): college algebra, geometry, and development of the real number system or introduction to mathematics; or three courses in calculus or other mathematics courses for which algebra and geometry are prerequisites;
- (10) Introductory Music, including at least one course in each of the following areas: vocal music, instrumental music, music history or appreciation, and music theory;
- (11) Introductory Physical Education, including at least one course in each of the following areas: team sports and games; fundamental and creative movement skills (such as dance and gymnastics); human movement, motor development, and/or motor learning; and individual, dual, nontraditional and global sports and games (such as aquatics, conditioning, and archery);
- (12) Introductory Science, including at least one course in each of the following areas: biological sciences, chemistry, geosciences, and physics; and
- (13) Introductory Social Science, including at least one course in each of the following areas: United States history, California history, world history, geography, and United States government.
- (14) Introductory Computer Science, including at least one course in each of the following areas: computational thinking, computing practice and programming, computer and communications devices, and the impacts of computing. The course of study must cover all content areas but impacts of computing may be met within a single course also used to meet one of the other required content areas.

- (c) Introductory Home Economics Supplementary Authorizations must include a laboratory component in one of the listed subject areas. The course of study must cover both subject areas of food and nutrition but a single course may be used to meet the requirement. The course of

study must cover both subject areas of family life and parenting, but a single course may be used to meet the requirement.

(d) Introductory Science Supplementary Authorizations Authorized by 80089.2(b)(12) shall include a one year sequence of courses in at least two of the listed subject areas. At least one course must include a laboratory component.

(e) The course of study for the Introductory Computer Science Supplementary Authorization must include coursework aligned with the following definitions:

- (1) Computational thinking— includes solving problems and designing systems, using fundamental computing concepts such as decomposition, data representation, generalization/abstraction, and algorithms.
- (2) Computing practice and programming—includes expertise in at least one block-based, visual (drag-and-drop) programming language, or a modern, high-level programming language.
- (3) Computer and communications devices—covers the major components and functions of digital devices and the computing systems they compose.
- (4) Impacts of computing—includes the social and ethical issues and impacts of computing, as well as the contributions of computer science to innovations in other fields. These topics may be included within any of the courses covering content areas (e)(1) through (e)(3).

(f) Applicants progressing toward completion of requirements for the Supplementary Authorization in Computer Concepts and Applications must complete the required coursework and submit an application for this supplementary authorization no later than April 1, 2016. After that date, applicants must complete coursework for the Supplementary Authorization in Computer Science that meets the definitions listed in (e)(1) through (e)(4).

Note: Authority cited: Section 44225, Education Code. Reference: Sections 44256 and 44349, Education Code.

Part II: Alignment of Regulations, Policy and Subject Matter Requirements for Single Subject Teaching Credential Content Areas for Teaching Computer Science

Introduction

Part II of this item examines the alignment between regulations, policy, and subject matter requirements (SMRs) pertaining to Single Subject Teaching Credential content areas of Mathematics, Business, and Industrial Technology Education (ITE) currently identified as authorized to teach courses in the range of K-12 Computer Science courses in California public schools. Staff provides a recommendation for aligning current policy with the regulations and content of the SMRs for these content areas for Commission consideration and direction.

Background

In Title 5 of the California Code of Regulations (CCR) section 80005(a), the subject area of computers is listed under three broad content areas: Mathematics, Business and ITE. An individual who holds a credential, teaching permit, or waiver in one of these three broad content areas is authorized to teach any course in Computer Science. This information is located on page C-11 under Computer Science and Appendix I of the Administrator's Assignment Manual (AAM): <http://www.ctc.ca.gov/credentials/manuals-handbooks/Administrator-Assignment-Manual.pdf>.

On January 31, 2001, regulations were implemented that impacted the assignment of individuals that teach classes in computer science. Prior to these regulations, an employing agency could determine which credentialed teacher had the requisite computer knowledge and skills and assign the individual to teach the class not considering any specific authorization from the Commission. With the addition of subsection (a) in Section 80005 in Title 5 of the California Code of Regulations, the subject area of computers was listed under the three broad content areas: Mathematics, Business, and ITE. Employing agencies were no longer able to choose any credentialed teacher to teach computer science or courses in computer skills.

The 2001 regulations were very specific about the computer science subjects and skills each Single Subject content area included:

- *Business - computer concepts and applications, data processing, keyboarding, and word processing*
- *Industrial and Technology Education (ITE) - computer technology*
- *Mathematics - computer science*

When the approved regulations were released in Coded Correspondence #00-0024, additional policy guidance included within the narrative and later in the AAM provided more flexibility to the employing agency. When assigning a teacher for specific courses in computer science or education, the local employing agency has the flexibility of determining whether to use the holder of a credential in business, mathematics or industrial, technology education or the supplementary authorization in computer concepts and applications. Employing agencies determine if a teacher holding one of the credentials or authorizations noted above has the requisite knowledge and skills for the specific type of computer science or education course offered in their district as long as the course falls within the grade and/or content level limitations noted for that credential or authorization.

Analysis of Policy, Regulations and Subject Matter Requirements

Based on inquiries from Computer Science Teachers Association (CSTA), language in Title 5 of the CCR section 80005(a) in conjunction with the adopted Subject Matter Requirements (SMRs) for Business, ITE, and Mathematics was reviewed for alignment with Commission policy. The language adopted in the regulations for the content areas of Business and ITE identifies limited specific subjects within the broad field of computer science that are authorized for classroom instruction while the content area of Mathematics encompasses the broader study of computer science as a whole.

Subject matter requirements (SMRs) represent the body of knowledge, skills and abilities expected of teachers in a content area for California public schools. The SMRs form the basis for both subject matter preparation program standards and examination specifications for the content area. The SMRs pertaining to computer science for the broad content areas of Business and ITE are provided in *Appendix B* for reference.

Following the review, staff determined that the broad policy guidance provided to employers by the Commission in relation to teaching courses in computer science is not aligned with the specific language in the regulations. However, the current adopted SMRs for the content areas of Business and ITE appear to support the inclusion of additional specific subjects pertaining to computer science in Title 5 of the CCR section 80005(a).

Recommendations

Staff recommends a comprehensive review of Title 5 of the California Code of Regulations section 80005(a) to ensure that the subjects listed under each broad content area align with the current SMRs for each content area. Staff will bring back proposed amendments to this section of regulations that align with the current SMRs for Commission consideration. An analysis of the SMRs that support the addition or deletion of a particular subject area will be provided. Additionally, staff recommends that Commission policy pertaining to teaching courses in Computer Science moving forward be amended to align with either current regulations or proposed regulations as appropriate.

Next Steps

Based on Commission direction, staff will complete one of the following:

- 1) develop an official Coded Correspondence to align Commission policy with current regulations pertaining to computer science; or
- 2) review the subjects that fall within the broad single subject content areas as specified in regulations in conjunction with the SMRs for each content area for alignment. The review will be conducted with input from stakeholders and subject matter experts. Following the review, staff would present proposed amendments to Title 5 section 80005(a) in a future agenda item.

Appendix A

Standard 11: Using Technology in the Classroom

Through planned prerequisites and/or professional preparation, the teacher preparation program ensures the following:

Candidates are familiar with basic principles of operation of computer hardware and software, and implements basic troubleshooting techniques for computer systems and related peripheral devices before accessing the appropriate avenue of technical support.

Candidates use appropriate technology to facilitate the teaching and learning process. Candidates are able to evaluate and select a wide array of technologies for relevance, effectiveness, and alignment with state-adopted academic content standards, and the value they add to student learning.

Candidates demonstrate knowledge and understanding of the legal and ethical issues related to the use of technology, including copyright issues and issues of privacy, security, safety, and acceptable use. Candidates demonstrate knowledge and understanding of the appropriate use of computer-based technology for information collection, analysis, and management in the instructional setting.

Candidates demonstrate competence in the use of electronic research tools and the ability to assess the authenticity, reliability, and bias of the data gathered. Candidates analyze best practices and research on the use of technology to deliver lessons that enhance student learning.

Candidates integrate technology-related tools into the educational experience and provide equitable access to available resources to the full range of learners. Candidates understand that students come with varying degrees of technological knowledge and skills. Candidates encourage the use of technology with students in their research, learning activities, and presentations, and explore options for students who do not readily have access to technology in their homes and classrooms.

Candidates use computer applications to manipulate and analyze data as a tool for assessing student learning, informing instruction, managing records, and providing feedback to students and their parents.

Candidates learn to use a variety of technologies to collaborate and communicate with students, colleagues, school support personnel, and families to provide the full range of learners with equitable access to all school and community resources.

Appendix B

Subject Matter Requirements Pertaining to Computer Science for Business and ITE

Subject matter requirements (SMRs) represent the body of knowledge, skills and abilities expected of teachers in a content area for California public schools. The SMRs form the basis for both subject matter preparation program standards and examination specifications for the content area. The following content pertaining to computer science is addressed within the SMRs for the content areas below:

Business

Domain 4. Information Technology

Candidates demonstrate an understanding of the terminology, principles, and procedures related to information technology. Candidates understand principles and procedures related to ethics, security, and data integrity in technology systems. They understand communications and networking systems and apply basic concepts of programming and systems development in business situations.

4.1 Computer Technology

- a. Understand terminology and concepts related to computer technology (e.g., operating system, hardware and software compatibility, drivers).
- b. Understand the process of evaluating, selecting, installing, and configuring computer components, peripherals, operating systems, and industry-standard application software.
- c. Utilize operating systems and associated utilities for file management, backup and recovery, and execution of programs; and compare simple and multi-user operating systems.
- d. Understand basic procedures for troubleshooting problems in hardware, software, and network systems.
- e. Understand the impact of information on society (e.g., changes at home and in the work place).

4.2 Information and Media Systems

- a. Understand principles and procedures necessary to analyze, plan, implement, and support information and media systems.
- b. Understand and apply factors affecting the ongoing management of information and media systems.

4.3 Ethics, Security, and Data Integrity

- a. Understand proper ethical procedures related to information technology, including management of intellectual property.
- b. Understand methods for implementing basic security plans and procedures for information systems.
- c. Understand policies for managing privacy and ethical issues to ensure the integrity and accuracy of electronic data in organizations and in a technology-based society.

4.4 Network Communications

- a. Understand the basic networking concepts, systems, and business models related to the creation, installation, management, and security of a network system.
- b. Understand voice and data transmission media and emerging technology trends.

4.5 Programming

- a. Understand programming logic, concepts, methodology, and design (e.g., interface, code, execution, test, debugging).
- b. Understand how to use and customize software in business applications (e.g., word processing, spreadsheet, database, Web page editor).
- c. Compare several programming languages and identify characteristics of structured programs in at least one language.

(Challenge Standards for Student Success: Career Preparation—Business Education [2000]: Standards 1.6, 4.1–4.5. Business Teacher Preparation in California: Standards of Quality and Effectiveness for Subject Matter Programs [1999]: Standards 2, 3.)

Information Technology Education

Domain 1. Nature of Technology

Candidates understand technology as a problem-solving process and know the history and evolution of technology. They understand that technology involves creativity and innovation and are able to use concepts from the core content areas of science, mathematics, social science, and language arts as well as other content areas commonly taught in California public schools to design solutions to problems. Candidates understand the social aspect of technology and analyze the positive and negative effects of technologies on society and the environment. They understand the skills, knowledge, attitudes, and commitment to lifelong learning necessary to develop technological literacy and apply this knowledge in a rapidly changing global environment.

1.4 Society and Globalization

- a. Understand the history and evolution of technology.
- b. Identify and analyze the positive and negative influences of technology on communities and society (e.g., air pollution, land use, environmental impact).
- c. Analyze factors (e.g., cultural, economic) that influence innovation and the development of technology.
- d. Demonstrate an understanding of the relationship between technological literacy and technical skills.
- e. Demonstrate an understanding of legal and ethical issues related to technology (e.g., copyright, liability, intellectual property, patents).

1.5 Independent and Integrated System Model

- a. Demonstrate an understanding of systems and subsystems in terms of input, process, output, and feedback.
- b. Identify and analyze the resources needed to develop and support technological systems.
- c. Demonstrate an understanding of control systems and their use in technological systems.
- d. Demonstrate an understanding of project and product management.

Domain 3. Information and Communication

Candidates demonstrate an understanding of the knowledge and skills needed to design, analyze, use, and maintain a variety of communication systems. They demonstrate an understanding of how information systems encode, transmit, receive, decode, and store data. Candidates understand

principles of graphic communication and use appropriate graphic tools to communicate visually. They apply knowledge of circuits and their components to electronic communication systems.

3.1 Design Processes

- a. Demonstrate an understanding of design documentation (e.g., blueprints, mock-ups, storyboards, schematics).
- b. Apply practical design concepts (i.e., form and function) to solve problems in communication.
- c. Understand computer design (e.g., hardware, software).
- d. Demonstrate an understanding of drawing and drafting principles (e.g., lettering, multiview drawing, dimensioning).

3.2 Systems

- a. Apply knowledge of imaging and image production (e.g., photographic, electronic, print).
- b. Analyze characteristics of telecommunication systems.
- c. Analyze characteristics of broadcast communication systems.
- d. Understand processes (e.g., preproduction, production, distribution) for developing multimedia systems.

3.3 Resources

- a. Demonstrate an understanding of the materials (e.g., media, electronic components), tools (e.g., test equipment, software, hand tools), and equipment (e.g., hardware, imaging equipment) used in information and communication systems.
- b. Understand strategies for the effective use of information resources (e.g., data banks, subject matter experts, search engines).
- c. Demonstrate an understanding of communication systems architecture and infrastructure (e.g., analog systems, digital systems, mainframes, client servers, network architecture).
- d. Understand criteria for the selection of appropriate materials, tools, and equipment used in information and communication systems.

3.4 Security and Privacy

- a. Understand physical security systems (e.g., locks, access control, motion detectors, surveillance, intrusion detection).
- b. Understand electronic security systems (e.g., access and permissions, passwords, user IDs, roles of administrators and end users, encryption).
- c. Demonstrate an understanding of principles related to security compliance procedures (e.g., personal responsibility, job function, need-to-know basis, ethical and legal).