

Excellence in Environmental Education: Guidelines for Learning (K–12)

A publication of the North American Association for Environmental Education

Excellence in Environmental Education offers a vision of environmental education that makes sense within the formal education system and that promotes progress toward sustaining a healthy environment and quality of life. Guidelines are suggested for each of three grade levels (fourth, eighth, and twelfth). Each guideline focuses on one element of environmental literacy, describing a level of skill or knowledge appropriate to the grade level under which it appears. Below is a brief summary of the guidelines; download the full publication for more detail, including specific cross-discipline suggestions and achievement indicators (<http://www.naaee.org/programs-and-initiatives/guidelines-for-excellence/materials-guidelines/learner-guidelines>).

How the Guidelines are Organized

The guidelines are organized into four strands, each of which represents a broad aspect of environmental education and its goal of environmental literacy. Keep in mind, the sequence of the strands are not meant to imply that one strand serves as a foundation for another. The process of becoming environmentally literate is not linear and the sequence of guidelines is not a hierarchy of skills and knowledge.

Strand 1: Questioning, Analysis and Interpretation Skills

Environmental literacy depends on learners' ability to ask questions, speculate, and hypothesize about the world around them, seek information, and develop answers to their questions. Learners must be familiar with inquiry, master fundamental skills for gathering and organizing information, and interpret and synthesize information to develop and communicate explanations.

Strand 2: Knowledge of Environmental Processes and Systems

An important component of environmental literacy is understanding the processes and systems that comprise the environment, including human social systems and influences. That understanding is based on knowledge synthesized from across traditional disciplines. The guidelines under this strand are grouped in four sub-categories:

- 2.1—The Earth as a physical system
- 2.2—The living environment
- 2.3—Humans and their societies
- 2.4—Environment and society

Strand 3: Skills for Understanding and Addressing Environmental Issues

Skills and knowledge are refined and applied in the context of environmental issues. These environmental issues are real-life dramas where differing viewpoints about environmental problems and their potential solutions are played out. Environmental literacy includes the abilities to define, learn about, evaluate, and act on environmental issues. Under this strand, the guidelines are grouped in two sub-categories:

- 3.1—Skills for analyzing and investigating environmental issues
- 3.2—Decision-making and citizenship skills

Strand 4: Personal and Civic Responsibility

Environmentally literate citizens are willing and able to act on their own conclusions about what should be done to ensure environmental quality. As learners develop and apply concept-based learning and skills for inquiry, analysis, and action, they also understand that what they do individually and in groups can make a difference.

Guidelines by Grade Level

K-4th Grade

The kindergarten through fourth grade years are a time of tremendous cognitive development. By third and fourth grades, learners have developed some basic skills that help them construct knowledge. Instructors in earlier grade levels should use these fourth grade guidelines as a target, extrapolating from this end goal appropriate activities and lessons for younger learners.

In these early years of formal education, learners tend to be concrete thinkers with a natural curiosity about the world around them. Environmental education can build on these characteristics by focusing on observation and exploration of the environment—beginning close to home. Basic suggestions for examining environmental issues with fourth graders are:

- Keep it simple.
- Keep it local.
- Make close links with what they're observing and learning about the local environment.

Learners should be able to meet the following guidelines by the end of fourth grade:

Strand 1: Questioning, Analysis, and Interpretation Skills

- Questioning**: Learners are able to develop questions that help them learn about the environment and do simple investigations.
- Designing Investigations**: Learners are able to design simple investigations.
- Collecting Information**: Learners are able to locate and collect information about the environment and environmental topics.
- Evaluating Accuracy and Reliability**: Learners understand the need to use reliable information to answer their questions. They are familiar with some basic factors to consider in judging the merits of information.
- Organizing Information**: Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics.
- Working with Models and Situations**: Learners understand that relationships, patterns, and processes can be represented by models.
- Drawing Conclusions and Developing Explanations**: Learners can develop simple explanations that address their questions about the environment.

Strand 2: Knowledge of Environmental Processes and Systems

Strand 2.1: The Earth as a Physical System

- Processes that Shape the Earth**: Learners are able to identify changes and differences in the physical environment.
- Changes in Matter**: Learners are able to identify basic characteristics of and changes in matter.
- Energy**: While they may have little understanding of formal concepts associated with energy, learners are familiar with the basic behavior of some different forms of energy.

Strand 2.2: The Living Environment

- Organisms, Populations, and Communities**: Learners understand basic similarities and differences among a wide variety of living organisms. They understand the concept of habitat.

- B. Heredity and Evolution: Learners understand that plants and animals have different characteristics and that many of the characteristics are inherited.
- C. Systems and Connections: Learners understand basic ways in which organisms are related to their environments and to other organisms.
- D. Flow of Matter and Energy: Learners know that living things need some source of energy to live and grow.

Strand 2.3: Humans and Their Societies

- A. Individuals and Groups: Learners understand that people act as individuals and as group members and that groups can influence individual actions.
- B. Culture: Learners understand that experiences and places may be interpreted differently by people with different cultural backgrounds, at different times, or with other frames of reference.
- C. Political and Economic Systems: Learners understand that government and economic systems exist because people living together in groups need ways to do things such as provide for needs and wants, maintain order, and manage conflict.
- D. Global Connections: Learners understand how people are connected at many levels—including the global level—by actions and common responsibilities that concern the environment.
- E. Change and Conflict: Learners recognize that change is a normal part of individual and societal life. They understand that conflict is rooted in different points of view.

Strand 2.4: Environment and Society

- A. Human/Environment Interactions: Learners understand that people depend on, change, and are affected by the environment.
- B. Places: Learners understand that places differ in their physical and human characteristics.
- C. Resources: Learners understand the basic concepts of resource and resource distribution.
- D. Technology: Learners understand that technology is an integral part of human existence and culture.
- E. Environmental Issues: Learners are familiar with some local environmental issues and understand that people in other places experience environmental issues as well.

Strand 3: Skills for Understanding and Addressing Environmental Issues

Strand 3.1: Skills for Analyzing and Investigating Environmental Issues

- A. Identifying and Investigating Issues: Learners are able to identify and investigate issues in their local environments and communities.
- B. Sorting Out the Consequences of Issues: As learners come to understand that environmental and social phenomena are linked, they are able to explore the consequences of issues.
- C. Identifying and Evaluating Alternative Solutions and Courses of Action: Learners understand there are many approaches to resolving issues.
- D. Working with Flexibility, Creativity, and Openness: Learners understand the importance of sharing ideas and hearing other points of view.

Strand 3.2: Decision-Making and Citizenship Skills

- A. Forming and Evaluating Personal Views: Learners are able to examine and express their own views on environmental issues.

- B. Evaluating the Need for Citizen Action: Learners are able to think critically about whether they believe action is needed in particular situations and whether they believe they should be involved.
- C. Planning and Taking Action: By participating in issues of their choosing—mostly close to home—they learn the basics of individual and collective action.
- D. Evaluating the Results of Actions: Learners understand that civic actions have consequences.

Strand 4: Personal and Civic Responsibility

- A. Understanding Societal Values and Principles: Learners can identify fundamental principles of U.S. society and explain their importance in the context of environmental issues.
- B. Recognizing Citizens' Rights and Responsibilities: Learners understand the basic rights and responsibilities of citizenship.
- C. Recognizing Efficacy: Learners possess a realistic self-confidence in their effectiveness as citizens.
- D. Accepting Personal Responsibility: Learners understand that they have responsibility for the effects of their actions.

5-8th Grade

In the fifth through eighth grades, learners begin to develop skills in abstract thinking and continue to develop creative thinking skills—and along with these, the ability to understand the interplay of environmental and human social systems in greater depth. Environmental education can foster this development by focusing on investigation of local environmental systems, problems, and issues. As learners become actively engaged in deciding for themselves what is right and wrong, educators can use environmental problems to help learners explore their own responsibilities and ethics.

Learners should be able to meet the following guidelines by the end of eighth grade.

Strand 1: Questioning, Analysis, and Interpretation Skills

- A. Questioning: Learners are able to develop, focus, and explain questions that help them learn about the environment and do environmental investigations.
- B. Designing Investigations: Learners are able to design environmental investigations to answer particular questions, often their own questions.
- C. Collecting Information: Learners are able to locate and collect reliable information about the environment or environmental topics using a variety of methods and sources.
- D. Evaluating Accuracy and Reliability: Learners are able to judge the weaknesses and strengths of the information they are using.
- E. Organizing Information: Learners are able to classify and order data, and to organize and display information in ways that help analysis and interpretation.
- F. Working with Models and Situations: Learners understand many of the uses and limitations of models.
- G. Drawing Conclusions and Developing Explanations: Learners are able to synthesize their observations and findings into coherent explanations.

Strand 2: Knowledge of Environmental Processes and Systems

Strand 2.1: The Earth as a Physical System

- A. Processes that Shape the Earth: Learners have a basic understanding of most of the physical processes that shape the Earth. They are able to explore the origin of differences in physical patterns.
- B. Changes in Matter: Learners understand the properties of the substances that make up objects or materials found in the environment.
- C. Energy: Learners begin to grasp formal concepts related to energy by focusing on energy transfer and transformations. They are able to make connections among phenomena such as light, heat, magnetism, electricity, and the motion of objects.

Strand 2.2: The Living Environment

- A. Organisms, Populations, and Communities: Learners understand that biotic communities are made up of plants and animals that are adapted to live in particular environments.
- B. Heredity and Evolution: Learners have a basic understanding of the importance of genetic heritage.
- C. Systems and Connections: Learners understand major kinds of interactions among organisms or populations of organisms.
- D. Flow of Matter and Energy: Learners understand how energy and matter flow among the abiotic and biotic components of the environment.

Strand 2.3: Humans and Their Societies

- A. Individuals and Groups: Learners understand that how individuals perceive the environment is influenced in part by individual traits and group membership or affiliation.
- B. Culture: As they become familiar with a wider range of cultures and subcultures, learners gain an understanding of cultural perspectives on the environment and how the environment may, in turn, influence culture.
- C. Political and Economic Systems: Learners become more familiar with political and economic systems and how these systems take the environment into consideration.
- D. Global Connections: Learners become familiar with ways in which the world's environmental, social, economic, cultural, and political systems are linked.
- E. Change and Conflict: Learners understand that human social systems change over time and that conflicts sometimes arise over differing and changing viewpoints about the environment.

Strand 2.4: Environment and Society

- A. Human/Environment Interactions: Learners understand that human-caused changes have consequences for the immediate environment as well as for other places and future times.
- B. Places: Learners begin to explore the meaning of places both close to home and around the world.
- C. Resources: Learners understand that uneven distribution of resources influences their use and perceived value.
- D. Technology: Learners understand the human ability to shape and control the environment as a function of the capacities for creating knowledge and developing new technologies.
- E. Environmental Issues: Learners are familiar with a range of environmental issues at scales that range from local to national to global. They understand that people in other places around the world experience environmental issues similar to the ones they are concerned about locally.

Strand 3: Skills for Understanding and Addressing Environmental Issues

Strand 3.1: Skills for Analyzing and Investigating Environmental Issues

- A. Identifying and Investigating Issues: Learners are able to use primary and secondary sources of information, and apply growing research and analytical skills to investigate environmental issues, beginning in their own community.
- B. Sorting Out the Consequences of Issues: Learners are able to apply their knowledge of ecological and human processes and systems to identify the consequences of specific environmental issues.
- C. Identifying and Evaluating Alternative Solutions and Courses of Action: Learners are able to identify and develop action strategies for addressing particular issues.
- D. Working with Flexibility, Creativity, and Openness: Learners are able to consider the assumptions and interpretations that influence the conclusions they and others draw about environmental issues.

Strand 3.2: Decision-Making and Citizenship Skills

- A. Forming and Evaluating Personal Views: Learners are able to identify, justify, and clarify their views on environmental issues and alternative ways to address them.
- B. Evaluating the Need for Citizen Action: Learners are able to evaluate whether they believe action is needed in particular situations, and decide whether they should be involved.
- C. Planning and Taking Action: As learners begin to see themselves as citizens taking active roles in their communities, they are able to plan for and engage in citizen action at levels appropriate to their maturity and preparation.
- D. Evaluating the Results of Actions: Learners are able to analyze the effects of their own actions and actions taken by individuals and groups.

Strand 4: Personal and Civic Responsibility

- A. Understanding Societal Values and Principles: Learners understand that societal values can be both a unifying and a divisive force.
- B. Recognizing Citizens' Rights and Responsibilities: Learners understand the rights and responsibilities of citizenship and their importance in promoting the resolution of environmental issues.
- C. Recognizing Efficacy: Learners possess a realistic self-confidence in their effectiveness as citizens.
- D. Accepting Personal Responsibility: Learners understand that their actions can have broad consequences and that they are responsible for those consequences.

9-12th Grade

By the end of twelfth grade, learners are well on their way to environmental literacy. They should possess the basic skills and dispositions they need to understand and act on environmental problems and issues as responsible citizens—and to continue the learning process throughout their lives. In the ninth through twelfth grades, environmental education can promote active and responsible citizenship by challenging learners to hone and apply problem-solving, analysis, persuasive communication, and other higher level skills, often in real-world contexts.

Learners should be able to meet the following guidelines by the time they graduate from high school.

Strand 1: Questioning, Analysis, and Interpretation Skills

- A. Questioning: Learners are able to develop, modify, clarify, and explain questions that guide environmental investigations of various types. They understand factors that influence the questions they pose.
- B. Designing Investigations: Learners know how to design investigations to answer particular questions about the environment. They are able to develop approaches for investigating unfamiliar types of problems and phenomena, select appropriate means of inquiry, including scientific investigations, historical inquiry, and social science observation and research.
- C. Collecting Information: Learners are able to locate and collect reliable information for environmental investigations of many types. They know how to use sophisticated technology to collect information, including computer programs that access, gather, store, and display data.
- D. Evaluating Accuracy and Reliability: Learners can apply basic logic and reasoning skills to evaluate completeness and reliability in a variety of information sources.
- E. Organizing Information: Learners are able to organize and display information in ways appropriate to different types of environmental investigations and purposes.
- F. Working with Models and Situations: Learners are able to create, use, and evaluate models to understand environmental phenomena.
- G. Drawing Conclusions and Developing Explanations: Learners are able to use evidence and logic in developing proposed explanations that address their initial questions and hypotheses.

Strand 2: Knowledge of Environmental Processes and Systems

Strand 2.1: The Earth as a Physical System

- A. Processes that Shape the Earth: Learners understand the major physical processes that shape the Earth. They can relate these processes, especially those that are large-scale and long-term, to characteristics of the Earth.
- B. Changes in Matter: Learners apply their understanding of chemical reactions to round out their explanations of environmental characteristics and everyday phenomena.
- C. Energy: Learners apply their knowledge of energy and matter to understand phenomena in the world around them.

Strand 2.2: The Living Environment

- A. Organisms, Populations, and Communities: Learners understand basic population dynamics and the importance of diversity in living systems.
- B. Heredity and Evolution: Learners understand the basic ideas and genetic mechanisms behind biological evolution.
- C. Systems and Connections: Learners understand the living environment to be comprised of interrelated, dynamic systems.
- D. Flow of Matter and Energy: Learners are able to account for environmental characteristics based on their knowledge of how matter and energy interact in living systems.

Strand 2.3: Humans and Their Societies

- A. Individuals and Groups: Learners understand the influence of individual and group actions on the environment, and how groups can work to promote and balance interests.

- B. Culture: Learners understand cultural perspectives and dynamics and apply their understanding in context.
- C. Political and Economic Systems: Learners understand how different political and economic systems account for, manage, and affect natural resources and environmental quality.
- D. Global Connections: Learners are able to analyze global social, cultural, political, economic, and environmental linkages.
- E. Change and Conflict: Learners understand the functioning of public processes for promoting and managing change and conflict, and can analyze their effects on the environment.

Strand 2.4: Environment and Society

- A. Human/Environment Interactions: Learners understand that humans are able to alter the physical environment to meet their needs and that there are limits to the ability of the environment to absorb impacts or meet human needs.
- B. Places: Learners understand "place" as humans endowing a particular part of the Earth with meaning through their interactions with that environment.
- C. Resources: Learners understand that the importance and use of resources change over time and vary under different economic and technological systems.
- D. Technology: Learners are able to examine the social and environmental impacts of various technologies and technological systems.
- E. Environmental Issues: Learners are familiar with a range of environmental issues at scales that range from local to national to global. They understand that these scales and issues are often linked.

Strand 3: Skills for Understanding and Addressing Environmental Issues

Strand 3.1: Skills for Analyzing and Investigating Environmental Issues

- A. Identifying and Investigating Issues: Learners apply their research and analytical skills to investigate environmental issues ranging from local issues to those that are regional or global in scope.
- B. Sorting Out the Consequences of Issues: Learners are able to evaluate the consequences of specific environmental changes, conditions, and issues for human and ecological systems.
- C. Identifying and Evaluating Alternative Solutions and Courses of Action: Learners are able to identify and propose action strategies that are likely to be effective in particular situations and for particular purposes.
- D. Working with Flexibility, Creativity, and Openness: While environmental issues investigations can bring to the surface deeply held views, learners are able to engage each other in peer review conducted in the spirit of open inquiry.

Strand 3.2: Decision-Making and Citizenship Skills

- A. Forming and Evaluating Personal Views: Learners are able to communicate, evaluate, and justify their own views on environmental issues and alternative ways to address them.
- B. Evaluating the Need for Citizen Action: Learners are able to decide whether action is needed in particular situations and whether they should be involved.
- C. Planning and Taking Action: Learners know how to plan for action based on their research and analysis of an environmental issue. If appropriate, they take actions that are

within the scope of their rights and consistent with their abilities and responsibilities as citizens.

- D. Evaluating the Results of Actions: Learners are able to evaluate the effects of their own actions and actions taken by other individuals and groups, including possible intended and unintended consequences of actions.

Strand 4: Personal and Civic Responsibility

- A. Understanding Societal Values and Principles: Learners know how to analyze the influence of shared and conflicting societal values.
- B. Recognizing Citizens' Rights and Responsibilities: Learners understand the importance of exercising the rights and responsibilities of citizenship.
- C. Recognizing Efficacy: Learners possess a realistic self-confidence in their effectiveness as citizens.
- D. Accepting Personal Responsibility: Learners understand that their actions can have broad consequences and accept responsibility for recognizing those effects and changing their actions when necessary.