

STATE STANDARDS



What are State Standards?

Every state has a set of standards which outline the knowledge and skills that the state expects students to learn for each grade, kindergarten through 12th grade, within particular subject areas. State standards compile learning targets and key competencies for each subject, including reading, math, science, and social studies.

Standards outline a state's expectations for teaching and learning but are not the same as curriculum. Curriculum determines how content is taught and often includes textbooks, materials, lesson plans or other resources for teachers. Curriculum decisions and class offerings can differ by district and school. Having a state standard on a given topic does not mean that standard is necessarily taught to all students or that all students will have the same depth of knowledge about that topic. States have internal processes for establishing their own standards. States, school districts, and teachers all help determine the curriculum taught in schools.

This report looks exclusively at state science and social studies standards for grades kindergarten through 12. For the purpose of this report, science standards include all elementary and middle school science classes, as well as high school science courses or topics such as biology and environmental science. Social studies standards include topics or courses such as history, geography, civics, and economics. These may be threaded throughout one grade-level social studies class or taught in separate courses by topic, particularly in high school.



CONNECTION TO CLIMATE CHANGE

Addressing climate change and protecting the environment involves both scientific and societal changes at all levels, from local to global. State standards provide an opportunity to create a framework to equip students with the knowledge and skills to understand and act on climate change. In 2019, 68% of parents and 74% of teachers thought that climate change and its effects on the environment and society should be taught in schools.¹ Another study found an estimate of 78% of adults believe schools should teach about the causes, consequences, and potential solutions to climate change.²

Understanding the science behind climate change is crucial for taking action to mitigate its effects on the environment. There is overwhelming scientific consensus that human actions impact climate change, with 97% of climate scientists in agreement.³ Climate science involves many scientific disciplines—such as biology, chemistry, and earth system science.

Weaving climate change into these topics in kindergarten through 12th grade science classes in a developmentally appropriate way can give students a deep understanding of the causes, consequences, and solutions to climate change.

Understanding human impacts on the environment is critical in addressing climate change and advancing sustainability. Social studies classes are an opportunity for students to learn about how individuals and societies interact with the environment and the ways individuals, businesses, and governments make social and economic decisions.⁴ Climate change and sustainability are particularly relevant in classes or units on geography, civics, and economics. Environmental conservation and sustainability are increasingly visible topics at various levels of government and continue to spur civic action in the US and around the world.

TERMINOLOGY

- **Standards:** Statements that define what students should know and be able to do by the end of a certain subject in a specific grade. Standards for public schools are generally set at the state level.
- **Curriculum:** Lesson plans and other resources for teachers that detail how course content should be taught. Curricula are generally created or selected to align with relevant standards in a subject and grade level. Curriculum decisions are often made at the district or school level.



INDIGENOUS KNOWLEDGE SYSTEMS

Indigenous peoples have a deep relationship with the land, water, and other natural elements which are integral to their cultures, knowledges, and livelihoods. These relationships have been developed and taught in Indigenous communities since time immemorial, long before the American public-school system was established. Indigenous Knowledge Systems (IKS) shapes Indigenous youth identity and perceptions of the world.

While science and social studies education in the US often includes human-environment interactions, there is an emphasis on empirical data and western science. Rarely do these classes include Indigenous Knowledge Systems, which is a holistic, observational, and systematic way of understanding the environment and its connection to culture and society. IKS has contributed to Indigenous communities leading on mitigating and responding to climate change as well as management of lands in which the majority of the world's remaining biodiversity is found.⁵ To address climate change in schools, we need to be inclusive of Indigenous Knowledge Systems.



ENVIRONMENTAL LITERACY

Environmental literacy has provided a framework to help students build understanding about the environment and their role in it.⁶ Environmental literacy involves developing students' understanding of how individual and collective actions impact the environment and preparing students to make environmentally conscious decisions based on their knowledge, skills, and context. While not necessarily named in state standards, environmental literacy relates to environmental education across disciplines including science and social studies. One state, Wisconsin, currently has interdisciplinary standards on environmental literacy and sustainability.

Some states have policies explicitly promoting environmental literacy. In California, a law on environmental education requires “environmental principles and concepts” to be included in state standards.⁷ These principles include climate change and sustainability and have increased access to environmental education across the state.



CLIMATE LITERACY

Climate literacy is defined as “an understanding of your influence on climate and climate’s influence on you and society.”⁸ In the late 2000s, many scientists and educators collaborated to define climate literacy, identify the principles and concepts that should be taught, and justify the teaching of climate science. In The Essential Principles of Climate Sciences guide, they acknowledge the need for climate literacy, stating: “Such understanding improves our ability to make decisions about activities that increase vulnerability to the impacts of climate change and to take precautionary steps in our lives and livelihoods that would reduce those vulnerabilities.”⁹

This guide influenced the inclusion of climate literacy and concepts in the National Research Council’s 2012 framework report which served as a basis for the Next Generation Science Standards (NGSS). Science teachers have stated that standards, like the NGSS, are one of the main reasons for teaching climate change.¹⁰

State Policies



Science Standards

Twenty-nine states and DC have state science standards that include teaching human-caused climate change. Of these, 20 states and DC use the Next Generation Science Standards (NGSS).¹¹ NGSS are a set of standards developed by states based on the National Research Council's (NRC) 2012 research-based Framework for K–12 Science Education.¹²

Louisiana Grade 7 Science MS.ESS3D.a: 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. Addressing 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.

Fifteen states include science standards that mention climate change but do not specify that it is predominantly caused by humans. Many of these states' standards are also informed by the NRC's framework, but often their standards addressing climate change have been modified to remove or deemphasize the role of human actions on climate change. Several states mention climate change in their standards but only mention evidence that climate change occurs or what its effects are, without discussing the cause.

Indiana Grade 8 Science 8.ESS.1: Research global temperatures over the past century. Compare and contrast data in relation to the theory of climate change.

Five states only include climate change in the standards for optional or elective high school-level science courses. As a result, only some students may engage in teaching and learning that addresses climate change. Of these five states, only one (MA) specifically mentions human causes of climate change.

One state (PA), currently lacks any mention of climate change in their state science standards. However, Pennsylvania's current standards are from 2002, and the state began the process of reviewing and updating the standards in fall 2019.¹³



Photos by Allison Shelley for American Education: Images of Teachers and Students in Action.

State Policies



Social Studies Standards

Forty states and DC have social studies standards that address **environmental issues** broadly, such as interactions between humans and their environments.

Eighteen states have social studies standards that explicitly mention **environmental sustainability**. Several states (including CO, GA, NJ, SC, WA) connect environmental sustainability to economics, trade, resource distribution, and the political consequences (e.g. global conflict) of decisions related to these topics. Some states (including OK, NJ, SC) have standards that direct students to describe or plan actions they can take to protect the environment. A few states (including MS, OK) specifically mention renewable resources, such as solar energy, in their social studies standards.

Oregon Grade 4 Geography 4.10: Describe how technological developments, societal decisions, and personal practices affect Oregon's sustainability (dams, wind turbines, climate change and variability, transportation systems, etc.).

Seventeen states' social studies standards explicitly include **climate change**. Of these, one references the human impact on climate change and four require teaching climate change but do not mention human

causes. Twelve states allow but do not require teaching about climate change. For example, a standard addressing climate change may appear only in an elective or optional social studies class, or climate change may be listed as an optional example that teachers may or may not use.

New Jersey U.S. History: America in the World by the End of Grade 12 6.1.12.GeoHE.14.a:

Evaluate the impact of individual, business, and government decisions and actions on the environment and climate change and assess the efficacy of government policies and agencies in New Jersey and the United States in addressing these decisions.

Ten states do not mention any of the previous three topics—environmental issues, climate change, and environmental sustainability—in their social studies standards.

Reviewed by Frank Niepold, Climate Education Coordinator, Climate Program Office, NOAA



BRIGHT SPOTS

- New Jersey recently updated its standards to include climate change across most content areas for kindergarten through 12th grade.¹⁴ The standards are designed to give students an understanding of the science behind climate change, prepare them for green jobs, and prompt them to consider climate solutions.¹⁵ The standards will be implemented beginning with the 2021–22 school year.
- Portland Public Schools (OR) are utilizing social studies and science curricula about climate change and climate justice.¹⁶ This work was spurred by the district board of education's 2016 resolution on climate literacy and is being led by the district's Climate Justice Program Manager.¹⁷ Portland Public School students have been engaged in climate activism and are being involved in the curriculum development process.^{18,19}

SCIENCE STANDARDS

DO STATE SCIENCE STANDARDS ADDRESS CLIMATE CHANGE?

States A–N	Requires teaching human-caused climate change	Requires teaching climate change but not as predominantly human-caused	Climate change only included in optional high school classes
Alabama			X
Alaska	X		
Arizona	X		
Arkansas	✓		
California	✓		
Colorado	X		
Connecticut	✓		
Delaware	✓		
DC	✓		
Florida		X	
Georgia			X
Hawaii	✓		
Idaho		X	
Illinois	✓		
Indiana		X	
Iowa	✓		
Kansas	✓		
Kentucky	✓		
Louisiana	X		
Maine	✓		
Maryland	✓		
Massachusetts			X [^]
Michigan	✓		
Minnesota		X	
Mississippi		X	
Missouri		X	
Montana		X	
Nebraska		X	
Nevada	✓		
New Hampshire	✓		
New Jersey	✓		
New Mexico	✓		
New York	X		
North Carolina		X	
North Dakota	X		

Remaining states on following page

States O-W

Ohio		X	
Oklahoma		X	
Oregon	✓		
Pennsylvania			
Rhode Island	✓		
South Carolina			X
South Dakota		X	
Tennessee	X		
Texas			X
Utah		X	
Vermont	✓		
Virginia		X	
Washington	✓		
West Virginia		X	
Wisconsin	X		
Wyoming	X		
TOTALS	30	15	5
PERCENT	59%	29%	10%

Note: Percentages are out of 51 (includes DC) ✓ State uses Next Generation Science Standards (NGSS) ^ Standard about human-caused climate change



Photo by Allison Shelley for American Education: Images of Teachers and Students in Action.

SOCIAL STUDIES STANDARDS

Do social studies standards address environmental issues?

States A-N	Environmental issues (e.g. human-environment interaction)	Climate Change		Sustainability	
		Requires teaching climate change, not necessarily human-caused	Allows but does not require teaching climate change (optional content or optional class)	Requires teaching sustainability	Allows but does not require sustainability (optional content or optional class)
Alabama	X			X	
Alaska					
Arizona	X			X	
Arkansas	X			X	
California	X		X*		X*
Colorado	X			X	
Connecticut					
Delaware	X				
DC	X				
Florida	X				
Georgia	X			X	
Hawaii	X	X		X	
Idaho	X				
Illinois	X				
Indiana	X		X	X	
Iowa	X				
Kansas	X				
Kentucky					
Louisiana					
Maine					
Maryland	X		X		
Massachusetts	X	X			
Michigan	X		X		
Minnesota	X	X			
Mississippi	X			X	
Missouri	X				
Montana	X				
Nebraska	X		X		
Nevada	X				
New Hampshire	X		X		
New Jersey	X	X^		X	
New Mexico	X				
New York	X				
North Carolina	X		X		
North Dakota	X				

Remaining states on following page

States O-W

Ohio	X			X	
Oklahoma	X	X		X	
Oregon	X		X	X	
Pennsylvania					
Rhode Island	X		X		
South Carolina	X			X	
South Dakota					
Tennessee					
Texas	X				
Utah	X		X	X	
Vermont	X		X		
Virginia					
Washington	X			X	
West Virginia	X		X		X
Wisconsin	X			X	
Wyoming					
TOTALS	41	5	12	16	2
PERCENT	80%	10%	24%	31%	4%

Note: Percentages are out of 51 (includes DC) ^Standard about human-caused climate change

*Topic required to be incorporated as standards and curriculum frameworks are revised

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