Presentation Overview

- California’s Context
- ECCLPS Project Overview
- Key Aspects of Summit Planning and Report Process
- Report Recommendations
- Summit Highlights
- Discussion
Amy Frame, K-12 Program Manager

Dr. Amy Frame is a credentialed teacher who has worked at almost every level of the school system, from teaching English, history, and science to coaching and managing curriculum implementation and leading as a principal. She has worked in public, magnet, charter, and independent schools. Amy has a MEd in Instructional Leadership from Harvard Graduate School of Education and an EdD in Educational Leadership from UCLA where she published her dissertation, “Assessing the Efficacy of Environmental Education on Environmental Stewardship, Civic Engagement, and College and Career Pathways.” She is committed to building stronger connections between people, communities, and the land.

aframe@tenstrands.org
Linda Livers, Project Management Consultant

Linda Livers has worked on several Ten Strands projects over the last 3 years as a project management consultant. Recent projects include project managing the UC–CSU Environmental and Climate Change Literacy Project and Summit at UCLA, assisting with implementation of a Global Climate Action Summit education affiliate event in San Francisco, coordinating advocacy work for Senate Bill 720, soliciting funders for a year-end campaign, helping to plan 3 fundraising events. Linda currently assists the Ten Strands chief executive officer with organizational operations. Her work also includes project management and administrative support for individuals by coordinating insurance policies, planning and implementing events of all sizes, and taking on various ad hoc projects.

livers@tenstrands.org
Our mission is to build and strengthen the partnerships and strategies that will bring environmental literacy to all of California’s K–12 students.
Over $10 million in private funding has been invested:

- **Supportive context** through legislation and communications

- **Incremental infusion** of environmental literacy into state standards and frameworks and professional learning

- **Leading edge exemplars** being curated with districts and county offices to develop
California’s Education System
- 6,299,451 students
- 266,255 teachers
- 1,181 school districts
- 10,315 schools

University of California
- 10 campuses, a combined student body of 280,380 students, 21,200 faculty members

California State University
- 23 campuses, 482,000 enrolled each year, 30k grad degrees every year, prepare half of California’s teachers, 1/12 of all teachers nationally, sustainability is integrated in their teacher prep programs, 4,500+ sustainability-related courses available across the system
California’s Building Blocks for Environmental Literacy
A Model for the Nation


- 2010 – State Board of Education approves EEI Curriculum

- 2015 – *Blueprint for Environmental Literacy* (Torlakson)

- 2018 – California Education Code amended to include EP&Cs, climate change, and environmental justice (SB 720, Allen)
AN ENVIRONMENTALLY LITERATE PERSON...

has the capacity to act individually and with others to support ecologically sound, economically prosperous and equitable communities for present and future generations.
CA Environmental Principles and Concepts

**Principle I:** 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 II:** The long-term functioning and health of terrestrial, freshwater, coastal, and marine ecosystems are influenced by their relationships with human societies.

**Principle III:** Natural systems proceed through cycles that humans depend upon, benefit from, and can alter.

**Principle IV:** The exchange of matter between natural systems and human societies affects the long-term functioning of both.

**Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.
(d) The environmental principles and concepts shall include, but not be limited to, concepts relating to the following topics:

(1) Air.

(2) Climate change.

(3) Energy.

(4) Environmental justice.

(5) Environmental sustainability.

(6) Fish and wildlife resources.

(7) Forestry.

(8) Integrated pest management.

(9) Oceans.

(10) Pollution prevention.

(11) Public health and the environment.

(12) Resource conservation, waste reduction, and recycling.

(13) Toxics and hazardous waste.

(14) Water.
SB 720 (Allen, 2018)

(4) Encourage and support the incorporation of the environmental principles and concepts into the credential requirements for both teachers and school administrators.

Section 51227.3 is added to the Education Code, to read:

51227.3.

(a) The Instructional Quality Commission shall ensure that the environmental principles and concepts developed pursuant to Section 71301 of the Public Resources Code 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.

(b) The environmental principles and concepts shall be incorporated, as the state board determines to be appropriate, in the criteria developed for textbook adoption required pursuant to Section 60200 or 60400.
# INTERSECTIONS AMONG THE THREE FRAMEWORKS

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<th>Student Inquiry</th>
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<td>Students investigate the communities where they live.</td>
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<td><strong>Phenomenon-based</strong> science inquiries based on the interests and needs of</td>
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<td>students and their communities.</td>
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<td>Students develop inquiry-based critical thinking skills to improve their ability</td>
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<td>to make reasoned <strong>decisions based on evidence</strong>.</td>
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<td>Students <strong>explore their local community</strong> to make contact with times past with</td>
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<td>the people whose activities have left their mark behind on the land.</td>
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<th>Student Action</th>
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<td>Students collaborate to resolve problems and issues in their local communities.</td>
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<td>Students engage in exploring societal and environmental challenges and</td>
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<td>contribute to <strong>designing and implementing solutions</strong> to these problems.</td>
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<td>Promote <strong>civic engagement</strong> and deepen student understanding and the rights</td>
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<td>and responsibilities of citizenship.</td>
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<td>Students use what they have learned to <strong>enhance individual and community</strong></td>
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<td><strong>health</strong> and resolve local health problems.</td>
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Climate Policies

California's GHG Emissions Reduction Policy Timeline

**2020**
- **AB 32** Economywide GHG emissions equal to 1990 levels
- **SB 1383** 75% reduction of organic waste disposed in landfills from 2014 levels

**2023**
- **SB 1383** Economywide GHG emissions 40% below 1990 levels
- **SB 32** Reduce methane & HFCs 40% and black carbon 50% below 2013 levels

**2025**
- **SB 1275** One million zero-emission vehicles (ZEVs) or near-ZEVs
- **E.O. B-55-18** Economywide carbon neutrality & net negative emissions thereafter

**2030**
- **E.O. B-48-18** 1.5 million ZEVs
- **SB 100** 60% renewables for electricity
- **SB 350** Double energy efficiency
- **Low Carbon Fuel Standard** Carbon intensity of gasoline reduced 16.9%, diesel 14.9%, and jet fuel 10.1% below 2011 levels*

**2045**
- **SB 100** 100% zero-carbon electricity
- **E.O. S-3-05** Economywide GHG emissions 80% below 1990 levels

**2050**
- **E.O. B-16-12** Transportation sector GHG emissions 80% below 1990 levels

**Note:** To meet its aggressive GHG emissions reduction goals, California has a number of policies aimed at reducing emissions from various sectors and end uses. Also note that bill numbers were used as a shorthand.

Source: Energy Futures Initiative
California’s Environmental Literacy “Blueprints”
ENVIRONMENTAL AND CLIMATE CHANGE LITERACY SUMMIT

December 11-12, 2019 | UCLA Meyer and Renee Luskin Conference Center | Los Angeles, CA

Now more than ever, climate change is an urgent issue that must be addressed. Education must be part of the solution. With that in mind, the University of California (UC) and California State University (CSU) systems are partnering with key stakeholders to support the urgent need to advance PK-12 environmental and climate change literacy by focusing on the preparation of current and future teachers to respond to these urgent issues.

The Environmental and Climate Change Literacy Project and Summit (ECCLPS, pronounced "eclipse") Steering Committee is a collaborative effort helping to make this work possible with the goal to:

Educate 500,000 graduating high school students per year in California to become literate in environmental and climate change issues and solutions.
My UCLA Environmental Education Story
Ram’s Vision: 500,000 Climate Warriors

**Bending the Curve: Climate Solutions**

*A New Education Protocol*
- Hybrid Course
- Digital Text Book
- Online Hybrid Course
- MOOC: 4 Course certification program

Developed by UC’s: Innovative Initiative & UCSD-Extension (MOOC).
50 Faculty from all 10 Campuses
ECCLPS Steering Committee Co-chairs

Marquita Grenot-Scheyer
Assistant Vice Chancellor, Educator Preparation and Public Schools Programs, CSU Office of the Chancellor

Ram Ramanathan
Distinguished Professor of Climate and Atmospheric Sciences, Scripps Institution of Oceanography, UC San Diego

Marcelo Suárez-Orozco
Wasserman Dean & Distinguished Professor of Education, Graduate School of Education & Information Studies, UC Los Angeles

Fred Uy
Director, Educator Preparation and Public School Programs and Co-Director, Center for the Advancement of Instruction in Quantitative Reasoning, CSU Office of the Chancellor
Subcommittee Co-chairs

Pre-service Subcommittee Co-chairs

Richard Arum
Dean and Professor, School of Education, UC Irvine

Cheryl Ney
Dean, Charter College of Education, Cal State LA

In-service Subcommittee Co-chairs

Jill Grace
Regional Director for K-12 Alliance, WestEd

Emily M. Schell
Executive Director, California Global Education Project

Curriculum Subcommittee Co-chairs

Karen Cowe
Chief Executive Officer, Ten Strands

Barbara Murchison
Director of the Educator Excellence and Equity Division, California Department of Education
Subcommittee Members

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Katie Burns, Senior Project Coordinator, Teachers College of San Joaquin
Aquiles Cervantes, Director, Office for Student Services, CSU, Los Angeles
Marc Epstein, Director, California Environmental Technology Education Network
Jason Fein, Chief, and Environmental Advisor, California Natural Resources
Marnie Jowett, Professor, Applied and Advanced Studies in Education, CSU, Los Angeles
Vegard Stenhaug von Stengelen, Professor, Biology, CSU, Northridge
Leslie Pianko, Director, Research Opportunities, CSU Chancellor’s Office
Jessica Pratt, Associate Teaching Professor, Ecology & Evolutionary Biology and Co-Director, CalTech, UC Irvine
Jeff Shane, Faculty Advisor, Teacher Education Program, UC, Los Angeles
Leslie Terrace, Director, Green Program, Seventh Generation Advisors
Asha Whaley-Brown, Community Representative, Center for Environmental Studies, and CSU, Los Angeles
Jeffrey White, Professor, Biological Sciences, Humboldt State University

IN-SERVICE
Denise Chen, Master of Science Student, Community Development, UC Davis
Annamarie Frati, Executive Director, Center X, UC, Los Angeles
Susen Gonzalez-Zelaya, Professor, Department of Science Education, College of Natural Sciences and Mathematics, CSU, Long Beach
Mary Anne Pella-Darnovsky, Teacher, Science, Chico Junior High School, Chico Unified School District
Mona Simas, Executive Director, California Science Project, UC, Riverside
Anne Stephens, Assistant Professor, Department of Science Education and Director, 9th and Northern California Science Project, CSU Chico
Fred Updike, Director of Education Preparation and Public School Programs, CSU, Chico’s Office
Kimberly Wells, Teacher Leader, California Global Education Project

Core Coordinators at the ECCPS Secretariat
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Claudia Martinez, Executive Director, Educator Programs, Office of Diversity and Engagement, University of California, Office of the President
Mall St. Clair, Director of Sustainability, University of California, Office of the President

Shelley Brooks, Program Coordinator, California History-Social Science Project, UC Davis
Cayce Dondich, Executive Director, Strategic Energy Innovations
Amy Frene, K-12 Program Manager, Ten Strands
Rebecca Henshaw, Outreach Specialist and Demonstration Teacher, Dual Language Immersion, UC Los Angeles Lab School
Frank Niepold, Senior Climate Education Program Manager, National Geographic and Agriculture Administration
Cheryl Porter, Senior Environmental Science Specialist, Office of Education and the Environment, CalRecycle

Steering Committee Members
Richard Arum, Dean, School of Education, UC Irvine
Pre-service Subcommittee Chair
Susan P. Belgrad, Michael G. Ekerdt College of Education, CSU Northridge, CSU STEM Innovations Team Leader
Karla Bigelow, Green Technologies and Energy Conservation Teacher, Yosemiite High School, Merced Union High School District
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Barbara Manchon, Educational Resource and Equity Division Director, California Department of Education, Curriculum Subcommittee Chair
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Jody Prinse, Associate Dean, Community Programs, UC Los Angeles
Non-Reader, Senior Director of Learning Design and Innovation, Birch Aquarium at Scripps and CISEST, Center for Research on Educational Equity, Assessment, and Teaching Effectiveness, UC San Diego
Emily Schell, Executive Director, California Global Education Project, San Diego State University
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Samuel Shen, Professor, Department of Mathematics and Statistics, San Diego State University
Mona Simas, Executive Director, California Science Project, UC, Riverside
Anne Strauss, Vice President, California State Board of Education
Leslie Terrace, Director, Ocean Program, Seventh Generation Advisors
Kimberly Wells, Teacher Leader, California Global Education Project
Jeffrey White, Professor, Biological Sciences, Humboldt State University
1. Event Coordination
2. Invites/Attendees
3. Planning and Logistics ($250k budget)
4. Communications/Website
5. Program Support
1. **Key Stakeholders** — 216 attendees
   - Higher Education Leaders
   - K-12 Teachers
   - Districts/County Offices
   - State Departments/Agencies
   - Students
   - Nonprofits (education and non-education)
   - Scientists
   - Nonformal Educators (museums/aquariums)
   - Philanthropy Leaders
   - Principals/Administrators
   - Legislators

2. **Additional Parameters**
   - Diversity
   - Geography
   - Gender
   - Perspectives
   - Age
Demonstrating Sustainable Practices

1. Considerations
   - Menu
   - No plastic
   - Centerpieces

2. Challenges
   - Individually wrapped items
   - Avoiding food waste
Report Challenges and Successes

1. Timeline and workload
2. Budget
3. Content
4. Vetting
5. Printing
6. Next steps
https://sites.google.com/tenstrands.org/ecdps/report?authuser=0
First, the co-chairs and committee members had to get up to speed on the foundational California initiatives.
1. **Integrate** environmental and climate change literacy across all subjects.
2. **Earth science** is an indispensable discipline to holistically address the issues at stake.
3. The **state** of California should create a **task force** for the promotion of environmental and climate change literacy.
4. **ECCLPS** should create a **task force** for the implementation of this plan.
5. The **California Commission on Teacher Credentialing** will further refine and update opportunities for current pre-service teachers to integrate Environmental Principles & Concepts into core subjects they teach.
Teacher education programs must ensure teachers meet these TPEs to earn teaching credentials.

**TPE 3: Understanding and Organizing Subject Matter for Student Learning**

3.1 Demonstrate knowledge of subject matter, including the adopted California State Standards and curriculum frameworks.

3.2 Plan, design, implement, and monitor instruction consistent with current subject-specific pedagogy in the content area(s) of instruction, and design and implement disciplinary and cross-disciplinary learning sequences, including integrating the visual and performing arts as applicable to the discipline.

3.6 Use and adapt resources, standards-aligned instructional materials, and a range of technology, including assistive technology, to facilitate students' equitable access to the curriculum.

**TPE 4: Planning Instruction and Designing Learning Experiences for All Students**

4.1 Design and implement instruction and assessment that reflects the interconnectedness of academic content areas and related student skills development in literacy, mathematics, science, and other disciplines across the curriculum, as applicable to the subject area of instruction.
1. The proposed efforts should endeavor to **align with existing initiatives** to leverage resources and build capacity for implementing the report’s recommendations at the system-wide, institutional, and individual level.

2. The task force should advocate for the use of **technological tools** and materials to access educational materials including climate and environmental data.
UC-CSU CAMPUSES

UC-CSU NXTerra is a unique collaboration between the state of California's two public university systems — the University of California (UC) and California State University (CSU).

Browse through these campuses by scrolling down, then follow the links to learn more about climate change education and sustainability at each campus.

Get in touch if you think there's something happening on your campus that we should know about!

https://www.nxterra.orfaleacenter.ucsb.edu/
1. Increase **teacher confidence** in environmental and climate change literacy.

2. Promote a **fully-scaled statewide system** for high quality teacher **professional learning** around California’s Environmental Principles & Concepts.

3. Obtain **administrative support** for environmental and climate change literacy in schools.

4. Emphasize action and **civic engagement** as part of environmental and climate change literacy.

5. Create **interdisciplinary** learning models across different subject areas.
CSMP has nine Subject Matter Projects. Browse the various project's programs through the links below. You may also view all programs across projects.
1. *Pre-service* course for elementary and secondary teachers should endeavor, whenever possible, to expose student teachers to state of the art environmental and climate change literacy.

2. *In-service* professional learning offerings for teachers should *strategically convene educators and relevant local working groups* or community networks to re-examine and localize PK-12 course offerings.
Model Curriculum vs. Localized Curriculum

https://www.californiaeei.org/curriculum/

The EEI Curriculum has 40 science units and 45 History-Social Studies units that integrated content standards with the EP&Cs.

They were written before Common Core ELA and Math and NGSS.

Our History-Social Studies standards remain in effect.

Climate change was not an explicit topic.

They remain popular with teachers for free downloads because of their quality.
Why not update EEI?

https://www.californiaeei.org/media/1087/environmental-topics-map.pdf

“We want our students and our students want to be engaged in inquiry-based learning leading to action in their local communities in partnership with community based organizations, science rich institutions, environmental justice organizations, social justice organizations, infrastructure organizations, water, waste, energy...”

- Karen Cowe, Chief Executive Officer, Ten Strands

### ENVIRONMENTAL TOPICS IN THE EEI CURRICULUM

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<td>2.2.f.-Flowering Plants in Our Changing Environment</td>
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<td>2.4.1.-From Field to Table</td>
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<td>2.4.3. and 2.4.5.-The Dollars and Sense of Food Production</td>
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<td>3.2.2.-California Indian People: Exploring Tribal Regions</td>
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<td>3.5.1, 3.5.2, and 3.5.3.-California’s Economy: Natural Choices</td>
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1. Curricula should teach climate change as expressed in California’s Next Generation Science Standards (NGSS) and CA Science Framework with explicit connections to California’s Environmental Principles & Concepts.

2. Curricula should teach climate change via connections to California’s Environmental Principles & Concepts and as outlined in California’s adopted frameworks in History-Social Science, and Health.

3. Curricula should guide students to explore real-world phenomena through outdoor and environmental place-based experiences, participate in problem-based learning and apply engineering design strategies to solve real-world problems.

4. To engage and empower students, developmentally appropriate curricula should activate students to play a significant role in culturally relevant community issues in an integrated, interdisciplinary way. Students should identify themselves as climate leaders that can drive equitable climate solutions now and into the future.

5. The teaching of climate change needs to be coherent and coordinated across school and community experiences.
VIGNETTES OF BEST PRACTICES

VIGNETTE 1
Designing Solutions for California’s Energy Future in the Central Valley

In 2018, a suite of PK-12 learning sequences was developed by members of the California Science Teachers Association (CSTA) in collaboration with practicing climate scientists. These teachers developed and piloted these lessons in classrooms. In addition, they underwent peer review and the Next Generation Science Standards Lesson Screeners were utilized to revise and update them. In a high school physics unit, “Constructing California’s Energy Future,” students discuss and read about the prevalent phenomena of poor air quality in their own backyard. Then students identify what they would like to know more about to determine both the causes of air pollution in the Central Valley and solutions to the problem. Students are given the opportunity to first patterns in the data they propose and explore connections between both natural and human-made events that might be causing the poor air quality. Once students determine clear causes of the Central Valley air pollution, they explore solutions to control the air quality and reduce the impacts of humans on the environment, including choices individuals, communities, and governments can make. Students use Governor Brown’s executive order on carbon neutrality and SB 100 (committing California to 100% renewable energy for electricity by 2045) as a framework for designing their solutions and present these proposals to the class for their final assessment.

This teacher- and researcher-created curriculum illustrates three related best practices. This unit addresses science and social studies standards by having students examine data and public policy documents in the context of a pressing environmental issue. The curriculum also addresses the Next Generation Science Standards (Best Practices 1 and 2, respectively). Specifically, this unit addresses the NGSS Disciplinary Core Ideas that “all forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits and new technologies and social regulations can change the balance of these factors” (ESS3-4) and “when evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and ethical implications” (ETS1-4). More than just an engaging phenomenon, air quality is a highly relevant climate change-related health danger that today’s youth around the world are bringing a sense of urgency to their teachers, mentors, and employers in policy industry, and science to solve together (Best Practice 3). This learning sequence directly addresses California’s Environmental Principles and Concepts (E&P&C) Principle IV, Concept C, which states that students should understand “that the capacity of natural systems to adjust to human-caused alterations depends on the nature of...

VIGNETTE 2
Career Development through Student Leadership Projects in Marin County

The Marin School of Environmental Leadership (MSEL) at Terra Linda High School, a project-based, environmentally focused, “school within a school” that emphasizes development in leadership and 21st Century skills, designed and supported by Strategic Energy Innovation (SEI), is a model for transforming public education. Students dedicate four years to becoming environmental leaders and follow an Entrepreneurship Career Technical Education (CTE) pathway. They take NGSS-aligned coursework ranging from ocean accification and energy auditing to sustainable enterprises and environmental engineering. Multiple A-G subject courses have been integrated with both environmental and leadership skill development, including English, History-Social Science, Health, and Science courses. Students are active in community projects with significant climate protection impacts during their freshman and sophomore years. In the past nine years, students have led local resident neighborhood initiatives, reduced waste by eliminating single-use plastic, and successfully petitioned for their local school district to move to 100% renewable electricity with local utilities. They created Matter Climate Report Cards for the city and county, which resulted in a citywide youth ordinance and the entire City of San Rafael committing to 100% renewable electricity. Students intern with a local organization their senior year of high school to lead a sustainability project with organizations such as the San Rafael Airport, MCE Clean Energy, Clough Construction, Marin County Office of Education, and Zero Waste Marin.

Strategic Energy Innovation’s A-G Career and Technical Education (CTE) approved courses provide a solid foundation from which a school can help young adults expand their efforts into the community. The curriculum for courses such as “Innovations in Green Tech,” “Energy and Environmental Design,” and the “Solar Certificate” is free to California educators. They help students explore in a robust manner how to apply engineering solutions (Best Practice 4) in their own community as they transition through high school to vocational training and higher education (Best Practice 5).

VIGNETTE 3
Student Engagement through a Youth Climate Summit in Cupertino

Chemistry teacher and 2019 National Geographic Educator of the Year Kevina Gupta from Monte Vista High School hosts an annual Youth Climate Summit that unifies students, staff, and local experts around a common cause. As a teacher-leader, she brings her colleagues together from different departments for monthly planning sessions in which teachers are encouraged to address climate change where it naturally fits in their curriculum in ways that help students meet multiple standards at once. The summit itself is a presentation of learning where students share out the results of their climate-related research. Ms. Gupta’s chemistry students presented their findings in a four- to five-page paper and in poster sessions. In other 9th-12th grade classes such as social studies, ceramics, drama, and English, students demonstrated and deepened their content knowledge and expressive communication skills by performing songs, creating interactive booths, displaying artwork, and presenting short stories and websites. On the day of the summit, held at the San Jose Tech Museum, scientists and policy makers provided feedback on student presentations. Ms. Gupta reflected on the event: “High schoolers feel small with big problems. They think, ‘I can’t change the world.’ I have seen what it gives kids—that confidence, and the real meaning of education. When the experts look at your work, it validates you. Many students pledged to walk to school two days a week, to do real impactful things. They used modeling and data visualization and saw how other people benefited from their small actions. They realized ‘Yes I have a voice and a choice.’”

While standards-aligned instructional materials and district-wide adoption of high-quality published curricula are crucial assets in climate change education, the generative power of local creativity and flexibility cannot be overemphasized. Nor can the influence of student voices be ignored. The Youth Climate Summit approach models the process of national and international collaboration and can spur schools and community members to informed action (Best Practices 4 and 5). Ms. Gupta has created an Educator Guide to help with the process and the National Science Teaching Association (NSTA) has published a flexi

The curriculum subcommittee created three classroom vignettes to exemplify our five best practices in real California schools.
APPENDIX 4.1 (CURRICULUM): Climate Change Instructional Resources

The UC/CSU system K–12 educators and their partners have a wealth of well-developed, standards-aligned curricular and instructional resources from which to draw in developing pre-service, in-service, elementary, and secondary courses. For example, in 2018, the California SBE adopted science programs from 18 publishers. Each program is NGSS-aligned and incorporates the EPSCs. (https://www.cde.ca.gov/ci/el/elprogr/programs2018.asp). NGSS explicitly addresses climate change and its related issues from middle school to high school and possibly addresses it in K-12. In addition to publications available for purchase, there are many free, easily accessible, climate-related instructional resources.

Advancing Climate Literacy through Investment in Pre-School Educators (ACLIPES) (Grades K–12) instructional materials and professional learning materials in climate science education (https://www.niea.edu/niea/college-courses/ACLPES/overview)

Alliance for Climate Education, Our Climate Our Future. Award-winning climate education resource for teachers featuring ACS teachers sharing our sign of arrest, video, and interaction, including their questions, climate change lesson plans and more. (https://ourclimateourfuture.org)

California Department of Education, Instructional Resources, Climate Change This collection of supplementary curricular resources can help teach students about global climate change and increase awareness. (https://www.cde.ca.gov/ta/tg/climatechange.asp)

California Department of Water Resources offers resources related to California’s climate-water connection. (water.ca.gov/What-We-Do/Education/Climate-Change-Poster)

California Education and the Environment Initiative K–12 curriculum that demonstrates how to incorporate the EPSCs into science and history instruction. While the EBI science units were written prior to NGSS, they remain resources that may be harvested for NGSS lessons. (https://www.californiawef.org/curriculum/history-sciences-utms/)

California History-Social Science Project Resources to help students understand current events in relation to their historical context. (https://tssnp.ucol.vcsu.edu/education-content/)

California Science Teacher Association K–12 learning sequences focusing on phenomena-based teaching and learning. (https://www.cssteachers.org/climate-summer/k-12-learning-sequences/)

Civic Action Project (CAP) Project-based learning that connects an issue to public policy then guides students how to take “civic actions” to impact the issue. (https://cito楙ing.com)


Climate Literacy & Energy Awareness Network (CLEAN) Learning resources, visualizations, videos, and classroom materials by core and project partners focused on climate and energy. (https://www.cleen.org/index.html)

EarthLabs Earth and environmental/life science courses. NGSS-aligned units. Evaluate a sequence for learning science concepts through data analysis, visualizations, satellite imagery and other models, and hands-on experiments that illustrate processes of our Earth system. (https://serc.carleton.edu/earthlabs/index.html)

EcoRise: A green-focused high school that empowers youth to tackle real-world challenges in their schools and communities by teaching sustainability, design innovation, and social entrepreneurship. (https://ecorise.org/about/)

Energize Schools: A Program of Strategic Energy Innovations Grades 9–12 project-based learning that engages students in sustainability. (https://www.energizeschools.org/)

Global Warming Project Aims to connect to stories, the local human experience related to climate change. (https://www.gloabalwarmingproject.org/)

Morningside Center for Teaching Social Responsibility Lessons and resources to help educators encourage social responsibility and foster social and emotional learning. (https://www.morningsidecenter.org/)

NASA: Global Climate Change Articles, data, lessons, and interactive components focused on climate change. (https://climate.nasa.gov/)

NASA: Jet Propulsion Laboratory Articles, data, lessons, and interactive components focused on our universe of science, technology, engineering, and math. (https://www.jpl.nasa.gov/)


National Wildlife Federation’s (NWF) Climate Classroom Online climate science and solutions curriculum, learning community and education program development program to help K-12 educators develop skills in and hone the tools and public support they need to teach students about the most important environmental subject they will experience throughout their lifetimes. (https://climateclassroom.org/)

Nature Works Everywhere Lessons and resources to help students learn the science behind how nature works for us and how we can keep it thriving. (https://www.natureworks.everywhere.org/)

NOAA Climate.gov Science-based, interdisciplinary models of education and public engagement support learners of all levels and foster climate and energy literacy and action. (https://www.noaanews.noaa.gov/climate.gov)

Climate.gov features a page of information about teaching with the Third National Climate Assessment, including background and learning pathways to help educators utilize key messages and data, region-by-region, or other supporting education and communication resources. (https://www.climate.gov/teaching/)


Project Drawdown Global research organization that identifies, reviews, assesses the most viable solutions to climate change, and shares these findings with the world. (http://www.drawdown.org/)

Project Learning Tree Curriculum that uses trees and forests as windows on the world to increase students’ understanding of the environment and action. (https://www.plt.org)

Project WET offers water resource education materials that are appropriate for many different age groups and cultures, includes a climate resilience lesson on environmental and infrastructural changes that can help to mitigate the water-related impacts of climate change in communities and on certain populations. (https://www.projectwet.org/climate)

Project Phenomena Phenomena focused university used to student- personal experiences with observable events, where an evidence based explanation can be constructed. Website creates a searchable database of local phenomena and data aligned with NGSS dimensions and EPSCs. (http://nsgeведите/phenomena-and-the-NGSS/)

The-Importance-of-Phenomena

Teacher-Friendly Guide to Climate Change Policymaking Research Institute’s book includes all the basics of climate change science and perspectives on teaching a subject that has become socially and politically polarized. For high school earth science and environmental science teachers with classroom ready information and graphics. (https://pubsite.xpx2xpubsite/)

Understanding Global Change and Understanding Science, UC Berkeley A thoughtful framework, systems models, lessons, and assessment tools that guide the design of interdisciplinary global change curricula and to support the exploration of the nature and status of science. (http://www.implicit.berkeley.edu/guide-resources/)

U.S. Climate Resilience Toolkit Website designed to help policy-makers and tool use find, inform, and support, and subject matter experts to build climate resilience. Offers information from all across the U.S. federal government in one easy-to-use location. (https://toolkit.climate.gov/)

World Climate: Climate Change Negotiations Game Role playing exercise of the UK climate change negotiations for groups. Uses an interactive computer model to rapidly analyze the results of the mock-negotiations during the event. Available in multiple languages. (https://www.climatetime.org/programa/world-climate/)

Young Voices for the Planet Film Series Empowering children and youth, through a network of inspiring stories, to take an essential role in informing their communities and sides of the world’s most challenging decision-makers, and catalyzing change. (https://www.youngvoicesfortheplanet.com/)

SUBCOMMITTEE RECOMMENDATIONS

These recommendations are offered as additions to the Subcommittee recommendations included in the Strategic Summary.

Recommendations to the UC-CSU Systems

Implicit and explicit policy changes to how higher education priorities and supports environmental and climate change literacy can be supported for teachers on the ground and provide incentives for administration and parents to become more interested and committed to better environmental and climate change literacy.

In terms of implicit and explicit policy changes, we offer suggestions for:

- Leverage Existing Campus Resources
  UC and CSU systems can invest in collaborating in local working groups of university researchers and instructors from all relevant science and non-science disciplines, schools of education, community partners, and PK-12 leaders and teachers to revise existing courses and develop new ones for future and current teachers to better align with the goals already in place. Policies, standards, frameworks, and State Board of Education-approved published curricula exist and there are many supplemental resources available. In order to teach these curricula, universities play a vital role in building educator content knowledge and pedagogical capacities.

- Environmental and Climate Change Literacy and Leadership Master’s or Certificate Programs
  Create and offer master’s programs or certificate programs that are focused on environmental and climate change literacy and leadership.

- Revise Research, Tenure, and Promotion (RTP) Policies and Practices
  Encourage universities to revisit their RTP policies and practices to promote cross-curricular programs. For example, encourage environmental science faculty to collaborate with schools of education to develop PK-12 professional learning programs.

- Pilot Group to Create Model Pre-Service Courses
  Collaborate with a group to create model pre-service courses that align with these best practices, state standards, and the California Commission on Teacher Credentialing’s Teacher Performance Expectations for new teachers.

- Additional Subcommittee Recommendations

Environmental and climate change literacy interconnectedness of educational content and with real-world experiences. Students work and learn within the ecosystem of their campus and community; therefore, a systems approach should include parents and community, school boards and trustees, unions, nonprofits, community-based organizations, local businesses, and accrediting bodies.

These recommendations are related and build off each other to provide a more comprehensive framework for educators to succeed in increasing educational environments related to environmental and climate change literacy. They also extend the professional learning recommendations presented for pre-service educators in this report.

- Leverage existing State resources such as Residency Grants, the Integrated Education Program (IEP), and Bilingual Authorization (BLA) grants to promote environmental and climate change literacy education

Specifically, the development of IEP programs explicitly focused on environmental and climate change literacy will improve the education of future teachers in this area while also increasing diversity in the teacher workforce.

This is an important component of environmental justice efforts because environmental justice is intimately connected to social justice.

- Initiate partnerships between educator preparation programs and industry sector identified high school pathway programs participating in Linked Learning

This is a California statewide initiative that combines rigorous academic, work-based learning, and career and technical education (CTE) for middle and high school students to prepare them for college and careers. Teachers collaborate across subject areas with input from working professionals and are reinforced using scaffolded work-based learning opportunities provided by real employers cultivating in senior design projects.

- Strategically convene in-service professional learning networks

In-service professional learning networks for practicing teachers should convene educators and other local working groups or community networks to re-think and localize PK-12 course offerings. At the high school level, the focus should be on helping educators incorporate climate change content into A-G approved courses, in every subject and in expanding the number of Career and Technical Education (CTE) courses in environmentally-related sectors available to students.
1. Update California’s Education Code and subsequent earmarked funding to support three years of science in high school.

2. Maximize the benefits of Local Control and Accountability Plans (LCAPs).

3. Target financial support from the state specifically for the implementation of new standards and frameworks.
<table>
<thead>
<tr>
<th>High School Subject Area</th>
<th>State Mandated Requirements* (EC 51225.3) for High School Graduation</th>
<th>UC Requirements for Freshman Admissions</th>
<th>CSU Requirements for Freshman Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Three Years</td>
<td>Four years of approved courses</td>
<td>Four years of approved courses</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Two years, including Algebra I, beginning in 2003–04. (EC 51224.5)</td>
<td>Three years, including algebra, geometry, and intermediate algebra. Four years recommended.</td>
<td>Three years, including algebra, intermediate algebra, and geometry.</td>
</tr>
<tr>
<td>Social Studies/Science</td>
<td>Three years of history/social studies, including one year of U.S. history and geography; one year of world history, culture, and geography; one semester of American government and civics, and one semester of economics.</td>
<td>Two years of history/social science, including one year of U.S. history or one-half year of U.S. history and one-half year of civics or American government; and one year of world history, cultures, and geography.</td>
<td>Two years, including one year of U.S. history or U.S. history and government and one year of other approved social science.</td>
</tr>
<tr>
<td>Science</td>
<td>Two years, including biological and physical sciences.</td>
<td>Two years with lab required, chosen from biology, chemistry, and physics. Three years recommended.</td>
<td>Two years, including one year of biological and one year of physical science with lab.</td>
</tr>
</tbody>
</table>

[URL](https://www.cde.ca.gov/ci/gs/hs/hsgrtable.asp)
Call to Action for County, District, & Educational Leaders

How do we think about the world in our own backyard when we think of nature as being 'out there'? How do we make sure they're really learning that they need to take care of the classroom, the community, where they live, and to be aware of what's going on globally?

KELLEY BARRETT, SCIENCE COORDINATOR, ANAHEIM ELEMENTARY SCHOOL DISTRICT

Environmental Literacy—California’s Promise

This matrix shows how guiding structures in California’s educational landscape—LCAPs, CA MTSS, and Environmental Literacy (as codified in SB 720)—mutually support conditions of learning, engagement, and pupil outcomes.

STATE PRIORITIES

**CONDITIONS OF LEARNING**

Students are provided with safe and properly maintained schools. Teachers are fully knowledgeable about their students and their needs with a clear, course of study that helps students identify critical thinking skills and prepares them to be civically engaged and college and career ready.

**ENGAGEMENT**

Students are provided with engaging programs, coursework, and opportunities that they find meaningful and can be both in and out of the classroom. Teachers, schools, and communities work closely together to create a strong foundation for student achievement.

**PUPIL OUTCOMES**

Student achievement means improving outcomes for all students, especially student access.

**Planning Guidelines**

**LCAP Local Control Accountability Plan**

All students regardless of age, race, gender, gender identity, disability, sexual orientation or expression, are provided with a safe and conducive learning environment.

**CA MTSS California Multi-Tiered System of Support**

Families and community members are partners with their child’s school in the development of student achievement in the life of the school and the school responds to family inquiries and involvement in culturally-responsive, inclusive, and engaging activities.

**Environmental Literacy**


Educators should ensure that environmental literacy content and standards are developed and available for use in classrooms to teach the linguistic, ethnic, and socioeconomic diversity of California. Include a critical foundation of skills and knowledge to help students explore the natural world and contribute to the environment in ways that will sustain a diverse and sustainable future.

Integrating subjects such as science, history-social science, health, social justice, and environmental justice provides a unique opportunity to equip our students with a relevant and meaningful appreciation for stewardship of the environment, while providing valuable real-world experiences.

TONY THURMOND, STATE SUPERINTENDENT OF PUBLIC INSTRUCTION

Call to Action for County, District, & Educational Leaders

Document available at: https://ca-eli.org/resources-administrators/
Featured Keynotes

Edmund G. Brown Jr.
Governor (former), California

Marcia McNutt
President, National Academy of Sciences

Janet Napolitano
President, University of California

Timothy P. White
Chancellor, California State University
Call to Action

“We [native people] managed to remember our biggest responsibilities that have been left to us by our ancestors. And that is to live and to use the instructions that have been given to us on how to be human beings, to protect that which we are a part of, the nature and the environment.”

- Miztlayolxochitl Aguilera, Tongva/Gabrielino and Mexica Native and B.S. Student, Chicano and Latino Studies, Certificate, American Indian Indigenous Cultures

“We are here collectively addressing [climate change] because it is the single most existential problem we face in the world today.”

- Janet Napolitano, President, UC
“I was pleased to see in the report the approach of systems thinking. This is where the Newsome administration is in thinking about climate. It is part of and integrated into everything else we do...We need to be thinking about this across every agency and every part of the university...I want to talk about doing that both internally and externally..doing this within the university itself, not just thinking of this as something we’re teaching...how do we break down some of the silos so this becomes what’s underpinning everything we do?”

- Kate Gordon, Director, Governor’s Office of Planning and Research and Senior Policy Advisor to the Governor on Climate

“If we’re going to help kids learn science in ways that help them act politically, then we’ve got to take the political nature of these problems head on and we need to help teachers understand how to do that in classrooms in places where they might be antagonistic to that.”

- Bill Sandoval, Professor of Education, UCLA
Pre-service (Teacher Preparation) Roundtables

Table 1. How can we enhance the recruitment of students with interests in climate change action into the teaching profession?

1. Presenter: Jose Flores, Civic and Environmental Advisor, Comite Civico Del Valle and former educator
2. Presenter and Facilitator: Agustin Cervantes, Director, Office for Student Services, Charter College of Education, California State University, Los Angeles
3. Description: Explore current recruitment strategies into teaching with a focus on teachers of color and teachers with an interest in environmental education.

Table 2. What is the alignment between Environmental Principles and Concepts and single subject/multiple subject matters?

1. Presenters:
   1. Mara Brady, Associate Professor, College of Science and Mathematics, California State University, Fresno
   2. Virginia Oberholzer Vanderberg, Professor, Biology, College of Science and Math, California State University, Northridge
   2. Facilitator: Cheryl Ney, Dean, Charter College of Education, California State University, Los Angeles
3. Description: This session focuses on how the California’s Environmental Principles and Concepts (EP&C’s) can be integrated into both education courses and science content courses for pre-service teachers. Ways to introduce EP&C’s to university faculty in both education and science are discussed and experiences are shared by presenters and participants.

Table 3. How can field work help prepare student teachers to integrate climate crisis studies?

1. Presenter: Jeffrey White, Professor, Biological Sciences, Humboldt State University
2. Presenter and Facilitator: Jessica Pratt, Assistant Teaching Professor and Faculty Director, CalTeach Program, School of Biological Sciences, University of California, Irvine
3. Description: Recent studies show that children can foster climate change concerns from their parents, especially when linked to local or regional issues, which can result in meaningful local action to mitigate or adapt to the impacts of the climate crisis. Discuss the role of student teacher field work in climate crisis education from two perspectives: (1) student teachers can bring university research on climate impacts directly into classrooms, and (2) student teachers can be trained to effectively make the climate crisis a local issue by understanding the needs and concerns of the community they are working within. Examples of local and regional climate impacts are highlighted.

Table 4. What types of instructional materials and pedagogical approaches would best support teaching about the climate crisis in pre-service training?

1. Presenters:
   1. Jeff Share, Faculty Advisor, Teacher Education Program, University of California, Los Angeles
   2. Grinnell Smith, Professor, Teacher Education, Connie L. Lurie College of Education, San Jose State University
   2. Facilitator: Richard Arum, Dean and Professor, School of Education, University of California, Irvine
3. Description: Democratic pedagogy that is inquiry-based should address the intersections of environmental justice with social justice. Explore uses of media, technology, and popular culture to promote critical thinking about our relationship with the natural world and the climate crisis.
In-service (Teacher Professional Development) Roundtables

Table 7. How can the high school science 3-year course model (with embedded Earth and space sciences) truly promote environmental literacy development?

1. Presenters:
   1. Dean Reese, Science Coordinator, Outdoor Education and Environmental Literacy, San Joaquin County Office of Education
   2. Richard Smith, Science Teacher, Buena High School, Ventura Unified School District

2. Facilitator: Maria Simani, Executive Director, California Science Project, University of California, Riverside

3. Description: Explore the benefits and challenges of requiring 3 years of science at the high school level to promote a comprehensive science education designed to build scientific and environmental literacy including a deep understanding of climate change that empowers students to take action.

Table 8. How might Scholars, Practitioners, and Community Partners Contribute to Improving Best Practices?

1. Presenters:
   1. Thomas Herman, Director, California Geographic Alliance, San Diego State University
   2. Lynn Kim-John, Director, Science Programs, Graduate School of Education & Information Studies, Center X and Site Director, California Science Project, University of California, Los Angeles

2. Facilitator: Mary Anne Pella-Donnelly, Teacher, Science, Chico Junior High School, Chico Unified School District

3. Description: Explore opportunities for tapping into university scholars, professional learning programs, and community organizations connected to climate change and sustainability to enhance K-12 student learning.

Table 9. How might students, educators, scientists and community organizations collaborate to promote and support environmental engagement that benefits all students and the environment?

1. Presenters:
   1. Linda Chilton, Programs Manager, Sea Grant Education, College of Letters, Arts and Sciences, University of Southern California
   2. Rob Wade, Science and Outdoor Education Coordinator, Plumas County Office of Education

2. Facilitator: Kimberly Waite, Teacher, Compton Unified School District

3. Description: Explore how strong partnerships afford all students opportunities to understand and engage with authentic and relevant environmental phenomena and problems and allow them to become solution finders.

Table 10. How might we design systems of support that secondary classroom teachers need to implement environmental literacy best practices?

1. Presenter: Anne Stephens, Professor, California State University, Chico

2. Facilitator: Emily Schell, Executive Director, California Global Education Project, San Diego State University

3. Description: Explore the challenges and opportunities for creating a supportive ecosystem for secondary classroom teachers to effectively implement environmental literacy.
Curriculum Roundtable Topics

Table 13. CSTA Climate Summit—Lesson Sequences Co-created by Teachers and Scientists
1. Presenter: Stephanie Sanchez, Science Teacher, Vista Magnet Middle School, Vista Unified School District
2. Facilitator: Shannon Gordon, Education Programs Consultant, California Department of Education
3. Description: Participants learn about the lesson sequences, co-developed by California Science Teachers Association members and climate scientists, that support local, active, engaged, and authentic learning.

Table 14. Creating University Courses To Engage College Students in K-12 Classrooms
1. Presenters:
   1. Greg Grether, Professor, Ecology and Evolutionary Biology, University of California, Los Angeles
   2. Rebecca Henise, Outreach Specialist and Demonstration Teacher, Dual Language Immersion, Lab School, University of California, Los Angeles
2. Facilitator: Amy Frame, K-12 Program Manager, Ten Strands
3. Description: Hear about a successful partnership between a university faculty member and K-12 teachers that engages college students in delivering lessons in local classrooms. Learn about the implications of research on this project and the best ways to teach complex, multi-grade level concepts in the Next Generation Science Standards. Help refine a proposed professional learning and collaboration model for universities to encourage and support faculty in future climate change-focused lesson creation.

Table 15. Supporting Youth Climate Action
1. Presenter: Maxine Jimenez, Climate Educator, Climate Corps Education Outside
2. Facilitator: Karen Cowe, Chief Executive Officer, Ten Strands
3. Description: Learn about ways to support and empower high school students through their journey to becoming climate leaders. Maxine will share effective ways that educators, teachers, and community members have successfully supported youth in their community despite limited resources.

Table 16. Leveraging NGSS—How Learning about Climate Change Progresses in the California NGSS & Coherent Systems Support
1. Presenters:
   1. Kelley Le, Teacher Network Coordinator, CalTeach Math and Science Program, University of California, Irvine
   2. Mark Stemen, Professor, Geography and Planning, California State University, Chico
2. Facilitator: Frank Niepold, Senior Climate Education Program Manager, Climate Program Office, National Oceanic and Atmospheric Administration
3. Description: Explore (1) alignment between the Next Generation Science Standards (NGSS) and climate change topics in the California 2016 Science Framework across grade levels (2) different analyses are explored on how learning progresses in the NGSS related to climate change (3) educational and science practices and resources, including the Climate Literacy and Energy Awareness Network (CLEAN)—a peer-reviewed source of over 700 high-quality, rigorously reviewed, and NGSS-aligned climate and energy educational resources for grades 6-16.
Burning Questions

- Should we call the high school graduates climate *warriors*?
- Do we need another task force or steering committee or do we need to just open a center?
- Do we need to change the teacher credential or teacher preparation program requirements or are they already baked into the system?
- If not us, who? If not now, when?
Next Steps

- Steering Committee meeting will be held in person on Marcy 4, 2020 in Long Beach.
Discussion Questions

- What have you learned that might help the ECCLPS project be successful?
- What obstacles or threats can you foresee that ECCLPS might have to overcome?
- So far, what seems most promising about the ECCLPS work?
- How might ECCLPS be a model for what might happen in other states?
- How could the ECCLPS project connect with your work?