

Date of Hearing: April 6, 2022

ASSEMBLY COMMITTEE ON EDUCATION
Patrick O'Donnell, Chair
AB 1939 (Luz Rivas) – As Amended March 14, 2022

SUBJECT: Pupil instruction: science requirements: climate change

SUMMARY: Adds content on the causes and effects of, and methods to mitigate and adapt to, climate change to the course of study in the subject of science for grades 1 to 6 and grades 7 to 12, requires that appropriate coursework be offered to students no later than the 2023-24 school year, and requires that at least one science course required for graduation include material on the causes and effects of, and methods to mitigate and adapt to, climate change, commencing with the graduating class of 2027-28. Specifically, **this bill:**

- 1) Adds content on the causes and effects of, and methods to mitigate and adapt to, climate change to the science course of study for grades 1 to 6 and grades 7 to 12.
- 2) Requires that appropriate coursework be offered to students no later than the 2023-24 school year.
- 3) Requires that at least one science course required for graduation include material on the causes and effects of, and methods to mitigate and adapt to climate change, commencing with the graduating class of 2027-28.

EXISTING LAW:

- 1) Establishes high school graduation requirements, and authorizes school districts to establish additional requirements for graduation.
- 2) Establishes the course of study for grades 1 to 6 and for grades 7-12, including in science and in history social science.
- 3) Establishes the Office of Education and the Environment (OEE) of the Department of Resources Recycling and Recovery (DRRR) and requires it, in cooperation with the California Department of Education (CDE) and the State Board of Education (SBE), to develop and implement a unified education strategy on the environment for elementary and secondary schools in the state. (Public Resources Code (PRC) 71300)
- 4) Requires the CDE and the SBE, in cooperation with the DRRR, to develop and implement to the extent feasible, a teacher training and implementation plan, to guide the implementation of the unified education strategy, for the education of students, faculty, and administrators on the importance of integrating environmental concepts and programs in schools throughout the State.
- 5) Requires, as part of the unified education strategy, the OEE, in cooperation with the Secretary for Environmental Protection, the Natural Resources Agency (NRA), the CDE and the SBE, to develop environmental principles and concepts (EP&Cs) for elementary and secondary school students. (PRC 71301)

- 6) Requires that the EP&Cs include, but not be limited to, concepts relating to the following topics:
 - a) Air;
 - b) Climate change;
 - c) Energy;
 - d) Environmental justice;
 - e) Environmental sustainability;
 - f) Fish and wildlife resources;
 - g) Forestry;
 - h) Integrated pest management;
 - i) Oceans;
 - j) Pollution prevention;
 - k) Public health and the environment;
 - l) Resource conservation, waste reduction, and recycling;
 - m) Toxics and hazardous waste; and
 - n) Water.
- 7) Requires the Instructional Quality Commission (IQC) to ensure that the EP&Cs are integrated into the academic content standards and curriculum frameworks in the subjects of English language arts, science, history-social science, health, and, to the extent practicable, mathematics whenever those standards and frameworks are revised. (EC 51227.3.)
- 8) Requires that the EP&Cs be incorporated, as the SBE determines to be appropriate, in the criteria developed for textbook adoption for grades K-8.

FISCAL EFFECT: This bill has been keyed a possible state mandated local program by the Office of Legislative Counsel.

COMMENTS:

Need for the bill. According to the author, “Climate change is no longer a future problem waiting for us to act upon – it is already here. Extreme climate events are wreaking havoc across the globe and escalating in severity each year. Millennials and Generation Z have already mobilized as key leaders in climate and environmental activism because they know their generations will have to live with the consequences of a changed climate. Several countries, such

as Italy and New Zealand, are preparing their youth for the new climate realities affecting the planet by educating them on climate change. This legislation will cultivate a new generation of climate policy leaders in California as we educate, help prepare, and give our next generation the tools to shape their futures in the wake of our current climate crisis.”

Curriculum, standards, frameworks. California’s public school curriculum is based on content standards in various subjects, including English language Arts, mathematics, science, history-social science, physical education, English language development, career technical education, health education, world languages, and visual and performing arts. These standards are developed by the IQC through a public process, and are adopted by the SBE.

These content standards form the basis of California’s curriculum frameworks. The frameworks, which are developed by the IQC and adopted by the SBE, guide the implementation of these standards, and are used to establish criteria for the evaluation of instructional materials for state adoption for grades kindergarten through grade 8. They also guide school district selection of instructional materials for grades 9 through 12.

State graduation requirements. Current law establishes state high school graduation requirements for public school students (including those attending charter schools) which must be met while students are enrolled in grades 9 through 12. These are:

- Three year-long courses in English;
- Two year-long courses in mathematics;
- Two year-long courses in science, including biological and physical sciences;
- Three year-long courses in social studies, including United States history and geography and world history, culture, and geography; a one-semester course in American government and civics; and a one-semester course in economics;
- One year-long course in visual or performing arts or world languages;
- Two courses in physical education, unless the pupil has been exempted pursuant to this code; and
- One one-semester course in ethnic studies, commencing with students graduating in the 2029–30 school year.

Current law also permits school districts to establish local graduation requirements which exceed those of the state.

To be eligible for admission to the California State University and the University of California, students must meet additional requirements in mathematics, science, world languages, visual and performing arts, and specified electives.

Environmental Principles and Concepts. Current law requires that the OEE, in cooperation with the Secretary for Environmental Protection, the Natural Resources Agency, the CDE and the SBE, to develop EP&Cs for elementary and secondary school students. Current law also requires the IQC to ensure that the environmental principles and concepts are integrated into the content standards and curriculum frameworks in the subjects of English language arts, science, history-social science, health, and, to the extent practicable, mathematics, whenever those standards and frameworks are revised. These principles are:

- Principle 1 - People Depend on Natural Systems. The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.
- Principle 2 - People Influence Natural Systems. The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.
- Principle 3 - Natural Systems Change in Ways that People Benefit From and Can Influence. Natural systems proceed through cycles that humans depend upon, benefit from, and can alter.
- Principle 4 - There are no Permanent or Impermeable Boundaries that Prevent Matter from Flowing Between Systems. The exchange of matter between natural systems and human societies affects the long-term functioning of both.
- Principle 5 - Decisions Affecting Resources and Natural Systems are Complex and Involve Many Factors. Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.

New curriculum on climate change and environmental justice funded by 2021-22 Budget with little detail. AB 130 (Committee on Budget), Chapter 44, Statutes of 2021 appropriated \$6 million to the San Mateo County Office of Education to contract for the creation of “free and open education resources that are K–12 standards-based curriculum units on climate change and environmental justice and the integration of the EP&Cs.” ***The Committee may wish to consider*** that the appropriation did not specify a role for the IQC, SBE, or public review or approval, or specify how these resources will interact with the existing curriculum produced by the OEE, the state curriculum frameworks, or adopted instructional materials.

Climate change content in current state curriculum. According to the CDE, content related to climate change appears in a number of the state curriculum frameworks. Every grade level has been integrated with the EP&Cs at the performance expectation and instructional segment groupings. The following examples were provided by the CDE:

2016 Science Framework	
The CDE notes that climate change is spread throughout the Science Framework at all grade-levels, from specific standards to an understanding that science literate students are better climate stewards. There are at least two instructional segments in grades K-8 that directly discuss climate change, and each high school course deals with at least three, more if the course follows the recommended course outlines in the Framework. Below are some examples of climate change education from various chapters in the Framework.	
Chapter 1: Overview p. 12	Discussion about integration of concepts by teachers: “For example, students investigating ecosystems should integrate life science ideas about food webs with physical science concepts about chemical energy and energy transfer and Earth science principles that affect climate and other environmental factors in the ecosystem.”
Chapter 1: Overview p. 34	Discussion about the importance of science literacy and help for teachers on how to add this to their curriculum: “Being able to read a science text is intertwined with evaluating science information. Students need

	strategies to help them decide if information is scientifically valid or if it is less reliable. Students should learn to investigate the scientific qualifications of the authors or source of the knowledge (for example when comparing the conclusions of the International Panel on Climate Change with a blog post or report by a political organization that presents opposing conclusions).”
Chapter 3: Kindergarten through Grade Two p. 121	Kindergarten Instructional Segment Three: “For example, IS4 in kindergarten focuses on weather and climate investigations. To be successful, weather observation should be carried out over different times during the year to allow for some variability in weather conditions. To broaden the scope of data, teachers can creatively engage families and expanded learning programs to build upon classroom learning experiences.”
Ch. 4: Grades Three through Five p. 331	The vignette is an example of science integration using a climate change lesson in Grade span 3-5.
Ch. 5: Preferred Integrated Model for Grades Six through Eight p. 356	The overarching guiding concept for the entire year (grade 6) is “Systems within organisms and between them are adapted to Earth’s climate systems.”
Ch. 7: High School Three Course Model p. 800	Includes an example of a standard that is taught in a high school biology course: HS-ESS3-1, construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
Ch. 7: High School Three Course Model p. 859	Includes two instructional segments from a high school chemistry course: including the Chemistry of Climate Change and the Dynamics of Chemical Reactions and Ocean Acidification.

2016 History-Social Science Framework	
Chapter 2, Instructional Practice for Kindergarten Through Grade Five, pp. 21-22	In studying geography, students explore local characteristics of places and learn about how places connect to each other. Elementary-school students’ geographic reasoning skills include the use of maps and globes to describe environmental and cultural features of places and the relationships and interactions between them...Additionally, students should explain how weather, climate, other environmental characteristics, as well as human-made and natural catastrophic disasters, affect people’s lives in a place or region and the migration of people within and between regions.
Chapter 16, Grade Eleven, United States History and Geography: Continuity and	Students read about the beginning of the modern environmental movement in the 1960s and the resulting environmental protection laws that were passed in the next decade. They note similarities and differences between environmentalism and other forms of activism of the decade, and they can also trace effects of the Cold War (especially

<p>Change in Modern United States History, p. 425</p>	<p>fears of nuclear proliferation) to the priorities of the movement. Examining case studies, such as the controversial expansion of Redwood National Park and state parks in 1978 and oil drilling in the Arctic National Wildlife Refuge, helps students develop skills in analysis of complex and controversial issues. Students may also link those early achievements with a student-led debate over issues such as climate change today and the appropriate role of government in dealing with these problems.</p>
<p>Chapter 17, Grade Twelve, Principles of American Democracy course: pp. 454-455</p>	<p>This course also provides opportunities for students to discuss, analyze, and construct writings on contemporary local, national, and international issues; participate in simulations of governmental processes; and apply what they have learned in addressing real-world problems... Topics for discussion may include technology (such as nuclear proliferation or the effect of the Internet on the political process or on intellectual property), the environment (such as global warming, preservation of wildlife, or alternative energy sources)...</p>
<p>Appendix B, Problems, Questions, and Themes in the History & Geography Classroom pp. 646-647</p>	<p>Human migration is another important part of population history... Most men and women who have migrated voluntarily have aimed to settle in new lands to seek better jobs or simply safety from war or famine or the effects of changes in climate, even though they do not necessarily find what they want when they reach their destination.</p>
<p>Appendix B, Problems, Questions, and Themes in the History and Geography Classroom p. 668</p>	<p>The study of science and technology has to do with the changing ways in which humans have used knowledge to exploit their physical and natural surroundings for human benefit... Though technological and scientific creativity has allowed the human species to multiply, it has also transformed the living conditions for all species on earth. Where these accelerating changes will lead is not yet known. They include, for example, an explosion of genetic knowledge that promises effective treatments for numerous diseases. But they also include global warming, which, if it continues, will have devastating effects on humankind's future. Over time, humans have learned to exploit a huge variety of different physical and natural environments with increasing efficiency. Today, though humans are only one of millions of species, they may control up to 40 percent of all the energy that enters the biosphere from sunlight. The environment includes both biological and physical surroundings...</p>
<p>pp. 757-758</p>	<p>Contemporary nations face challenges and threats that transcend their borders. They include environmental degradation and global climate change; cross-border terrorism and crime, including the illegal trafficking of drugs and human beings; and chaotic instability and enduring inequalities in the world economy. In recent years, governments have devised new frameworks and institutions for promoting cooperation on common dilemmas, such as the North American Free Trade Agreement, the European Union, or the Kyoto Protocol. Yet governments are reluctant to cede governing authority to international bodies. And war and violence, both within societies and between nations, remains an endemic feature of world civilization.</p>

The Science Framework includes an appendix showing alignment between the California Next Generation Science Standards and the EP&Cs. An example of climate change content is this crosswalk is shown below:

HS-LS2 ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS		
<p>HS-LS2-4: Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. [Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.] [Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.]</p> <p>HS-LS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. [Clarification Statement: Examples of models could include simulations and mathematical models.] [Assessment Boundary: Assessment does not include the specific chemical steps of photosynthesis and respiration.]</p>	<p>Stability and Change^b</p> <ul style="list-style-type: none"> • Much of science deals with constructing explanations of how things change and how they remain stable. (HS-LS2-6) (HS-LS2-7) <p>Cause and Effect</p> <ul style="list-style-type: none"> • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8) <p>Scale, Proportion, and Quantity^b</p> <ul style="list-style-type: none"> • The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. (HS-LS2-1) • Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale. (HS-LS2-2) 	<p>LS2.C: Moreover, anthropogenic changes (those induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7) <i>Secondary DCI(s)</i></p> <p>LS4.D: Biodiversity and Humans Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary to HS-LS2-7)</p> <p>LS4.D: Humans depend on the living world for the resources and other benefits provided by biodiversity, but human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change, thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth, sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)</p>

CREEC Network. The California Regional Environmental Education Community (CREEC) Network is a program of the CDE which fosters regional partnerships to promote environmental education and environmental literacy by providing teachers with access to high quality professional learning opportunities and education resources. Along with statewide sponsors and partners, each of the 11 California CREEC Regions provides professional learning opportunities and resources to educators as well as fosters communications among schools and organizations interested in supporting the environmental literacy of California’s teachers and students.

History of environmental literacy as a state priority. Several state actions over the past two decades have focused on developing environmental literacy among California’s K-12 students. AB 1548 (Pavley), Chapter 665, Statutes of 2003, initiated the Environmental Education Initiative (EEI) by creating the OEE within the state agency now known as CalRecycle. The bill also tasked the OEE with developing the state’s EP&Cs, required the EP&Cs to be integrated throughout a newly created environment-based K-12 model curriculum, and required the EP&Cs

to be integrated into criteria for textbook adoption in science, mathematics, English/language arts, and history-social sciences.

The EP&Cs guide the model curriculum that was developed by the OEE in collaboration with the CDE, the California Natural Resources Agency, and several non-state organizations, including Heal the Bay, the National Geographic Society, and the State Education and Environment Roundtable. In developing the EEI Curriculum, the OEE solicited input from state agencies, education organizations, business groups, universities, and environmental organizations. In addition, the OEE distributed an "Educator Needs Assessment" to 10,000 teachers and held numerous focus group meetings and discussion sessions. In 2010, the SBE unanimously approved the EEI curriculum, including the EP&Cs, for use throughout the state.

The OEE shares its educational resources, including the model curriculum and teacher guides to facilitate implementation of the curriculum, by conducting outreach and training at sites throughout the state and via webinars.

A second environmental literacy initiative began in 2014, when SPI Torlakson assembled the California Environmental Literacy Task Force (ELTF) to create a blueprint for achieving environmental literacy for all California students. The Blueprint, entitled *A Blueprint for Environmental Literacy: Educating Every Student In, About, and For the Environment*, was published in 2015. The Blueprint highlights the need for expanded environmental literacy education by referencing a recent survey of 520 California school principals. This survey showed that 13% of schools have integrated environmental education into their curricula, and 77% spend less than \$5,000 on field trips, professional development, and curricular materials for environmental education. In addition, the Blueprint states, "A false perception persists from the No Child Left Behind accountability era that environmental and outdoor programs are non-academic and not connected to the core curriculum. Research shows, however, that in schools where environmental content is integrated as a primary part of instruction, student achievement has improved."

To improve environmental literacy among California's students, the Blueprint identified the following six strategies:

- 1) Systematically integrate environmental literacy concepts into statewide educational priorities;
- 2) Strengthen collaboration across the state between key stakeholders;
- 3) Leverage the Superintendent's influence and create a public awareness campaign to build broad support for the importance of environmental literacy, and encourage and support increased allocation of state and locally controlled funding to environmental literacy programs;
- 4) Implement changes to relevant state law and policy and ensure that relevant existing laws are funded and effectively implemented;
- 5) Create an Environmental Literacy Steering Committee (ELSC) to oversee the implementation of the recommendations of the Blueprint; and
- 6) Develop a coherent strategy for funding environmental literacy across the state.

In 2016, Superintendent Torlakson appointed the ELSC to create an implementation plan for environmental literacy. The ELSC is comprised of 30 educational leaders and nonprofit stakeholders, and includes representatives from CDE, CalRecycle, University of California, and the SBE.

SB 720 (Allen), Chapter 374, Statutes of 2018 revised provisions relating to the education principles for the environment by, among other things, (1) renaming them the environmental principles and concepts; (2) revising the process for, and entities involved in, updating the environmental principles and concepts; and (3) requiring the IQC to ensure that the environmental principles and concepts are integrated into content standards and curriculum frameworks whenever those standards and frameworks are revised.

As noted above, the 2021-22 State budget provides \$6 million for “free and open education resources that are K–12 standards-based curriculum units on climate change and environmental justice and the integration of the EP&Cs.” The language did not provide a role for the IQC or SBE review, or specify how these resources will interact with the existing curriculum produced by the OEE.

Recommended Committee amendment. *Staff recommends that the bill be amended*, in recognition of the extreme demands on the public school system as a result of the COVID-19 pandemic, to remove the provisions requiring that at least one science course required for graduation include material on the causes and effects of, and methods to mitigate and adapt to, commencing with the graduating class of 2027-28.

Arguments in Support. Ten Strands writes, “Warming temperatures and increases in extreme weather threaten our health, air quality, water, food, shelter, and economic security posing an existential threat to humanity. Climate change is happening now and is especially impacting students in Black, Brown, Asian, Indigenous and low-income communities. One of the most effective ways of reducing the impacts of climate change is to educate our students on the causes and effects of climate change, and what can be done to address it in their communities. This work has already started, and progress has been made, but significantly more needs to be done. Ten Strands agrees that it is vitally important for all students to learn about the causes and effects of climate change and environmental justice. Informed students will be better able to make wise decisions in their everyday lives that will lead to protecting our planet.”

Related legislation. AB 130 (Committee on Budget), Chapter 44, Statutes of 2021 appropriated \$6 million to the San Mateo County Office of Education to contract for the creation of free and open education resources that are K–12 standards-based curriculum units on climate change and environmental justice and the integration of the EP&Cs.

AB 1922 (Rivas) of the 2019-20 Session would have added content on the causes and effects of climate change to the science course of study for grades 1 to 6 and grades 7 to 12, required that appropriate coursework be offered to students no later than the 2021-22 school year, and required that at least one science course required for graduation to include material on the causes and effects of climate change, commencing with the graduating class of 2025-26. This bill was held in the Assembly Education Committee.

SB 720 (Allen), Chapter 374, Statutes of 2018 revised provisions relating to the education principles for the environment by, among other things, (1) renaming them the environmental

principles and concepts; (2) revising the process for, and entities involved in, updating the environmental principles and concepts; and (3) requiring the Instructional Quality Commission to ensure that the environmental principles and concepts are integrated into content standards and curriculum frameworks whenever those standards and frameworks are revised.

AB 1548 (Pavley), Chapter 665, Statutes of 2003, established the OEE within the California Environmental Protection Agency and required it to develop environmental education principles and a model curriculum.

REGISTERED SUPPORT / OPPOSITION:**Support**

350 Bay Area Action
350 Sacramento
Active San Gabriel Valley
California Student Board Member Association
City of Sacramento Department of Utilities
Climate Reality Project, San Fernando Valley
Climate Reality Project, Silicon Valley
Generation Up
Menlo Spark
Regional Water Authority
Silicon Valley Youth Climate Action
Ten Strands
The Climate Center

Opposition

None on file

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