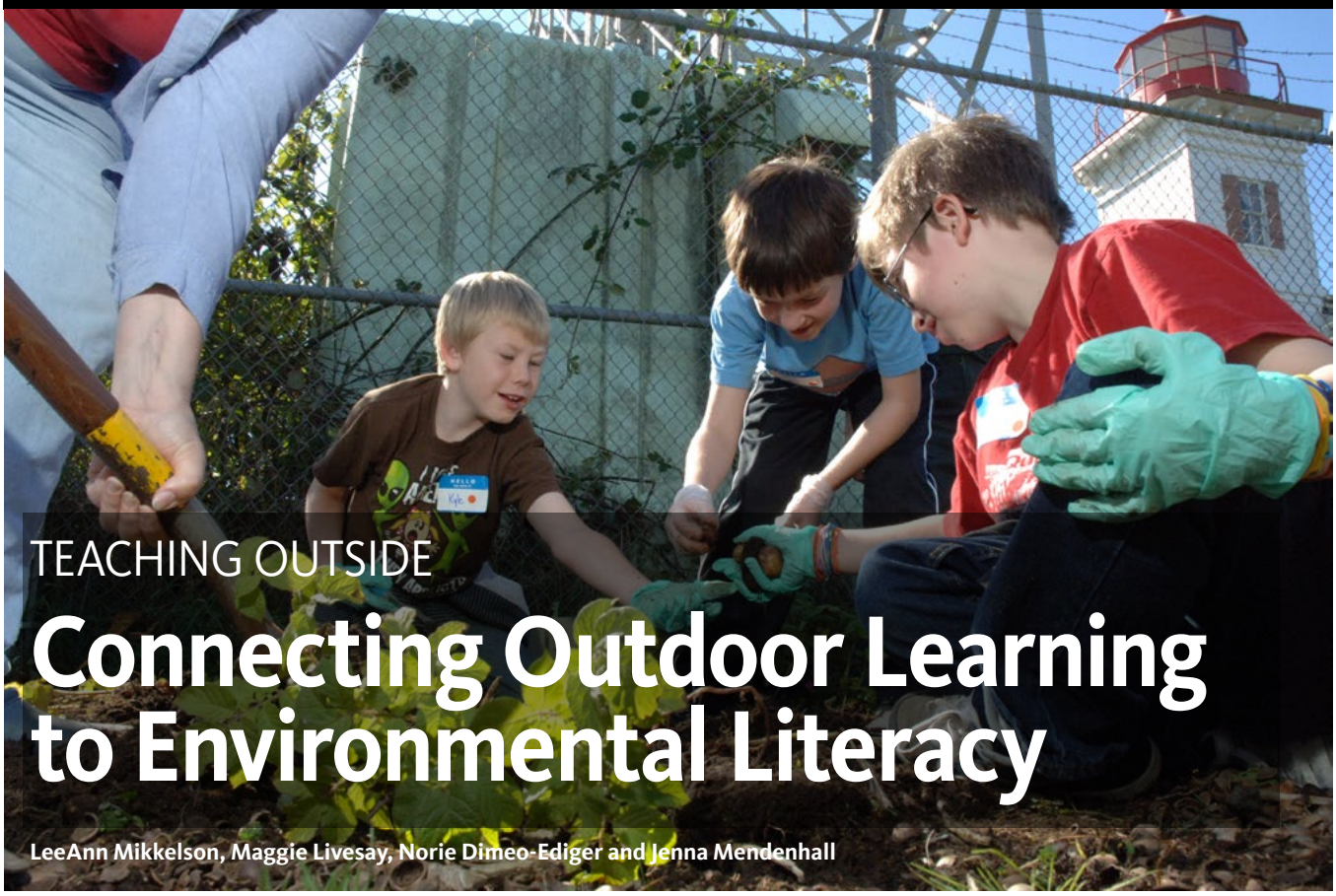
OREGON STATE UNIVERSITY EXTENSION SERVICE



TEACHING OUTSIDE

Connecting Outdoor Learning to Environmental Literacy

LeeAnn Mikkelson, Maggie Livesay, Norie Dimeo-Ediger and Jenna Mendenhall

Preparing Oregon's future generations to protect and sustain our state's natural resources is critical to Oregon's economic, environmental and social sustainability. Through outdoor learning, students have the opportunity to build the knowledge and skills needed to consider whole systems and develop a sense of place. Outdoor learning experiences can improve physical and mental health, behavior, academic performance and emotional well-being.

The Oregon Environmental Literacy Program believes environmental and outdoor education can empower students to be Oregonians who can discover and treasure the places that provide us countless recreation opportunities, drive our state's economy and shape our communities. Oregon State University Extension Service became the home of the Oregon environmental literacy program in 2014 to implement the Oregon Environmental Literacy Plan by creating thoughtful connections with the natural world through education and engagement of people. The state literacy program works closely with organizations, stakeholders and educators across the state to support formal educators in collaboration with nonformal educators to foster environmental literacy of kindergarten through 12th-grade students.

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This is done by engaging them in activities that:

- Increase their awareness, understanding and knowledge of the environment and their relationship to it.
- Allow participation as community members in the stewardship of the environment.
- Prepare them to participate in ensuring a sustainable future.
- Contribute to establishing healthy lifestyles.

The Oregon Environmental Literacy Program strives for a continuum of outdoor learning experiences throughout K-12 education. The goal of this publication is to encourage and support educators who use or want to use the outdoors as an integral part of the teaching and learning experience for their students. Find the components of this document in Table 1.1.

Table 1.1: Grade level band: There are four grade-level bands represented in this document. Each is given a separate color and identified separately. Each includes articles that directly relate to the benefits of outdoor experiences at this stage of development.

SPECIFIC GRADE LEVEL

Guiding question: These broad questions are designed to steer the student toward knowledge and skills while requiring some inferences and connections.

Illustrative outdoor activity: The activities listed are brief descriptions to show possibilities and examples that tie guiding questions, meaningful outdoor learning experiences and environmental literacy strands together while addressing standards.

Concept development: These are the main ideas that are easily linked to the guiding question.

Oregon Environmental Literacy Plan strands: A brief title to identify one or more stands easily addressed through the activity. This is not a full description or exhaustive list of all the strands.

Oregon Department of Education standards: The standards listed connect to the provided description. This is not an exhaustive list of all the connections that could be made and depends on the direction the educator takes the activity.

Language is an important tool in understanding an issue or topic. Word choice can change the meaning of a topic, and different communities have different ways of describing the environment. The following are definitions for a few terms in this document:

- **Natural resources:** Natural resources are resources that exist without any actions of humankind. They include all land, vegetation, animals, energy sources and minerals.
- **Environmental literacy:** An individual's understanding, skills and motivation to make responsible decisions that consider their relationship to natural systems, communities and future generations.
- **Environmental sustainability:** Responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality.

Oregon Environmental Literacy Plan Strands:

Strand 1: Systems thinking

Students study systems and issues holistically, striving to understand the relationships and interactions between each system's parts. They use the knowledge gained to assess the effects of human choices on economic, ecological and social systems, and to optimize outcomes for all three systems.

Strand 2: Physical, living and human systems

Students understand the characteristics of Earth's physical, living and human systems.

Strand 3: Interconnectedness of people and the environment

Students understand the interdependence of humans and the environment, and appreciate the interconnectedness of environment quality and human well-being.

Strand 4: Personal and civic responsibility

Students understand the rights, roles, responsibilities and actions associated with leading or participating in the creation of healthy environments and sustainable communities.

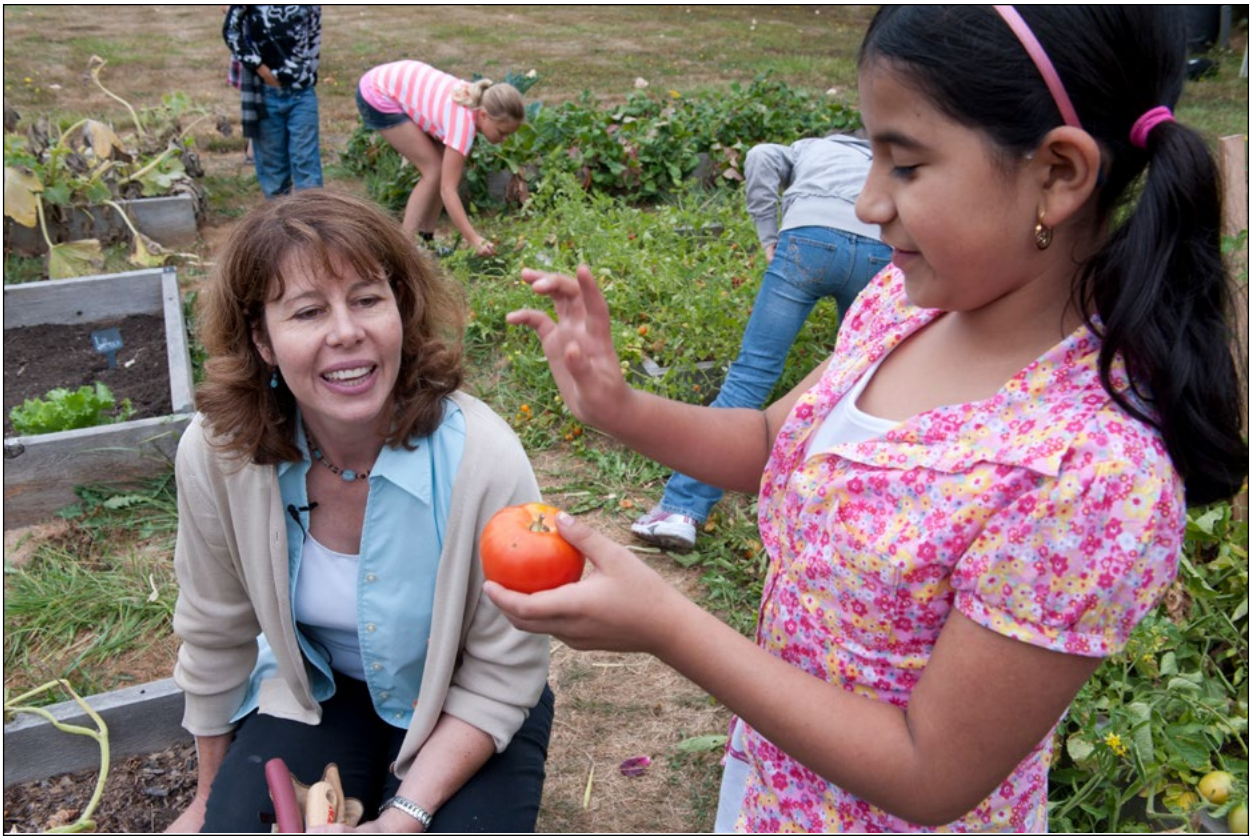
Strand 5: Investigate, plan and create a sustainable future

Students apply civic action skills that are essential to healthy, sustainable environments and communities.

Acknowledgments

This publication, *Teaching Outside: Connecting Outdoor Learning to Environmental Literacy*, of the Oregon Environmental Literacy Program is the result of the collaboration of many different partners and educators who believe environmental literacy in K-12 settings profoundly impacts students and communities throughout Oregon. The Oregon Environmental Literacy Program is grateful to the individuals and organizations that have contributed to the development of this document.

The following organizations provided resources to this project: Oregon Natural Resources Education Program, Environmental Education Association of Oregon and Oregon Forest Resources Institute.



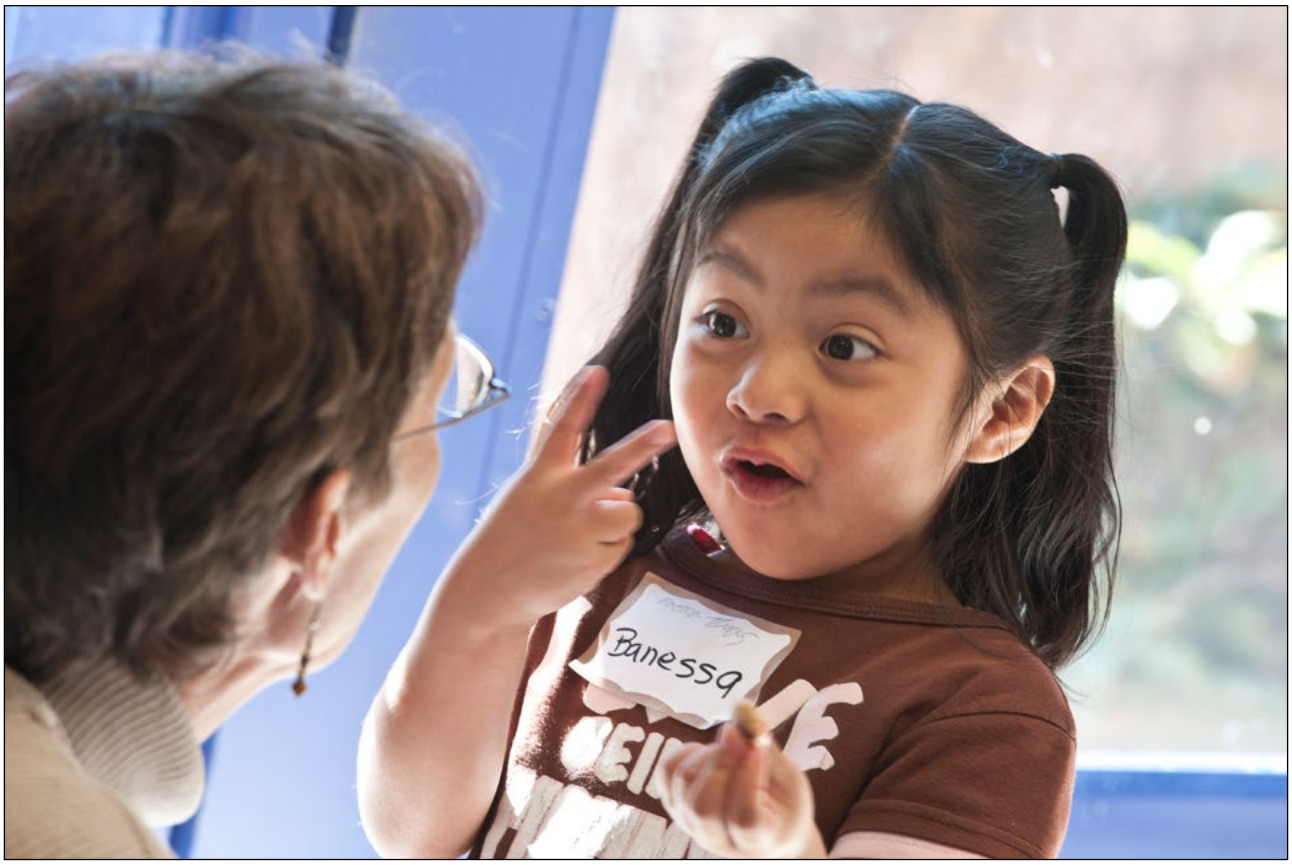
THE PRIMARY YEARS

Primary students are active explorers, and are naturally curious about their world. They learn best through direct discovery in hands-on experiences that engage the five senses. During the primary years, students develop the ability to approach the world logically, with an increasing capacity to use abstract reasoning. (From Oregon Forest Literacy Plan: A K-12 Conceptual Guide to Teaching and Learning about Oregon's Forests. Portland: Oregon Forest Resources Institute, 2016.)

Listed below are research articles that consider the question of why it is developmentally important to engage students in this grade level band in nature.

"The Importance of Outdoor Play for Young Children's Healthy Development," by Gabriela Bento and Gisela Dias. *Porto Biomedical Journal*, September 2017, Vol. 2, Issue 5. https://doi.org/10.1016/j.pbj.2017.03.003

Bilton, H. and Jane Waters. "Why Take Young Children Outside? A Critical Consideration of the Professed Aims for Outdoor Learning in the Early Years by Teachers from England and Wales." *The Social Sciences* 6 (2016): 1-16. https://www.semanticscholar.org/paper/Why-Take-Young-Children-Outside-A-Critical-of-the-Bilton-Waters/a4d3be9f8c57c60f581239bd8ce0dbc2c3d4258c



KINDERGARTEN

GUIDING QUESTION

- *How do plants and/or animals live in nature?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Using simple tools (for example, craft sticks, hand lenses and rulers), find plants or animals in the schoolyard and make observations — where they are found, their different parts and how many different kinds. Use these observations as a basis to discuss the needs of plants or animals and how they live where they are found.

CONCEPT DEVELOPMENT

Plants and animals have basic needs.

OREGON ENVIRONMENTAL LITERACY PLAN (OELP) STRANDS

Strand 2: Physical, living and human systems

STATE STANDARDS

NEXT GENERATION SCIENCE STANDARDS (NGSS):

Performance expectation: K–LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

GUIDING QUESTION

- *How do plants and animals live together in the same environment?*

ILLUSTRATIVE OUTDOOR ACTIVITY

While outside, observe and draw a picture of an insect or plant.

CONCEPT DEVELOPMENT

Plants and animals depend on the places they live to survive.

OELP STRANDS

Strand 1: Systems thinking

OREGON DEPARTMENT EDUCATION STANDARDS

NGSS:

Performance expectation: K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

GUIDING QUESTION

- *How do humans interact with nature?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Visit a natural setting and discuss the various ways humans have changed the environment. As the walk progresses, students count how many changes to the environment by humans that they can find (such as, broken or sawed limbs, trash, paths) and record the changes. Discuss positive and negative ways humans change and interact with nature.

CONCEPT DEVELOPMENT

Humans affect the land, water, air and other living things in the environment.

OELP STRANDS

Strand 3: Interconnectedness of people and the environment

STATE STANDARDS

NGSS:

Performance expectation: K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air or other living things in the local environment.

SOCIAL SCIENCES:

Historical thinking: K.18. Compare and contrast past and present events or practices.

FIRST GRADE

GUIDING QUESTION

- *How should we interact with the natural world?*

ILLUSTRATIVE OUTDOOR ACTIVITY

At the midpoint of an observation walk, ask students to discuss any issues they experienced or saw while walking outside (such as trash, dirty water or noise). Have small student teams or pairs identify one issue and come up with one rule they will follow to take action on the issue and guide their behavior during the remainder of their time outside.

CONCEPT DEVELOPMENT

Environmental awareness, responsible citizen, actions of civil engagement.

OELP STRANDS

Strand 4: Personal and civic responsibility

STATE STANDARDS

SOCIAL SCIENCES:

Civics and Government: 1.1 Describe the responsibilities of leaders and team members and demonstrate the ability to be both when working to accomplish a common task.

Social science analysis: 1.20 Identify and explain a range of issues and problems and some ways that people are addressing them.

Social science analysis: 1.21 Identify ways that students can take informed action to help address issues and problems.

GUIDING QUESTION

- *When the environment changes, what happens to the plants and animals (including humans)?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Find a disturbed outside area (for example, a path, construction site) and a well-established outdoor area (a lawn, flower bed or stand of trees for example). Count the different plants and animals found in a plot (designated by string, coat hanger squares, quadrats) within each area. Discuss the differences about what the students found and why. Students keep data in a journal and revisit each season.

CONCEPT DEVELOPMENT

Different plants and animals move in order to survive change in habitats.

OELP STRANDS

Strand 2: Physical, living and human system

Strand 3: Interconnectedness of people and the environment.

STATE STANDARDS

NGSS:

Performance expectation: 1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

SOCIAL SCIENCES:

Geography: 1.8 Explain how seasonal changes influence activities in school and community.

GUIDING QUESTION

- *What features of plants and animals allow them to survive and grow in their habitat?*

ILLUSTRATIVE OUTDOOR ACTIVITY

After discussing what a habitat is, map plants and animals in a small section of the schoolyard. Have each student choose a plant or animal. Students identify the organism's structures and the functions of those structures in the organism's habitat. Each student introduces their organism, giving the whole class an opportunity to compare and contrast the chosen organisms.

CONCEPT DEVELOPMENT

Organisms have adaptations that make them more likely to survive and grow in a habitat.

OELP STRANDS

Strand 2: Physical, living and human systems

STATE STANDARDS

NGSS:

Performance expectation: 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and animals use their external parts to help them survive, grow and meet their needs.

SECOND GRADE

GUIDING QUESTION

- *How are the plants and animals in two different habitats the same and different?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Students choose their favorite plant or animal in two different habitats. Using simple tools (for example, hand lens, ruler, colored pencils), they record details of each habitat and organism and answer the guiding question.

CONCEPT DEVELOPMENT

There are differences within the same kinds of living things. Different animals can live in different places.

OELP STRANDS

Strand 1: Systems thinking

Strand 2: Physical, living and human systems

STATE STANDARDS

NGSS:

Performance expectation: 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.

GUIDING QUESTION

- *How do you determine a healthy ecosystem?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Within a determined outside space, have small student teams do multiple, random plot studies using hula hoops, PVC grid squares, wire coat hangers, or yarn to mark the plot. Count all the plants and animals within the plot. Students compile all the data and discuss any patterns they noticed. Using evidence, have the students share their thoughts on the health of the ecosystem.

CONCEPT DEVELOPMENT

A diversity of plants and animals is important to the health of a functioning ecosystem.

OELP STRANDS

Strand 1: Systems thinking

Strand 2: Physical, living and human systems

STATE STANDARDS

NGSS:

Performance expectation: 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.

GUIDING QUESTION

- *How do plants depend on animals for pollination?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Find a setting with many blooms and identify and observe pollinators. Out of found materials, construct a simple model that demonstrates how an animal pollinates plants. Determining how the flowering plants came to be in the landscape could provide an opportunity to connect human interaction to the environment.

CONCEPT DEVELOPMENT

Plants and animals depend on each other.

OELP STRANDS

Strand 2: Physical, living and human systems

STATE STANDARDS

NGSS:

Performance expectation: 2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

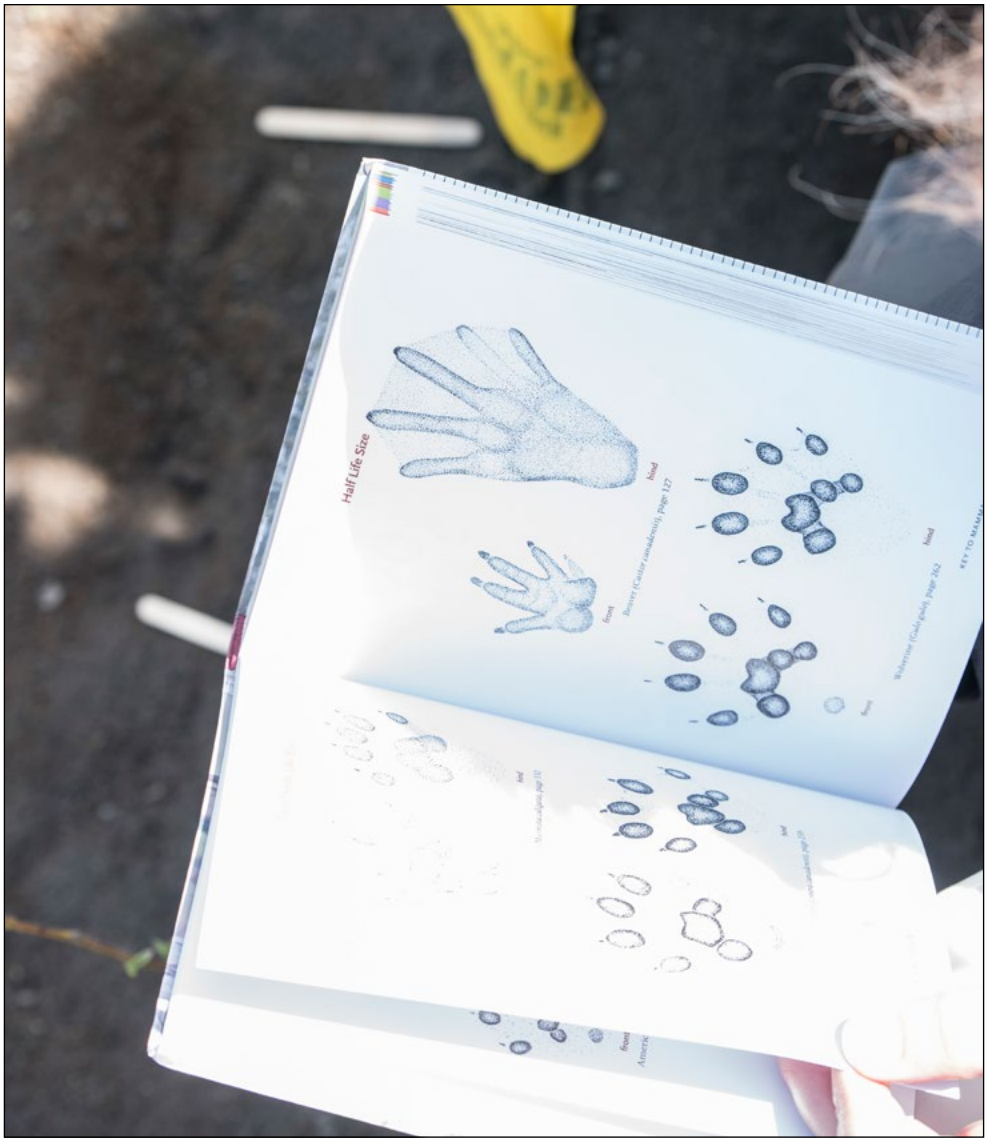
THE INTERMEDIATE YEARS

Students in the intermediate years are interested in the natural world, in how things are put together, and in how things work. This is a time when their intellectual capabilities expand greatly as they move from a focus on the here-and-now toward abstract thinking. Students this age work well in groups and enjoy doing collaborative projects. They enjoy problem-solving, sharing ideas and voicing opinions. They also want to be responsible members of the local community. (From *Oregon Forest Literacy Plan: A K-12 Conceptual Guide to Teaching and Learning about Oregon's Forests*. Portland: Oregon Forest Resources Institute, 2016.)

Listed below are research articles that consider the question of why it is developmentally important to engage students in this grade-level band in nature.

"Six Ways Nature Helps Children Learn," by Ming Kuo, *Greater Good Magazine*. https://greatergood.berkeley.edu/article/item/six_ways_nature_helps_children_learn

"Do Lessons in Nature Boost Subsequent Classroom Engagement? Refueling Students in Flight," by Ming Kuo, Matthew H.E.M. Browning and Milbert L. Penner. *Frontiers in Psychology*, January 2018. https://www.frontiersin.org/articles/10.3389/fpsyg.2017.02253/full.



THIRD GRADE

GUIDING QUESTION

- *What can we do to reduce the impact of environmental changes on people, plants and animals?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Students research the importance of pollinators for humans, plants and animals. Locate an area to observe and record the insects. Students decide if the habitat is suitable for pollinators. Record ways the habitat could be changed to benefit pollinators. Students plan and plant a pollinator garden.

CONCEPT DEVELOPMENT

How and why are certain insects beneficial for pollination? Humans may help the environment through intentional management changes.

OELP STRANDS

Strand 5: Investigate, plan and create a sustainable future

STATE STANDARDS

NGSS:

Performance expectation: 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well and some cannot survive at all.

Performance expectation: 3-LS4-4. 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.

SOCIAL SCIENCES:

Social science analysis: 3.19 Analyze different ways that people, other living things and the environment might be affected by an event, issue or problem.

GUIDING QUESTION

- *How have people changed the landscape in Oregon?*

ILLUSTRATIVE OUTDOOR ACTIVITY

This activity is best to do after providing students with a background on the Indigenous people and pioneers of your local area. While outside, students draw the human-made structures they observe. Ask students to sketch and label the area they see in their field journal. Discuss what features might have been on the landscape before those structures were built.

CONCEPT DEVELOPMENT

Humans change the environment over time.

OELP STRANDS

Strand 3: Interconnectedness of people and the environment

STATE STANDARDS

NGSS:

Performance expectation: 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the type of plants and animals that live there may change.

SOCIAL SCIENCES:

Historical thinking: 3.13 Apply research skills and technologies to gather information about a region's past.

GUIDING QUESTION

- *How do changes affect a plant or animal's ability to survive?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Visit a pond or stream and make a claim about the overall water quality. Conduct a simple water quality investigation. Use a macroinvertebrate chart (https://data.environment.sa.gov.au/Content/Publications/macroinvertebrate_chart.pdf) to discover the types of insects and macroinvertebrates that live in the water. Review the water quality tolerance level for them. Compare and discuss potential human activities that could impact the type of insects and macroinvertebrates living in the water.

CONCEPT DEVELOPMENT

Human activities affect the environment many ways.

OELP STRANDS

Strand 1: Systems thinking

STATE STANDARDS

NGSS:

Performance expectation: 3-LS-3. Construct an argument with evidence that in a particular habitat some organisms can survive well. Some survive less well and some cannot survive at all.

Performance expectation: 3-LS-4. Make a claim about the merit of a solution to a problem caused when the environment changed and the types of plants and animals that live there might change.

SOCIAL SCIENCES:

Social science analysis: 3.19. Analyze different ways that people, other living things and the environment might be affected by an event, issue or problem.

FOURTH GRADE

GUIDING QUESTION

- *How and why do people use natural resources?*

ILLUSTRATIVE ACTIVITY

Students brainstorm what natural resources they use daily. Student teams visit the schoolyard and record all items they observe that are made from natural resources. Students formulate and share ideas for what alternate materials could be used.

CONCEPT DEVELOPMENT

Humans use natural resources. Natural resource use is reduced by conserving, limiting actions that consume resources, repurposing and recycling.

OELP STRANDS

Strand 4: Personal and civic responsibility

STATE STANDARDS

NGSS:

Performance expectation 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.

SOCIAL SCIENCES:

Multicultural studies: 4.3. Analyze how wealth and scarcity connect to personal, community, regional and world resources. (Economics)

Social science analysis: 4.23. Explain individual and cooperative approaches people have taken or could take in the future to address local, regional and global problems. Also, predict possible results of those actions.

GUIDING QUESTION

- *How do natural actions such as weathering and erosion (for example, wind, water and gravity) affect the Earth's surface?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Visit the schoolyard and look for signs of soil erosion or deposition. Student teams choose an area to observe. In their field journal they draw, measure and document with detailed observations the erosion or deposition. Each team shares their site evaluation with other students and explains their observations and ideas for causes of weathering. Students will generate and compare solutions to control or reduce erosion at each site.

CONCEPT DEVELOPMENT

Natural earth actions from water, ice, rain, wind and vegetation cause rock, soil, sand, etc. to erode or deposit. Erosion can take a long time or happen very rapidly, depending on many factors.

OREGON ENVIRONMENTAL LITERACY PROGRAM STRANDS

Strand 2: Physical, living and human systems

Oregon Department Education standards:

NGSS:

Performance expectation: 4-ESS2-1. Make observations or measurements to provide evidence of the effects of weathering on the rate of erosion by water, ice, wind or vegetation.

NGSS:

Performance expectation: 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

GUIDING QUESTION

- *In what ways can people use resources sustainably?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Perform an investigation of the school garden compost. Examine the variety of organic and inorganic materials in the compost. Record and identify the number of living organisms in the compost. Brainstorm and record how these organisms break down organic materials.

CONCEPT DEVELOPMENT

Organic and inorganic waste breaks down at different rates. Organisms (for example, fungi, microorganisms and insects) have different physical structures that play different roles in the process of decomposition.

OELP STRANDS

Strand 2: Physical, living and human systems

STATE STANDARDS:

NGSS:

Performance expectation: 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction.

SOCIAL SCIENCES:

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.).

FIFTH GRADE

GUIDING QUESTION

- *What are the factors (human and nonhuman) that affect an ecosystem and its inhabitants?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Visit a nearby stream or pond and observe and record the biotic and abiotic features. Discuss the results and brainstorm evidence of visible and potential factors that might affect this ecosystem. What actions or technologies might improve the human caused impacts on this ecosystem?

CONCEPT DEVELOPMENT

Humans can disrupt ecological function leading to environmental issues.

OELP STRANDS

Strand 1: Systems thinking

STATE STANDARDS

NGSS:

Performance expectation: 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earths' resources and environments.

SOCIAL SCIENCES:

Geography: 5.13 .Describe how natural and human-made events in one place affect people in other places.

Social Science Analysis: 5.28. Propose a response or solution to an issue or problem, utilizing research, to support the position.

GUIDING QUESTION

- *How have human activities affected the ecosystem and the natural cycles of the land and its organisms?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Student teams list the organisms in the schoolyard that need water to survive. Give students a scenario in which the school district must turn off the water to the school grounds because it is too expensive.

CONCEPT DEVELOPMENT

Humans impact an ecosystem, both through their actions and their inaction.

OELP STRANDS

Strand 1: Systems thinking

Strand 3: Interconnectedness of people and the environment

STATE STANDARDS

NGSS:

Performance expectation: 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.

SOCIAL SCIENCES:

Geography: 5.13. Describe how natural and human-made events in one place affect people in other places.

Social science analysis: 5.28. Propose a response or solution to an issue or problem, utilizing research, to support the position.

GUIDING QUESTION

- *What human solutions can be used to address environmental impacts?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Each students group tests a location in the schoolyard for soil properties, compaction and absorption rates. Create a table illustrating the soil permeability, plant abundance and animal and human activity. Discuss the relationship between human/animal activity in these areas and the results of the soil investigation.

CONCEPT DEVELOPMENT

Soil properties can be impacted by human/animal activities.

OELP STRANDS

Strand 3: Interconnectedness of people and the environment

STATE STANDARDS

NGSS:

Performance expectation: 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environments.

SOCIAL SCIENCES:

Geography: 5.13. Describe how natural and human-made events in one place affect people in other places.

Social science analysis: 5.28. Propose a response or solution to an issue or problem, utilizing research, to support the position.

THE MIDDLE SCHOOL YEARS

Middle school students are gaining a deeper sense of themselves as members of communities – both human communities and natural communities. They are becoming aware of how people's actions impact others, and friends and relationships consume a lot of their thought and energy. Students this age understand that problems have multiple solutions, and are able to see different perspectives on an issue. They should also be able to back up personal opinions with evidence and to distinguish between opinion and fact. (From *Oregon Forest Literacy Plan: A K-12 Conceptual Guide to Teaching and Learning about Oregon's Forests*. Portland: Oregon Forest Resources Institute, 2016.)

Listed below are research articles that consider the question of why it is developmentally important to engage students in this grade-level band in nature.

"Environmental service learning: outcomes of innovative pedagogy in Baja California Sur, Mexico, " by Andrew Jon Schneller. *Environmental Education Research*, Volume 14, Issue 3. https://www.tandfonline.com/doi/abs/10.1080/13504620802192418?journalCode=ceer20

"The Effects of an Environmental Education Program on Students, Parents, and Community," by Trudi L. Volk and Marie J. Cheak. *Journal of Environmental Education*, Vol. 34, No. 4, 2003. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.630.2619&rep=rep1&type=pdf

"Service Learning in the Middle Grades: Learning by Doing and Caring," by Katy Farber and Penny Bishop. Research in Middle Level Education, Volume 41, Issue 2. 2018. https://www.tandfonline.com/doi/full/10.1080/19404476.2017.1415600.

SIXTH GRADE

GUIDING QUESTION

- *How do environmental problems and issues affect society?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Restore a section of the schoolyard for a purpose. After assessing the designated area's attributes, students design (with community help) a plan to build the habitat for the designated purpose. Over time, data is gathered (for example, soil structure, plant growth and species) and presented to the community.

CONCEPT DEVELOPMENT

Nature can be found in any place, and humans have an impact on the health of the environment.

OELP STRANDS

Strand 5: Interconnectedness of People and the Environment

STATE STANDARDS

NGSS:

Performance expectation: MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

GUIDING QUESTION

- *How can humans affect their environment?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Students learn the difference between native and non-native and invasive plants. Divide the class in small groups to conduct surveys of two local areas: one on the school grounds and one where a planting or restoration work has or will be done. Students identify and inventory plants in both areas and compare and contrast the plants they have found. Given the data, the students will make claims, backed up with evidence, related to which location best supports native species.

CONCEPT DEVELOPMENT

Living things thrive in different areas.

OELP STRANDS

Strand 2: Physical, living and human systems

STATE STANDARDS

NGSS:

Performance expectation: MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Performance expectation: MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

SEVENTH GRADE

GUIDING QUESTION

- *How do environmental problems and issues affect society?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Students will study a local nature area through investigation, data collection and mapping. They will also research the local history by conducting interviews of at least three community members about the space. Some questions could include: how did they interact with the space, how has it been used, why was it established? Then students write a report about what they discover. Share findings with the community, the local parks and recreation department and other interested groups.

CONCEPT DEVELOPMENT

Environmental issues affect community members differently.

OELP STRANDS

Strand 4: Interconnectedness of People and the Environment

Strand 5: Investigate, Plan and Create a Sustainable Future

STATE STANDARDS

NGSS:

Performance expectation: MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, considering relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

SOCIAL SCIENCES:

Social science analysis: 7.28. Draw on multiple disciplinary lenses to analyze how a specific problem can manifest itself at local, regional and global levels over time, identifying its characteristics and causes, and the challenges and opportunities faced by those trying to address the problem.

GUIDING QUESTION

- *How do environmental changes affect biodiversity?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Students will observe a plot of land to collect data on noninvasive and invasive plants and animals, and plot the data to show the diversity of the plot. Using the data collected, students will analyze the plot to draw conclusions about what affected the plot and possible improvements or changes.

CONCEPT DEVELOPMENT

Many factors can influence the biodiversity within an ecosystem.

OELP STRANDS

Strand 1: Systems thinking

Strand 2: Physical, living and human systems

STATE STANDARDS

NGSS:

Performance expectation: MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, considering relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

SOCIAL SCIENCES:

Social Studies Analysis: 7.28. Draw on multiple disciplinary lenses to analyze how a specific problem can manifest itself at local, regional and global levels over time, identifying its characteristics and causes and the challenges and opportunities faced by those trying to address the problem.

EIGHTH GRADE

GUIDING QUESTION

- *How can people support biodiversity and ecosystems?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Students interview local community members in the environmental field to learn about their jobs. If possible and with proper permissions, conduct video interviews. Students will edit videos to include in their written report and community presentations. This could be set up like a job fair.

CONCEPT DEVELOPMENT

There are many careers that support the environment.

OELP STRANDS

Strand 4: Interconnectedness of People and the Environment

STATE STANDARDS

SOCIAL SCIENCES:

Multicultural studies: 8.25. Evaluate the influence of the intersections of identity, including but not limited to, gender, age, race, ethnicity, religion and class on the experiences of peoples, groups and events.

GUIDING QUESTION

- *How have technology, societal decisions and personal practices influenced sustainability?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Conduct a transportation audit at your school. Record the number of cars, buses (students in them), bikers and walkers for two different days. Graph the results, including a calculation of the average mileage or fuel use for cars and buses per day. Record estimated fuel used and the monetary cost per day. Discuss and show evidence that technology and personal decisions influence sustainability. Launch a community carpool-, bike- or walk-to-school week.

CONCEPT DEVELOPMENT

Personal choices of humans affect the environment.

OELP STRANDS

Strand 3: Interconnectedness of people and the environment

Strand 4: Personal and civic responsibility

Strand 5: Investigate, plan and create a sustainable future

STATE STANDARDS

NGSS:

Performance expectation: MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Performance expectation: MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

SOCIAL SCIENCES:

Social science analysis: 8.33. Analyze how a specific problem can manifest itself at local, regional and global levels over time, identifying its characteristics and causes, and the challenges and opportunities faced by those trying to address the problem.

Social science analysis: 8.34. Analyze and apply a range of deliberative and collaborative procedures to make decisions and take informed action.

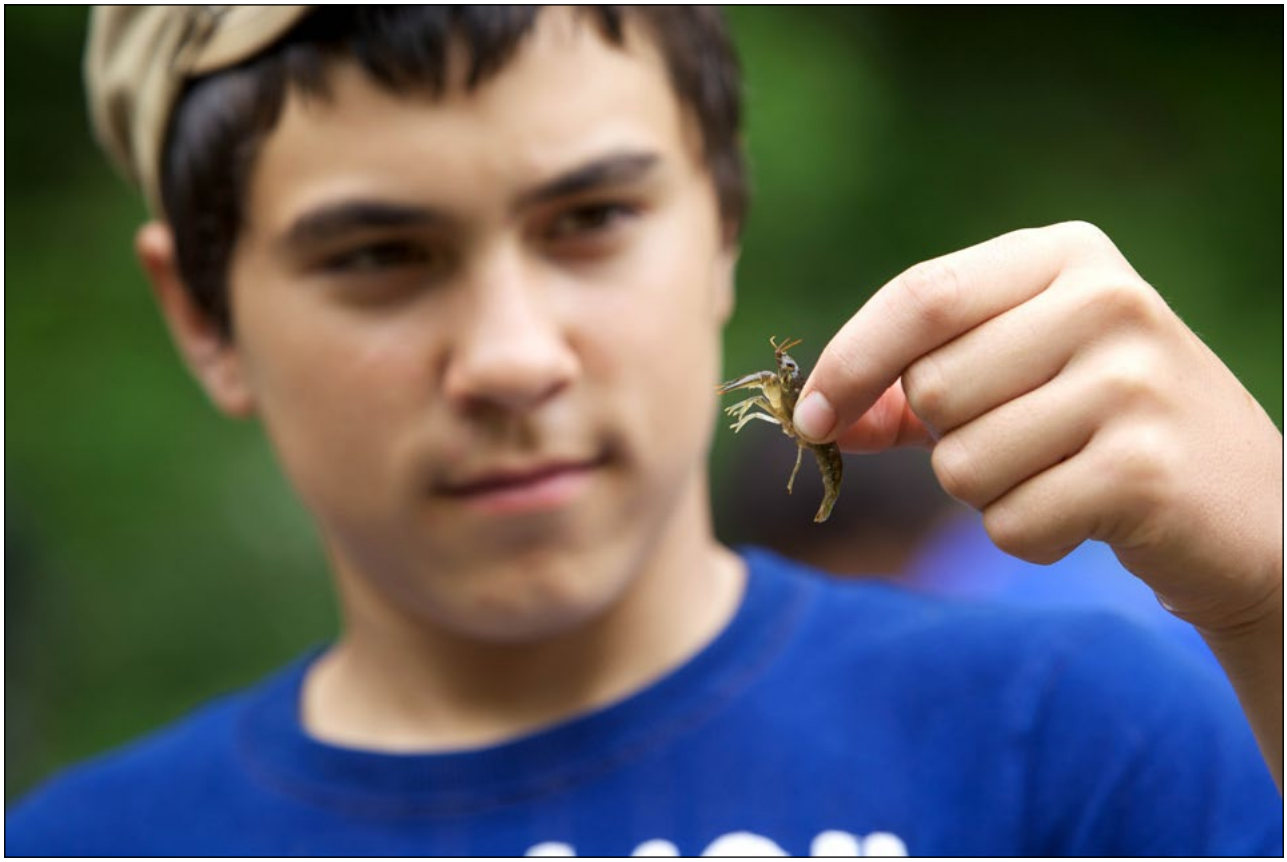
THE HIGH SCHOOL YEARS

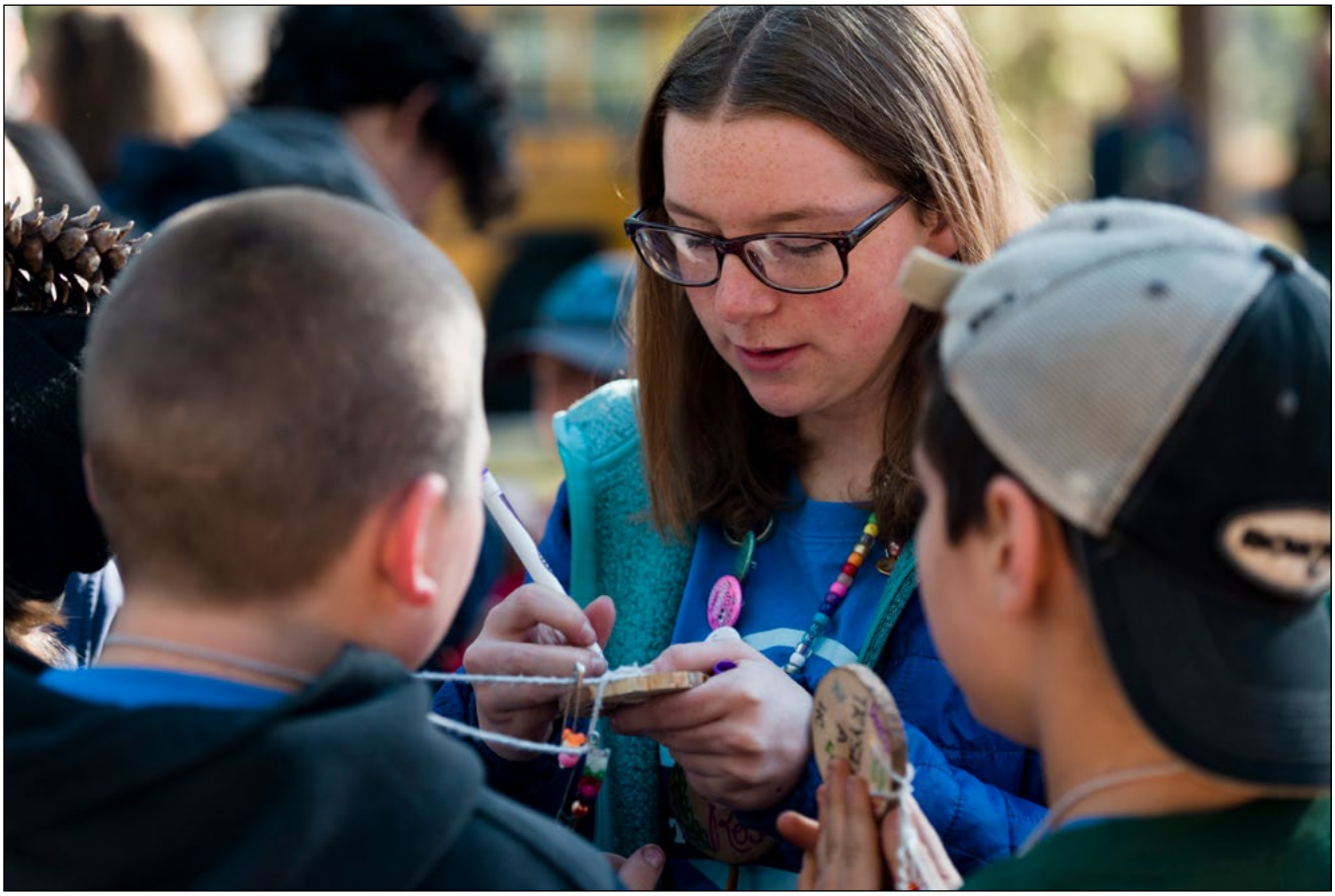
High school students are able to use sophisticated reasoning with difficult concepts, particularly when the learning context is familiar to them. Using forests as a context for learning is beneficial for students this age, as it provides them with a "real world" basis for applying new knowledge. Many high school students still have difficulty proposing explanations based on logic and evidence instead of on their prior conceptions of the natural world. Providing many opportunities to collect evidence and develop explanations based on that evidence can help them develop this skill. (From *Oregon Forest Literacy Plan: A K-12 Conceptual Guide to Teaching and Learning about Oregon's Forests*. Portland: Oregon Forest Resources Institute, 2016.

Listed below are research articles that consider the question of why it is developmentally important to engage students in this grade-level band in nature.

"The Impact of Participation in Service Learning on High School Students' Civic Engagement," by Shelley Billig, Sue Root and Dan Jesse. Center for Information & Research on Civic Learning & Engagement, Working Paper 33 https://files.eric.ed.gov/fulltext/ED495215.pdf

"Teaching and Learning in Nature," U.S. Fish and Wildlife Service, https://www.fws.gov/northeast/cpwn/pdf/educatornature.pdf.





GUIDING QUESTION

- *What role do we play in climate change?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Discover the process of the carbon cycle and how heat is stored in and around the Earth. This may include inquiry projects to demonstrate the phenomena of the greenhouse effect. Research topics could include looking at the increase in atmospheric carbon dioxide and the process, causes and effects of ocean acidification on climate change. These inquiry projects then could be presented and shared at a town hall meeting, community event or science night.

CONCEPT DEVELOPMENT

Change in one biological cycle impacts Earth's systems.

OELP STRANDS

Strand 2: Physical, living and human systems

Strand 3: Interconnectedness of people and the environment

Strand 4: Personal and civic responsibility

STATE STANDARDS

NGSS:

Performance expectation: HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards and changes in climate have influenced human activity.

Performance expectation: HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

Performance expectation: HS-ESS3-6. Use a computational representation to illustrate the relationship among Earth systems and how those relationships are being modified due to human activity.

SOCIAL SCIENCES:

Social science analysis: HS.74. Analyze an event, issue, problem or phenomenon, identifying characteristics, influences, causes and both short- and long-term effects.

Social science analysis: HS.76. Propose, compare and judge multiple responses, alternatives or solutions to issues or problems. Then reach an informed, defensible and supported conclusion.

GUIDING QUESTION

- *What is the value of biodiversity?*

ILLUSTRATIVE OUTDOOR ACTIVITY1:

Engage in a service learning or stewardship project that promotes biodiversity. Have students identify two local habitats in need of restoration. Have them design and develop a restoration plan, implement the plan and share the results with the appropriate audience.

CONCEPT DEVELOPMENT

The health of an ecosystem is dependent on the diversity of life within it.

OELP STRANDS

Strand 1: Systems thinking

Strand 3: Interconnectedness of people and the environment

Strand 4: Personal and civic responsibility

STATE STANDARDS

NGSS:

Performance expectation: HS-LS2-7. Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Performance expectation: HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

SOCIAL SCIENCES:

Social science analysis: HS.74. Analyze an event, issue, problem or phenomenon, identifying characteristics, influences, causes and both short- and long-term effects.

Social science analysis: HS.76. Propose, compare and judge multiple responses, alternatives or solutions to issues or problems; then reach an informed, defensible and supported conclusion.

GUIDING QUESTION

- *What influences how we use natural resources and what are the impacts of that use?*

ILLUSTRATIVE OUTDOOR ACTIVITY

Conduct a water audit of your school both inside and outside (sprinklers, garden, classroom sinks). Analyze data collected and determine a desired course of action (if needed). Design an action plan and communicate the results at a school assembly.

CONCEPT DEVELOPMENT

Choices humans make impact the natural world.

OELP STRANDS

Strand 1: Systems thinking

Strand 2: Physical, living and human systems

Strand 3: Interconnectedness of people and the environment

Strand 4: Personal and civic responsibility

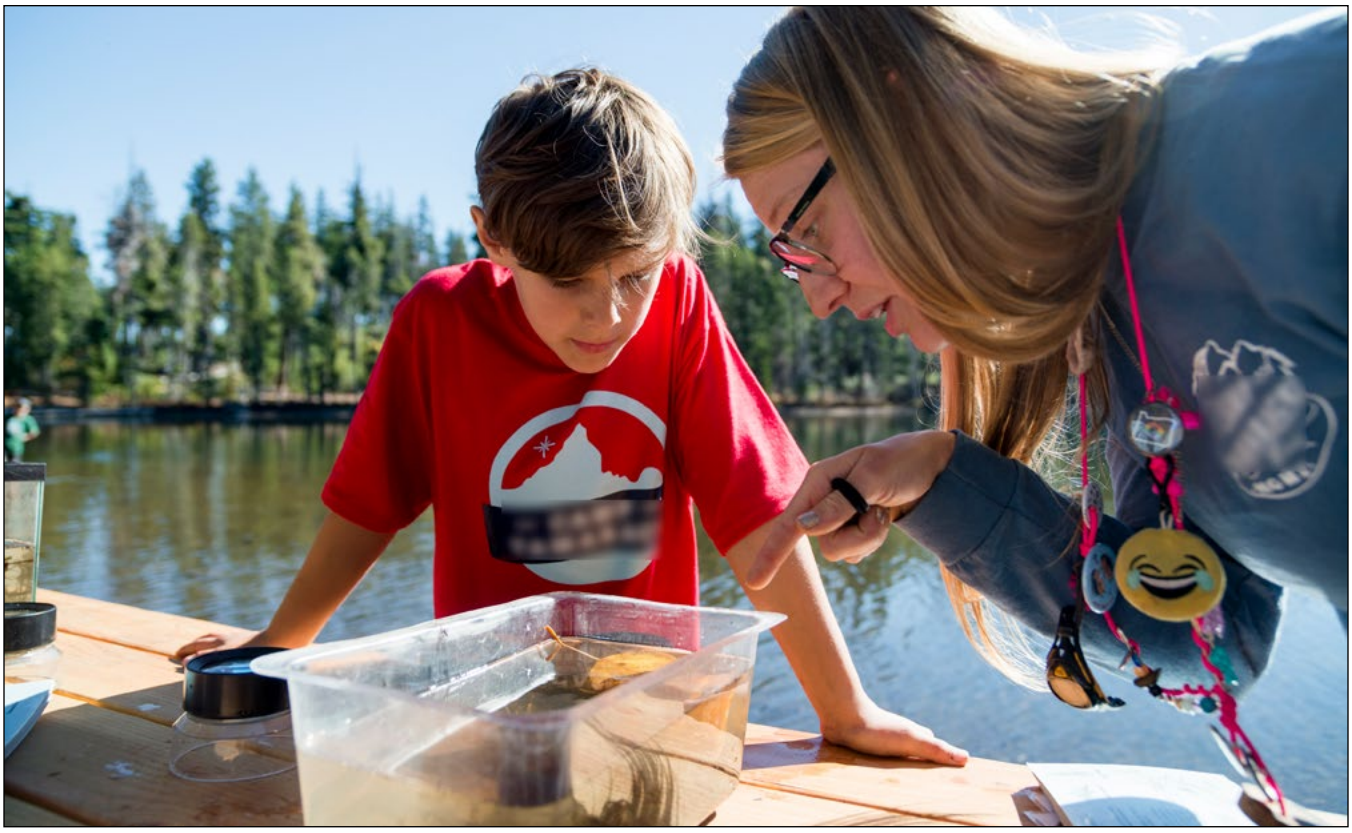
STATE STANDARDS

NGSS:

Performance expectation: HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards and changes in climate have influenced human activity.

SOCIAL SCIENCES:

Social science analysis: HS.77. Engage in informed and respectful deliberation and discussion of issues, events and ideas applying a range of strategies and procedures to make decisions and take informed action.



Tips for effective outdoor student learning experiences

Teaching outside takes planning and implementing, similar to indoor teaching, and many techniques and lessons can cross over. The more you take students outside and get to know your available sites, the richer the outdoor experiences will become. Below are a few tips to help support your endeavors.

Preparing to take students outside

1. Start with short outdoor learning experiences in the schoolyard and build on the experiences and learning for you and your students. Ideas: Consider a tree study, insect observations, set up a rain gauge, go on a scavenger hunt looking for signs of wildlife, etc.
2. Visit a park or local natural area within walking distance: Scope out your route and do a safety check. Ideas: Set up a scavenger hunt along your walking route, look for items that start with "S", count the number of plants with flowers, "I spy" clues for wildlife, start a bird list, etc.
3. Plan a bus trip to a natural area to explore various habitat types such as a wetland or forest. Before your field trip, visit the location and do a safety check. Ideas: Gather data to compare habitat types, a water-quality investigation, a service project such as planting native species or removing invasive ones.
4. Don't forget to recruit chaperones to help oversee and engage with students!

Before you go out

1. Explain to students what to expect and share details of the outdoor experience they will have when they are in the out-of-doors classroom.
2. Explain and practice the activity (use of tools, protocols, how to journal, etc.) in the classroom before going outside. Identify new vocabulary/ terminology.
3. Brainstorm and establish the outdoor classroom "rules," such as the buddy system, gathering and freeze signals. Have students all agree with the rules.
4. Communicate a clear set of physical boundaries for the outdoor experience.
5. Decide on groupings and assign tasks. Make sure all students have a job, equipment and the materials needed.
6. Have students create a personalized field journal using a composition book. A clipboard with pencil and data sheet attached also work well outdoors.

7. Brainstorm good choices for dressing for the outdoors (closed toed shoes, rain gear, hat, etc.). Consider extra "turtle wear" — large garbage bags to keep students dry.
8. Bring a first aid kit if you travel away from the school.

Out in the schoolyard or on the field trip

1. Safety first. Review gathering and freeze signals and point out the activity boundaries, especially any potential hazards (water, poison oak).
2. Design the experience to be hands-on, involving each member of the student team with a specific task to complete (a job for everyone).
3. Oversee the tasks from a central point or "hub" and keep visual contact!
4. Teach and model respect for the environment and encourage others to do the same. Leave only footprints, respect for living things and stay on the trail, for example.
5. Provide prompts for observational recordings. Start with date, time, location and weather.
6. Enjoy the experience and take advantage of many teachable moments.
7. Before you leave the site, take five to 10 minutes so students can write, draw or quietly reflect on the outdoor experience.

Back in the classroom

1. Debrief the outdoor experience with students, providing opportunities for reflection to help students synthesize learning from outdoors.
2. Reflection questions may include:
   - ❏ What worked well?
   - ❏ What did you enjoy?
   - ❏ What was hard or challenging?
   - ❏ When we go back, what do you want to explore?
   - ❏ What could we change to make our outdoor learning session work better?
3. Make connections between outdoor learning and classroom work. Graph your data, use outdoor experiences as writing prompts, connect experiences to textbook content or create an art piece.
4. Provide opportunities for students to share their outdoor knowledge, attitudes and perspective with others.

Content adapted from a multitude of experienced teachers and outdoor educators.

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