



Mapping the Landscape of K–12 Climate Change Education Policy in the United States

Full Report

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MECCE
MONITORING AND EVALUATING
CLIMATE COMMUNICATION
AND EDUCATION PROJECT



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North American Association
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Table of Contents

4	About the Research
9	Summary of Findings
11	Key Findings
40	Summary and Recommendations
45	What States Can Do Now to Take Climate Action
49	Limitations
50	Conclusions
51	References



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“Education is the most powerful element in preparing societies for the global challenges that climate change brings.”¹

The Time For Climate Action Is Now

The need to prepare for climate change is not a distant possibility; it is a current reality. Indeed, 2021 saw the declaration of the world’s first “climate change famine” in Madagascar² and the diagnosis of the first person suffering from climate change in Canada.³ The Intergovernmental Panel on Climate Change’s 2021 report was clear in its issuing of a “code red for humanity.”⁴

Headlines about the state of the planet are not lost on youth. A recent survey found 75% of youth feel the future is frightening because of climate change.⁵ With millions of people joining youth-led global climate protests, we are seeing increasing demand for leaders to take meaningful action, if possible to keep global temperatures from accelerating above 1.5 degrees Celsius of pre-industrial levels.² The protests that began in September 2019 have continued despite an on-going pandemic, which saw much activity move online during 2020.⁶ In September 2021, nearly a million youth across 99 countries returned to the streets to demand climate action ahead of COP26.⁷

For decades, political and social will to act on climate change was quickly swept away in a current of denial, avoidance, and political posturing. Recent evidence, however, suggests that the tides are turning. Public perception about the seriousness of climate change has never been higher.⁸ This pool of public concern is beginning to be coupled with action at all levels of society. In 2021, the Biden Administration announced an agenda to respond to climate change,⁹ which includes an executive order directing all agencies to develop climate action plans.¹⁰

Even in the midst of a global pandemic, public perception about the seriousness of climate change has never been higher.⁸

At this important juncture in global history, climate change education should support students to understand climate change causes. It should also provide opportunities for contributing to adaptation and mitigation in ways that harness youth interest and motivation to create more sustainable communities.^{11,12} There is immense opportunity for the education system to provide the impetus for action needed to counter years of immobilization.¹³ These opportunities include the potential not only for massive greenhouse gas emission reductions, but young people gaining the skills, knowledge, dispositions, and action capacity needed to respond to the climate crisis.

The 98,000 schools in the United States represent, “one of the largest public sector energy consumers, operate the largest mass transit fleet in the country, occupy 2 million acres of land, and serve over 7 billion meals annually with related food waste (p. 15)”¹⁴ Education has been identified as a crucial social tipping point for decarbonization—but only if education goes beyond cognitive student learning about the causes and effects of climate change, to also include engaging with socio-emotional considerations and action, and using more holistic forms of climate change education.¹⁵ This also includes using a justice lens to focus on who is most affected by or most able to take climate action.¹⁴ Research has also found that the presence of climate and sustainability in education policy at national, state, and school district levels has self-reinforcing effects that make it more likely that this focus will be taken up by schools locally.¹⁶

About the Research

This study reports on the state of climate change education policy across kindergarten to grade twelve (K–12) education in the United States. By identifying trends and opportunities for advancing climate change inclusion in education policy, education systems can support the development of climate change solutions within policy and practice.

Benchmarking whether and how states are currently including climate change in education policy materials can help inform and motivate further inclusion. Strong uptake of climate change in education policy helps administrators, educators, parents, and students recognize and mobilize the role of education in climate action, as well as address climate-related mental and social health issues.

Research Methods

The study includes a review of 802 publicly available education policies across the United States.^a These policies were found by searching department of education and board of education^b websites, as well as a web search engine for climate change keywords (herein ‘content’)^c across all 50 U.S. states and the District of Columbia.¹⁷

In the study, *education policy* refers to official education policy texts, such as strategic plans, environmental literacy plans, and sustainability policies, as well as curriculum frameworks and state standards,^d which have been produced by departments or boards of education.

Only policy materials within public state-level departments or boards of education were collected.^e



^a Policies were collected from April 2021 to July 2021.

^b Some states have separate websites for their departments and boards of education. State educational authorities are usually referred to as the state departments of education, which are usually personified through the state board of education. State boards of education differ in relation to their policy authority in every state. Within 45 states, state boards of education adopt the learning standards for all students in the state (NASBE, 2022).

^c Mention of climate change content within the policies was reviewed to ensure it referred to climate change.

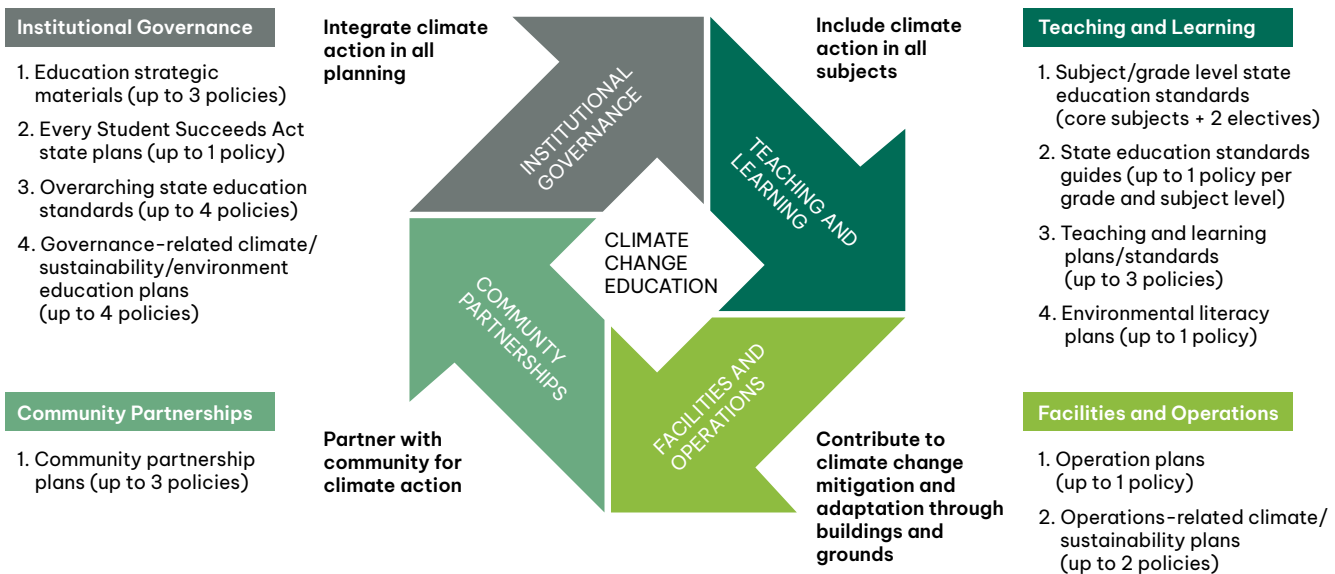
^d State education standards indicate what students should know and be able to do by the end of each grade level and within particular subjects to pass state assessments.

^e Policies from the private education sector or local authorities (e.g., school districts) were not collected. Standards for career and technical education at the primary and secondary level were also not collected. States rarely have one policy for their career and technical education standards. More commonly, the standards are separated by career clusters or individual courses, which are selected at the district level. For states that use course-specific standards, this often would have meant collecting course outlines for hundreds of classes to obtain a comprehensive list of all the standards used for a career cluster.

The study used a whole institution approach for data collection and analysis and considered four institutional domains of potential climate change activity: 1) institutional governance, 2) teaching and learning, 3) facilities and operations, and 4) community partnerships (see Figure 1). Past research has indicated that a whole institution approach is an effective framework for ensuring higher levels of sustainability and climate change education in education policy and practice.^{18,19,20} A whole institution approach to climate change education is also recognized as an effective model by UNESCO.^{21,22}



Figure 1. A whole institution approach to climate change education framework and the policy types collected within each domain.



For policy analysis, the extent and type of climate change inclusion in policies were examined, supported by NVivo 12 qualitative research software.[†] The relative frequency of climate change keywords within education policies was used to measure the extent of state-level inclusion of climate change in education policy.

[†] To consider varying policy lengths and numbers of policies per state, keyword frequencies were standardized by 1,000,000 words.



The keywords were divided into clusters that represent different ways climate change can be engaged in K-12 education (see Table 1). Due to few results returned for climate justice, mitigation, and adaptation, more detailed searches were conducted for related keywords within one paragraph of the word *climate* to capture broader climate change content at the paragraph level. Keywords related to the United Nations (UN) were also searched within one paragraph of the word *climate* to determine if/how key UN policy initiatives were referenced in the policies.

Table 1. Keyword clusters searched using NVivo 12.

Climate Change-Overall:			
<ul style="list-style-type: none"> • “climate change” • “climate hazard*” • “climate impact*” • “climate vulnerable*” • “climate action*” 	<ul style="list-style-type: none"> • “climate resilience” • “carbon footprint*” • “global warming” • “GHG emission*” • “greenhouse gas emission*” 	<ul style="list-style-type: none"> • “CO₂ emission*” • “carbon dioxide emission*” • “low emission*” • “net-zero emission*” 	<ul style="list-style-type: none"> • “carbon neutral” • “climate mitigation*” • “climate adaptation*” • “just transition*” • “climate justice”
Green Schools:	Environmental or Climate Change Laws:	Energy:	Environmental Protection Agency:
<ul style="list-style-type: none"> • “green school*” • “green ribbon school*” • “eco school*” • “eco certification*” 	<ul style="list-style-type: none"> • “climate change law*” • “climate change education law*” • “climate law*” • “climate action law*” • “environment* law*” • “environment* education law*” 	<ul style="list-style-type: none"> • “fossil fuel*” • “renewable energy*” • “renewable resource*” • “alternative energy*” 	<ul style="list-style-type: none"> • EPA • “Environmental Protection Agency”
Keywords searched within one paragraph of the word “climate”			
Justice:		Adaptation and Mitigation:	United Nations:
<ul style="list-style-type: none"> • justice • civics • citizenship • vulnerable • “social movement*” 	<ul style="list-style-type: none"> • protest* • strike* • disproportionate • “at risk” • marginalized 	<ul style="list-style-type: none"> • mitigate • mitigation • mitigating • adapt • adaptation • adapting 	<ul style="list-style-type: none"> • UNFCCC (& spelled out) • UN (& spelled out) • “Paris Agreement” • ACE (& spelled out) • “2030 Agenda” • SDG (& spelled out) • “Kyoto Protocol” • “Doha Work Programme” • UNESCO (& spelled out)

*Indicates multiple variations of the word or words were included in the search

Unique Contributions of the Study

The type of climate change content discussed in the policies was also analyzed. The study used a holistic learning framework to explore how climate change was taken up within the state standards and curriculum frameworks (see Figure 2, Table 2). Specifically, the study examined the degree to which the policies included a focus on all learning dimensions of cognitive (e.g., teaching the science of the greenhouse effect), socio-emotional (e.g., addressing social and emotional issues such as grief and denial), and action-oriented (e.g., focusing on collective justice-oriented action). Previous studies have largely focused on inclusion of content on the science of climate change (a cognitive-focus),²³ as well as increasingly, on the trauma students can experience from extreme weather events associated with climate change.²⁴ What has been largely missing are analyses of the extent and type of content in education policies on broader socio-emotional and action-oriented elements of climate change education, including how grief and denial are iteratively related to climate (in)action. Such a holistic approach reflects much current thinking on some of the important aspects of quality climate change education.

Figure 2. Holistic climate change education framework.

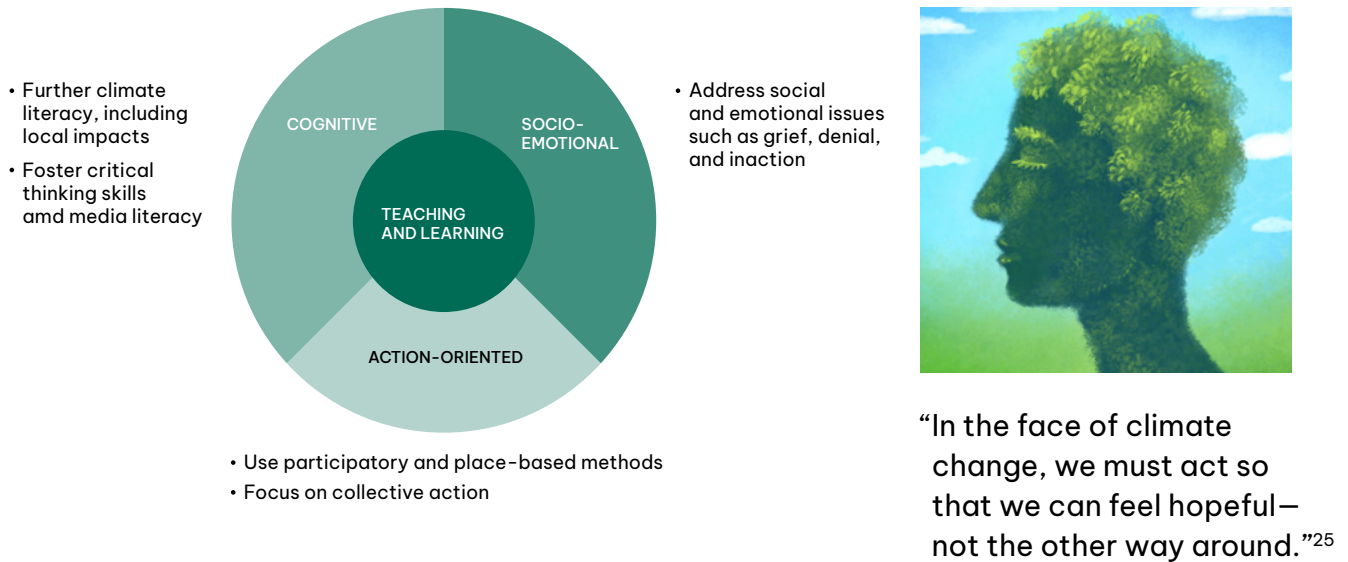


Table 2. Holistic Learning Dimension Definitions^A

Cognitive	Aimed at developing the knowledge of and the learning agility necessary to better understand climate change, including its underlying anthropogenic and biophysical causes, impacts, and solutions.
Action-oriented	Aimed at developing action competencies, including skills and practices, individual and collective agency, and behavioral change to address climate change and to minimize one’s own and collective climate impact.
Socio-emotional⁹	Aimed at developing the emotional intelligence and/or interpersonal skills that enable learners to process emotions and feelings about climate change and its impacts, and to more effectively collaborate, negotiate, and communicate with others to address climate change. This can include self-reflection skills, knowledge, values, attitudes, and motivations that enable learners to build their own capacity for resilience and action.

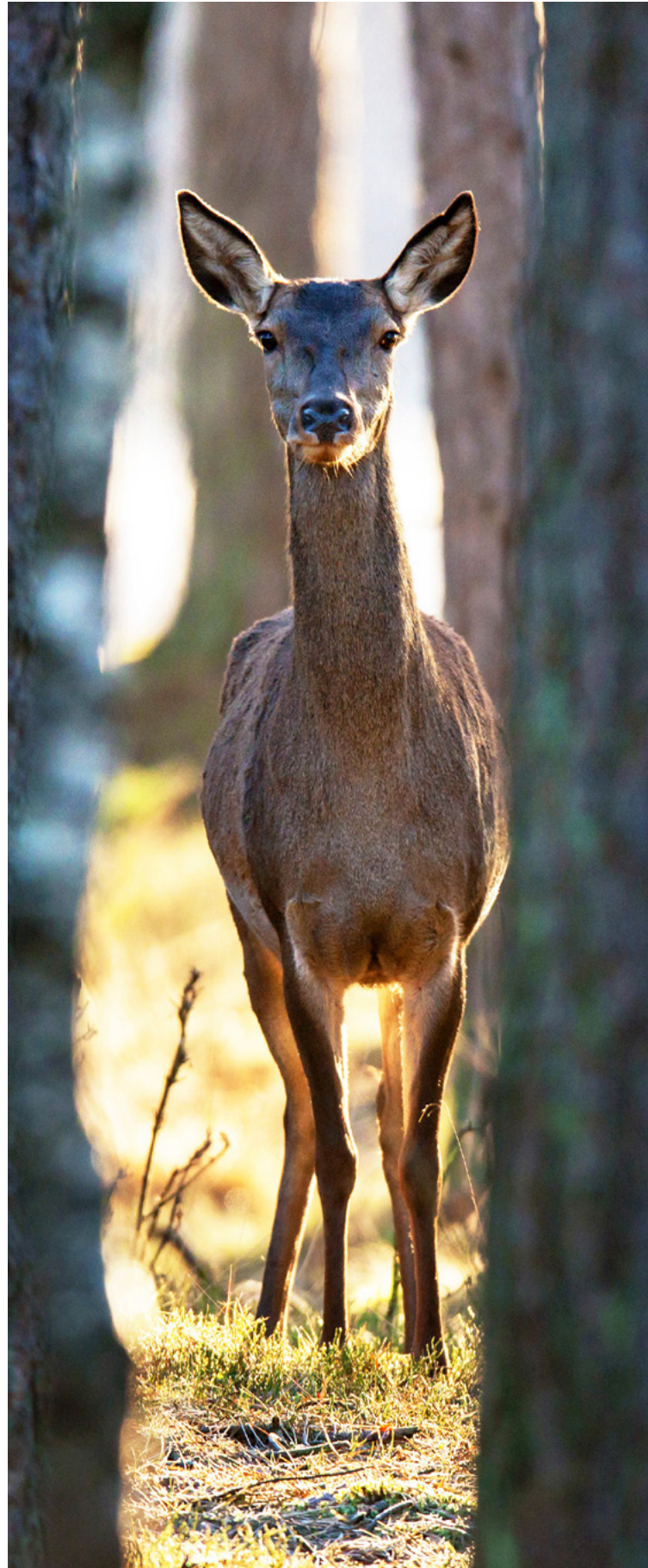
⁹ The Monitoring and Evaluating Climate Communications and Education (MECCE) project has used the term “psycho-social” in past projects to indicate broader inclusion of psychological, sociological, and cultural factors beyond just individual emotions. The term “socio-emotional” is used here because it is more common in American and educational contexts; however, we still include a broad range of psychological and sociological factors in our definition of “socio-emotional.”^A

Quality climate change education policy also includes a focus on Indigenous knowledges and priorities. This should include: 1) validating and respecting place-based Indigenous knowledges, 2) recognizing and valuing Indigenous understandings of what constitutes “quality” education, 3) understanding and addressing the impacts of natural resource extraction on Indigenous peoples, and 4) recognizing that Indigenous land-based education is sustainability and climate change education. Much past research has not focused on the inclusion of Indigenous knowledges and priorities within climate change education policy within the United States, a gap that the present study addresses.

While previous studies have analyzed policies from the whole institution domain of teaching and learning, such as the presence of climate change education in science and/or social studies standards,^{23,24} this study is unique in also including analysis of language arts and mathematics standards, as well as of curriculum frameworks for all core subjects.

Past research has also analyzed broader state policy (e.g., legislation, regulations, mitigation settlements) from the domain of facilities and operations; however, there has not been much of a focus on climate change inclusion in education policy.²⁴ The prior research that has focused on education policy has considered climate change inclusion mainly in the domains of teaching and learning, and facilities and operations. However, there has not yet been a focus on climate change inclusion in education policy in relation to overall institutional governance and community partnerships.

This report builds on this prior research and adds the importance of including climate change in education policy in all areas of institutional activity, to further climate change action through education.





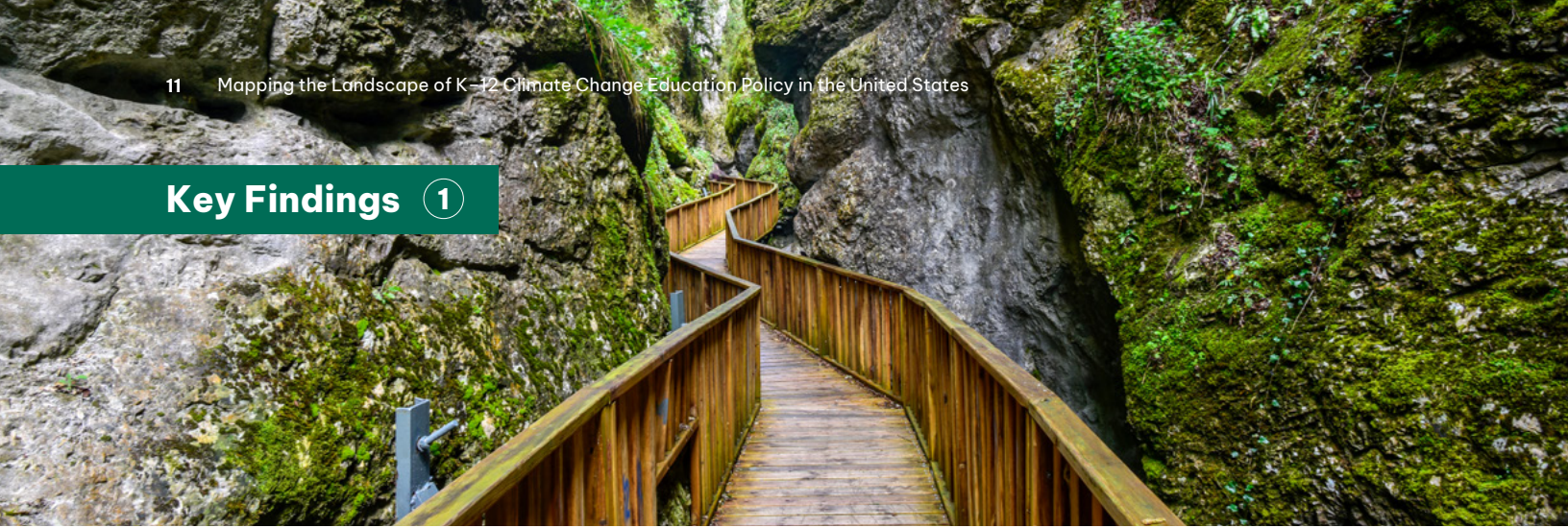
Summary of Findings

- ① All states had policies that mentioned climate change at least once; extent of inclusion was usually very low.
- ② When looking across policy types, climate change content was most commonly included in sustainability-specific operations plans and environmental literacy plans; although many environmental literacy plans are dated.
- ③ When looking at the domain of policy types, climate change content was most commonly included in teaching and learning policies (i.e., environmental literacy plans, state standards, curriculum frameworks, or teaching and learning plans).
- ④ Within state standards and curriculum frameworks, climate change content was found most often in environment/climate change-specific and science subjects, rarely in social studies or language arts, and never in mathematics.
- ⑤ State standards and curriculum frameworks that used or were influenced by the Next Generation Science Standards were more likely to include climate change content.
- ⑥ The majority of state standards and curriculum frameworks did not include holistic approaches to climate change education; when climate change content was included, it tended to focus on cognitive learning and on the ends (i.e., outcomes) not the means (i.e., process) of education.
- ⑦ Discussions of energy were often in relation to fossil fuel, and there was little mention of key topics and initiatives such as climate action, justice, mitigation, or adaptation, Indigenous knowledges, or the United Nations, in the policies analyzed.
- ⑧ State political affiliation, presence of a climate change plan, and whether or not a state had made a broader commitment to climate change correlated with to what extent climate change content was included in the policies.

Table 3. Policy Highlights for Various Study Foci.

Topic	Policy Highlights
Any climate change content	<ul style="list-style-type: none"> • All states and Washington D.C. have some climate change content in department or board of education policies.
Extent of climate change content	<ul style="list-style-type: none"> • 33 states have a very low focus on climate change content in department or board of education policies. • 14 states have a low focus on climate change content in department or board of education policies. • 3 states and Washington D.C. have a moderate level of focus on climate change content in department or board of education policies.
Whole institution domain coverage	<ul style="list-style-type: none"> • 41 states and Washington D.C. include climate change content in policies of one whole institution domain type in department or board of education policies. • 8 states include climate change content in policies of two domain types in department or board of education policies. • 1 state includes climate change content in policies of three domain types in department or board of education policies.
Across multiple subjects coverage	<ul style="list-style-type: none"> • 23 states include climate change content in the standards or curriculum frameworks of only one subject. • 17 states and Washington D.C. include climate change content in the standards or curriculum frameworks of two subjects. • 10 states include climate change content in the standards or curriculum frameworks of three subjects.
Holistic learning dimensions coverage	<ul style="list-style-type: none"> • All states and Washington D.C. include climate change content that focuses on the cognitive learning dimension in their state standards or curriculum frameworks. • 10 states include climate change content that focuses on the socio-emotional learning dimension. • 8 states include climate change content that focuses on the action-oriented learning dimension. • 37 states include climate change content that focuses on only one learning dimension (i.e., cognitive). • 10 states include climate change content that focuses on two learning dimensions. • 4 states include climate change content that focuses on all three learning dimensions: cognitive, action-oriented, and socio-emotional.

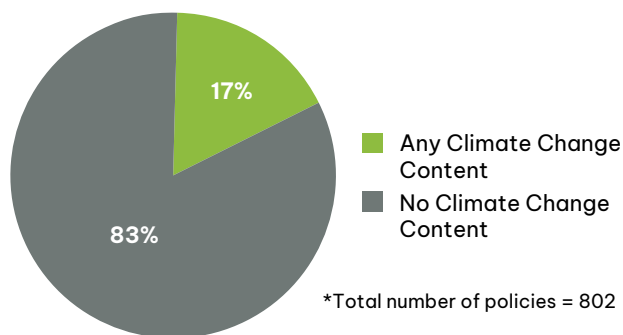
Key Findings 1



All states had policies that mentioned climate change at least once; extent of inclusion was usually very low.

Of the 802 education policies analyzed, only 17% (136) mentioned climate change at least once (see Figure 3). Within the policies with climate change content, climate change was discussed an average of 3 times (after standardization for policy length), with considerable variance across policies. For instance, Indiana’s policies mentioned climate change content an average of 42 times per policy across 13 policies, whereas policies from Utah have the lowest average mentions of climate change, at <1 standardized mention across 25 policies (5 actual mentions).

Figure 3. Percentage of policies with any climate change content.



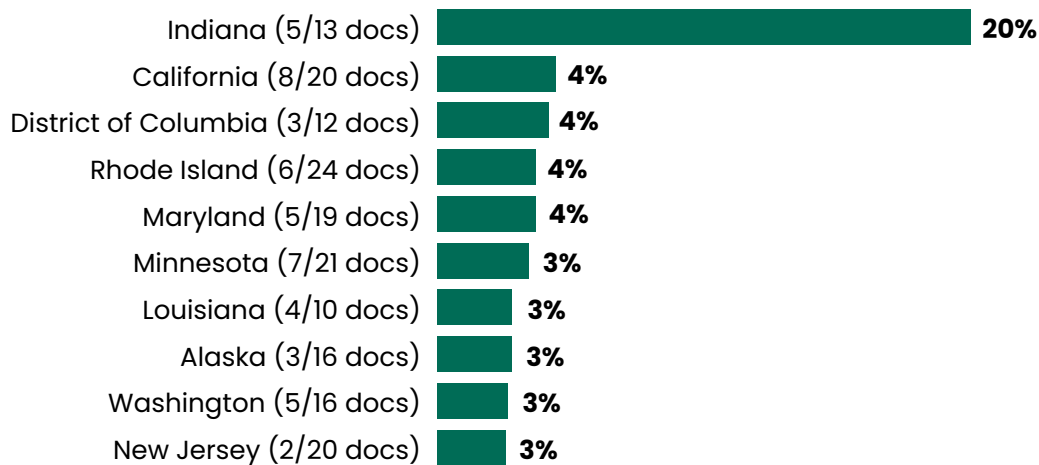
State Rankings for Climate Change Inclusion

States were ranked based on their extent of inclusion of climate change in their education policies (see Figure 4 on page 12).

Twenty percent of all climate change content was in policies from Indiana, which released a climate change curriculum framework in 2021, which includes climate change resources aligned to their science standards.²⁶ Statements in the curriculum framework are a stark contrast to their 2016 science standards, which referred to climate change as a ‘theory.’²⁷ The creation of the curriculum framework was the result of a partnership between the Indiana Department of Education, Purdue Climate Change Research Center, and Purdue University College of Science.²⁸ The curriculum framework was created, at least in part, due to a 2020 assessment by the National Center for Science Education that assigned Indiana a ‘D’ for climate change education.²⁹

“Research global temperatures over the past century. Compare and contrast data in relation to the **theory of climate change.**”
 –Indiana science standards, 2016, p. 6 (emphasis added)

“The scientific community strongly agrees and concludes that human activities are causing global warming, which in turn causes climates to change. Educators need to teach the scientific perspective about climate change. The debate and controversy lie in the social, economic, and political approaches to mitigate and adapt to global warming and climate change.”
 –Indiana science curriculum framework, 2021, n.p. (emphasis added)

Figure 4. Top ten jurisdictions with the most climate change content.

*Total number of standardized references to climate change content across all states = 2,705

Louisiana's top 10 placement was influenced by the mention of climate change in two optional environment/ climate change subjects, as well as in a draft social studies standards policy. Louisiana's current science standards also received a 'B' from the "Making the Grade Study."²³

Alaska's inclusion in the top 10 was largely influenced by a draft policy for construction standards that recommends the creation of a climate action plan as well as carbon footprint reporting to meet the standards of a "premium" project.³⁰ Alaska's placement in the top 10 was also influenced by the inclusion of climate change in their science standards (adopted in 2019). This signalled the first time their science standards went beyond parenthetical mentions of climate change,³¹ and they received an 'A-' for climate change inclusion in these standards by the 'Making the Grade' study.²³



Premium:

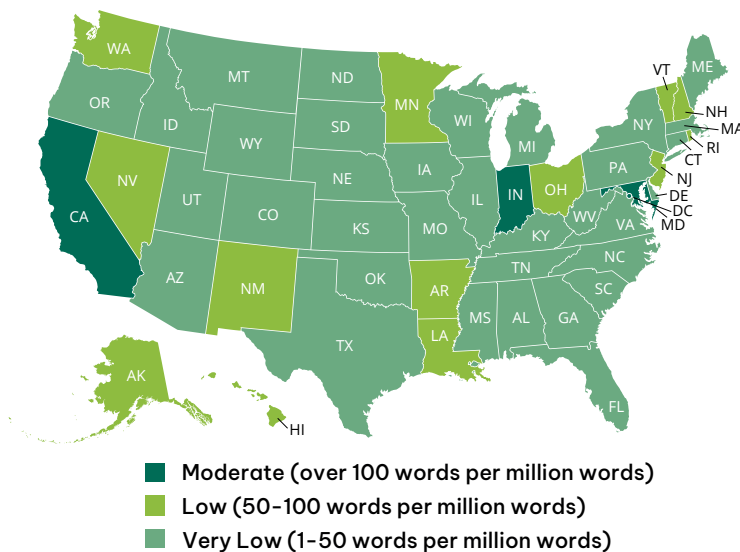
1. **Green Building Certification:** Register the project with the USGBC LEED Rating System and obtain LEED for Schools certification.
2. **Educational Display:** Provide a permanent display, building signage, digital dashboard, or building tour that describe the high-performance features of the school.
3. **Carbon Footprint Reporting:** Calculate the school's carbon footprint. Include a greenhouse gas inventory and opportunities to reduce greenhouse gas emissions.
4. **Climate Action Plan:** Develop and implement a climate action plan to raise awareness of the school community's carbon footprint and engage students, staff, and the community in reducing that carbon footprint."

—Alaska operations plan, 2021, p. 28 (emphasis added)

State Groupings by Extent of Climate Change Inclusion

To further determine the extent of climate change inclusion within the policies analyzed, states were categorized into groups based on how many times climate change content was included in the analyzed policies. A policy was categorized as having ‘no focus’ if it had 0 climate change keywords out of a million words, ‘very low focus’ if it had 1–50 keywords per million words, ‘low focus’ if it had 50–100 keywords per million words, and ‘moderate focus’ if it had over 100 keywords per million words. Across 65% of the 50 states and Washington D.C., inclusion of climate change content was very low (33/51). Twenty seven percent of states had a low level of inclusion (14/51), and just 8% of jurisdictions had a moderate level of inclusion (3/51, see Figure 5).

Figure 5. Extent of climate change inclusion by state.



To provide context for the overall extent of inclusion of climate change content within curriculum policies, the amount of climate change content in curriculum policies was compared to a UNESCO commissioned 100 country study of climate change inclusion in national curricular frameworks.³² Within the UNESCO study, climate change content was mentioned an average of 154 times per country (Range: 0 to 2,246; Median: 18.4). In the present study, climate change content was mentioned an average of 2 times per state (Range: <1 to 21; Median: 1).^h Compared to the UNESCO study, a considerable number of additional climate change keywords were used in the NAAEE study, so one could expect higher levels of content in the present study; however, that was not found.

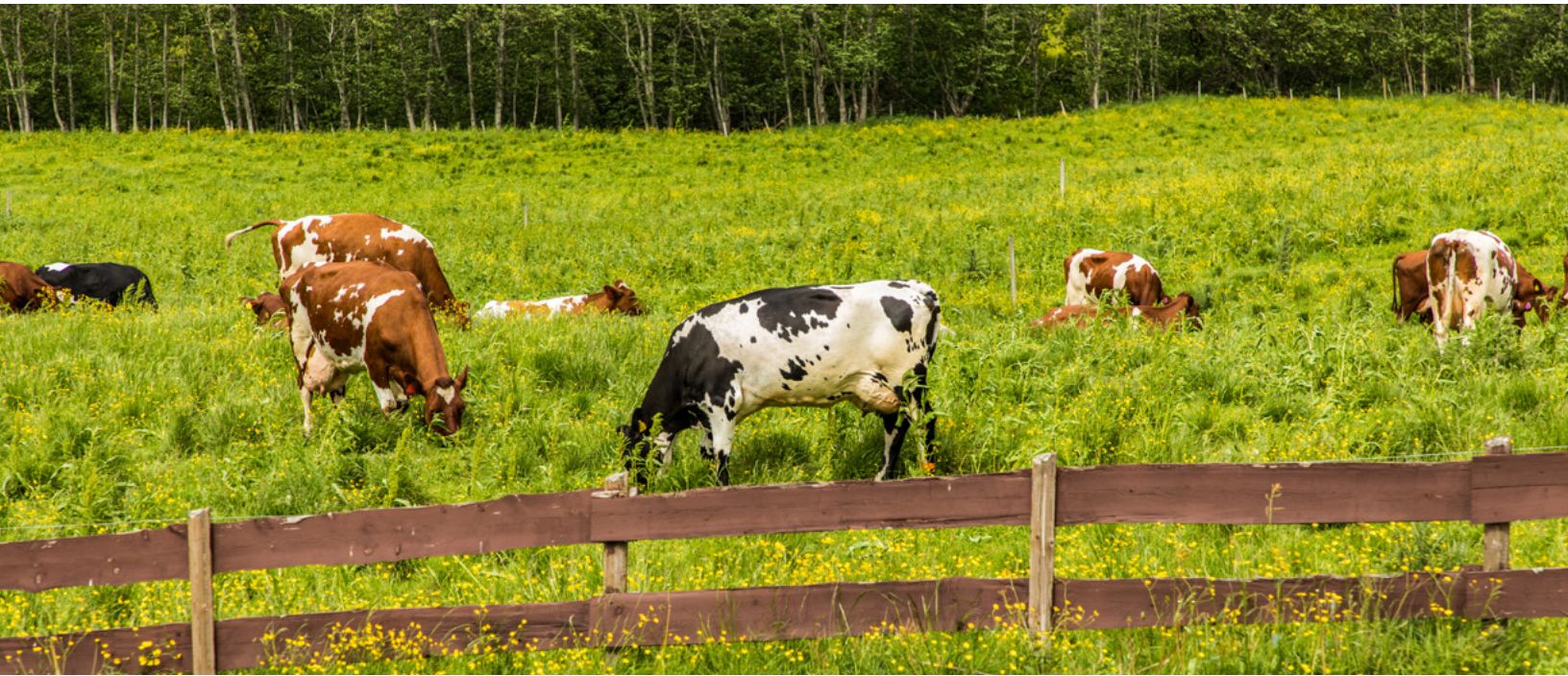
Climate Change (Non)inclusion

While all states included at least one mention of climate change content in the analyzed policies, the presence of climate change content does not necessarily indicate support for climate change or climate action. In total, 1% of climate change content indicated that climate change either should not be taught, or it was mentioned that assessment of that outcome did not include climate change. For instance, in South Dakota, climate change is discussed to suggest that, like evolution, it should be taught at home and not within schools.³³ Likewise, in other states, the existence of global warming and climate change itself (e.g., in Texas,³⁴ Mississippi³⁵) and/or its human causation (e.g., in South Carolina³⁶) was called into question.ⁱ In total, 65% of climate change content did not discuss the causes of climate change, 32% of content was not supportive of human causation, and 3% of content was ambiguous or encouraging of debate about the causes of climate change.

^h Each state was considered equivalent to a country for this comparison since curriculum policies are set at the state-level in the United States.

ⁱ This finding aligns with and builds on research conducted by the Aspen Institute, which found that 15 states with climate change content in their science standards do not mention human causation (see Katz et al., 2020).

A bill also failed to pass a Texas House committee in May 2021 that would have added “the long-term problem of human-caused climate change and its effects” to the Texas Education Code,³⁷ and debates are ongoing about climate change inclusion in Texas state standards.³⁸



“Through the public hearing process related to adoption of the South Dakota Science Standards, it is evident that there is particular sensitivity to two issues: **climate change** and evolution. The South Dakota Board of Education recognizes that parents are their children’s first teachers, and that parents play a critical role in their children’s formal education. The South Dakota Board of Education also recognizes that not all viewpoints can be covered in the science classroom. Therefore, **the board recommends that parents engage their children in discussions regarding these important issues**, in order that South Dakota students are able to analyze all forms of evidence and argument and **draw their own conclusions.**”

—South Dakota science standards, 2015, p. 6 (emphasis added)

“[A]nalyze and evaluate **different views on the existence of global warming**”

—Texas environment/climate change standards, 2010, n.p. (emphasis added)

“**Engage in scientific argument** based on current evidence to determine whether climate change happens naturally or is being accelerated through the influence of man.”

—Mississippi science standards, 2018, p. 47 (emphasis added)

“[A]nalyze scientific arguments regarding **the nature of the relationship between human activities and climate change.**”

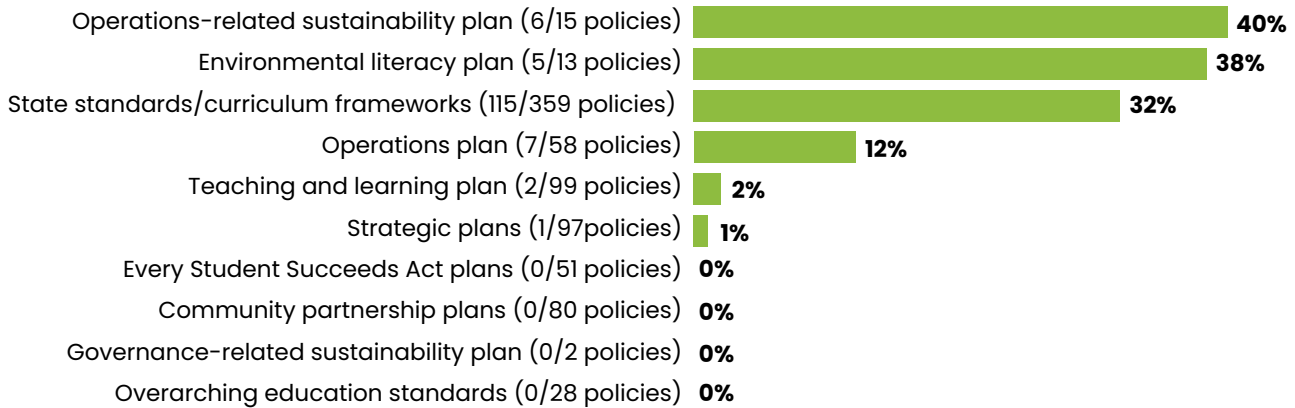
—South Carolina science standards, 2014, p. 109 (emphasis added)

Key Findings 2

When looking across policy types, climate change content was most commonly included in sustainability-specific operations plans and environmental literacy plans; although many environmental literacy plans are dated.

When climate change content was mentioned within any policy analyzed, it was most often within 1) sustainability-specific operations plans (versus general operations plans) and/or 2) environmental literacy plans (see Figure 6). That said, these two types of policies were rare, in that only 3% of the collected policies (28/802 policies) were of either type. In addition, still fewer than half of policies of these types specifically mentioned climate change.

Figure 6. Percentage of policies with any reference to climate change content by policy type.



*136 out of 802 documents had climate change content



Sustainability-Specific Operations Plans

Only 10 states had sustainability-specific operations plans, and only 4 of those 10 states had policies of this type that mentioned climate change content.

Taking climate change action was often optional in sustainability-specific operations plans. When climate change was discussed in these plans, it was often related to optional credits available to schools seeking to obtain high-performance status over and above the minimum state requirements.

This included through the creation of emissions reduction or climate action plans (e.g., in Washington³⁹ and Rhode Island⁴⁰), as well as through the purchasing of renewable energy certificates (e.g., in New York,⁴¹ Rhode Island, and Washington). For example, New York's sustainability-specific operations plan includes a template that districts can use to express their commitment to using renewable energy certificates or renewable energy (see Figure 7). In Washington, new school buildings built by school districts can also obtain points for designing and constructing a zero net energy building, and they indicated that such a building can be an educational opportunity for the local community. No mention of how school operational upgrades can be used to educate students was found.

Figure 7. Sample resolution within New York's sustainability-specific operations plan.

Sample Resolution

WHEREAS, the cost of conventional fuels, such as oil and natural gas is increasing; and
 WHEREAS, in the last five years, New York has become increasingly dependent on natural gas;
 and
 WHEREAS, fuel diversity is important for energy security reasons; and
 WHEREAS, fossil fuels are limited in supply and will someday be exhausted; and
 WHEREAS, fossil fuels generate pollutants when combusted, including greenhouse gases that
 can lead to global climate change; and
 WHEREAS, renewable power is from clean, abundant energy sources, such as the sun and wind;
 and
 WHEREAS, renewable power generates few, if any, pollutants.
 NOW THEREFORE BE IT RESOLVED that the _____ [insert name of school
 district, city or town] will make arrangements to purchase clean renewable electricity or
 Renewable Energy Certificates (RECs) for a period of two years covering at least 25% of the
 _____ [insert name of school] projected annual electricity needs. The
 _____ [insert name of school] projected annual electricity needs are _____ kwh [insert
 number of kwh].

“Develop and implement a Resource Conservation Plan including energy, water, and materials conservation. And **develop a Greenhouse Gas Reduction plan**. Include plans for reduction of water, energy, and vehicle miles traveled. Include goals with target dates” (for 1 optional point).

—Washington sustainability-specific operations plan, 2018, p. 138 (emphasis added)

“Design and construct the building to be zero net energy” (for 35 optional points)

“K-12 schools can educate the broader public about sustainability and green building, and show a commitment to reducing climate impacts.”

—Washington sustainability-specific operations plan, 2018, p. 80 (emphasis added)

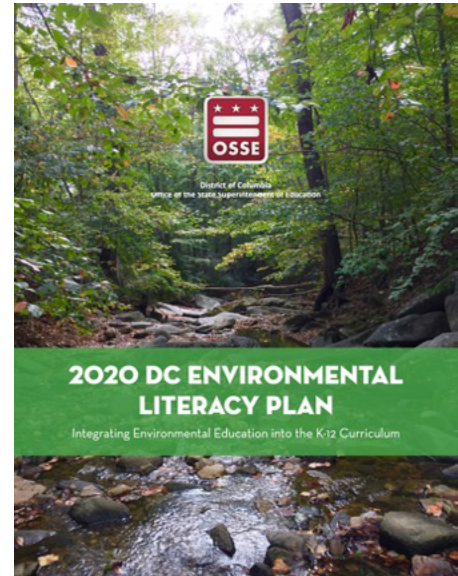
“**[Schools can] commit for a minimum period of two years to purchasing Renewable Energy Certificates (RECs) or clean renewable electricity** for the equivalent of at least 25% of the school's projected annual electricity needs” (for 1 optional point, must achieve 65 points in total).

—New York sustainability-specific operations plan, 2007, p. 111 (emphasis added)

Environmental Literacy Plans

Only 13 states had publicly available environmental literacy plans published by departments of education.^{k,42} Of those, only 5 included climate change content, with 4 out of these 5 placing climate change front and center (i.e., California,⁴³ Maryland,⁴⁴ Tennessee,⁴⁵ and Washington D.C.⁴⁶). For instance, Washington D.C. placed their environmental literacy plan squarely within the context of climate change, as well as broader social justice movements and issues of global concern in the first sentence of their plan.

Environmental literacy plans, however, did not often provide resources to carry out climate change education. Some states, like Maryland, are helping to support the implementation of climate education (e.g., website of resources). Many of the environmental literacy plans are also dated with only 3% of plans (4/13) published in the past five years.



“From global issues such as pandemics and strikes for climate change, to social movements such as March for Our Lives and Black Lives Matter: the world around us is changing rapidly.”

—Washington D.C. environmental literacy plan, 2021, p. 1 (emphasis added)

“The Maryland State Department of Education Environmental Education website hosts a Climate Change Education resource page and classroom toolkit. Lessons, websites, and unit plans for all appropriate grade levels are included on the site.”

—Maryland environmental literacy plan, 2010, p. 23 (emphasis added)



^j Renewable energy certificates (sometimes called credits) are market-based solutions that represent property rights to renewable energy generation. They are the renewable energy equivalent to carbon offsets, except instead of offsetting greenhouse gas emissions, renewable energy certificates offset electricity generation from non-renewable sources.

^k The remaining 21 environmental literacy plans identified by prior NAAEE research (NAAEE, 2019), were not published by departments of education and/or were not publicly available. Though departments of education may have served on advisory committees for these policies, the policies themselves were not published and/or endorsed by departments of education for use within formal education.

Key Findings 3

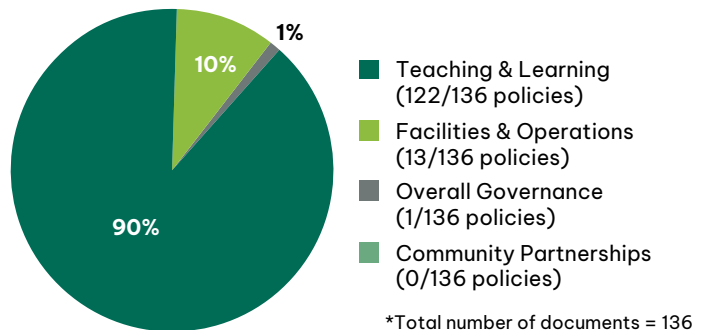
When looking at the domain of policy types, climate change content was most commonly in teaching and learning policies (i.e., environmental literacy plans, state standards, curriculum frameworks, or teaching and learning plans).

Teaching and Learning Policy

As shown in Figure 8, 90% of the time climate change content was mentioned (122/136 policies), it was in a teaching and learning policy (i.e., state standards, curriculum frameworks, environmental literacy plan, or teaching and learning plan). In fact, all 50 states and Washington D.C. had climate change content in at least one teaching and learning policy. Overall, 26% of all teaching and learning policies included climate change content (122/471 policies). For instance, in Idaho teachers are expected to develop lessons that include a climate change focus.⁴⁷

However, the battle to retain mention of human-caused climate change in Idaho public schools has been long and is ongoing.⁴⁸ For example, from 2016 to 2018, legislators in the Idaho House of Representatives objected to how climate change was included in the science standards and attempted to block their adoption. In 2020, Idaho House legislators tried again to challenge the inclusion of climate change in the science standards before those attempts also failed. The standards are being revised as of 2022, which means the inclusion of climate change is likely to come under attack again.⁴⁹

Figure 8. Climate change inclusion across institutional domains.

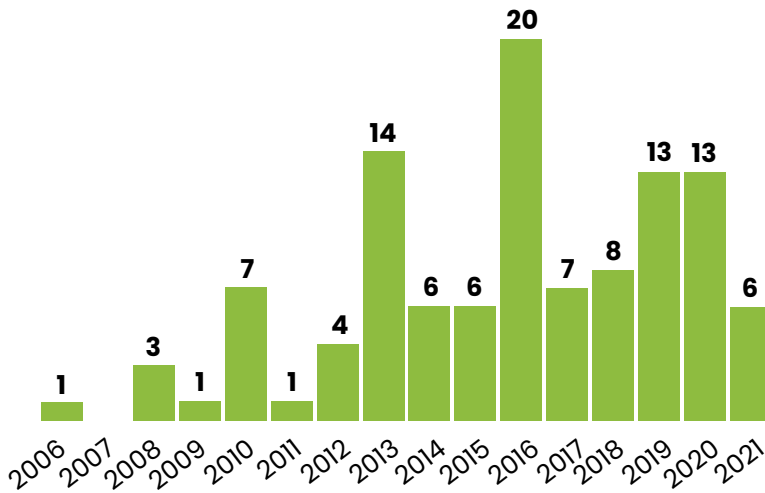


"The teacher **develops lessons based on the major underlying theories and principles of Earth and human activity including:** natural resources, natural hazards, human impacts on Earth systems, and global **climate change.**"

—Idaho teaching and learning plan, 2019, p. 169 (emphasis added)



Figure 9. Number of state standards and curriculum framework policies published by year with climate change content.



Policies without a date were not included.



Within the curriculum teaching and learning policies (i.e., state standards and curriculum frameworks), there were spikes in the number of policies with climate change content published in the years 2013, 2016, and 2019 (see Figure 9). The 2013 spike in climate change content is from the publication of the Next Generation Science Standards (NGSS) that year. The increased number of policies published in 2016 with climate change content may be associated with the signing of the Paris Agreement in 2015. The final spikes in 2019 and 2020 may be from the publication of an Intergovernmental Panel on Climate Change (IPCC) report in 2018, which was unprecedented in its warning that only 12 years remained to avert climate catastrophe,⁵¹ as well as the climate strikes led by youth and joined by millions worldwide in 2019.⁴⁶ While the Paris Agreement, climate strikes, and 2018 IPCC report may not have impacted policy in all cases, the climate strikes were mentioned in the Washington D.C. environmental literacy plan example mentioned above,⁴⁶ and it is possible the events may have indirectly influenced other policies due to their international significance.

Facilities and Operations Policy

Policies within the facilities and operations domain were the second most likely to include climate change content. Eighteen percent of facilities and operations policies found in 8 states had climate change content (13/73 policies). In some states, climate change was discussed as something that may impact facilities and operations. For instance, Washington included climate change in its facilities hazard mitigation plan and described how climate change might affect K-12 facilities in relation to flood and tsunami risks and through the alteration of weather patterns.⁵² Less commonly, the reduction of greenhouse gas emissions was embedded in the overall vision for facilities and operations (e.g., in California⁵³).

“Global climate change may affect K-12 facilities in two ways:

- Sea level rise will exacerbate flood and tsunami risk for facilities near the coast of the Pacific Ocean and Puget Sound
- Climate change may alter weather patterns with possible effects on the frequency and severity of storm events and/or droughts.

...The effects of climate change on weather patterns are less well understood. However, **the impacts on school districts appear to be relatively minor.**”

—Washington operations plan, 2014, p. 252-253 (emphasis added)

“Promote sustainable practices that conserve natural resources, limit greenhouse gas emissions, optimize construction and life cycle costs, and encourage walking and bicycling.”

—California operations plan, 2015, n.p. (emphasis added)

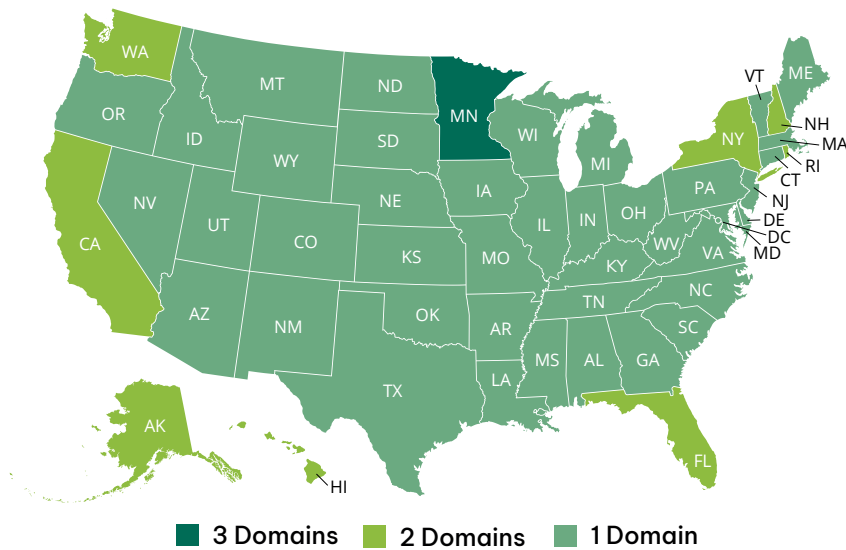
Community Partnerships Policy

No states had climate change content in community partnership policies (0/80 policies). Current federal funding requirements do not require state agencies to demonstrate partnerships that support climate change action, which may explain the lack of focus in this area.

State-Level Patterns in Whole Institution Domains

Looking across all 50 states and Washington D.C., 84% of jurisdictions (43/51), had policies that addressed climate change in only one whole institution domain (see Figure 10). Only 14% of states (7/51) had policies that addressed climate change in two domains. Only one state, Minnesota, had policies that included climate change in three domains (i.e., teaching and learning, facilities and operations, and institutional governance). No states mentioned climate change content in all four domains. When a state had a policy from only one domain, it was always teaching and learning. If a state had policies from a second domain, it was always facilities and operations. Minnesota was the only state to include climate change content in a governance policy.

Figure 10. Number of domains covered by state.



Key Findings 4

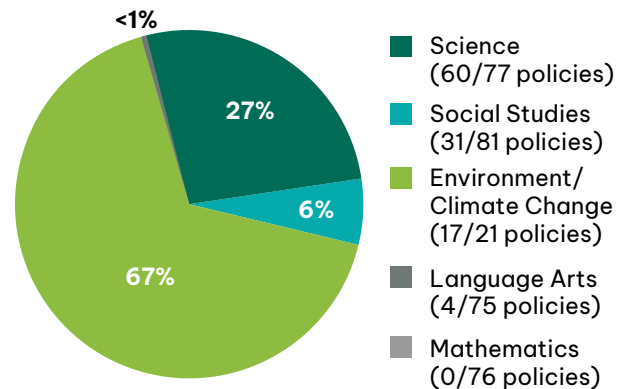
Within state standards and curriculum frameworks, climate change content was found most often in environment/climate change and science subjects, rarely in social studies or language arts, and never in mathematics.

State education standards and curriculum frameworks were collected for elementary (grades K-5), middle school (grades 6-8), and high school (grades 9-12) within the core subjects of language arts (excluding foreign languages), social sciences (social studies, history, geography, civics/citizenship education), sciences (general science, biology, chemistry, physics), mathematics (general math, geometry, algebra, statistics) and up to two “elective” subjects specific to climate change, environmental, or sustainability education.¹ This section reports on the presence of climate change content in both state standards and curriculum frameworks, but for the sake of brevity, both are referred to as “standards.”

When climate change content was mentioned in standards, 67% of the time it was in environment/climate change standards (17/21 policies), 27% of the time it was in science standards (60/77 policies), 6% of the time it was in social studies standards (31/81 policies), and less than 1% of the time it was in language arts standards (4/75 policies) (see Figure 11).

Support for the existence of climate change varied across the standards. Some states included a specific outcome in environment/climate standards on students’ understanding that climate change does in fact exist (e.g., in Virginia),⁵⁶ whereas in other states, students were expected to evaluate different opinions on the existence of climate change (e.g., in Texas). This finding aligns with and builds on previous research, which found only 29 states and Washington D.C. require climate change to be taught as human-caused in at least one required science class,²⁴ and only 17 states’ social studies standards explicitly mention climate change.²⁴

Figure 11. Extent of inclusion of climate change content in state standards and curriculum frameworks.



*Environment/climate change includes up to two “elective” subjects specifically related to climate change, environmental, or sustainability education. Total number of standardized references = 801.

“The student will **investigate and understand that global climate change is occurring.**”

—Virginia environment/climate change curriculum framework, n.d., n.p. (emphasis added)

“Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and **climate change**—can disrupt an ecosystem and threaten the survival of some species.”

—Quote in the science standards of 26 states using the NGSS

¹The environment/sustainability/climate change subject categorization was usually used for optional high school science courses that were not part of the core curriculum. Sometimes the standards for these optional courses were included in the same policy as the required core standards. These optional courses were only captured in cases where a separate policy existed.

When climate change content was included in science, social studies, and language arts standards, the discussion was often cursory and lacked depth. For example, in a draft language arts standards policy from Minnesota, students were asked to analyze the progression of several concepts within literacy and historical texts, one of which was climate change.⁵⁷

Climate change content was not found at all in mathematics standards. Science standards in a few states included a brief mention of how mathematics could be used for climate change education (e.g., in Mississippi⁵⁵ and Tennessee⁵⁸). For instance, there was a suggested enrichment activity to calculate an individual's carbon footprint in Mississippi's science standards. In Tennessee, students were asked to use mathematics to link human causation to climate change.

In Rhode Island, two bills were introduced in January 2021 that would have mandated that the department of education provide guidance on incorporating climate change education into mathematics and language arts standards (as well as professional development for climate change inclusion in the subjects of science and social studies).⁵⁹ Both bills, however, failed to pass committee. It should also be noted that New Jersey announced in 2020 that climate change content would be incorporated across all subjects; however, at the time of data collection, they had not yet updated their mathematics or language arts standards to reflect this commitment.⁶⁰ While these efforts are notable, much more work is still needed in this area to ensure cross-curricular inclusion of climate change content.

Some states also have overarching teaching and learning standards that all students are expected to know and be able to do (e.g., socio-emotional learning standards, 21st Century skills, essential skills). Due to their cross-cutting nature, these policies were labelled as covering "all subjects." Only 10% of these policies collected (3/29 policies) included a brief mention of climate change (i.e., Illinois,⁶¹ Iowa,⁶² and Mississippi⁶³).

For states that have these types of teaching and learning policies, holistic inclusion of climate change represents an easy step that can be taken. For instance, inclusion of climate change in socio-emotional learning standards encourages support of relationship skills needed to effectively communicate about climate change and build the emotional capacity necessary to understand students' own (and others) emotions and perspectives related to climate change.

Climate change inclusion in other skills-related policies (e.g., 21st Century skills, essential skills) indicates support for skills for broader civic engagement on climate change adaptation and mitigation, and also supports the development of leadership, interpersonal, decision-making, media-literacy, and critical-thinking skills that are applicable across disciplines.

"Analyze the progression of an idea or concept (e.g., democracy, integration, identity, **climate change**) as it has evolved in discussion in texts through decades or centuries through foundational documents of historical and literary significance.

—Minnesota draft language arts standards, 2020, p. 91 (emphasis added)

"Enrichment: Determine mathematically an individual's impact on the environment (carbon footprint, water usage, landfill contribution) and develop a plan to reduce personal contribution."

—Mississippi science standards, 2018, p. 87 (emphasis added)

"Using mathematics and computational thinking, analyze data linking human activity to climate change. Design solutions to address human impacts on climate change."

—Tennessee science standards, 2016, p. 93 (emphasis added)





“Work cooperatively with other students in addressing an identified need in the broader community (e.g., working on a political campaign, a literacy project, an effort to reduce hunger, **an educational program to raise awareness about climate change**, etc.)” (grade 11-12 socio-emotional learning performance descriptor).

—Illinois curriculum framework, n.d., n.p. (emphasis added)

“Ask students to pick a topic (e.g., climate change, immigration, gun control) **and research how different sources present information and how that might impact decision making**” (a strategy to meet a standard related to responsible decision-making).

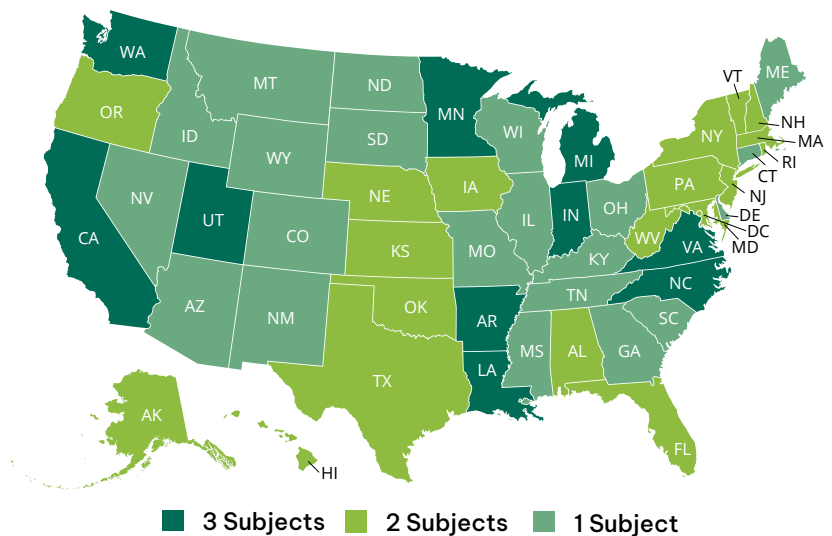
—Mississippi curriculum framework, n.d., p. 50 (emphasis added)

State-Level Patterns on Inclusion in Multiple Subjects

Looking across all US states and Washington D.C., climate change content was included in 98% of jurisdictions’ (50/51) science standards, 49% of jurisdictions’ (25/51) social studies standards,^m 20% of jurisdictions’ (10/51) environment/climate change standards, and 8% of jurisdictions’ language arts standards (4/51).

Forty-five percent of states (23/51) included climate change content in the standards of only one school subject, which was either science or environment/climate change (see Figure 12). Thirty seven percent of states included climate change content in the standards of two subjects (19/51). The two subjects were usually science and social studies. Only 20% of states plus Washington D.C. included climate change content in the standards of three subjects (10/51).

Figure 12. Number of subjects with climate change content in state standards and curriculum frameworks by state.



^m The difference in the number of states including climate change content in social studies standards between the current research and past work is due to the inclusion of policies published since its release, and the broader search for climate change content, which went beyond exact mentions of “climate change.”

Key Findings 5

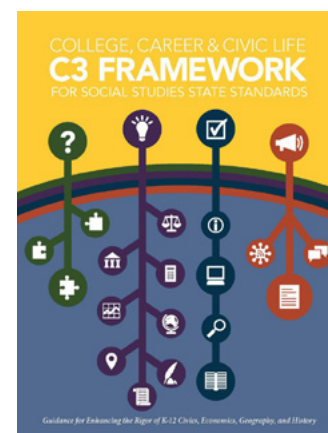
State standards and curriculum frameworks that used or were influenced by the next generation science standards were more likely to include climate change content.

States often used, or were influenced by, outside policies when creating their own state standards or curriculum frameworks.^a

For social studies standards and curriculum frameworks, states often used or were influenced by the College, Career, and Civic Life Framework (C3 Framework). For science standards and curriculum frameworks, states often used or were influenced by the Next Generation Science Standards (NGSS), or states based their science standards on the National Research Council framework upon which the NGSS are based. For language arts and mathematics standards and curriculum frameworks, states often used or were influenced by the Common Core state standards. It is important to note that many states have repealed the Common Core standards or are in the process of repealing them.

For science and environment/climate change subjects, policies that either used or were influenced by the NGSS were more likely to include climate change content than those produced by the state (see Figure 13). This aligns with previous research which found that, of the 29 jurisdictions that required teaching human-caused climate change in their state science standards, 20 (including Washington D.C.) had adopted the NGSS.²⁴

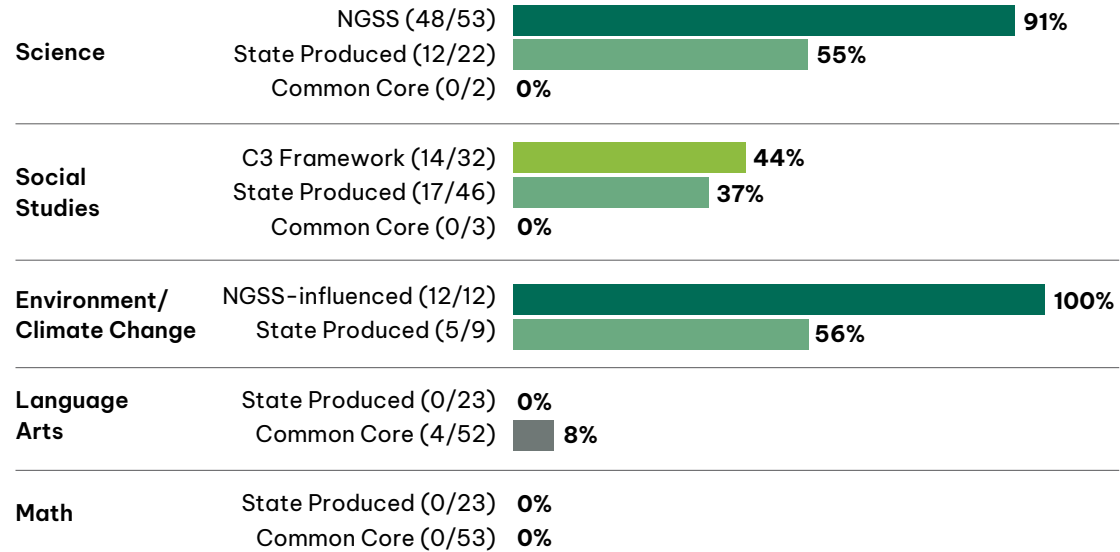
Coverage of climate change content differed drastically across states that either used or were influenced by the NGSS. For instance, the total number of times that climate change content was mentioned in NGSS or NGSS-influenced standards and curriculum frameworks ranged from 0 to 70 times. The presence of climate change content also did not necessarily indicate support of climate change. For instance, both South Dakota's and South Carolina's science standards were influenced by the NGSS but were not supportive of including climate change education in schools and were ambiguous about human causation, respectively (see examples on p. 14).



^aNGSS categorization was determined using the map available on the NGSS website (see here). Common Core categorization was determined using the World Population Review (see here). C3 Framework categorization was determined using a study published by Brookings for social studies standards published on or before 2017 (see here). For social studies standards published after 2017, policies were classified as C3 Framework or as being influenced by the C3 Framework if this was explicitly mentioned in the policy or on the department of education's website.

Social studies state standards and curriculum frameworks that either used or were influenced by the C3 Framework were only slightly more likely to include references to climate change than state produced policies. That is, 44% of C3 Framework-influenced social studies standards (14/32 policies) included climate change content versus 37% of state produced policies (17/46 policies). That said, within state-produced policies, mentions of climate change were more likely to be brief, with climate change or global warming often only mentioned as an example to meet a particular outcome (e.g., in Kansas⁶⁴ and Alabama⁶⁵).

Figure 13. Percentage of standards with any climate change content by subject and type of standards.



“Modern Global Issues (1980–Present)

Students should study the issues of the modern world by tracing their origins and effects on people. Students analyze the causes and effects of major conflicts including pushes for democracy, the war on terror, and the working of a global economy. Further topics can include efforts to unify people, the changing role of technology, and concerns about the health of the planet.

Ideas globalization, terrorism, environmentalism, neoliberalism, social inequality, Information, 9/11, **climate change**

—Kansas social studies standards, 2020, p. 150 (emphasis added)



“Describe significant foreign and domestic issues of presidential administrations from Richard M. Nixon to present.

Examples: Nixon’s policy of détente; Cambodia; Watergate scandal; pardon of Nixon; Iranian hostage situation; Reaganomics; Libyan crisis; end of the Cold War; Persian Gulf War; impeachment trial of William “Bill” Clinton; terrorist attack of September 11, 2001; Operation Iraqi Freedom; war in Afghanistan; election of the first African-American president, Barack Obama; terrorism; **global warming**; immigration

—Alabama social studies standards, 2010, p. 72

However, states that used or were influenced by the C3 Framework included more meaningful climate change outcomes. That is, these states were more likely to include outcomes that either specifically addressed climate change (versus only using climate change as an example) or to include outcomes that went beyond asking learners to obtain an understanding of the topic of climate change to also include socio-emotional and action-oriented learning outcomes (e.g., Minnesota and New Jersey). For instance, Minnesota’s draft social studies standards included a grade 9 Geography benchmark asking students to design a plan that addresses the unequal impacts of climate change on communities. Similarly, New Jersey included an outcome for developing climate change communication skills as well as fostering the ability to propose targeted actions to address climate change.

“[D]esign an action plan to address the disproportionate impacts of environmental issues and climate change on different communities from local to national scale.”

—Minnesota draft social studies standards, 2021, p. 140 (emphasis added)

“Use technology to collaborate with others who have different perspectives to examine global issues, including climate change and propose possible solutions.”

—New Jersey social studies standards, 2020, n.p. (emphasis added)

U.S. General Services Administration. Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management.

“(a) improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity...”

—Iowa language arts standards, 2016, p. 181; Utah language arts standards, 2013, p. 175 (emphasis in original)

Only language arts standards or curriculum frameworks that either used or were influenced by the Common Core standards included climate change content. However, this was in only four states, two of which only mentioned “greenhouse gas emissions” once in an example text teachers could use when teaching for literacy in science, math, and technical subjects (i.e., in Iowa⁶⁸ and Utah⁶⁹).

Key Findings 6

The majority of state standards and curriculum frameworks did not include holistic approaches to climate change education; when climate change content was included, it tended to focus on cognitive learning and on the ends (i.e., outcomes) not the means (i.e., process) of education.

Within state standards and curriculum frameworks, 22% percent of the time climate change content was mentioned, it was only done so as an example concept (17/76 references), and 5% of the time it was indicated that climate change should not be assessed for a particular outcome (4/76 references).^o

To further determine the quality of the approach taken to climate change education in state standards and curriculum frameworks, climate change content within these policy types was analyzed for coverage of the holistic learning dimensions and whether the content focused on the means (i.e., process) or ends (i.e., outcomes) of climate change education.

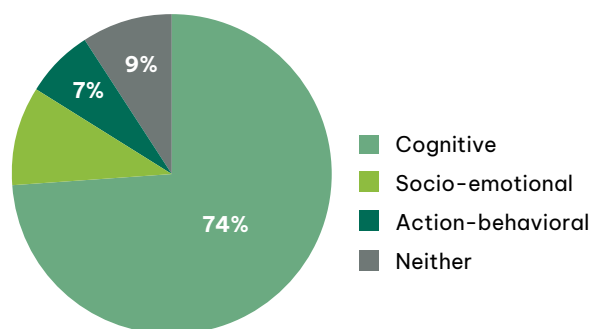
Inclusion of Holistic Learning Dimensions

Most climate change content in state standards and curriculum frameworks focused on students gaining a cognitive understanding and did not include a strong focus on also developing socio-emotional and action-oriented skills.

Across the 115 state standards and curriculum frameworks with climate change content, 74% (85/115 policies) addressed the cognitive learning dimension, 10% (12/115 policies) addressed the socio-emotional learning dimension, and 7% (8/115 policies) addressed the action-oriented learning dimension (see Figure 14). This finding aligns with previous research analyzing the positioning of the environment in the NGSS, which found that while the NGSS standards are notable in their inclusion of climate change, they do not fully address the socio-emotional components of climate change necessary for transformative change.⁷⁰

All jurisdictions included climate change content that focused on the cognitive learning dimension in their standards and/or curriculum frameworks. Only 20% of jurisdictions (10/51) included a focus on the socio-emotional, and only 16% of jurisdictions (8/51) included a focus on action-oriented learning dimensions. That said, a few exemplars were found. For example, in 2020, New Jersey committed to incorporating climate change across all subject areas.^p Following this mandate, New Jersey updated their social studies and science standards to include learning outcomes addressing all three of the holistic learning dimensions (i.e., cognitive, socio-emotional, and action-oriented).^{67,71}

Figure 14. Percentage of state standards or curriculum frameworks with climate change content focusing on the holistic learning dimensions.



*Number of standards/curriculum frameworks with climate change content=115

^oFor example, one of the Science standards in Alaska (2019) mentions students should, "Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change...Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change." (p. 65)



“Develop an action plan that addresses issues related to climate change and **share with school and/or community members.**”

“Use evidence and quantitative data to **propose or defend a public policy related to climate change.**”

“Investigate a global issue such as climate change, its significance, and **share information** about how it impacts different regions around the world.”

—New Jersey social studies standards, 2020, n.p. (emphasis added)^p

Several states’ policies also included outcomes with a focus on the action-oriented and/or socio-emotional learning dimension (e.g., Ohio⁷² and Tennessee⁵⁸ in their science standards). Inclusion of action-oriented outcomes was commonly in relation to planning for action versus actually taking action (e.g., Ohio). Socio-emotional outcomes usually included preparing students to talk about climate change with others (e.g., Ohio, Tennessee) as opposed to developing emotional capacity to deal with climate denial, grief, or anxiety.



“Design a “green” environment (e.g., school, house, microenvironment) that demonstrates sustainable environmental practices, such as vegetated green roof systems to improve air quality. The design should encompass the efficient use of fuel resources and building materials **to lower carbon footprint and reduce greenhouse gas emissions. Generate an argument and present data** justifying how the design improves sustainability.”

—Ohio science standards, 2018, p. 258 (emphasis added)

“Engage in [an] argument from evidence regarding the impacts of human activity on climate change. Design solutions to address these impacts.”

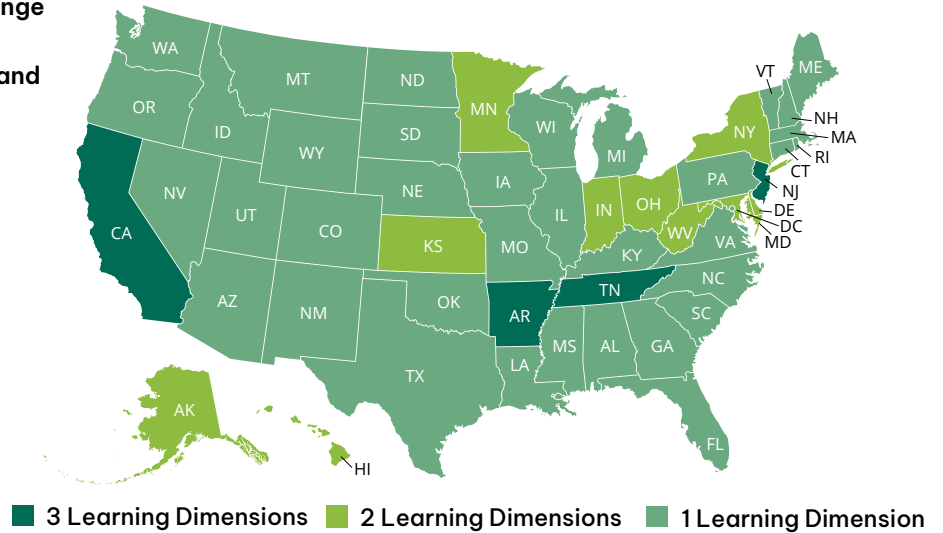
—Tennessee science standards, 2016, p. 88 (emphasis added)

^p At the time of data collection, New Jersey had adopted new science and social studies standards (in 2020) that incorporated the new mandate for climate change inclusion. For the 2021–22 school year, school districts are considered compliant if they use the 2020 or 2014 standards (which do not incorporate the climate change inclusion mandate), so both were collected. The New Jersey language arts and mathematics subjects were not under review at the time of data collection.

State-Level Patterns on Inclusion of Learning Dimensions

Only 8% of states’ standards and curriculum frameworks (4/51) included climate change content with a focus on all three learning dimensions (i.e., cognitive, socio-emotional, and action-oriented) across the subjects of science and/or social studies. Twenty percent of states (10/51) included climate change content covering two learning dimensions, and 73% of states (37/51) only included climate change content covering one learning dimension (i.e., cognitive, see Figure 15)

Figure 15. Inclusion of climate change content by number of learning dimensions covered in standards and curriculum frameworks.



Inclusion of The Means and Ends of Climate Change Education

The majority of the climate change content in the state standards and curriculum frameworks analyzed focused on the ends (i.e., outcomes – what students should know and be able to do), not the means (i.e., process – teaching methods) of climate change education. Thirty-two percent (24/76 references) of the climate change content in state standards or curriculum frameworks referred to climate change education outcomes and only 4% (3/76 references) referred to climate change education processes.



Outcome example:

“the student is able to...**Analyze the factors affecting climate change** and global sustainability”^A

–Hawaii social studies standards, 2018, n.p. (emphasis added)⁷³

Process example:

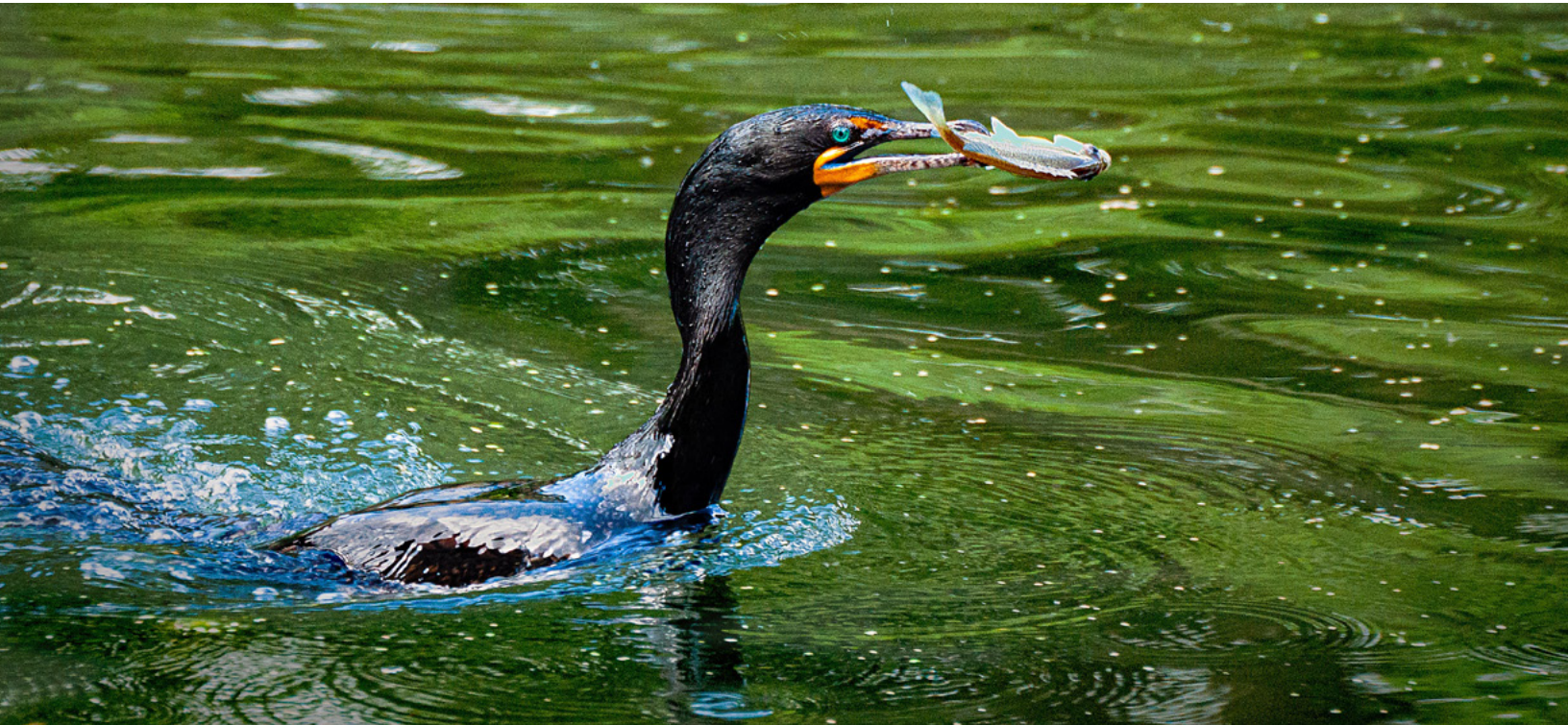
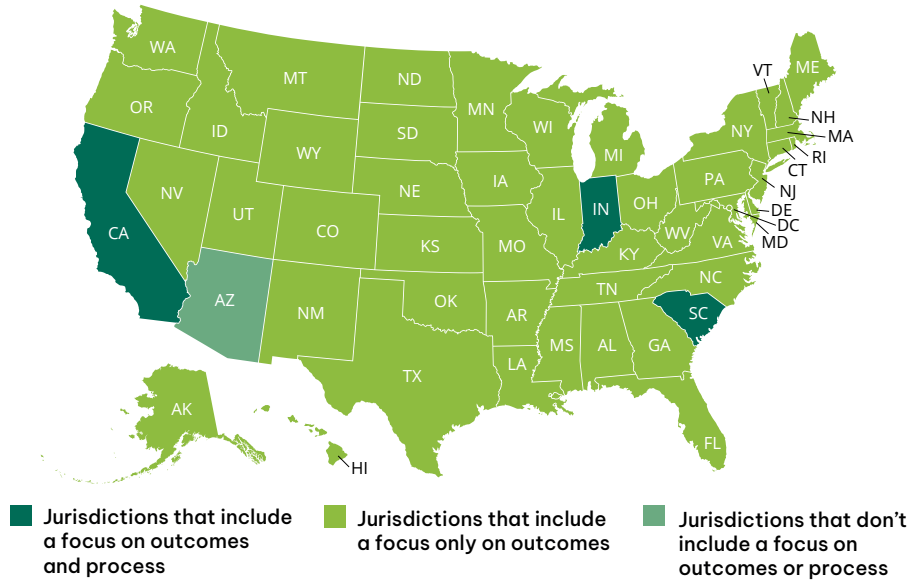
“**Problem-based learning** shifts the emphasis to solving a problem as the primary goal and learning occurs embedded within the problem solving. In PBL, the problem is introduced at the beginning as the motivation for an entire unit. For example, **a high school unit might begin by introducing the problems caused by climate change. During the unit, students will develop solutions that minimize the release of carbon dioxide into the atmosphere from burning fossil fuel.**”^A

–California science curriculum framework, 2016, p. 1454 (emphasis added)⁷⁴

State-Level Patterns on Inclusion of Outcomes and Process

Ninety percent of jurisdictions (46/51) only included a focus on outcomes in their state standards or curriculum frameworks, 6% of jurisdictions (3/51) included a focus on climate change education processes and outcomes, and 2% of jurisdictions (1/51, i.e., Arizona) did not include a focus on climate change education processes or outcomes (see Figure 16). In Arizona, climate change content was only mentioned as part of background information in their state science standards.⁷⁵

Figure 16. Inclusion of climate change outcomes and/or process content within state standards or curriculum frameworks.



Key Findings 7

Discussions of energy were often in relation to fossil fuel, and there was little mention of key topics and initiatives such as climate action, justice, mitigation, or adaptation, Indigenous Knowledges, or the United Nations in the policies analyzed.

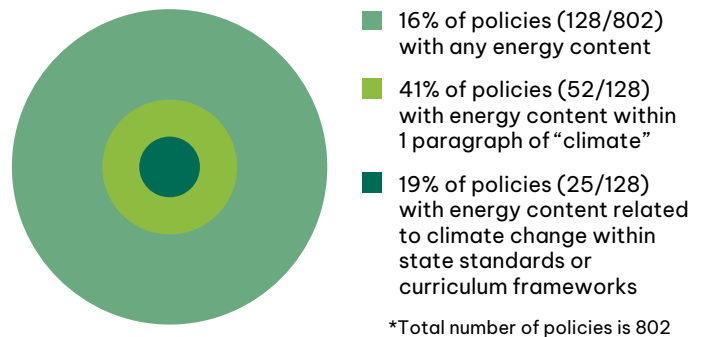
Inclusion of Energy and Resources

Of all the policies analyzed, 16% (128/802 policies) had energy content. Within state standards and curriculum frameworks, only 18% of the energy content (17/94 references) was associated with climate change across 19% of policies (25/128 policies, see Figure 17). The states with the most energy content were Indiana, Rhode Island, and Louisiana (see Figure 18 on page 32).

Further analysis found that only 14% (17/121 references) of the energy-focused content was located within one paragraph of the word “climate” across 41% of policies (52/128 policies), suggesting that discussions of energy were not often associated with climate change. For these reasons, energy content was analyzed separately from the climate change content in the rest of the study.

Within the policies analyzed, climate change was often discussed in relation to both renewable and non-renewable energy, with “fossil fuel” accounting for 49% (59/121 references) of energy content and “renewable energy” (46/121 references) accounting for 38% of energy content. In fact, 74% (74/100) of state standards or curriculum frameworks included energy content that referred to both renewable and non-renewable energy (e.g., in Florida). In 2019, bills were introduced in Florida requiring that state standards use a “balanced approach” to controversial issues, which would lead to the existence of climate change being presented as a debate, despite the high level of public support for K-12 education that acknowledges the existence of climate change.

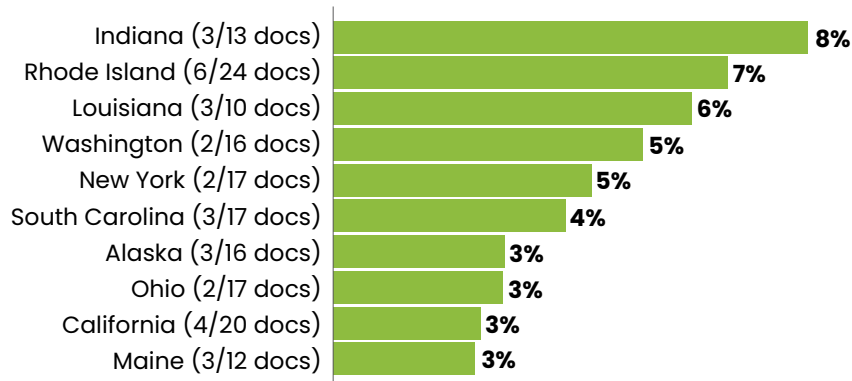
Figure 17. Representation of the amount of energy content associated with “climate” and climate change (to scale).



“Use geographic terms and tools to **identify different opinion on the use of renewable and non-renewable resources**, in Florida, the United States, and the world”

—Florida social studies standards, 2008, n.p. (emphasis added)

Figure 18. Top ten states with the most energy content.



*Total standardized number of references to energy across all states = 1,827

Inclusion of Climate Action

Of all the climate change content, the keywords “climate action,” “climate resilience,” “climate hazard,” and “climate impact” were hardly mentioned at all (mentions account for less than 1% of all climate change content). “Climate action” was not mentioned in any of the curriculum policies. Rather, mentions of “climate action” were often in reference to state climate action plans (e.g., Maryland⁴⁴). Sometimes policies called upon schools and districts to create their own climate action plans (e.g., Rhode Island⁷⁸).



“Maryland Climate Action Plan’s three major tasks:

- Climate Change Awareness and Energy Efficiency Education for Maryland Residents and Institutions
- **Maryland-Specific Climate Change Curricula and Energy Efficiency in Schools**
- Media Coordination”

—Maryland environmental literacy plan, 2010, p. 23 (emphasis added)

“Develop and implement a District-approved Climate Action Plan (CAP) that includes annual reporting of GHG emission to raise awareness of the school community’s carbon footprint, and engage students, staff, and community in reducing the footprint” (For 1 optional point. New construction projects must achieve 110 points and major renovations must achieve 85 points).

—Rhode Island sustainability-specific operations plan, 2014, p. 28 (emphasis added)

Inclusion of Climate Justice

After finding no mentions of climate justice (see Figure 19, p. 35), the search was expanded to look more broadly for justice content, including civics and citizenship, within one paragraph of the word “climate” (see Table 1, p. 6). This expanded search found only 1% (5/441 references) of justice content was within 1 paragraph of the word “climate” (e.g., California,⁷⁴ Indiana²⁶). That said, there have been recent efforts to include a stronger focus on climate justice in some states. For instance, in Minnesota two bills were introduced to include a focus on “connecting climate change to social and economic justice issues;” however, both bills died after failing to pass their House and Senate committees by their deadlines in 2021.⁷⁹

Efforts in the United States in 2021 to ban Critical Race Theory may further impede climate justice education. For instance, Missouri House Bill 952⁸⁰ specifically bans curricula produced by prominent social justice education groups, including the Zinn Education Project, which is coordinated by the non-profit organizations Rethinking Schools and Schools for Change. The Zinn Education Project website includes resources from an interdisciplinary K–12 guide on how to teach climate change education (i.e., the *People’s Curriculum for the Earth*, published by Rethinking Schools), which also includes a focus on climate justice.

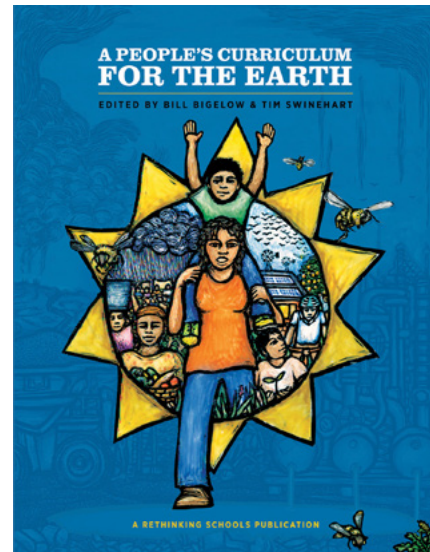
Inclusion of climate justice content was also rare in state standards or curriculum frameworks and represented less than 1% of the references to climate change content (<1/76 references). In fact, only two states (i.e., Indiana²⁶ and New Jersey⁶⁷) included justice-oriented content in relation to climate change within their state standards or curriculum frameworks.

“Human actions can change the Earth system’s components and interactions in ways that profoundly alter organisms and climate at local, regional, and global levels. The Integrated Grade Six course can help build a middle grades foundation of science and engineering understandings and practices related to citizenship and sustainability that can grow in depth in the succeeding middle and high school grades.”

—California science curriculum framework, 2016, p. 421

“In Indiana, science outcomes are connected to “climate change and questions of justice.”

—Indiana climate change curriculum framework, 2021, n.p.



“New Jersey’s social studies standards include a standard related to “Active Citizenship in the 21st Century” with a grade 12 indicator to: “collaborate with students from other countries **to develop possible solutions to an issue of environmental justice**, including climate change and water scarcity”

—New Jersey social studies standards, 2020, n.p. (emphasis added)

Inclusion of Indigenous Knowledges

Only 8% of states (4/51, i.e., Indiana,⁸¹ Minnesota,⁸² North Carolina,⁸³ and Oregon⁸⁴) included climate change content that engaged with Indigenous knowledges or priorities, which accounted for less than 1% of climate change content (<1/76 references). Indigenous climate change content included providing Indigenous peoples as an example of climate change adaptation (in Indiana) and suggesting Indigenous knowledges be used to describe local climate change effects (in Minnesota). There was also a brief acknowledgment of the impact of western expansionism on Indigenous peoples in relation to climate change (in Oregon). No mention of land-based education in relation to climate change was found in the standards.



“Give examples of and evaluate how the physical and human environments in different regions have changed over time due to significant population growth or decline

- **Examples: Alaskan Native populations to global warming; large urban areas”**

–Indiana social studies standards, 2020, p. 7 (emphasis added)

“Emphasis is on **understanding and using American [Indigenous] knowledge systems to describe regional impacts of climate change** to Minnesota. Examples may include the water cycle and how precipitation change over time impacts cultural practices related to *nibi* (“water” in the Ojibwe language); or the decline/species loss of *wiigwaas* (“paper birch” in the Ojibwe language and an important tree in Anishinaabe culture) due to climate stressors like drought or changes in snow cover.”

–North Carolina social studies curriculum framework, 2021, p. 18–19 (emphasis added)

“**Understand the impact and legacy of colonialism on marginalized communities and describe the decisions made to shape the human (e.g., tribal, cultural, agricultural, industrial, etc.) and physical geography (dams, wind turbines, climate change, transportation, etc.) and its effect on Oregon’s environmental sustainability.**”

–Oregon social studies standards, 2021, p. 9 (emphasis added)

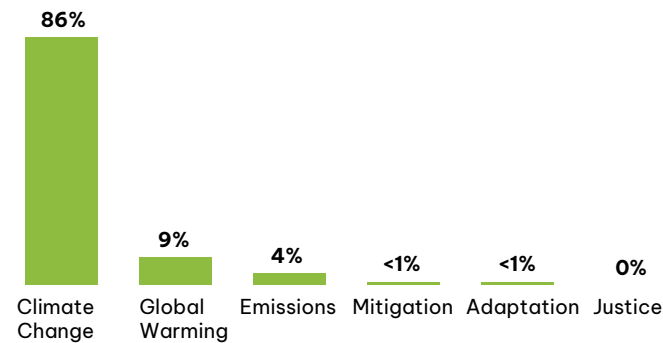


Inclusion of Adaptation and Mitigation

After finding little mention of climate change adaptation and mitigation (see Figure 19), the search was expanded to include mentions of adaptation and mitigation within one paragraph of the word “climate” (see Table 1, pg. 6).

With this expanded search, only 15% of policies (56/382 policies) with adaptation content mentioned “climate” within one paragraph. The policies identified by this analysis usually used the same exact sentence, which is from the NGSS standards (see below). In total, 46% of the adaptation content within one paragraph of the word “climate” used the same sentence (65/142 total references). Notably, Wyoming also included this sentence; however, instead of using the words “climate change,” they referred to a “long-term change in climate.”

Figure 19. Percentage of references to type of climate change content in all policies.



*Results are for exact term matches.
Total number of standardized references = 58

“Construct an explanation based on evidence for how natural selection leads to adaptation of populations. [Clarification Statement: Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal temperature, **long-term climate change**, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations.]”

—Science standards in 25 states from the NGSS (emphasis added)

“Construct an explanation based on evidence for how natural selection leads to adaptation of populations. Clarification Statement: Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal temperature, **long-term change in climate**, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations.”

—Wyoming science standards, 2016, p. 221 (emphasis added)

“Mitigating current changes in climate depends on understanding climate science.

Current scientific models indicate that human activities, such as the release of greenhouse gases from fossil fuel combustion, are the primary factors in the present-day measured rise in Earth’s mean surface temperature. Natural activities, such as changes in incoming solar radiation, also contribute to changing global temperatures.”

—Idaho science standards, 2018, p. 50 (emphasis added)

Of the policies that mentioned mitigation content, only 10% (13/125 policies) mentioned that content within one paragraph of the word “climate.” When climate change mitigation was discussed within the analyzed policies, it most commonly discussed how a cognitive understanding of the climate science was necessary for climate change mitigation (e.g., Idaho).⁸⁷ Less commonly, a focus on actions that may help mitigate climate change was discussed (For examples of states that included this type of content see New Jersey⁷¹ and Utah⁸⁸).





“In the middle grades, students use resources from New Jersey Department of Environmental Protection, the National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration (NASA), to inform their actions as they engage in **designing, testing, and modifying an engineered solution to mitigate the impact of climate change on their community.**”

–New Jersey science standards, 2020, p. 8 (emphasis added)

“WG Standard 1.4: Students will use geographic reasoning to **propose actions that mitigate or solve issues, such as natural disasters, pollution, climate change, and habitat loss.**”

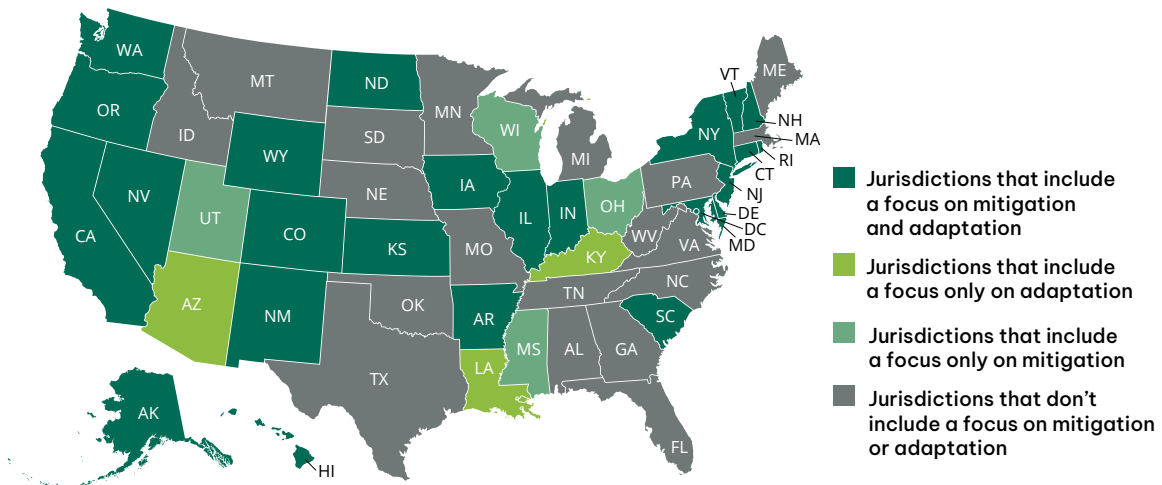
–Utah social studies standards, 2016, p. 19 (emphasis added)

Within the state standards and curriculum frameworks, 7% of climate change content (5/76 references) was focused on mitigation and 6% of climate change content (5/76 references) was focused on adaptation.

State-Level Patterns on Inclusion of Adaptation and Mitigation

Overall, 61% of jurisdictions (31/51) included adaptation and/or mitigation content in their state standards and/or curriculum frameworks. Of these, 77% of jurisdictions (24/31) included a focus on both mitigation and adaptation, 13% of jurisdictions (4/31) only included a focus on mitigation, and 10% of jurisdictions (3/31) only included a focus on adaptation (see Figure 20).

Figure 20. Inclusion of adaptation and/or mitigation climate change content within state standards or curriculum frameworks.



Inclusion of Global Warming

Global warming terminology was rarely used in the policies analyzed. When the term global warming was mentioned within the policies, usually the same phrase from the Next Generation Science Standards (NGSS) was used (see box on right).⁸⁵ This phrase was also the one most commonly found in the expanded justice search referred to above. That is, human vulnerability, in general, was much more commonly referred to than the vulnerability of marginalized groups.



Inclusion of Other Content of Interest

Policies were searched for mentions of green schools, climate or environmental laws, the Environmental Protection Agency (EPA), and United Nations content within one paragraph of the word “climate.” Overall, these words were mentioned infrequently in relation to mentions of “climate.”

When EPA content was found in this analysis, it was usually in reference to EPA resources. For instance, curriculum frameworks from two states referred to the EPA’s Climate Change Indicators, with California suggesting language arts connections to science content⁷⁴ and Indiana suggesting how the resource could meet outcomes within their science standards.²⁷ Additionally, one of the optional credits in the Washington Sustainable Schools Protocol included a greenhouse gas emission reduction plan with links to EPA resources to help districts meet this criterion.³⁹

Of the policies with UN content, only 3% of the policies (4/145 policies) included that content within one paragraph of the word “climate.” Most commonly the Sustainable Development Goals, Paris Agreement, or Kyoto Protocol were listed as example topics to meet curriculum objectives (e.g., Maine⁸⁹ and North Carolina⁸³).

“Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.”

–23 out of 55 (42%) science standard policies that included references to “global warming” used this phrase from the NGSS or some variation (emphasis added)

“Opportunities for ELA/ELD Connections: To help data come alive and help students compile it for a particular audience, have them obtain information [SEP-8] about the effect [CCC-2] temperature changes [CCC-7] have on sea level, glaciers, or storm intensity. In groups, or pairs, students research one aspect of the effect of temperature change on sea level, glaciers, or storm intensity using government reports summarizing these changes (**such as EPA Climate Change Indicators**, National Climate Assessment, or NASA’s Climate Effects).”

–California science curriculum framework, 2016, p. 605 (emphasis added)

“Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. Further explanation: Examples of challenges include local and global climate change issues, biodiversity loss or **United Nations sustainable development goals.**”

–Maine social studies standards, 2019, p. 160 (emphasis added)

“Critique the effectiveness of cooperative efforts and consensus-building among nations, regions, and groups from various perspectives...Example topics...**Paris Climate Agreement Kyoto Protocol...**”

–North Carolina social studies curriculum framework, 2021, p. 22-23 (emphasis added)

Key Findings 8



State political affiliation, presence of a climate change plan, and whether or not a state had made a broader commitment to climate change correlated with to what extent climate change content was included in the policies.

When analyzed based on the political affiliation of the jurisdiction’s governor (see Figure 21), the study found that 57% of climate change content was from Democrat (i.e., Blue) jurisdictions (66/115 references, see Figure 22) as opposed to Republican (i.e., Red) jurisdictions.

Seventy percent of the top 10 jurisdictions (7/10) with climate change content were also Democrat, with some exceptions (i.e., Alaska, Indiana, and Maryland, see Figure 4).

Figure 21. Percentage of climate change content by a jurisdictional political affiliation.

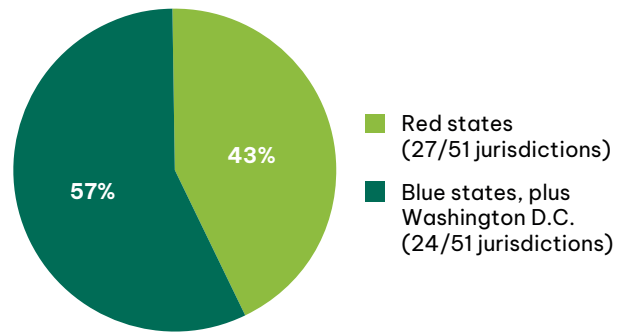
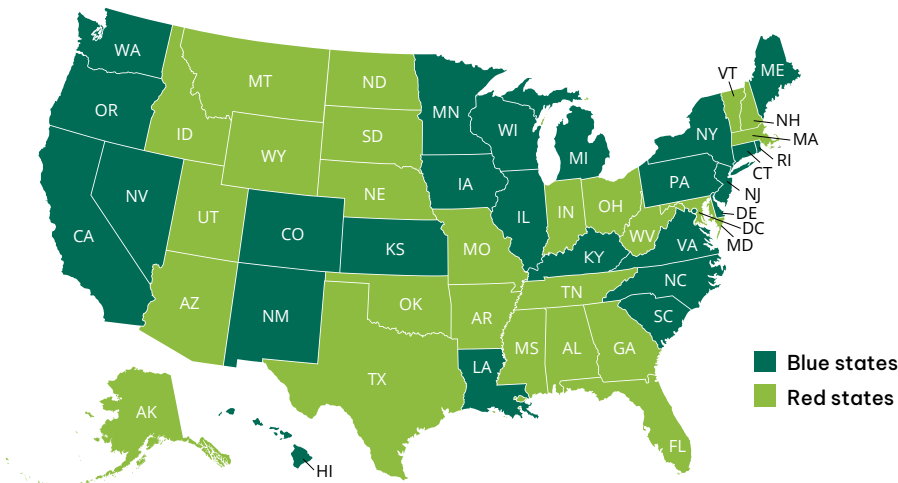


Figure 22. Jurisdictional political affiliations by governor (as of February 2021 according to a list published by the National Conference of State Legislatures).⁹⁰ Red jurisdictions are Republican and Blue jurisdictions are Democrat.

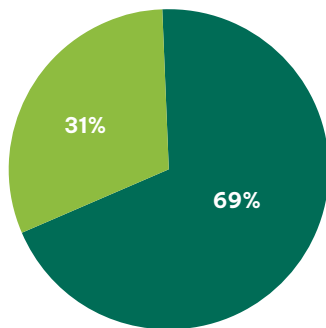


The study found that 86% of jurisdictions had non-education climate plans^a (44/51). Half of the jurisdictions with climate plans were Democrat and half were Republican. Jurisdictions with overall climate plans were more than twice as likely to include climate change content in their education policies (see Figure 23).

Affiliation with the ‘We Are Still In’ declaration^r was associated with higher uptake of climate change content in the policies collected, with ten jurisdictions accounting for 63% of references (81/129 references, see Figure 24). Only Democrat jurisdictions had signed onto the ‘We Are Still In’ declaration at the time of the study.

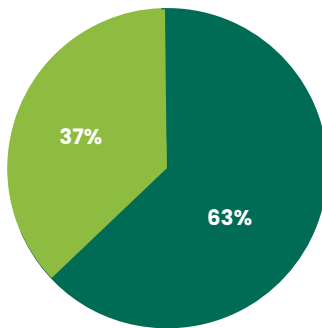
Finally, jurisdictions affiliated with the US Climate Alliance contributed the most references to climate change content in the policies analyzed.^s Specifically, policies from 47% of jurisdictions (24/51) accounted for 60% of all references (68/114 references, see Figure 25). Interestingly, most US Climate Alliance members were also Democrat jurisdictions. Only three Republican jurisdictions were US Climate Alliance members (i.e., Maryland, Massachusetts, and Vermont).

Figure 23. Percentage of climate change content by jurisdictional climate plan presence.



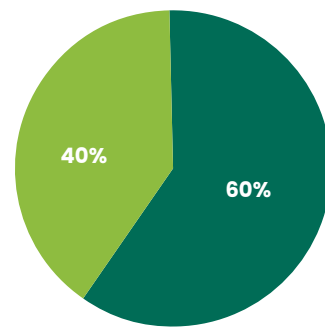
- Climate plan present (44/51 jurisdictions)
- No climate plan present (7/51 jurisdictions)

Figure 24. Percentage of climate change content by “We Are Still In” Affiliation.

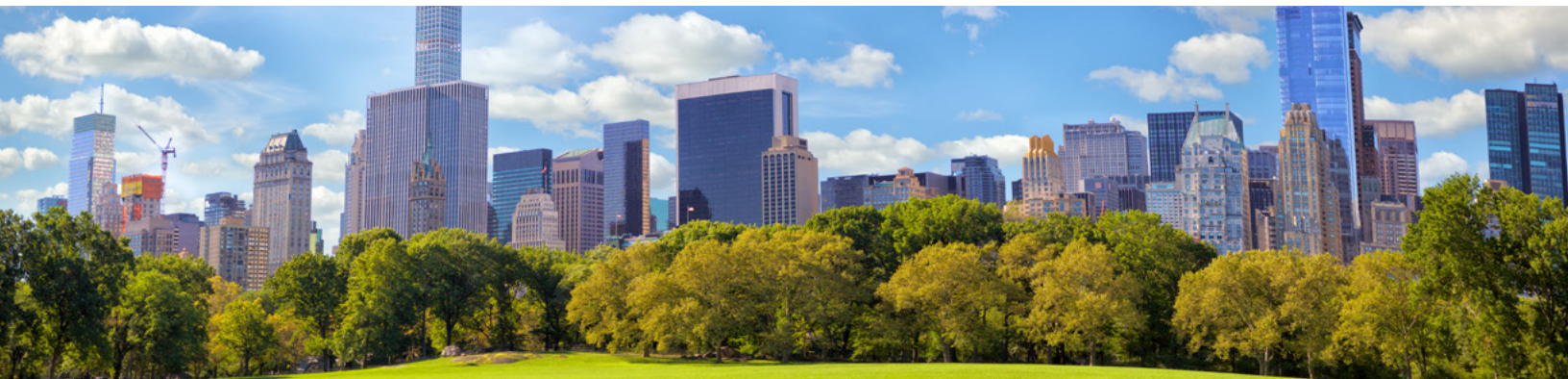


- “We Are Still In” affiliate (10/51 jurisdictions)
- Not a “We Are Still In” affiliate (41/51 jurisdictions)

Figure 25. Percentage of climate change content by US Climate Alliance Affiliation.



- United States Climate Alliance affiliate (24/51 jurisdictions)
- Not a United States Climate Alliance affiliate (27/51 jurisdictions)



^a Climate plan presence was determined using the following databases: the Georgetown Climate Center’s State Adaptation Progress Tracker, the National Association of State Energy Officials’ database of State Energy Plans (SEPs) and Climate Action Plans, the Center for the New Energy Economy’s interactive map (State Policy Opportunity Tracker - Spot) for tracking state energy/climate action plans, and the Centre for Climate and Energy Solutions’ interactive map for tracking state energy/climate action plans.

^r ‘We Are Still In’ is a climate change declaration that began when the United States withdrew from the Paris Agreement. Signatories include states, tribes, businesses and investors, cities and counties, colleges and universities, cultural organizations, health care organizations, and faith groups. See signatories here. It is now called America is All In (<https://www.americaisallin.com/whos-in/>).

^s The US Climate Alliance is a coalition of governors committed to reducing GHG emissions to meet the Paris Agreement goals. See members here.



Summary and Recommendations

Overall, little climate change content was found across all education policies analyzed. This was especially apparent when comparing the extent of climate change content in teaching and learning policies in US states and Washington D.C. to the extent of climate change content included in 100 other countries. When included, climate change content was usually mentioned in sustainability-specific operations plans and environmental literacy plans. Very few states had sustainability-specific plans or goals within any of the whole institution domains of teaching and learning (13/51 jurisdictions), facilities and operations (10/51 jurisdictions), institutional governance (2/51 jurisdictions), or community partnerships (0/51 jurisdictions), and they rarely included climate change content.

Policies from the domain of teaching and learning most commonly included climate change content. Only one state (i.e., Minnesota) included climate change content within policies from the three domains of teaching and learning, institutional governance, and facilities and operations.

Within curriculum policies, climate change content was usually included in the subjects of environment/climate change or science. When policies from a state only mentioned climate change in one subject, it was usually science. The type of standards states used appeared to affect uptake of climate change content. States that either used or were influenced by the NGSS were more likely to include climate change content in their science standards.

Several jurisdictions (11/51) had overarching socio-emotional learning or skills-related standards that all students were expected to know and be able to do, but policies from only three jurisdictions included a brief mention of climate change.

Jurisdictional characteristics also affected the inclusion of climate change content in the education policies analyzed. Democrat jurisdictions, those that have a climate plan, and jurisdictions that were affiliated with either 'We Are Still In' or the US Climate Alliance were more likely to include climate change content.

Mentions of energy content often included both renewable and non-renewable resources. Little mention of green schools, the EPA, environmental laws, or UN initiatives was found in the policies. The policies rarely included mention of climate action, justice, Indigenous knowledges and issues, mitigation, or adaptation content.

Climate change content in state standards and curriculum frameworks was found to not include holistic responses to climate change education. In particular, there was an overemphasis on cognitive learning outcomes as opposed to also considering socio-emotional and action-oriented outcomes (with some exceptions). It was rare for curriculum policies to include a focus on the process of climate change education. While this could be expected for state standards as their purpose is to detail what students should know and be able to do, curriculum frameworks could include a stronger focus on climate change pedagogy. There was also little focus on Indigenous knowledges or climate justice, mitigation, and adaptation in the state standards and curriculum frameworks.



Recommendations ①

Increase the quality and quantity of climate change content across all education policies.

Quality

In this study, the policies analyzed could engage more strongly with the socio-emotional and action-oriented learning dimensions. While all states included a cognitive focus on climate change in their standards, inclusion of the socio-emotional (10/51 jurisdictions) and the action-oriented (8/51 jurisdictions) learning dimensions were less common. States looking to incorporate more holistic responses to climate change within the teaching and learning domain can look to New Jersey as an exemplar.

Education policies should signal support for a culture of climate action by addressing climate change across all whole institution domains and attending to all holistic learning dimensions. A culture of climate action creates safe spaces for climate action practices and can serve as practice accelerators due to the support received from various actors (e.g., community partners, teachers, administrators, facilities and operations staff). Cultures of climate action also ensure students are supported to process emotions related to climate change and prepared to take climate action.

Quantity

The largest gaps in climate change content in the analyzed policies were from the institutional governance and community partnership whole institution domains. No community partnership policies had climate change content, and only Minnesota included a brief mention of climate change in a governance policy. Policies from the teaching and learning and facilities and operations domains could also include climate change in more in-depth and holistic ways.

The inclusion of climate change content predominantly in science and social studies subject standards sends the message that other subjects are not well suited to address climate change. However, subjects such as language arts and mathematics are key to addressing climate change and can make significant contributions to spur climate action. For example, language arts classes can prepare students to develop and deliver climate speeches, and mathematics classes can teach students to calculate, record, report, and analyze the impact of climate action practices.

While not included in this study, climate change content could and should also be included in subjects beyond the core subjects of mathematics, science, social studies, and language arts. For instance, inclusion of climate change in subjects, such as art and music sends the message that the arts can also contribute to the climate movement (e.g., climate change songs, plays). Further subject-specific examples are provided in Table 4 in relation to the holistic domains.

Table 4. Examples of climate change education outcome statements across subjects.**Inquiry Question: What are some ways to mitigate the impacts of climate change?**

Subject	Outcome
Science	<ul style="list-style-type: none"> • Cognitive: Understand how solar ovens obtain energy. • Socio-emotional: Discuss solar ovens with a peer in relation to scientific (e.g., heat, reflectivity), socio-economic (e.g., lack of access to other fuel types), and environmental (e.g., less fossil fuel emissions) considerations. • Action-oriented: Build a solar oven and cook a food item.
Math	<ul style="list-style-type: none"> • Cognitive: Understand how to calculate the amount of energy used by an electric oven and a solar oven. • Socio-emotional: Prepare a mathematical report communicating findings about the amount and type of energy used by a solar oven versus an electric oven. • Action-oriented: Calculate and record the amount of energy used by an electric and solar oven.
English	<ul style="list-style-type: none"> • Cognitive: Research the benefits and challenges of a “just transition.” • Socio-emotional: Keep a journal related to “just transitions” that includes emotions felt, as well as an examination of prejudices, biases, values, and thoughts. Write a reflection about your findings related to “just transitions” from the community interviews. • Action-oriented: Record a podcast that interviews community members about their perspectives on a “just transition.”
Social Studies	<ul style="list-style-type: none"> • Cognitive: Investigate the cultural-psycho-socio-economic considerations of renewable energy, including in relation to Indigenous priorities. • Socio-emotional: Write a letter to a government official about renewable energy actions you would like taken and why these actions are important to you. • Action-oriented: Research renewable energy actions taken within your city/state and then create a renewable energy action plan for your city.
Theater	<ul style="list-style-type: none"> • Cognitive: Research different opinions about renewable energy from various stakeholders (e.g., government, business, activists, Indigenous people). • Socio-emotional: Facilitate a conversation with theater attendees about renewable energy. • Action-oriented: Create a play illustrating different perspectives on renewable energy from various stakeholders.
Art	<ul style="list-style-type: none"> • Cognitive: Investigate the role of artists in awareness-raising and taking climate change action within society. • Socio-emotional: Discuss how a work of art is related to climate change action, as well as how artistic techniques are used to communicate about the issue represented in the artwork (e.g., use of color to portray emotion). • Action-oriented: Create a work of art to raise awareness about climate change actions, including in relation to the climate justice movement and Indigenous peoples.
Music	<ul style="list-style-type: none"> • Cognitive: Analyze the role of music in communicating about climate change. • Socio-emotional: Reflect on how you feel about climate change and how those feelings can be translated into musical elements. • Action-oriented: Create a song that illustrates your feelings about climate change.

State departments can work with NGOs or universities prior to, or in conjunction with, updating state standards to create curriculum frameworks with high quality climate change content. For instance, although Indiana’s science standards were last updated in 2016 and referred to climate change as a ‘theory,’ in 2021, Indiana published a curriculum framework in partnership with Purdue University that acknowledges the scientific consensus on human-caused climate change.



Recommendations ②

Update and increase the number of environmental literacy plans.

As the impacts of climate change increasingly affect local environmental conditions and the human and non-human populations who reside there disproportionately, climate literacy will become synonymous with justice-oriented environmental literacy. This study found only 25% of jurisdictions (13/51) have environmental literacy plans published by departments of education. These plans were often dated (only 4 were published in the last 5 years) and rarely mentioned climate change (only 5 policies). By updating environmental literacy plans to include climate change and climate justice, states can ensure students are equipped to design, plan, and implement “just” climate mitigation and adaptation strategies. When departments of education are involved in the publication of environmental literacy plans, they signal their support for the inclusion of such content in formal education contexts.

Recommendations ③

Include a stronger focus on climate justice, climate action, and Indigenous knowledges in all education policies.

Incorporating climate justice and climate action in climate change education helps all students feel as though they and society can and are taking meaningful action on climate change. A climate justice focus could include connecting students with leaders in the climate movement, such as Indigenous and other people of color. Making these connections will enable students to see the disproportionate effects of climate change and the multiple layers of solutions needed, while also illustrating they are not alone in the fight for increased levels of climate action.

The policies collected rarely mentioned climate change in relation to Indigenous knowledges or peoples and the depth of inclusion was minimal. No mention of land-based education in relation to climate change content was found. Holistic climate change education must mention not only how Indigenous peoples are more likely to be affected by climate change, but also how Indigenous peoples are important leaders in advocating for and modelling alternative practices.



Recommendations ④

Include a focus on both climate change mitigation and adaptation in all education policies.

Mentioning climate change without engaging with potential actions is more likely to result in anxiety and denial responses for the entire school community.⁹¹ Within all the policies analyzed, specific mentions of climate adaptation or mitigation actions were rare. States should consider adding outcomes in state standards for obtaining knowledge, action, and socio-emotional capacity to engage with climate change adaptation and mitigation solutions. States should also include climate change adaptation and mitigation actions in policies across all whole institution domains to ensure schools and communities are prepared to adapt to a changing climate and to mitigate climate change impacts. Inclusion of specific, measurable mitigation and adaptation actions enables states to benchmark progress towards a climate-ready culture across all whole institution domains.

Recommendations ⑤

Provide policy support, such as funding, professional development, and staffing to help advance enactment of climate change education policy.

Making the change to include a stronger focus on climate change education can seem like a daunting task for local jurisdictions. States can alleviate the burden by providing funding, professional development, and staffing support. More targeted recommendations are included in the list below for how state departments and boards of education can signal their support of climate change education.



What States Can Do Now to Take Climate Action

The examples in the table below draw on the research previously mentioned, as well as broader research conducted by the Monitoring and Evaluating Climate Communication and Education Project. Also included are initiatives mentioned on department of education websites that were not included in policy texts but were found during policy collection. The suggested actions cover a wide range of contexts, so some recommendations may be more relevant than others to particular departments of education, as they operate differently in each state. The recommended actions are organized by domain, with an emphasis on climate justice throughout.

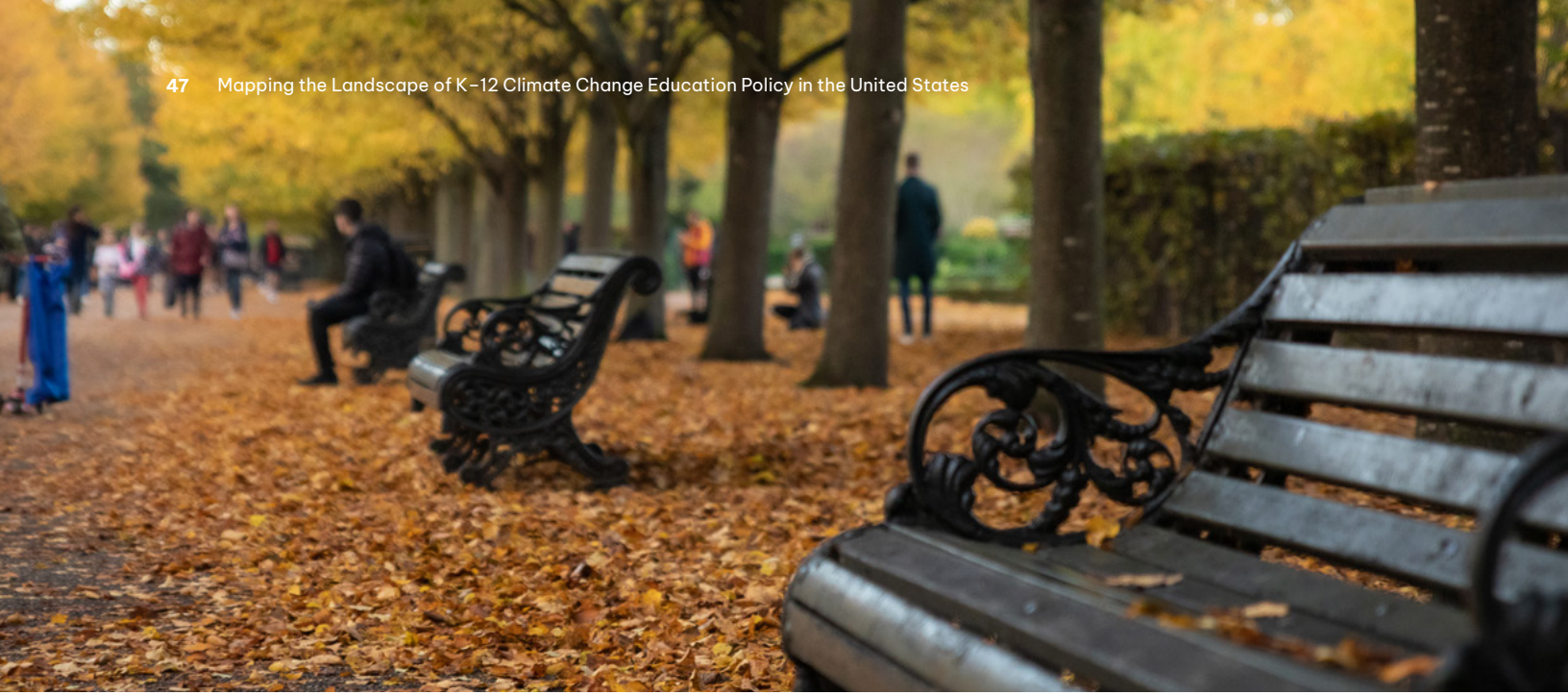
Institutional Governance

- Declare a climate emergency or pass a climate change education resolution
- Include climate change and climate action in strategic planning policies, as well as mission, vision, and value statements
- Develop a climate action plan with measurable targets for all domains with a focus on climate change mitigation, adaptation, and justice
- Provide incentives for districts to develop a climate action plan and suggest engaging with students and community partners when creating the plan
- Create a school-as-a-tool protocol in relation to climate change (see Rhode Island for an example related to environmental literacy⁹²)
- Provide districts support to create climate action plans (e.g., funding, templates, consultations with state sustainability staff)
- Incorporate climate change criteria into financial decisions and allocate funding (e.g., grants for student projects in New Hampshire⁹³) to motivate and incentivize
- Create a funding plan that describes adjudicating governance structures and criteria for distributing climate change education funds
- Use state funding to issue guidance to districts for teaching climate change education, including in relation to professional development and teacher networks for resource-sharing
- Establish an energy efficient school grant program (e.g., in Tennessee⁹⁴)
- Run an eco-certification program for schools (e.g., in Kentucky where the Green Schools program is jointly run by the Department of Education and Kentucky Green & Healthy Schools) and/or encourage schools to participate in eco-certification programs that already exist (e.g., Eco-schools)⁹⁵
- Don't penalize student participation in climate strikes (e.g., in New York⁹⁶) or students who engage in broader civic activities related to climate change
- Create a green practices committee with broad representation (e.g., staff, students, community) that includes a focus on greenhouse gas emission reduction (e.g., Washington D.C.⁹⁷)
- Employ dedicated climate change staff
- Support the development of climate change teacher networks for resource-sharing



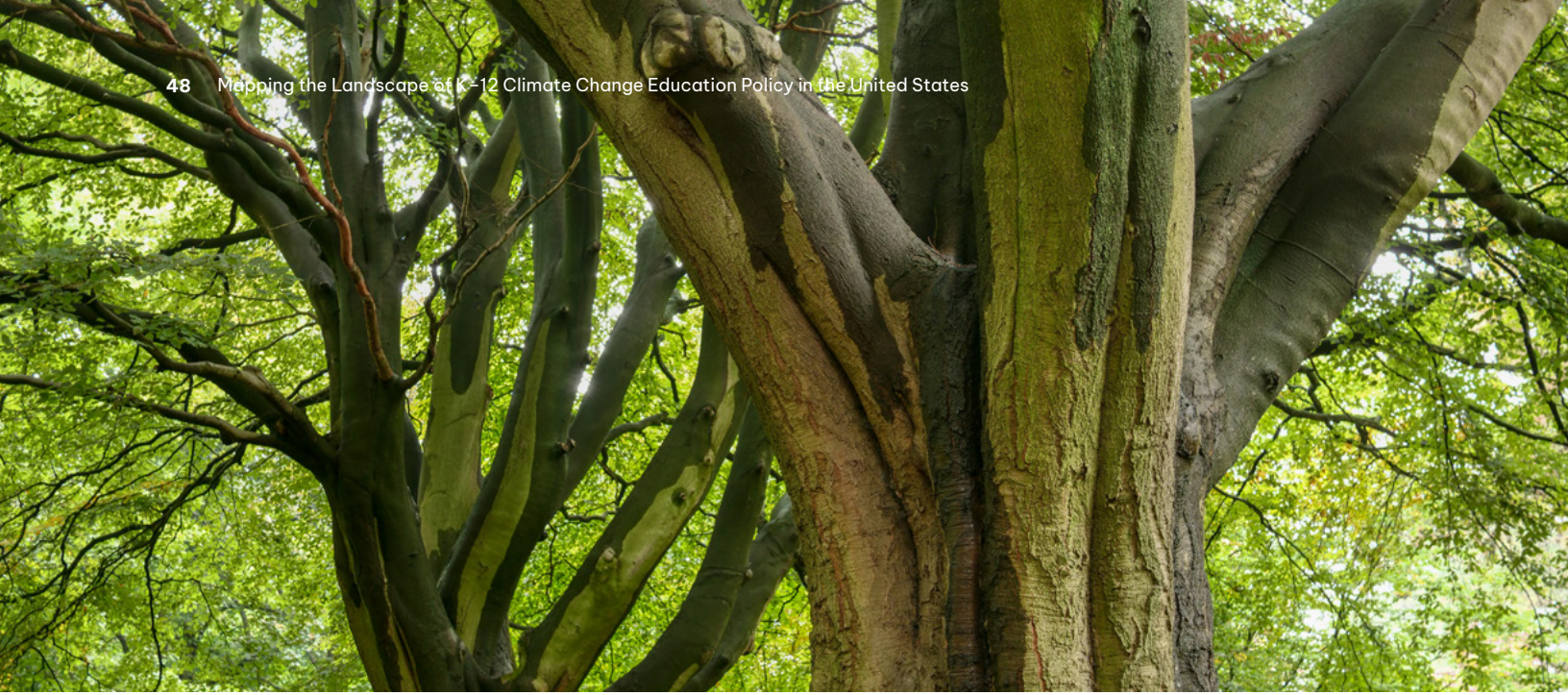
Teaching and Learning

- Require and support the inclusion of climate change content in all subjects, including in relation to climate justice in education standards for all subjects (e.g., in New Jersey⁶⁰)
- Develop guidelines for the inclusion of climate change education in standards and curriculum frameworks⁹⁸ that 1) Incorporates all holistic learning dimensions; 2) Includes a focus on justice; and 3) connects climate change to Indigenous knowledges and learning
- Align standards and curriculum frameworks with climate change in all subjects, including in relation to pedagogy and climate justice (e.g., Indiana in relation to science standards²⁶)
- Develop policies that provide spaces and recommend pedagogies to build socio-emotional capabilities that can support student emotions related to climate change
- Connect districts with Indigenous educators who can teach students Indigenous knowledges
- Publish guidance on what teachers need to know before taking classes outside (e.g., health and safety) and sample outdoor lessons with curriculum connections
- Provide teachers time to develop new content and pedagogical approaches
- Award education “Oscars” to teachers who teach climate change education (e.g., in Hawaii⁹⁹)
- Create grants for school districts to support the development of local climate change education curricula and professional development
- Provide support for climate change education, such as professional development (e.g., in California,¹⁰⁰ Washington’s ClimateTime¹⁰¹); conferences for students, and competitions that award climate action projects (e.g., in Virginia¹⁰²), with a focus on climate justice throughout
- Provide climate change education resources, (e.g., instructional unit samples), programs, and workshops (e.g., in Hawaii¹⁰³), including having ‘courageous conversations’ (e.g., in Maine¹⁰⁴)
- Conduct a climate change education webinar series for students, teachers, administrators, and broader community (e.g., in Maine¹⁰⁵)
- Hold events where students develop solutions for the state’s climate action plan, include guest speakers representing various local concerns and include a focus on a ‘just transition’
- Host a climate change conference and/or workshop where students and teachers from several districts can present and learn from each other
- Have a climate change education newsletter (see Washington for previous environmental education newsletter¹⁰⁶) and include interviews with local community members who are most affected by climate change



Facilities and Operations

- Require districts to have climate action plans (CAPs) and/or ensure CAPs have more weight in operational guidelines
- Reward and/or provide support to districts/schools who make climate action a priority within their facilities and operations
- Create grants for schools that are under-funded or at risk for climate impacts to develop climate change mitigation or adaptation projects/plans
- Incentivize school districts to incorporate school action in the facilities and operations domain (e.g., energy efficiency or renewable energy actions) into teaching and learning
- Move toward renewable energy in department of education buildings (e.g., in Hawaii¹⁰⁷); improve energy efficiency (e.g., automatic 'shut down' infrastructure, passive heating and cooling) and encourage districts to follow suit
- Conduct an alternative energy feasibility study (e.g., in Maine¹⁰⁸) followed by an action plan to implement
- Develop a program to support schools to develop net-zero programs (e.g., Hawaii Department of Education's Ka Hei program¹⁰⁹)
- Create grants for renewable energy projects
- Support increased biodiversity in districts by partnering with community organizations to provide grants and resources for habitat building on school grounds
- Promote sustainable transportation (e.g., discourage private car use, use low emission transportation, install bike sheds, implement anti-idling policies, electrify school buses)
- Reduce water consumption and improve water efficiency with low-flow infrastructure in department of education buildings and provide grants for districts to make similar changes
- Promote sustainable food and waste management practices (e.g., school gardens, meat-free cafeterias, locally-sourced food) in state offices and districts
- Encourage school districts to develop policies that allow schools to share food from school gardens with students who lack access to healthy food or food banks
- Install/move critical equipment (e.g., boilers, generators) above ground floor and don't build new schools in low-lying coastal areas/flood plains
- Install communication networks so schools can quickly respond to changing conditions




Community Partnerships

- Partner with local government or organizations to develop climate solutions (e.g., co-develop municipal climate action plans) and upgrade infrastructure (e.g., low-flow toilets, solar panels)
- Work with community partners to provide climate change education support (e.g., Indiana's climate change curriculum framework, which was developed with community partners) for districts/schools
- Create grants that assure priority funding and provide tax breaks if school boards apply with a community organization to address climate change
- Engage with local industries to understand local effects of climate change to ensure education promotes a 'just transition'
- Partner with local organizations with relevant expertise to build and maintain food gardens
- Support and/or involve students in establishing partnerships with community organizations for climate action (e.g., Hawaii¹¹⁰)
- Support students in sharing learning about climate change with families, peers, and local community, at home and special events (e.g., annual symposium)
- Publish a list of potential climate-focused community partners, particularly those focused on climate justice, as well as guidance on how schools/districts can engage with the community on climate change to help build more climate resilient communities
- Spotlight schools or students who are taking climate action on departmental websites¹¹¹
- Invite students or recent graduates to write climate change opinion pieces, published on the department's website (e.g., in Hawaii¹¹²)
- Publish newsletters with opportunities for climate change education, action, and funding on departmental websites (e.g., in Alaska,¹¹³ Vermont¹¹³)
- Include climate change education resources on the state department of education website (e.g., Wisconsin,¹¹⁵ California,¹⁰⁰ and Hawaii¹¹⁶), including a focus on climate justice and Indigenous knowledges



Limitations

This study analyzed department of education and board of education policies, not broader state policies, state laws, or regulations, which may also address climate change education. The manual coding described in this summary was only conducted on state standards and curriculum frameworks. It is possible that states may discuss some of the topics investigated (e.g., justice, mitigation, adaptation) in non-curriculum policies without using the exact keywords searched. Inclusion of climate change content does not necessarily mean climate change is taught within classrooms. Recent or pending changes in state standards or policies since July 2021 are not reflected in these findings. During a rapidly changing education policy landscape, we recommend this analysis be repeated every 5 years to remain current.



“Once we start to act, hope is everywhere. So instead of looking for hope - look for action. Then the hope will come.”¹¹⁸

Conclusions

The aim of this work is to understand the current landscape of climate change education policy and practice and how the two can work together to support climate action. This study is part of a larger study, which will also include: 1) a similar policy analysis at the higher education level, 2) a data visualization platform with data from the K-12 and higher education policy analysis, 3) a K-12 administrator and teacher survey on climate change education on the ground, as well as gaps and barriers, 4) an examination of the type and extent of inclusion of climate change education by U.S. nongovernmental organizations (NGOs), 5) case study profiles highlighting innovative practices at the K-12, higher education, and NGO levels, and 6) a policy forum for K-12 policy administrators to leverage the results of this work.

Future next steps could also include exploration of education policy guidance from the U.S. Department of Education to determine whether climate change education is prioritized at the federal level.

Concerned scientists, Indigenous peoples, youth, and citizens are calling for urgent climate action. This concern is echoed in the 2022 IPCC report, which states, “any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a livable and sustainable future for all.”¹¹⁷

State departments and boards of education are uniquely positioned to signal and provide climate change education support for local districts to address the climate crisis. Education has a critical role to play and the time to listen and act is now.

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