

K-12 Interdisciplinary Performance Expectations for Teaching Climate Issues (6.3)

Social Studies (Grades K-2)	Art	Science
<p>6.3.2.GeoGI.1: Investigate a global issue such as climate change, its significance, and share information about <u>how it impacts different regions around the world</u>.</p> <p>https://climatekids.nasa.gov/menu/teach/</p> <p>https://climatekids.nasa.gov/review/how-to-help/</p> <p>https://www.carbon-footprint-defined.com/teaching-helpful-kids.html</p> <p>http://www.greenschools.net/article.php-id=271.html</p> <p>https://www.climaterealityproject.org/blog/just-kids-what-climate-change-and-what-can-i-do</p> <p>http://www.impactlab.org/map/#usmeas=absolute&usyear=1981-2010&gmeas=absolute&gyear=1986-2005 (Global Change Impact Map)</p> <p>6.3.2.GeoGI.2: Collect data and consider sources from multiple perspectives to become informed about an environmental issue and identify possible solutions.</p> <p>https://www.usgs.gov/special-topic/water-science-school/science/water-qa-how-much-water-do-i-use-home-each-day?qt-science_center_objects=0#qt-science_center_objects (Daily Water Usage)</p> <p>https://www.usgs.gov/core-science-systems/national-geospatial-program/supporting-themes?qt-science_support_page_related_con=0#qt-science_support_page_related_con (National Map)</p> <p>http://energyusecalculator.com/electricity_cellphone.htm (Energy Use Calculators)</p> <p>https://fitzlab.shinyapps.io/cityapp/ (Interactive city map USA) Based on emissions</p>	<p>1.2.2.Re7b: Identify, share and describe a variety of media artworks created from different experiences in response to global issues including climate change</p> <p>1.4.2.Cn11a: With prompting and support, identify similarities and differences in stories and various art forms from one’s own community and from multiple cultures in a guided drama (e.g., process drama, story drama, creative drama) experience about global issues, including climate change.</p> <p>1.5.2.Cn11b: Describe why people from different places and times make art about different issues, including climate change.</p>	<p>K-ESS3-2 Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. [Clarification Statement: Emphasis is on local forms of severe weather.]</p> <p>K-ESS3-3 Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment. [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]</p> <p>Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.</p> <p>ETS1.B: Developing Possible Solutions ♣ Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions, such as climate change, to other people. (K-2-ETS1-2)</p>

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Social Studies (Grades 3-5)	Art	Science
<p>6.3.5.CivicsPD.1: Develop an action plan that addresses issues related to climate change and share with school and/or community members.</p> <p>https://green.uw.edu/climate-of-change (Univ. of Washington)</p> <p>https://climatecrisis.house.gov/report</p> <p>https://www.c2es.org/document/climate-action-plans/</p> <p>https://www.epa.gov/greeningepa/climate-change-adaptation-plans</p> <p>https://green.harvard.edu/campaign/harvards-climate-action-plan</p> <p>6.3.5.CivicsPD.2: Use a variety of sources and data to identify the various perspectives and actions taken by individuals involving a current or historical community, state, or national issue.</p> <p>https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-world-view-climate-change/</p> <p>https://www.bloomberg.com/view/interactives/climate-change-in-perspective/</p> <p>https://www.cfr.org/backgrounder/alternative-views-climate-change</p> <p>https://www.ncdc.noaa.gov/global-warming</p> <p>https://www.nj.gov/dep/climatechange/data.html</p> <p>6.3.5.GeoHE.1: Plan and participate in an advocacy project to inform others about the impact of climate change at the local or state level and propose possible solutions.</p> <p>https://www.nj.gov/dep/climatechange/action.html</p> <p>https://njadapt.rutgers.edu/</p> <p>https://www.sustainablejc.org/</p> <p>http://jerseyshorepartnership.com/</p> <p>https://njcitizenaction.org/?page_id=718</p>	<p>1.1.5.Cn10b: Use an inquiry base to investigate global issues, including climate change, expressed through a variety of dance genres, styles and cultural lenses.</p> <p>1.2.5.Re7b: Identify, describe, explain and differentiate how various forms, methods, and styles in media artworks affect and manage audience experience when addressing global issues including climate change.</p> <p>1.4.5.Cn11a: Identify, respond to and investigate connections to global issues including climate change and other content areas in a dramatic/theatrical work.</p> <p>1.5.5.Cn11b: Communicate how art is used to inform others about global issues, including climate change.</p>	<p>3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard. [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]</p> <p>ETS1.B: Developing Possible Solutions ♣ <u>Research on a problem</u>, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)</p> <p>• 5-ESS3-1 <u>Obtain and combine information</u> about ways individual communities use science ideas to protect the Earth's resources, environment, and address climate change issues.</p> <p>MS-ESS3-5. <u>Ask questions to clarify evidence</u> of the factors that have caused climate change over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]</p> <p>ESS3.D: Global Climate Change ♣ 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. (MS-ESS3-5)</p>

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Social Studies (Grades 6-8)	Art	Science
<p>6.3.8.CivicsPR.4: Use evidence and quantitative data to propose or defend a public policy related to climate change.</p> <p>https://climate.nasa.gov/evidence/</p> <p>https://royalsociety.org/topics-policy/projects/climate-change-evidence-causes/basics-of-climate-change/</p> <p>https://www.nationalgeographic.com/science/2020/01/weather-shows-evidence-of-climate-change-every-single-day-since-2012/</p> <p>https://climate.nasa.gov/faq/34/what-kinds-of-data-do-scientists-use-to-study-climate/</p> <p>https://climate.nasa.gov/resources/global-warming-vs-climate-change/</p> <p>https://ourworldindata.org/search?q=climate</p>	<p>1.1.8.Cn10b: Employ a variety of research methods to inform the development of original dances about global issues, including climate change. Articulate ways the research deepened understanding of the topic and how big ideas are expressed metaphorically through dance.</p> <p>1.2.8.Re7b: Compare, contrast and analyze how various forms, methods and styles in media artworks affect and manage audience experience and create intention when addressing global issues including climate change. Anchor Standard 8:</p> <p>1.4.8.Cn11a: Research the story elements of a staged drama/theatre work about global issues, including climate change, and discuss how a playwright might have intended a theatrical work to be produced.</p> <p>1.5.8.Cn11b: Analyze and contrast how art forms are used to reflect global issues, including climate change.</p>	<p>LS4.D: Biodiversity and Humans ♣ Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary to HS-LS2-7) ♣ Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HSL4-6.)</p>

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Social Studies (Grades 9-12)	Art	Science
<p>6.3.12.GeoGI.1: Collaborate with students from other countries to develop possible solutions to an issue of environmental justice, including climate change and water scarcity, and present those solutions to relevant national and international governmental and/or nongovernmental organizations.</p> <p>http://www.impactlab.org/map/#usmeas=absolute&usyear=1981-2010&gmeas=absolute&gyear=1986-2005 (Climate Change Impact Map)</p> <p>https://www.climate.gov/teaching/essential-principles-climate-literacy/climate-youth-engagement</p> <p>https://asiasociety.org/ (Asia Society)</p> <p>https://www.socialstudies.org/ (National Council for the Social Studies – state councils)</p> <p>https://munimpact.org/ (Model UN)</p> <p>https://www.globalschoolsprogram.org/</p> <p>https://www.iss.edu/community/relationships (International Schools Services, Princeton, NJ)</p> <p>https://www.afsusa.org/</p> <p>https://www.state.gov/resources-for-foreign-embassies/diplomatic-list/ (Directory of U.S.A. Embassies)</p>	<p>1.1.12prof.Cn10b: Research global issues, including climate change, using multiple research methods to inform original dances expressed through multiple genres, styles, and varied cultural perspectives.</p> <p>1.1.12acc.Cn10b: Collaboratively investigate global issues, including climate change, to inform the development of an original dance project. Evaluate and present ways in which critical concepts are communicated metaphorically through dance.</p> <p>1.2.12prof.Re7b: Analyze how a variety of media artworks affect audience experience and create intention through multimodal perception when addressing global issues including climate change. Accomplished</p> <p>1.2.12acc.Re7b: Analyze how a broad range of media artworks affect audience experience, as well as create intention and persuasion through multimodal perception when addressing global issues including climate change.</p> <p>1.2.12adv.Re7b: Survey an exemplary range of media artworks, analyzing methods for managing audience experience, creating intention and persuasion through multimodal perception and systemic communications when addressing global issues including climate change.</p> <p>1.5.12prof.Cn11b: Describe how knowledge of global issues, including climate change, may influence personal responses to art.</p> <p>1.5.12acc.Cn11b: Compare uses of art in a variety of societal, cultural and historical contexts and make connections to global issues, including climate change.</p> <p>1.5.12adv.Cn11b: Assess the impact of an artist or group of artists on global issues, including climate change.</p>	<p>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.]</p> <p>LS4.D: Biodiversity and Humans ♣ Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth.</p> <p>Analyze geoscience data to make the claim that one change to Earth’s surface can create feedbacks that cause changes to other Earth systems. [Clarification Statement: Examples should include climate feedbacks, such as how an increase in greenhouse gases causes a rise in global temperatures that melts glacial ice, which reduces the amount of sunlight reflected from Earth’s surface, increasing surface temperatures and further reducing the amount of ice. Examples could also be taken from other system interactions, such as how the loss of ground vegetation causes an increase in water runoff and soil erosion; how dammed rivers increase groundwater recharge, decrease sediment transport, and increase coastal erosion; or how the loss of wetlands causes a decrease in local humidity that further reduces the wetland extent.]</p> <p>Use a model to describe how variations in the flow of energy into and out of Earth’s systems result in changes in climate. [Clarification Statement: Examples of the causes of climate change differ by timescale, over 1–10 years: large volcanic eruption, ocean circulation; 10–100s of years: changes in human activity, ocean circulation, solar output; 10–100s of thousands of years: changes to Earth’s orbit and the orientation of its axis; and 10–100s of millions of years: long-term changes in atmospheric composition.] [Assessment Boundary: Assessment of the results of changes in climate is limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.]</p>

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		<p>ESS1.B: Earth and the Solar System ♣ Cyclical changes in the shape of Earth’s orbit around the sun, together with changes in the tilt of the planet’s axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes. (secondary to HS-ESS2-4)</p> <p>♣ The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun’s energy output or Earth’s orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles. (HSESS2-4)</p> <p>Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity. [Clarification Statement: Examples of key natural resources include access to fresh water (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels. Examples of natural hazards can be from interior processes (such as volcanic eruptions and earthquakes), surface processes (such as tsunamis, mass wasting and soil erosion), and severe weather (such as hurricanes, floods, and droughts). Examples of the results of changes in climate that can affect populations or drive mass migrations include changes to sea level, regional patterns of temperature and precipitation, and the types of crops and livestock that can be raised.]</p> <p>HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems. [Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]</p> <p>HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the</p>
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		<p>current rate of global or regional climate change and associated future impacts to Earth systems. [Clarification Statement: Examples of evidence, for both data and climate model outputs, are for climate changes (such as precipitation and temperature) and their associated impacts (such as on sea level, glacial ice volumes, or atmosphere and ocean composition).] [Assessment Boundary: Assessment is limited to one example of a climate change and its associated impacts.]</p> <p>HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change). [Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from a human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.]</p> <p>ESS3.D: Global Climate Change ♣ Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts. (HS-ESS3-5) ♣ Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HSESS3-6) ETS1.B: Developing Possible Solutions ♣ When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary to HS-ESS3- 2), (secondary HS-ESS3-4)</p>
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