



Overview of Educator Guidelines for K-12 Global Climate Change Education

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Global warming has become the leading U.S. public environmental concern. Growing public enthusiasm for addressing global warming may mean that some K-12 global warming education efforts may not always be delivered in accordance with rigorous environmental education practice guidelines.

Providing effective global climate change K-12 education is best done in developmental stages according to age levels. Age appropriateness is a vitally important ingredient of climate change education because of its deep underlying complexity. Using the approach and structure of the NWF/NAAEE Guidelines for Excellence, NWF recommends that climate change education be carefully designed and arrayed according to age level. This allows for cognitive and problem-solving development of the human mind and also makes sense because the subject inherently requires strong and effective building blocks of knowledge and skill.

Educators and parents may also want to take note that the size and extent of the global climate change problem can seem overwhelming to younger children who do not yet grasp all the possibilities for solutions.

Fourth Grade

Third and fourth grade students think in fairly concrete terms. This makes concentrating on the following building blocks of inquiry-based learning important for this age group:

- Ability to form basic questions and do simple investigations of nature and the environment, locate, collect and organize simple information on nature, communities and environmental topics and be aware of the need to use reliable information.
- Ability to identify changes and differences in the physical environment, understand the basic definitions of: atmosphere, hydrosphere, lithosphere, biosphere and cryosphere, and identify characteristics and changes in matter such as in solids and gases.
- Understand that there are similarities and differences among a wide range of living organisms, grasp the basic concept of habitat and that organisms relate to each other and their surroundings and also recognize that plants and animals have different characteristics, many of which are inherited.

Eighth Grade

Students in this age group are more able to think abstractly with higher-order thinking skills and to engage in more creative thinking in general. They are developing more sophisticated cognitive abilities that let them understand the inter-relationships of scientific, environmental and human systems.

- Ability to develop questions and learn about the environment, to conduct environmental investigations, to find answers to particular questions, to assess and evaluate the strengths and weaknesses of the information and to synthesize observations and findings into coherent explanations.
- Understand the basic physical processes that shape the Earth and relate differences in physical patterns to their causes, basic interconnections among atmosphere; hydrosphere; lithosphere; biosphere and cryosphere. And understand cycles including: solar energy and albedo, the water cycle, changing seasons and atmospheric movement patterns, ocean currents, the carbon cycle, volcanism and plate tectonics.
- Understand that biotic communities are made up of plants and animals that are uniquely adapted to live in particular environments that can be affected by a changed climate, and be able to describe the importance of genetic variation in species and the possible implications of species extinction.
- Understand that the way in which individuals perceive the environment is influenced, in part, by individual traits and by group membership or affiliation and be familiar with a wide range of cultures and subcultures and that perspectives about the environment may influence culture. Also grasp the relative value and efficacy of climate change solutions based on emission reductions, sequestration and natural resource and human adaptation.

Twelfth Grade

Students in this age group are able to understand the complexity of many environmental subjects and related issues, and most important, to learn how to address them. This is a period when understanding of the science of global warming can be combined with an understanding of what it means to be a responsible citizen who has problem solving skills.

- Ability to develop and explain questions that guide environmental investigations and identify factors that influence the questions they pose even developing approaches for investigating unfamiliar types of problems and phenomena.
- Ability to locate and collect reliable information for environmental investigations of many types. Understand how to use technology to collect and display information and to apply basic logic and reasoning skills to evaluate the completeness and reliability of information.

- Understand the physical processes that shape the Earth and relate these processes to the characteristics of the Earth's surface including the relationships among atmosphere, hydrosphere, lithosphere, biosphere and cryosphere.
- Understand and analyze large-scale natural cycles, including distribution of solar energy and albedo, the water cycle, changing seasons and atmospheric movement patterns, ocean currents, the carbon cycle, volcanism and plate tectonics, and overall familiarity with the basic elements and interactions of Earth's atmosphere, land and oceans.
- Apply their knowledge of energy and matter to make connections among phenomena such as light, heat, electricity and the motion of objects. Understand basic population dynamics and the importance of diversity in living systems as well as the basic ideas and the genetic mechanics behind biological evolution.
- Has skill in understanding and assessing the relative value and efficacy of solutions based on emission reductions, sequestration and natural resource and human adaptation.
- Possesses a realistic self-confidence in their effectiveness as citizens and understand the importance of exercising those rights.