



State-Level Legislation Concerning K-12 Climate Change Education

James Elder | Campaign for Environmental Literacy

Anisa Heming | Center for Green Schools at the U.S. Green Building Council

Jacqueline Maley | Center for Green Schools at the U.S. Green Building Council



Center for Green Schools
at the U.S. Green Building Council

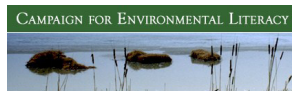


Photo credit: Graceland Park/O'Donnell Heights EMS | LEED Platinum | Baltimore, MD | © Martice Tucker (Grimm + Parker)



Center for Green Schools
at the U.S. Green Building Council

The Center for Green Schools is a global leader in advancing green schools, providing school districts and education leaders with resources and training to create sustainable, healthy, resilient, and equitable learning environments. We support and train those implementing sustainability within school systems to be the most effective change agents they can be through professional development, peer networks, research, and advocacy. Learn more at centerforgreenschools.org.



The Campaign for Environmental Literacy (CEL) is a network of national education and environmental organizations that work to engage the federal government in helping to close the nation's growing environmental literacy gap. CEL has led successful efforts with its lead partners (National Wildlife Federation, Second Nature, Earth Day Network, and U.S. Green Building Council) to restore and grow environmental education funding; authorize the University Sustainability Program at the Department of Education; establish the Green Ribbon Schools program at the Department of Education; and introduce the Ocean, Coastal, and Watershed Education Act and the No Child Left Inside Act. Learn more at climate-literacy.org.

The work on this report was generously supported by the Curtis & Edith Munson Foundation.

**THE CURTIS & EDITH
MUNSON FOUNDATION**

The Curtis & Edith Munson Foundation began making grants in 1987-88. Over the past three decades, they have emphasized partnerships, collaborations, and seed funding for new projects and organizations within the framework of their programs. Learn more at munsonfdn.org.

TABLE OF CONTENTS

I.	Introduction	1
II.	Making the Case for Climate Change Education	4
	Talking point 1: Parents, students, and administrators are calling for increased climate education	4
	Talking point 2: Climate change education in schools is essential to helping communities and our nation act to mitigate and adapt to the changing world.	5
	Talking point 3: Climate change education in schools will help our young people prepare for 21 st century jobs and careers.	6
	Talking point 4: Climate change education in our schools will increase national security.	7
III.	Crafting Language and Messaging for a Climate Change Education Bill	8
IV.	Essential Elements of a State Climate Change Education Bill	9
	1. Define key climate principles and concepts for the state	9
	2. Embed key principles and concepts into state education standards and assessments	10
	3. Include the state's NGO/non-formal learning community in planning and implementation	10
	4. Provide targeted funding to the state department of education and to school districts.	11
	5. Incorporate climate change education across the curricula	11
	6. Develop and disseminates statewide model curricula	12
	7. Require that textbooks align with the state's standards around climate change.	12
	8. Provide professional development to teachers	13
	9. Create a recognition program for high-performing schools	13
	10. Institute a statewide graduation requirement for climate literacy	14
V.	Model Climate Change Education Bill	15
VI.	Examples of States with Successful Climate Change Education Legislation	16
	California	17
	Connecticut	18
	Maine	19
	New Jersey	19
	Washington	20
VII.	Conclusion	22
VIII.	Works Cited	23

EXECUTIVE SUMMARY

State-Level Legislation Concerning K-12 Climate Change Education

OVERVIEW

Climate literacy is an overlooked tool in the toolbox for addressing the climate crisis. How can the necessary technological, economic, and policy changes happen without an educated citizenry? This report examines how state legislation can advance the development of essential human capital to tackle this daunting challenge.

WHY SUPPORT CLIMATE CHANGE EDUCATION?

Answer the call of parents, students, and administrators who are demanding it.

Help our communities act to mitigate and adapt to the changing world.

Support our young people in preparing for 21st-century jobs and careers.

Increase national security.

ESSENTIAL ELEMENTS IN A CLIMATE CHANGE EDUCATION BILL

- 1 Define key principles and concepts.
- 2 Embed principles and concepts into standards and assessments.
- 3 Include the state's NGOs in planning and implementation.
- 4 Provide targeted funding.
- 5 Incorporate climate change education across the curricula.
- 6 Develop and disseminate model curricula.
- 7 Require textbooks to align.
- 8 Provide professional development.
- 9 Create recognition programs.
- 10 Institute a graduation requirement.

PASSED LEGISLATION

CALIFORNIA

[Senate Bill 720 \(2018\)](#)

Adds the Environmental Principles and Concepts and core themes to the state's education code.

[Assembly/Senate Bill 130 \(2021\)](#)

Provides funding to create free education resources.

CONNECTICUT

[House Bill 5506 \(2021\)](#)

Requires that schools provide climate change education.

MAINE

[Legislative Document 1902/](#)

[House Paper 1409 \(2021\)](#)

Provides funding for a pilot program to provide teachers with professional development and for a climate change education position at the Maine Department of Education.

NEW JERSEY

[NJ Student Learning Standards \(2020\)](#)

Adds climate change to all New Jersey education content standards.

[Assembly Bill 4402/Senate Bill 2023 \(2023\)](#)

Provides funding to support climate change education grants to schools.

WASHINGTON

[Senate Bill 6032 \(2018\)](#)

Provides funding for grants to districts, community-based nonprofits, and education service districts for science teacher training, including training in climate science standards.

[Legislature confirmed](#) additional funding for 2019 and 2022/2023 fiscal years.

I. INTRODUCTION

PURSUING CLIMATE LITERACY IN THE UNITED STATES

Climate change is the paramount challenge of the 21st century. Although education is not the exclusive, nor perhaps even the primary means of addressing this issue, it is difficult to fathom how we could accomplish the extensive and far-reaching societal changes necessary to confront the climate crisis without a broad base of educated and literate citizens, consumers, policymakers, business leaders, and other stakeholders.

Improving climate literacy is imperative, and one way to have an impact is through top-down policy solutions. While climate change education in schools can occur organically in individual classrooms and schools, education policy—including through state legislation—will play a crucial role in expanding climate education to reach all students by removing barriers, providing resources, and setting expectations.

Regrettably, there are currently no comprehensive studies on the state of climate literacy in the United States. Nonetheless, there is some data and information that can help us understand the level of climate literacy and how public policy can have an impact, as outlined in this report. In 2021, [Allianz Research](#) surveyed a representative sample of 1,000 people in each of the five countries about their knowledge of the climate, climate policies, and climate actions. The United States stands out, with only 5% of American respondents considered highly climate-literate and over 55% demonstrating low climate literacy. Interestingly, the highest proportion of respondents considered climate-literate was among Boomers at 16.3%, while Gen-Z showed an 11.5% literacy rate.

In recent years, a growing number of state education policymakers have begun to recognize the need for climate literacy in K-12 schools. They have called for actions such as updating model educational standards to incorporate climate science and directing a shift in climate change education through standards of learning, funding, and teacher training.



Kellam High School | LEED Silver | Virginia Beach, Virginia | Photo credit: @ Ara Howrani

Perhaps the most significant step forward to date has been the release of the Next Generation Science Standards (NGSS) in 2013, which began the gradual process of revolutionizing K-12 science education. NGSS resulted from a state-led effort to create updated and improved science education standards based on the National Research Council's K-12 Framework for Science Education. In these new, voluntary standards, climate science is incorporated as a core idea for middle and high school students. Presently, twenty states and the District of Columbia have adopted these standards, and twenty-four additional states have adopted their own new standards largely based on NGSS, according to the National Science Teachers Association. Although the creation and adoption of NGSS was a significant step forward for climate change education, some fault NGSS for its relatively sparse treatment of the topic. Moreover, many experts estimate that it takes over a decade for new thinking and standards to trickle down to the classroom. The lack of adequate climate science in NGSS and the slow implementation, as well as the need to include climate in social studies and other subjects, means that greater efforts are essential.

OUR APPROACH

New policies are needed to enhance and broaden climate change education in all K-12 schools. These policies may originate from new legislation or from administrative actions. This document aims to provide state legislators, their staff, and advocates with information to comprehend the necessity for legislation, essential components of a bill, and examples of effective state legislation.

Recognizing the inadequate training of K-12 teachers in climate change education, our research reveals that only four states, namely California, Maine, New Jersey, and Washington, have recently passed legislation investing millions of dollars in preparing their teachers to teach climate change effectively. This paper examines these four states and a law without funding passed in Connecticut, highlighting how state-level legislation can positively influence the teaching of both the scientific and human aspects of climate change and improve climate change literacy.

While some states, such as Massachusetts, have introduced bills but not yet passed them, and others, such as Maryland, have established graduation requirements for environmental education, this paper focuses solely on states that have successfully passed state legislation or appropriations for climate change education. Our research was conducted through analysis of recently passed legislation, local news reporting, and interviews with key stakeholders who played a role in implementing state legislation.

DRIVERS OF CHANGE IN STATE EDUCATION

The state education policy system comprises several essential components, including governors, legislatures, state boards of education, and state education agencies.

Although governors lack direct control over curricula, their influence can be significant. Case studies from Washington and New Jersey, included in this report, demonstrate their tremendous sway. Depending on the state, governors may appoint members of the state board of education and influential education commissions, roundtables, and advisory bodies. Furthermore, they wield great power over spending.

Nearly all states task their legislatures with establishing academic standards, which are then implemented by state boards of education or departments of education.

State boards of education, functioning as the citizens' voice in state education, create policies about the state's education system. These boards' roles vary but often include setting high school graduation requirements, creating educational curricula, establishing statewide accountability and assessment programs, and other responsibilities. Recent examples of state board of education support for climate change education can be seen in New Jersey.

Efforts to adopt climate change education may originate from the legislature, governor, or board of education, but not usually from education departments, though their support is critical. A savvy advocate should begin with a landscape analysis of their state's education policy-making process, identify key decision-makers, assess their likelihood of supporting climate change education, and initiate outreach and engagement.



CLIMATE CHANGE EDUCATION:
Interdisciplinary formal and informal learning about relevant interrelationships between dynamic climate and human systems (including social and economic systems and technology).

CLIMATE SCIENCE EDUCATION:
Learning about the natural forces that control the climate (a subset of climate change education).

CLIMATE CHANGE LITERACY:
The result, or outcome, sought by climate change education, including increased capacity by the learner to perceive and interpret the relative health of our climate and to assess options to take appropriate action.

CLIMATE JUSTICE:
Action in response to the disproportionate impact of climate change on low-income communities and communities of color; in education, climate justice can look like empowering youth to understand the history of the disproportionate impacts of climate change, historical movements for change, climate justice in its current state, and how students can participate in climate action.

Photo credit: U.S. Green Building Council

II. MAKING THE CASE FOR CLIMATE CHANGE EDUCATION

To convince decision makers of the importance of climate change education in schools, advocates must provide compelling talking points supported by reliable research. The following are suggested talking points with relevant background and research.

1. Parents, students, and administrators are calling for increased climate education.
2. Climate change education in schools is essential to helping communities and our nation act to mitigate and adapt to the changing world.
3. Climate change education in schools will help our young people prepare for 21st century jobs and careers.
4. Climate change education in our schools will increase national security.

TALKING POINT 1

PARENTS, STUDENTS, AND ADMINISTRATORS ARE CALLING FOR INCREASED CLIMATE EDUCATION.

WHY:

Parents, students, and administrators are advocating for increased climate education in schools due to the overwhelming scientific evidence supporting human-induced climate change. While a large majority of U.S. adults and teachers agree on the value of including climate change education in schools, some teachers face pressure to eliminate or downplay climate science in their classrooms.

Therefore, teachers need support as they face conflicts over the subject material, including educational frameworks that encourage or require climate education in the classroom. Such frameworks have been called for by the National Association of Biology Teachers (NABT). To encourage science-backed content in the classroom, structures are needed from various quarters, including school boards and districts, state and district policymakers, community members, the media, and higher education faculty and administrators.

FACTS IN SUPPORT:

- 77% of U.S. adults and 86% of U.S. teachers agree on the importance of including climate change education in our schools, according to Yale's Program on Climate Change Communication and National Public Radio, respectively.
- A recent paper from the Proceedings of the National Academy of Sciences identified climate education as one of six key societal transformations needed to address the climate crisis.
- The National Science Teaching Association (NSTA), the National Association of Geoscience Teachers, and the National Association of Biology Teachers, among others, are calling for support for teachers who want to prepare their students with information about climate change. The NSTA has created a list of necessary support structures in its position statement.
- The largest teacher unions, the National Education Association and the American Federation of Teachers, have endorsed and supported widespread climate change education.

TALKING POINT 2

CLIMATE CHANGE EDUCATION IN SCHOOLS IS ESSENTIAL TO HELPING COMMUNITIES AND OUR NATION ACT TO MITIGATE AND ADAPT TO THE CHANGING WORLD.

WHY:

Collective action is necessary to develop and carry out new policies and technological solutions to mitigate and adapt to climate change. The public will need to make changes in business and personal practices, develop new technology and policy, and address the coming social and economic problems arising from a changing climate.

FACTS IN SUPPORT:

- Communities around the country, as well as institutions on the federal level, are preparing for the effects of climate change; young people will need climate literacy to understand and respond to the plans and priorities of their communities. As of February 2022, 35 of 50 of the largest U.S. cities (by population) have adopted local climate action plans. Additionally, in the wake of increased natural disasters, the Federal Emergency Management Agency (FEMA) is ensuring that their aid resources are spent well by emphasizing whole community resilience.
- Most respondents to the climate literacy study conducted by Allianz in 2021 massively underestimated the extent of the measures needed to combat climate change and the speed with which they must be implemented. While two-thirds of respondents recognized the catastrophic consequences for nature and people of a two-degree temperature increase, only half understood that substantial reduction in greenhouse gas emissions is necessary to prevent it. Among respondents with low climate literacy, only 13.4% were likely to take action to reduce their own carbon footprint; those considered climate-literate were three times more likely to take action.
- Evidence from recent studies indicates a lack of climate literacy among adolescents that could hinder their ability to make informed choices about their futures. For example, a 2020 study by George Mason University found that while eight out of ten adolescents (ages 10-19) understand that climate change is real and that humans are at least partially responsible, 64% of adolescents agreed with the incorrect statement that industrial activities have reduced greenhouse gases in the atmosphere. Additionally, half mistakenly believe that if greenhouse gas emissions were reduced, the climate would return to its prior stability, not appreciating that changes in the Earth's climate are long-lasting.
- A study by Hamilton College found that the average U.S. high school student fails when assessed on their knowledge of the causes and consequences of climate change. For example, the study found that 82% of quiz takers affirmed, incorrectly, that “scientists believe radiation from nuclear power plants causes global temperatures to rise.”
- A recent study published in the journal Nature Climate Change found that intergenerational learning, defined as the transfer of knowledge, attitudes, or behaviors from children to parents, is one way to raise awareness and understanding surrounding climate change among parents whose children receive climate change education. These findings demonstrate the critical role that climate literacy plays in a student's ability to advocate for their future, influence others, break down barriers in communities, and make informed decisions for the present and the future.

TALKING POINT 3

CLIMATE CHANGE EDUCATION IN SCHOOLS WILL HELP OUR YOUNG PEOPLE PREPARE FOR 21ST CENTURY JOBS AND CAREERS.

WHY:

The world economy is rapidly transitioning towards clean energy and taking other measures related to climate adaptation and mitigation. This transition is full of economic opportunity for those who are properly educated and trained, and more jobs than ever require green skills.

Climate change education aims to prepare students with relevant science and social studies knowledge along with the hard and soft skills that they need to know to combat climate change in their careers, lives, and communities. These same skills prepare them to think critically, analyze effectively, solve complex problems, and work collaboratively in whatever career they choose, making graduates more competitive with students and professionals across the globe.

FACTS IN SUPPORT:

- 3,900 major corporations have made a pledge to reduce emissions but are having a hard time implementing their plans because they lack trained staff. For example, Deloitte has made commitments to educate their 330,000 global employees on climate action to prepare them to make responsible choices at home, at work, and in advising clients.
- The 2022 Every Job is a Climate Job report found that 83% of people want to take climate action in their jobs. They also found that 15% of respondents have considered changing jobs to work in a position that allows them to work more closely on climate-related issues. This share of respondents is up 10% from 2020.
- A recent report by Microsoft investigates the shortage of workers with the skills needed to meet the company's sustainability goals, emphasizing that the company will not be able to meet its goals without employees who are prepared to understand and act on climate issues.
- A study by the National Renewable Energy Laboratory (NREL) found that the clean energy industry already employs around 3 million Americans, and that number is projected to grow significantly in the coming years. The report identified a strong demand for workers with the skills and knowledge needed for jobs in solar, wind, energy efficiency, and other renewable energy sectors, making climate education a crucial investment in the future workforce.
- The U.S. Bureau of Labor Statistics projects that jobs in the renewable energy sector will grow much faster than the average rate for all occupations in the coming years, and that jobs in energy efficiency will grow even faster. Climate education can help prepare students to take advantage of these job opportunities, creating a stronger, more resilient workforce for the future.

TALKING POINT 4

CLIMATE CHANGE EDUCATION IN OUR SCHOOLS WILL INCREASE NATIONAL SECURITY.

WHY:

The U.S. Department of Defense has identified climate change as a critical national security issue due to its impacts on operation costs, vulnerable military bases, training, health risks, and equipment needs. Moreover, rising temperatures and variable weather resulting from climate change can cause an increase in global political tension, social instability, and humanitarian aid needed. Increasing climate literacy will create a climate-literate workforce, which is essential to proactive climate adaptation and resilience. Climate change education in schools can contribute to national security by preparing students to understand and address the impacts of climate change.

FACTS IN SUPPORT:

- The Department of Defense's Climate Adaptation Plan states that working towards climate literacy to create a climate-literate workforce "puts the department on a proactive footing."
- The United States Army, the Department of the Navy, and the Department of the Air Force have each created climate action or climate strategy plans based on the Department of Defense's Climate Adaptation Plan.
- The Department of Homeland Security (DHS) has created a Climate Change Professionals Program to recruit recent graduates and provide hands-on experience supporting the department's focus on climate adaptation and resilience.
- The Federal Emergency Management Agency (FEMA) plans to increase climate literacy in the emergency management community by integrating climate science into policy, programs, partnerships, field operations, and training.

III. CRAFTING LANGUAGE AND MESSAGING FOR A CLIMATE CHANGE EDUCATION BILL

For a message to be fully communicated from one person to another, the sender must put themselves in the recipient's shoes and try to determine what language will most likely be heard. The recipient, in effect, determines how the message is framed, not the sender. Every situation is different, so the sender must craft a message that is specific to the receiver, making it difficult to generalize advice about messaging.

When speaking to a relatively conservative audience about climate change education, find common ground and emphasize shared values. Conservatives may not be opposed to climate education, per se, but may reject messaging that they perceive as liberal or values-based.

To craft effective language and messaging for a conservative audience, consider:

1. **Emphasize the importance of education:** Conservatives often value education and knowledge, and climate change education can provide students with the skills and knowledge they need to make informed decisions about the environment and the economy.
2. **Frame climate change education as a way to promote critical thinking:** Climate change education can promote critical thinking and independent thought by teaching students to evaluate scientific evidence, weigh competing arguments, and think creatively about solutions.
3. **Emphasize the importance of personal responsibility:** Climate change education is the only means to provide people with the knowledge to make informed decisions and take action related to climate change, which aligns with conservative values of personal responsibility and action.
4. **Highlight the economic benefits:** Huge opportunities are emerging to capitalize on clean energy for economic success. Students need to be educated so they can take advantage of these opportunities and contribute to climate solutions.
5. **Use moral and ethical arguments:** Many conservatives value moral and ethical principles, and climate change can be framed as a moral issue that requires stewardship of the environment for future generations.

It may also be possible to substitute a progressive term for a more conservative one. For example, "climate change education" might be framed as "community resilience education" (as the [National Oceanic and Atmospheric Administration](#) does) or as "extreme weather education." Additionally, pointing out that education is an effective and non-regulatory tool may help diffuse the conservative concerns about big government becoming involved.

IV. ESSENTIAL ELEMENTS OF A STATE CLIMATE CHANGE EDUCATION BILL

Considering emerging approaches and current gaps in state policy to expand and improve climate change education in schools, this report poses a core list of elements that together represent a comprehensive approach.

To drive expansion and improvement of climate education in K-12 classrooms, comprehensive state climate change education policy should:

1. Define key climate principles and concepts for the state.
2. Embed key principles and concepts into state education standards and assessments.
3. Include the state's NGO/non-formal learning community in planning and implementation.
4. Provide targeted funding to the state department of education and to school districts.
5. Incorporate climate change education across the curricula.
6. Develop and disseminates statewide model curricula.
7. Require that textbooks align with the state's standards around climate change.
8. Provide professional development to teachers.
9. Create a recognition program for high-performing schools.
10. Institute a statewide graduation requirement for climate literacy.

1. DEFINE KEY CLIMATE PRINCIPLES AND CONCEPTS FOR THE STATE

Comprehensive and effective climate change education programs are built on well-developed climate principles and concepts. Educators, both in-school and out-of-school, have varying understandings of what constitutes essential knowledge for climate literacy. This lack of coordination and agreement on end goals results in a “Frankenstein” education, where students receive fragmented and incomplete learning experiences over the course of their K-12 career. Formal and non-formal education communities, in collaboration with their respective state departments of education, must work together to collectively define the most critical concepts and principles that a climate-literate graduate should possess. This coordinated effort will ensure an intentional scope and sequence in climate change education, leading to a more informed and prepared generation of students.



In 2004, California successfully defined key principles and concepts through the creation of its **Environmental Principles and Concepts (EP&Cs)**. In 2018, climate change and environmental justice were added to the list of topics covered by its EP&Cs.

The EP&Cs highlight the interdependence between human social systems and natural world systems through 5 main principles*:

- People depend on natural systems
- People influence natural systems
- Natural systems change in ways the people benefit from and can influence
- There are no permanent or impermeable boundaries that prevent matter from flowing between systems
- Decisions affecting resources and natural systems are complex and involve many factors

Information sourced from [California Education and Environment Initiative](#)

2.

EMBED KEY CLIMATE PRINCIPLES AND CONCEPTS INTO STANDARDS AND ASSESSMENTS

Education standards are essentially the rules of the game: they tell educators what the state thinks their students should know, and they are the basis for statewide assessments. Due to limited time and bandwidth as well as the weight placed on standardized test scores, many educators focus on covering content and skills that they know will be included in state assessments. For state policymakers, standards and assessments are key leverage points and critical to ensuring that climate change is covered in classrooms.



California successfully embedded principles and concepts into its science assessments in 2017 when the State Board of Education approved the new California Science Test Blueprint. This blueprint implemented the Next Generation Science Standards as the state's new science standards and called for environmental literacy to be incorporated into statewide assessments. The California Environmental Principles and Concepts (EP&Cs) are now included in statewide student assessments for fifth, eighth, and ninth through twelfth grades.

Information sourced from [Ten Strands](#)

3.

INCLUDE THE STATE'S NGO/NON-FORMAL LEARNING COMMUNITY IN PLANNING AND IMPLEMENTATION

A good deal of climate literacy expertise lies in a state's climate change education community. Not only can local climate change education organizations help with crafting a bill that meets the state's needs and help push for a bill's passage, but they can also serve as valuable partners with the state department of education in implementing some aspects of the new policy.



In 2018, Washington established and funded a climate change education program, initiated by the governor and developed by non-governmental organizations and non-formal learning communities. The program utilized knowledge from 30 government and non-governmental representatives, including from the state's Office of Superintendent of Public Instruction (OSPI), E3 Washington, Association of Educational Service Districts, Suquamish Tribe, Climate Solutions, Pacific Education Institute, Western Washington University, Antioch University, Washington STEM, U.S. Partnership for Education for Sustainable Development, and Campaign for Environmental Literacy.

Information sourced from [Green Schools Catalyst Quarterly](#)

4.

PROVIDE TARGETED FUNDING TO THE STATE DEPARTMENT OF EDUCATION AND TO SCHOOL DISTRICTS

State funding gives policy the backing it needs to be effectively implemented and can provide a means for accountability. The professional development, curriculum development, and staffing needed to shift practices in K-12 schools demands dedicated resources. Requiring change through legislation without providing the resources to accomplish it, often called an “unfunded mandate,” generally means that little change takes place. If a state is unable to provide funding through existing state revenue, legislators can try other creative ways to generate revenue; for example, license plate fees have been appropriated to support environmental education in several states, as have corporate fines for environmental transgressions. The provision of dedicated funds for climate change education in a state’s annual budget can help ensure that the necessary resources are available to effectively implement climate change education in schools.



Maine successfully passed a state appropriation that supports climate change education in 2022. The funding created a pilot program for teacher professional development through partnerships with community groups. The program received over \$2 million from Maine’s Appropriation and Financial Affairs Committee.

Information sourced from [Nature Based Education Consortium](#)

5.

INCORPORATE CLIMATE CHANGE EDUCATION ACROSS THE CURRICULA

To fully develop climate literacy in students, climate change education must be incorporated across the curricula. Climate change is a complex, interdisciplinary topic, based on concepts that exist at the intersection of natural systems (science) and human systems (social studies). While it is typically taught only in science classes, if at all, this limited approach provides only a partial understanding of the topic. Students need a comprehensive understanding of the natural and human systems impacted by climate change, as well as the skills to evaluate climate information and proposed solutions, contribute to mitigation and adaptation efforts, and act responsibly as citizens. Therefore, incorporating climate change education into multiple subjects and curricula is essential. This approach will enable students to gain a well-rounded understanding of the topic, develop critical thinking and problem-solving skills, and become responsible and informed citizens.



New Jersey successfully incorporated climate change education across curricula in 2020 when the Board of Education approved revisions to the New Jersey Student Learning Standards (NJSLS), and the legislature then voted in 2022 to allocate funding to support their implementation.

During this revision process, the state added climate change to seven of the nine standards:

- Social studies
- Science
- Visual and performing arts
- Comprehensive health and physical education
- World languages
- Computer science and design thinking
- Career readiness, life literacies, and key skills

As of June 2023, the state has announced that the English language arts and math standards have been reviewed and updated to include climate change education, and the standards are expected to be approved.

Information sourced from the [New Jersey Department of Education](#), [link to the proposed revisions to ELA and Math](#)

6.

DEVELOP AND DISSEMINATE STATEWIDE MODEL CURRICULA

Even when teachers would like to create their own curriculum and lessons, most are short on time and are already overextended. When requiring the incorporation of new classroom content, policymakers need to ensure that the burden does not fall unsupported on teachers. Climate change education policy should anticipate implementation needs by prioritizing the development and dissemination of free resources, such as statewide model curricula, that are easily accessible to all teachers.



Since 2010, California has distributed a K-12 model environment-based curriculum and is investing in additional free resources for teachers.

After extensive development and field testing, the free statewide environment-based curriculum, Education and Environment Initiative (EEI), was unanimously approved by the State Board of Education. The curriculum is available and free online to teachers and provides access to over 85 units in science and history- social science.

In 2021, the governor of California signed legislation that released an additional \$6 million to create open educational resources (OER) for teachers focused on climate change and environmental justice, so development of curriculum is ongoing. The new funding builds on the success of the EEI Curriculum to support teachers in bringing the curriculum into their classrooms.

Information sourced from [California Education and the Environment Initiative History and Development](#) and [Ten Strands](#)

7.

REQUIRE THAT TEXTBOOKS ALIGN WITH THE STATE'S STANDARDS AROUND CLIMATE CHANGE

To ensure that students have access to accurate and up-to-date information on climate change, states should require that textbooks align with their climate change education standards. Public policy must be responsive to differences in the textbook adoption process across states, as each state has its own unique process to meet its education standards. In the twenty states known as textbook adoption states, the state government selects the textbooks that can be used by all districts, while the remaining states allow districts and schools to choose their own textbooks. Providing students with the resources they need to access accurate information is critical for developing climate literacy. By requiring textbooks to align with state education standards, policymakers can ensure that all students have access to accurate information about climate change.



By law, California requires the Environmental Principles and Concepts (EP&Cs) to be incorporated into future textbooks and instructional materials.

In 2003, California passed AB 1548, which required the state to create an environment-based curriculum for all public schools, now known as the Education and Environment Initiative (EEI). One of the requirements built into this law was the incorporation of the Environmental Concepts and Principles (EP&Cs) in future textbooks.

Information sourced from [California Education and the Environment Initiative](#) and [California Education and the Environment Initiative History and Development](#)

8. PROVIDE PROFESSIONAL DEVELOPMENT TO TEACHERS

Research has consistently shown that teaching quality and school leadership are the most important factors in raising student achievement. However, professional development for teachers is often not addressed in state law or funded by states.

To improve climate literacy in K-12 education, teachers need opportunities to expand their knowledge and skills on the subject. When teachers are passionate about a subject, they are more likely to incorporate it into their teaching, which can have a positive impact on student learning and interest in the topic. State legislation can be a powerful tool to provide teachers with professional development opportunities, which can help them learn, understand, and develop a passion for the subject matter and lead to improved instruction and engagement for their students.



Washington successfully provided professional development opportunities for teachers in 2018 when the state set aside \$4 million (\$10 million in total for 2018- 2022) for the Clime-time initiative. These funds are used to prepare science teachers on NGSS with a focus on climate science education.

Local partners have used these funds to provide new programs for teachers. For example, Cascadia Conservation District worked with partners to create The Kids in the Forest environmental education program. Through this program, 3rd-12th grade teachers receive professional development, instructional materials and curriculum, and guidance for leading field experiences with students.

Information sourced from [Washington Office of Superintendent of Public Instruction](#) and [Cascadia Conservation District](#)

9. CREATE A RECOGNITION PROGRAM FOR HIGH-PERFORMING SCHOOLS

Creating a recognition program for high-performing schools is a positive strategy to encourage and motivate schools to implement climate education initiatives. Such programs can provide validation and encouragement to teachers, administrators, and community members, recognizing their efforts to make their schools more sustainable and climate-friendly. Additionally, recognition programs can inspire other schools to follow suit and take similar actions, ultimately leading to a larger impact on the community and the environment. Recognition programs can include awards, grants, and other forms of recognition for schools that excel in implementing climate education initiatives.



The U.S. Department of Education's Green Ribbon School award (ED-GRS), launched in 2012, is an example of a long running national level recognition program.

This award gives federal recognition to schools, districts, and institutes of higher education that are excelling in reducing environmental impact, promoting health and wellness, and educating students for environmental and sustainability literacy. Annually, winners from each participating state travel to Washington, D.C., to celebrate, attend an award ceremony, receive a plaque, and meet and learn from one another.

As a result of this federal program, some states have created their own state-level awards, and the winners are then nominated to the U.S. Department of Education to be considered for the national award.

Information sourced from [the U.S. Department of Education](#)

The brass ring of state policy is a climate literacy graduation requirement. Such a requirement ensures a comprehensive level of exposure and proficiency, reducing the risk of students being left behind due to lack of climate education or limited exposure to the topic. A graduation requirement emphasizes the need for curricula, resources, and teacher training, making it the most influential measure that can be taken.



While not specific to climate change literacy, Maryland successfully implemented an environmental literacy requirement for all high schoolers at graduation. In this mandate, passed in 2011, every public school in the state must provide students with a comprehensive and multidisciplinary environmental education.

The state does not outline the courses needed to be completed for graduation. Instead, it allows districts to create their own programming, as long as it is in line with Maryland's Environmental Literacy Curriculum Standards.

Information sourced from [Maryland Department of Natural Resources](#)

STATUS OF FEDERAL CLIMATE CHANGE EDUCATION GRANT-MAKING

The federal government, through agencies such as the National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration (NASA), the Environmental Protection Agency (EPA), and many others, conduct a wide range of activities focused on climate science, climate change, and climate solutions. Through this work, federal agencies produce a wealth of educational materials, as well as learning opportunities such as internships, seminars, and resources to support education on climate and climate change.

But federal grant-making programs specifically supporting climate change education are scarce. The primary exception is NOAA's Environmental Literacy Program, which has funded community resilience education (NOAA's term for education related to climate change) projects since 2015. The program includes education in schools, higher education, and the general public. Some organizations received other federal funding for climate change education projects through grant-making programs that fund multiple or broad activities and are not identified specifically for climate change education.

For some time, advocates have sought to build on NOAA's program and increase the grants available specifically for climate change education. A decade ago, the [Climate Change Education Act](#) was introduced in Congress and has come close to passage on several occasions. Enactment of this bill, and appropriated funds, would expand NOAA grant-making to include a dedicated focus on bringing climate change education into formal education settings, such as K-12 schools.

V. MODEL CLIMATE CHANGE EDUCATION BILL

The following is sample language to consider in crafting a new bill. This text provides one suggested approach, and each state's legislature will need to craft language that responds to their state's specific context.

PURPOSE: The purpose and intent of this bill is to ensure that all students attending public schools, and other schools [licensed / in the purview of] the state, receive ongoing environmental and climate education and are environmentally and climate-literate upon graduation from twelfth grade.

The (state name) Department of Education shall:

1. Establish a robust program for ongoing stakeholder engagement in climate change education, which may include advisory boards, websites, emails, webinars and meetings, workshops, and other means of sharing and receiving information and input, including identifying needs and implementing plans and projects. Stakeholders shall include organizations and individuals involved in climate education; practicing teachers, principals, and superintendents; school district board members and administrators; student organizations; relevant state agencies; and other interested parties.
2. In consultation with stakeholders, develop a set of key environmental, climate, and sustainability principles and concepts intended to be infused into relevant curricula, including but not limited to science, civics, and social studies, from kindergarten through grade twelve (K-12), hereinafter referred to as "principles and concepts," no later than **X**;
3. Infuse the principles and concepts into the learning standards in the kindergarten through twelve (K-12) (state name) grade span expectations for all subjects where appropriate no later than **X**;
4. In consultation with stakeholders, identify, develop or procure, and disseminate lessons, activities, and materials related to the principles and concepts, including potential career paths, to enable meeting the updated learning standards and grade span expectations (see section (3)) no later than **X**;
5. Identify, develop or procure, and disseminate models and examples of how to incorporate the principles and concepts into all subjects to teachers and schools no later than **X**;
6. Ensure that (state name) Department of Education provides teacher professional development in relevant subject areas, including but not limited to science, civics, and social studies, which includes the principles and concepts where appropriate no later than **X**; and
7. Establish an award program to recognize high-performing schools based on the metrics of the U.S. Department of Education Green Ribbon Schools program and an award program to recognize kindergarten through twelfth grade (K-12) teachers who develop and implement high-quality instruction that addresses the principles and concepts no later than **X**.
8. There is established in the state treasury the climate change education fund, to be administered by the Department of Education, into which shall be deposited:
 - a. Appropriations made by the legislature to the fund;
 - b. Fees collected under any rule adopted by the legislature (e.g., revenue from special license plates, fees from environmental fines, taxes on fossil fuels, etc.);
 - c. Grants provided by governmental agencies or any other source;
 - d. Donations made by private individuals or organizations for deposit into the fund; and
 - e. Earnings on moneys in the fund.

VI. EXAMPLES OF STATES WITH SUCCESSFUL CLIMATE CHANGE EDUCATION LEGISLATION

Over the past decade, several dozen state bills concerning climate change education have been proposed, but many have been stuck in committee and have failed to pass. At this time of this publication, five state legislatures have passed bills that establish policies and/or funding for climate change education. This section presents examples of these laws and provides suggestions on how future state legislation can most effectively encourage climate change education.

BILL ELEMENTS	CALIFORNIA			CONNECTICUT	MAINE	NEW JERSEY	WASHINGTON
	ASSEMBLY BILL 1548	SENATE BILL 720	ASSEMBLY/SENATE BILL 130	HOUSE BILL 5506	LEGISLATIVE DOCUMENT 1902/HOUSE PAPER 1409	ASSEMBLY BILL 4402/SENATE BILL 2023	SENATE BILL 6032
Define key climate principles and concepts for the state	●	●					
Embed key climate principles and concepts into standards and assessments	●	●					
Include the state's NGO/non-formal learning community in planning and implementation			●		●	●	●
Provide targeted funding to the state department of education and to school districts			●		●	●	●
Incorporate climate change education across the curricula						●	
Develop and disseminates statewide model curricula	●		●	●	●	●	
Require that textbooks align with the state's standards around climate change	●						
Provide professional development to teachers	●				●	●	●
Create a recognition program for high-performing schools							
Institute a statewide graduation requirement for climate literacy							

Comparison chart of essential elements in current climate change education legislation.

CALIFORNIA

The state of California has had multiple successful climate change, environmental justice, and environment-based education bills, which span the past twenty years and build on one another.

In 2003, the legislature passed and Governor Davis signed [Assembly Bill 1548](#), which established the Education and the Environment Initiative (EEI) by creating the Office of Environment and Education. Shortly thereafter, the California Environmental Principles and Concepts were created and approved by the State Board of Education. The EEI curriculum, which followed, is a model environment-based curriculum that demonstrates how to integrate the [Environmental Principles and Concepts](#) into standards-based instruction in science and history social-sciences. While the science units are aligned with Next Generation Science Standards (NGSS), the history-social science units are based on the state's current standards.

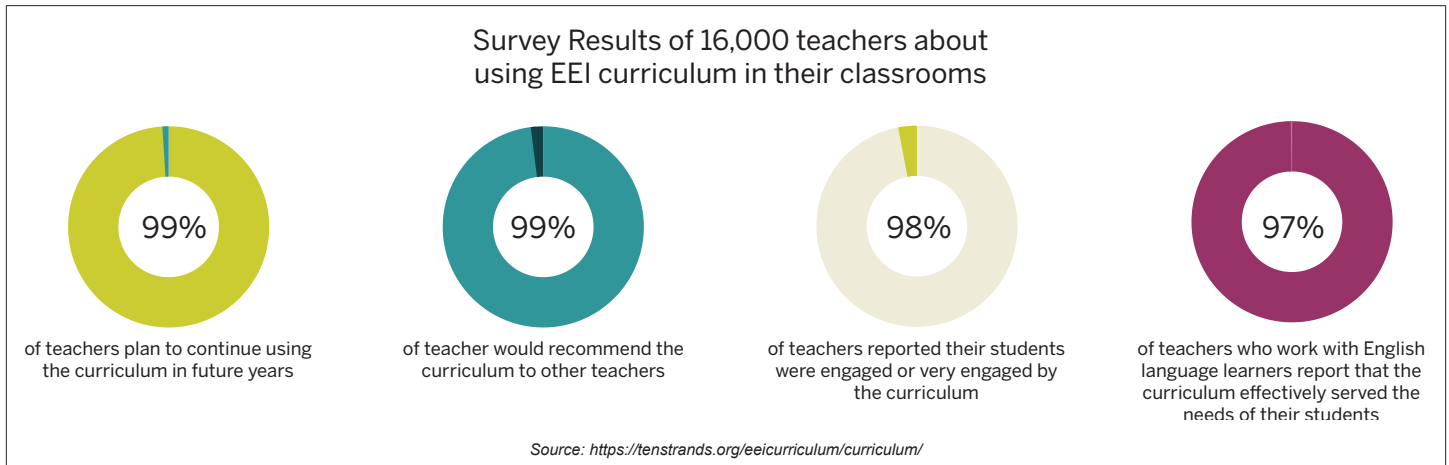
In 2018, the legislature passed and Governor Brown signed into law [Senate Bill 720](#). Senate Bill 720 adds the Environmental Principles and Concepts and core themes from the state's [Blueprint for Environmental Literacy](#) into the state's education code. [The Blueprint for Environmental Literacy](#) recommends strategies for improving environmental education.

In 2021, Governor Newsom signed into law [Assembly/Senate Bill 130](#), which provides \$6 million to be used to create free education resources on climate change education and environmental justice. The funds will be allocated from the General Fund to the State Superintendent, where they will be allocated to the San Mateo County Office of Education (SMCOE) to contract in the creation of these free resources. SMCOE is [working in partnership](#) with California nonprofit Ten Strands, community-writing teams, and climate change education experts from around the country on this project.

BILL	KEY PLAYERS
Assembly Bill 1548	<ul style="list-style-type: none"> Introduced and championed by Assemblywoman Fran Pavley, co-authored by Senator (later Education Superintendent) Thomas Torlakson Governor Gray Davis signed into law Supported by Heal the Bay State Agencies: State Board of Education, California Department of Education, Natural Resources Agency, CalRecycle
Senate Bill 720	<ul style="list-style-type: none"> Co-authored by Senator Ben Allen and now State Superintendent Tony Thurmond (when he was an assembly member) Governor Jerry Brown signed into law Supported by Ten Strands Ten Strands partners in the work: State Education and Environment Roundtable, CalRecycle, California Department of Education, The California Subject Matter Project
Assembly/Senate Bill 130	<ul style="list-style-type: none"> Senator Ben Allen created proposal Governor Gavin Newsom signed into law Ten Strands garnered support 165+ endorsers and advocates

DATA AND RESULTS

A survey was distributed to over 16,000 California teachers about their experiences using the 85 units in the Education and the Environment Initiative (EEI) Curriculum. Below are the findings from the survey.



CONNECTICUT

In 2018, Governor Malloy signed House Bill 5360, which says the state may teach climate change as it relates to the Next Generation Science Standards. The bill also requires the State Department of Energy and Environment Protection (DEEP) to assist local and regional boards of education in the development of climate change curriculum.

In 2021, House Bill 5506 (the annual state budget bill) was passed, stating that every school district in Connecticut shall teach about climate change consistent with the Next Generation Science Standards. This requirement will go into effect in July 2023. The bill also states that the state board shall make available curriculum to assist local and regional boards of education.

BILL	KEY PLAYERS
House Bill 5506	<ul style="list-style-type: none"> Introduced by State Representative Christine Palm Support included: Connecticut Department of Education, Department of Energy and Environmental Protection (DEEP), Save the Sound, Green Eco Warriors, Sunrise Movement, Reforest the Tropics, JASON Learning

MAINE

In 2022, Legislative Document 1902/House Paper 1409 was approved, which provides \$2 million for the creation of a 3-year pilot program that provides teachers professional development around climate education and assists in pairing school districts with nonprofits/community partners to create, provide, and implement training for educators related to the Next Generation Science Standards. The bill also allocates just over \$94,000 towards funding a position at the Maine Department of Education to assist districts in applying for and implementing climate education professional development.

BILL	KEY PLAYERS
Legislative Document 1902/ House Paper 1409	<ul style="list-style-type: none"> Presented by <u>Representative Lydia Blume</u> <u>Co-sponsored by</u> Senator David Woodsome, Chloe Maxmin, Marianne Moore and Representatives Michael Brennan, Michelle Dunphy, Allison Hepler, David McCrea, and Sarah Pebworth <u>Creation of the bill spearheaded by:</u> Nature Based Education Consortium's youth-led Climate Education Advocacy Working Group with feedback from the State Department of Education <u>Key supporters</u> included: Teachers, students, Maine Environmental Education Association, The Sierra Club Maine Chapter, Maine Youth for Climate Justice, Maine Science Teachers Association, The Ecology School, The Climate Initiative, JustME for JustUS, Norway Youth Climate Action, Maine Audubon, The Nature Conservancy in Maine, the Union of Concerned Scientists, 350 Maine, Maine Climate Action NOW, and more

NEW JERSEY

In 2020, the New Jersey State Board of Education adopted revised NJ Student Learning Standards, which apply to all public schools. During the 2020 revision process, at the urging of the Murphy administration, the state elected to add a climate change requirement to seven of the nine standards: social studies, science, visual and performing arts, health and physical education, world languages, computer science and design thinking, and career readiness, life literacies, and key skills. The state used the 2020/2021 school year as an introductory year for the standards, and implementation continued the following two years. As of June 2023, the state has announced that the English language arts and math standards have been reviewed and updated to include climate change education, and the standards are expected to be approved.

In 2022, the governor allocated \$5 million in Assembly Bill 4402/Senate Bill 2023 for climate change education in K-12 schools. Of that \$5 million, \$500,000 will be allocated to form an office for climate education within the New Jersey Department of Education and the remaining funds will be used as grant money to support educators with technical assistance, professional development opportunities, instructional materials, and evaluation strategies.

POLICY	KEY PLAYERS
New Jersey Student Learning Standards 2020 Revisions	<ul style="list-style-type: none"> Supported New Jersey's First Lady, Tammy Murphy Key partners included: Governor Phil Murphy, NJ Department of Education, NJ School Boards Association, NJ Department of Environmental Protection, NJ School Buildings and Grounds Association, National Wildlife Federation, educators from public and non-public schools, higher education, parents, school superintendents, and New Jersey Audubon, New Jersey Green Ribbon Schools, Sustainable Jersey, and the Cloud Institute

DATA AND RESULTS

Since the State Board of Education has adopted the revised standards to include climate change, the New Jersey Climate Change Education Initiative was created to ensure resources are available to teachers to include climate change education in their classrooms. Within this initiative, the New Jersey Thought Leadership Committee created a report outlining recommendations moving forward.

WASHINGTON

In 2018, the state of Washington passed [Senate Bill 6032](#), a legislative proviso that allocated \$4 million for the 2018/2019 fiscal year in grants to educational service districts and community partners to implement the Clime-time Initiative, training science teachers to use the Next Generation Science Standards and the Washington State Science Learning Standards and to teach about climate science.

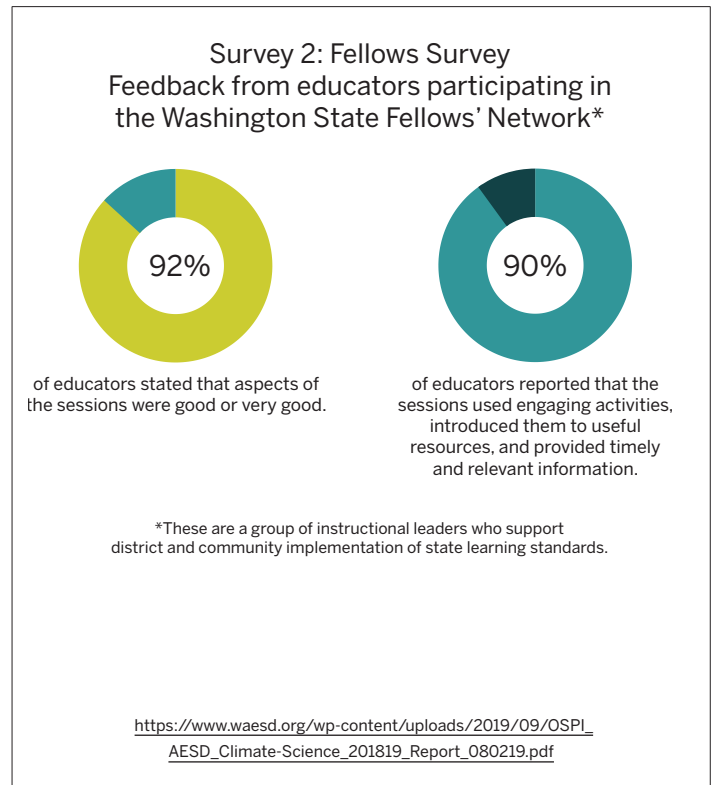
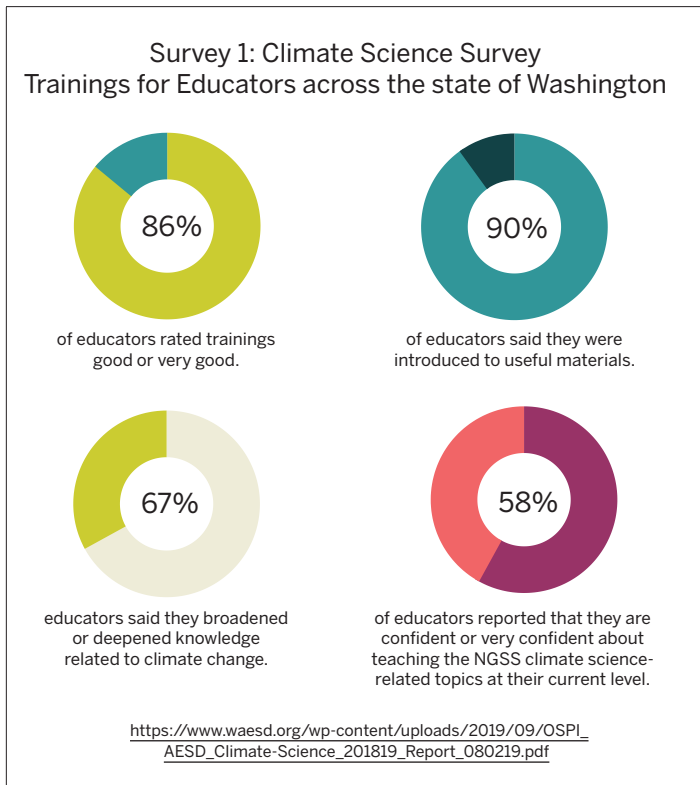
In 2019, [the funding was expanded](#), and \$3 million was invested into the initiative for the following two fiscal years. Recently, [the legislature confirmed](#) its commitment to the initiative by allocating \$6 million for 2022/2023 fiscal year.

BILL	KEY PLAYERS
Senate Bill 6032	<ul style="list-style-type: none">• Championed by Governor Jay Inslee• Supported by Senators Christine Rolfes and Kevin Ranker and Representatives Timm Ormsby, Kristine Lytton, Maureen Doglio, and Laurie Dolan• Community Partners included: Pacific Education Institute (PEI), E3 Washington, IslandWood, STEM Innovative Alliance, Office of Superintendent of Public Instruction, Association of Education Service Districts, Governor’s Policy Office, Squamish Tribe, Climate Solutions, Western Washington University, Antioch University, Washington STEM, U.S. Partnership for Education for Sustainable Development, Campaign for Environmental Literacy

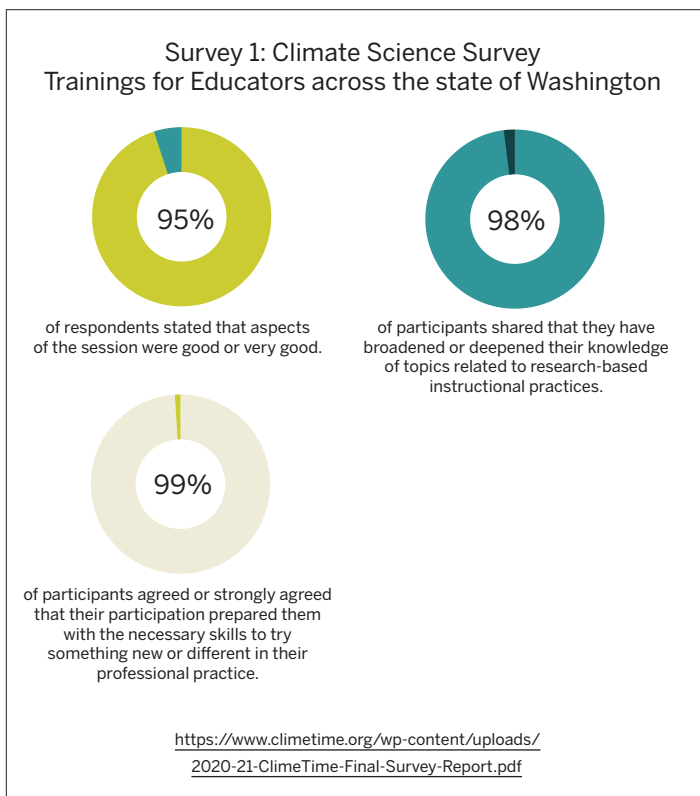
DATA AND RESULTS

The Association of Educational Service Districts (AESD) and the Office of Superintendent of Public Instruction (OSPI) administered a series of surveys evaluating the effectiveness of the Clime-time program between September 1, 2018 and June 15, 2019. Below are the findings of each of the surveys. Additional resources on program effectiveness can be found in the [2018/2019 Case Study Report](#) and through [success stories](#).

CLIMATE SCIENCE PROVISO 2018-2019 SURVEYS:



CLIMATE SCIENCE PROVISO 2020-2021 SURVEYS:



VII. CONCLUSION

Climate change education in K-12 classrooms is a clear and growing need, driven by the concerns of parents, students, teachers, communities, and business leaders. Public opinion clearly supports increased access to this education, and state legislation is a crucial tool for ensuring that schools have the necessary resources to improve climate literacy among our youth. Several states, including California, Connecticut, Maine, New Jersey, and Washington, have enacted successful climate change education laws, offering valuable insights into how to advance this cause in other states. By leveraging partnerships, youth voices, and locally relevant data, policymakers and advocates can build on these successes to achieve strong policy advances in the years ahead. While progress has been made, more work is needed to establish or safeguard climate change education across the country.

Advice from Stakeholders

PARTNERSHIPS

- Helps create a backbone and creates focus and consistency.
- Networks should be inclusive, diverse, equitable and representative.

POWER OF YOUTH

- Youth bring a unique and optimistic perspective to the table.
- Leverage and highlight youth stories.
 - Plan youth days of action
 - Include them in committees

FUNDING

- When making the ask for funding, get all key players and partners on the same page.
- Advocate for funding built into legislation.

LEARN FROM OTHER STATES

- Be aware this is a marathon and is incremental.
- Use the work other states have already done as a model.

FOCUS ON LOCAL IMPACT

- Communicate how and who climate change impacts in your state and local area.
- Make the case using state wide data.

PERSISTENCE

- Find your champions in and outside the state capital.
- Hold rallies, press conferences, days of action, hearings etc.
- Hold partners accountable.

Insights from interviews with stakeholders in states that were successful in passing climate change education legislation.

VIII. WORKS CITED

- Allianz Research, Euler Hermes Economic Research. (2021, October). **Literacy Survey: Time to Leave Climate Neverland.** Alliance Research. Available: https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/economic-research/publications/specials/en/2021/october/2021_10_27_Climate-literacy.pdf
- Arscott, P., Hooper, P., Hutchinson, T., et al. (2007, January). **Climate Change and Environmental Issues Poll.** Hamilton College National Youth Polls. Available: <https://www.hamilton.edu/documents/news-sports-events/HCClimateChangePoll.pdf>
- Darling-Hammond, Linda. (2010). **The Flat World and Education: How America's Commitment to Equity will Determine Our Future.** Teachers College Press. Available: https://books.google.com/books/about/The_Flat_World_and_Education.html?id=IP32XQw0IKYC
- Department of the Air Force, Office of the Assistant Secretary for Energy, Installations, and Environment. (October 2022). **Department of the Air Force Climate Action Plan.** Washington, DC. Available: https://www.safie.hq.af.mil/Portals/78/documents/Climate/DAF%20Climate%20Action%20Plan.pdf?ver=YcQAZsGM_Xom3DkNP_fL3g%3d%3d
- Department of the Army, Office of the Assistant Secretary of the Army for Installations, Energy and Environment. (February 2022). **United States Army Climate Strategy.** Washington, DC. Available: https://www.army.mil/e2/downloads/rv7/about/2022_army_climate_strategy.pdf
- Department of Defense, Office of the Undersecretary of Defense (Acquisition and Sustainment). **Department of Defense Climate Adaptation Plan 2022 Progress Report.** Report Submitted to National Climate Task Force and Federal Chief Sustainability Officer. 4 October 2022. Available: <https://media.defense.gov/2022/Oct/06/2003092213/-1/-1/0/2022-DOD-CAP-PROGRESS-REPORT.PDF>
- Department of the Navy, Office of the Assistant Secretary of the Navy for Energy, Installations, and Environment. (May 2022). **Department of the Navy Climate Action 2030.** Washington, DC. Available: <https://www.navy.mil/Portals/1/Documents/Department%20of%20the%20Navy%20Climate%20Action%202030%20220531.pdf>
- Kamentz, A. (2019, April 22). **Most Teachers Don't Teach Climate Change; 4 in 5 Parents Wish They Did.** National Public Radio. Available: <https://www.npr.org/2019/04/22/714262267/most-teachers-dont-teach-climate-change-4-in-5-parents-wish-they-did>
- Kite Insights. (2022). **Every Job is a Climate Job.** Kite Insights. Available: <https://kiteinsights.com/wp-content/uploads/2022/06/Every-Job-Is-A-Climate-Job-Kite-Insights.pdf>
- Lawhorn, W. (2021, February). Solar and wind generation occupations: a look at the next decade. **U.S. Bureau of Labor Statistics.** Available: <https://www.bls.gov/opub/btn/volume-10/solar-and-wind-generation-occupations-a-look-at-the-next-decade.htm>
- Lawson, D., Stevenson, K., Peterson, M., et al. (2019, May 6). **Children can foster climate change concern among their parents.** Nature Climate Change. Available: <https://www.nature.com/articles/s41558-019-0463-3>
- LinkedIn Economic Graph. (2022). **Global Green Skills Report 2022.** LinkedIn. Available: <https://economicgraph.linkedin.com/content/dam/me/economicgraph/en-us/global-green-skills-report/global-green-skills-report-pdf/li-green-economy-report-2022.pdf>
- Marken, S., Agrawal, S. (2022, June 13). **K-12 Workers Have Highest Burnout Rate in U.S.** Gallup. Available: <https://news.gallup.com/poll/393500/workers-highest-burnout-rate.aspx>

- Marlon, J., Neyens, L., Jefferson, M., et al. (2022, February 23). **Yale Climate Opinion Maps 2021**. Yale Program on Climate Communications. Available: <https://climatecommunication.yale.edu/visualizations-data/ycom-us/>
- Microsoft Corporation. (2022, November 2). **Closing the Sustainability Skills Gap: Helping businesses move from pledges to progress**. Microsoft. Available: <https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE5bhuf>
- Mizell, Hayes. (2010). **Why Professional Development Matters**. Learning Forward. Available: <https://learningforward.org/wp-content/uploads/2017/08/professional-development-matters.pdf>
- National Research Council, Division of Behavioral and Social Sciences and Education Board on Science Education, Committee on a Conceptual Framework for New K-12 Science Education Standards. (2012). **A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas**. National Academies. Available: <https://nap.nationalacademies.org/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>
- Otto, I., Donges, J., Cremades, R., Schellnhuber, H. (2020, January 21). **Social tipping dynamics stabilizing Earth's climate by 2050**. Proceedings of the National Academy of Sciences (PNAS). Available: <https://www.pnas.org/doi/10.1073/pnas.1900577117>
- Roser-Renouf, C., Maibach, E., Myers, T. (2020). **American Adolescents' Knowledge, Attitudes and Sources of Information on Climate Change**. George Mason University. Available: <http://mars.gmu.edu/handle/1920/11860>
- Truitt, S., Elsworth, E., Williams, J., et al. (2022, March). **State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030**. National Renewable Energy Lab. Available: <https://www.nrel.gov/docs/fy22osti/81486.pdf>

Acknowledgements

The authors would like to thank state advocates who participated in interviews, including Andra Yeghoian (California); Alex Rodriguez, Leticia Colon, Sena Wazer, and Susan Quincy (Connecticut); Allison Mulch and Randall Solomon (New Jersey); Amara Ifeji and Olivia Griset (Maine); and Kathryn Kurtz (Washington). Thanks also to colleagues who kindly reviewed and commented on early drafts: Kevin Coyle, Glenn Branch, Jennifer Gunby, Elizabeth Beardsley, Louisa Koch, Sara Ross, Karen Cowe, Dylan McDowell, and Laura Schifter. Finally, we express appreciation to the Curtis & Edith Munson Foundation for their financial support for costs associated with this publication.