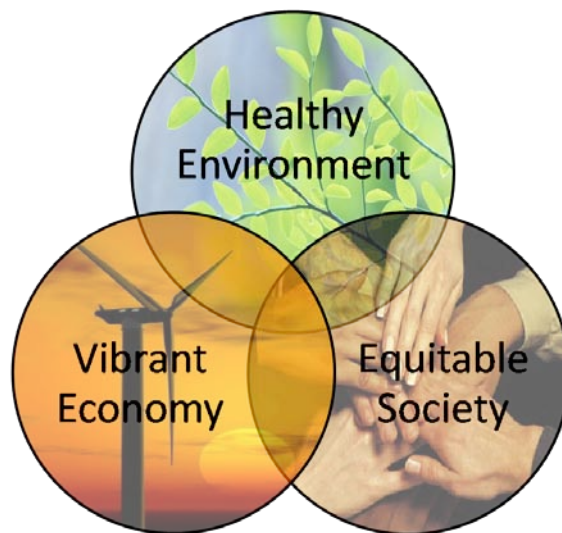


Stories from the Field: Examples of Integrated Environmental and Sustainability Education in Washington State

February 2010



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Introduction

In 2009 Washington’s Office of the Superintendent of Public Instruction (OSPI) adopted K-12 Integrated Environmental and Sustainability Education Learning Standards. To support the implementation of these standards, OSPI solicited examples from teachers across the state of what it looks like when students are engaged in integrated environmental and sustainability education. These “Stories from the Field” represent real lessons, units, extensions, projects, and programs across grade levels and in different subject areas.

The three Environmental and Sustainability Education Learning Standards exemplified in these stories are:

Standard 1: Ecological, Social, and Economic Systems

Students develop knowledge of the interconnections and interdependency of ecological, social, and economic systems. They demonstrate understanding of how the health of these systems determines the sustainability of natural and human communities at local, regional, national, and global levels.

Standard 2: The Natural and Built Environment

Students engage in inquiry and systems thinking and use information gained through learning experiences in, about, and for the environment to understand the structure, components, and processes of natural and human-built environments.

Standard 3: Sustainability and Civic Responsibility

Students develop and apply the knowledge, perspective, vision, skills, and habits of mind necessary to make personal and collective decisions and take actions that promote sustainability.



The complete Washington State K-12 Integrated Environmental and Sustainability Learning Standards (2009), including context and background for each standard and an alignment with science and social studies standards, can be found at:

<http://www.k12.wa.us/curriculumInstruct/EnvironmentSustainability/pubdocs/ESEStandardsFINAL.pdf>.

Washington State educators are encouraged to submit their own stories describing how Environmental and Sustainability Education is used as an integrating context in classrooms and schools. A template is provided for this at the end of the document.

Please note that these stories are not meant to paint a comprehensive picture of environmental and sustainability education, rather they should be viewed as examples of what teachers and their students are doing, consistent with the standards. Although OSPI has reviewed these stories, their inclusion in this document should not be considered an endorsement or promotion by OSPI.

Elementary Stories from the Field

Grade Level: K-1

Scope: Science Extension for both plants unit and/or animal habitats.

Subject Area(s):

- Science

Goals: Students create a habitat

Content Integration:

- Science – identifying plant parts and identifying the characteristics of a habitat for birds.
- Writing – (labeling)
- Art – drawing gourds on trees

ESE Standard(s):1

Core Content Standards Met:

Science K-1 LS1B Plant and Animal Parts; K-1 LS2B Habitats

Key Words:

plant parts, bird habitats

Gourd Birdhouse Project

Kindergarteners from the Issaquah School District planted birdhouse gourd seeds as part of their plants unit. After watching and recording the growth of the gourds, they were harvested. Students drew and labeled the plant parts of the gourd. Once the gourds were dried, they were cleaned and drilled. Students then identified an appropriate habitat to hang the birdhouses on the school grounds. Students then were able to look for signs of birds inhabiting the gourd birdhouses over time.

Resource link:

Assessment:

The standards assessments are in the students' journal drawing of the growth of the gourds (understanding that most plants get water from soil through their roots, and gather light through their leaves). Students' labeling of the gourd parts are also assessed for understanding of roots, stems, leaves and fruit.

Contact: Gabrielle Herring, herring@issaquah.wednet.edu



Grade Level: 2-3

Context/Scope: Unit/Science
Module Extension

Subject Area(s):

- Science
- Art
- Communication
- Writing/Reading (informational text)

Goals: Students learn about sustainable practices for maintaining healthy soil and apply their learning to improving soil by worm composting.

Content Integration:

- Science (Based on FOSS kit on soils)
– Inquiry, Systems and application of life science
- Writing – (journals and informational posters, handouts)
- Art – group posters, book marks, tri-fold handouts
- Communication – teaching members of the community

ESE Standard(s): 1, 3

Core Content Standards Met:

Key Words:

sustainability, compost, worm bins, soil

Soils Sustainability Project

Second graders at Cle Elum Elementary School made a difference in the sustainability of local soils. They taught community members how to build worm bins, grew worms, and used worms for composting. After students investigated soils in a science unit and examined ways to improve and sustain healthy soils they wanted to “do more” to change one element in their local environment to create a healthier way of living. At their Student Learning Celebration, they educated adults about ways to rebuild healthy soils.

Resource link: www.Cleelum/RoslynSD.org

Assessment:

The standards assessments are in daily work with journaling, science assessments that accompany FOSS kit on soils.

For the sustainability assessment students will teach adults and evaluate their success based on what these adults indicate they have learned about composting and caring for soils. The classroom goal was to teach one adult per three students (90 students in all).

Contact: Kayleen Pritchard, kayleenp99@gmail.com

Grade Level: 3-4

Context/Scope: Unit/lessons/ Field Study

Subject Area:

- Science
- FOSS Water

Goal: To connect school age children to the natural environment in their own backyard

Content Integration:

- Science
- Reading
- Art
- Social Studies

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: estuary, shorebird, sustainable, flight path, species, migratory birds, wetlands

Sustaining the Estuary

Hoquiam elementary students study the local estuary and the sustainability of the site for migrating shorebirds. Classroom education is provided in cooperation with the National Wildlife Federation and the classroom teacher. Students are given an overview of what an estuary is, where estuaries are located globally, migratory birds, sustainability of the local estuary, and culminating with a field study to the local estuary to study plants and the birds.

Resource Links:

Flying Wild – www.flyingwild.org

Project Learning Tree – www.plt.org

Grays Harbor Audubon Society –

Grays Harbor National Wildlife Refuge – www.fws.gov/graysharbor

Peterson's Birds of North America –

www.houghtonmifflinbooks.com/peterson

Assessment: Classroom activities

1. What is an Estuary?
2. Food Web
3. Build a Shorebird
4. Shorebird Poster (art)
5. Field Study at Estuary

Contact: Alice Boerner, aboerner@hoquiam.k12.wa.us



Grade Level: 4-5

Context/Scope: Extension of Washington Forest Unit

Subject Area:

- Science
- Art

Goal: To observe and record physical characteristics of twigs in winter and share those observations with younger students. To collect data on time of bud burst and submit that data to a national data bank.

Content Integration:

- Washington Forests
- Science inquiry
- Writing for a purpose
- Drawing
- Communication

ESE Standard(s): 1, 2

Core content Standards met:

Science 4-5 INQA, INQB, INQD, LS1A, LS1B, LS2F

Key Words:

observation, bud burst, inquiry, plant identification

Bursting Buds

Fourth grade students at Sunny Hills Elementary in Issaquah School District chose a shrub to “adopt” and identified what type of plant it was. Next students observed twigs on their shrubs in late winter and drew and labeled the parts. Students observed their shrub over time and measured growth between bud scale scars that indicate yearly growth. (Project Learning Tree Lesson #65 Bursting Buds). Then the fourth grade students taught 2nd graders about their plant. Finally, students observed their shrub daily in early spring and recorded when their plant’s buds first burst into leaf or flower. Bud burst data collected by students on all the various plants in the garden was submitted to www.budburst.org. Further, students discussed the importance of the national data bank to obtain data on global climate change.

Resource Links:

Field Investigation Guide: pages 51-57-

<http://www.pacificeducationinstitute.org/resources/pdf/Field%20Investigation%20Guide%20updated%20April%202009.pdf>

Article: http://www.plt.org/cms/pages/36_124_215.html

National Budburst- www.budburst.org

National Project Learning Tree www.plt.org

Assessment:

Accurate recording of physical characteristics of twigs. Accurate recording of bud bursting time.

Contact: Jane Ulrich, Sunny Hills Elementary,
ulrichj@issaquah.wednet.edu



Grade Level: 5-6

Context/Scope: School Wide Green Team or intermediate classroom

Subject Area:

- Science
- Social Studies
- Language Arts

Goal: Given an opportunity to observe and analyze lunch room waste students will be able to make recommendations for changes to promote sustainable lunchroom practices.

Content Integration:

- Economics
- Stewardship
- Communication
- Data Analysis

ESE Standard(s): 1, 2, 3

Core Content Standards Met

- Economics 2.1
- Science SYSA-D, INQA
- Social Studies 5.2.1

Key Words: recycling, solid waste, sustainable lunchroom

Reusable Tray Washing Program

Fifty 5th grade students at Thoreau Elementary School in Kirkland investigated the effects of using polystyrene trays in a limited recycling lunch room. They began by saving all lunch waste for a day, which was organized onto a tarp. After analyzing the data they advocated to the district food services for a comprehensive composting and reusable tray program where the students volunteer to wash trays. The program is now in its fifth successful year saving \$2,000 each year in reduction of the school's solid waste bill.

Resource Links: King County Green Schools Programs
<http://your.kingcounty.gov/solidwaste/greenschools/index.asp>

Life of litter chart provided by request.

Assessment: Pre & post inventory of solid waste building costs. Pre & post student solid waste questionnaire

Contact: Marie Hartford, mhartford@lwsd.org



Grade Level: 4

Context/Scope: Unit/Science
Classroom Module Extension

Subject Area:

- Science
- Math
- Reading/Writing
- Communications

Goals:

- Compare model ecosystems made in the classroom to real outdoor ecosystems
- Examine how everyday actions affect local environments
- Practice implementing a fair test field investigation

Content Integration:

- Science (Extends STC Ecosystems Unit): Systems, Inquiry, Application, Life Science
- Math: Data collection and interpretation, median
- Reading/Writing: reading and comprehension of scientific information/vocabulary, completing field notebooks, expository science writing
- Communications: cooperative learning, team work, communicating ideas to others

ESE Standard(s): 1, 2, 3

Core Content Standard(s):

- Science EALR 1- SYS (A-D), EALR 2- INQ (A-I), EALR 3- APPD, EALR 4-LS2 (A-F)
- Social Studies EALR 3-3.2
- Math 4.4 E, F, H, I, J
- Communications EALR 1-1.1, 1.2, EALR 2-2.1, 2.2, 2.3
- Reading EALR 1-1.2, 1.3, 1.4, EALR 3-3.2
- Writing EALR 2 – 2.2.1

Key Words: field investigation, ecosystems, fair test, data collection, invertebrates, dependence, interdependence, human impacts

Ecosystems Field Investigation (Extension of the Ecosystems Science Unit)

With the support and assistance of Homewaters Project, teachers and students at Seattle's Van Asselt Elementary conducted a field investigation within walking distance of school to extend the learning from their STC Ecosystems Science Unit. They answered the questions: How do the school grounds compare to the model ecosystems that were made in the classroom? How do my everyday actions affect local environments? They did two different activities: Ground Invertebrate Investigation and Ecosystems Exploration Walk. In the Ground Invertebrate Investigation students conducted a comparative fair test to answer the question: Do more ground invertebrates live in the grass or in a sheltered location? Students collected data, then found the class median and wrote conclusions. In the Ecosystems Walk, students did a scavenger hunt focused on dependence and interdependence of organisms, conducted an organism study and examined positive and negative human impacts.

Resource Links:

<http://www.homewatersproject.org>

Assessment:

- Pre/Post Test
- Complete science notebooks and write scientific conclusions
- Final reflections of essential questions and experience

Contact:

Linda Versage, Homewaters Project, lversage@sccd.ctc.edu



Grade Level: 4

Context/Scope: Extension of Land and Water unit

Subject Area:

- Science
- Social Studies

Goal: To have students use the technological design process to restore and solve the problem of silt runoff and erosion in a streambed in the wetlands next to the school.

Content Integration:

- Science
- Social Studies

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Science 4-5 APPC, APPD, APPE, APPF

Key Words:

design process, technological design process, application, wetland, models, investigations

School Wetland Streambed Restoration

Students at Discovery Elementary in the Issaquah School District used the technological design process to restore a streambed on school wetland property that was damaged during the building of a public boardwalk. Students created plans to restore the streambed which included specific steps to follow and a visual diagram. They made models of their plans and then tested and retested their models for erosion and sedimentation. Plans were viewed by the City of Sammamish and Wetland Stewardship Committee. The plans were used to inform the actual restoration. Restoration was completed the following school year by a new group of fourth graders under the supervision of a wetland biologist.

Resource Links:

Discovery Wetland Streambed Restoration Blog Post:

<http://blog.mywonderfulworld.org/2009/03/ee-week-guest-blogger-series-wondrous-wetlands.html>

Another design process at Discovery Elementary:

<http://www.discovery.issaquah.wednet.edu/Outdoor%20Classrooms/Native%20Plant.htm>

Assessment:

Evaluation of students' plans and posters of plans

Contact: Tasha Kirby KirbyT@issaquah.wednet.edu



Grade Level: 4

Context/Scope: Unit/Science
Classroom Module Extension

Subject Area:

- Science
- Math
- Reading/Writing
- Communications

Goals:

- Become aware of the importance of water in daily life
- Consider behaviors to improve water quality and conserve water
- Examine how everyday actions affect local environments
- Practice implementing a fair test field investigation

Content Integration:

- Science (Extends FOSS Water Unit): Inquiry, Application, Earth Science
- Math: Data collection/interpretation, multiplying multiple numbers, rate, graphing
- Reading/Writing: reading and comprehension of scientific data and information/vocabulary, completing field notebooks, expository science writing
- Communications: cooperative learning, team work, communicating ideas to others

ESE Standard(s): 1, 2, 3

Core Content Standard(s):

- Science EALR 2-INQ (A-I), EALR 3-APP D, EALR 4-ES2 A
- Social Studies EALR 2-2.1, 2.4, EALR 3-3.2
- Math 4.1 A-F, 4.2 A, B, 4.4 D, 4.5 I
- Communications EALR 1-1.1, 1.2, EALR 2-2.1, 2.2, 2.3
- Reading EALR 1-1.2, 1.3, 1.4, EALR 3-3.2
- Writing EALR 2 – 2.2.1

Key Words: water conservation, watersheds, surface water, sustainability, water audits, percolation, field investigation

Water in Our Lives (Extension of the Water Science Unit)

Fourth grade students and their teachers in Shoreline School District, north of Seattle, received support and materials from Homewaters Project to do a real-world extension of their FOSS Water unit. In the FOSS unit, students learned about the properties of water. The Water In Our Lives extension helped students become aware of the water they use everyday and that falls to the ground. They considered what behaviors could reduce the amount of water they use so this limited resource is conserved and sustained. All activities took place in the building or on school grounds and included mathematical calculations and graphing.

Students went on a rainy day walk to learn about watersheds and surface water. They did a percolation-type field investigation to examine how water flows through earth materials. They measured their school's water use by conducting water audits. They examined their school's water bills. They shared their findings with others in the school community, including classmates, parents and administrators, and suggested ideas to reduce water use.

Resource Links:

<http://www.homewatersproject.org>

Assessment:

- Pre/Post Test
- Complete science notebooks and write scientific conclusions
- Graphs illustrating amount of water used by school
- Communication about findings with school community

Contact:

Linda Versage, Homewaters Project, versage@sccd.ctc.edu



Grade Level: 5-6

Context/Scope: School Wide Green Team or intermediate classroom

Subject Area:

- Science
- Social Studies
- Language Arts
- Civics

Goal: Given an opportunity to observe & analyze traffic patterns in an elementary school parking lot, students will be able to make recommendations for changes to promote no idling, carpooling and walking/biking sustainable commuting practices.

Content Integration:

Stewardship, Communication, Data Analysis

ESE Standard(s): 1, 2, 3

Core Content Standards Met

Science SYSA-D, INQA

Economics 2.1.1

Civics 1.4.1

Social Studies 5.2.1

Key Words: carpooling, walking clubs, no idling campaign

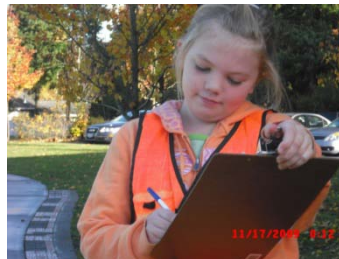
Student-led No Idling Campaign

Twenty five fifth & sixth grade students at Horace Mann Elementary School in Redmond investigated the effects of idling cars and other traffic issues in the school parking lot. They began by monitoring the traffic fifteen minutes before and after morning and afternoon school bells by recording the total number of cars coming through the lot, the amount of time it took cars to complete the circuit through the lot and the amount of time cars spent idling in the drop off/pick up zone. The results were powerful especially when the students prepared a power point presentation for the PTSA and staff of the school. A no idle zone was recommended and a student-parent-teacher plan for promoting walking clubs, bike days and carpools was proposed to reduce the number of cars coming through the lot by 20 percent.

Resource Links: <http://www.airwatchnorthwest.org/anti-idling.htm>

Assessment: Pre & post traffic monitoring data sheets (provided by request)

Contact: Marie Hartford, mhartford@lwsd.org



Grade Level: 5

Context/Scope: Unit/Science
Classroom Module Extension of
Microworlds Science unit

Subject Area:

- Science
- Reading/Writing
- Communications

Goals:

- Compare a real pond/lake to the hay infusion model made in the classroom.
- Learn how to collect water samples and study them for diversity of life.
- Explore how humans impact the health of a nearby ecosystem.

Content Integration:

- Science (Extends STC Microworlds Unit): Systems, Inquiry, Application, Life Science
- Reading/Writing: scientific information/vocabulary, field notebooks and data collection
- Communications: cooperative learning, team work, communicating ideas to others

ESE Standard(s): 1, 2, 3

Core Content Standard(s):

- **Science** EALR 1- SYS(A-D), EALR 2 - INQ (A, B, D, F) EALR 3 – APPD, EALR 4 – LS1 (A-D), LS2 (A-F)
- **Social Studies** EALR 3 – 3.2.3
- **Communications** EALR 1 – 1.2, EALR 2 – 2.1, 2.1
- **Writing** EALR 2 - 2.2.1

Key Words: field investigation, observations, diversity, microorganisms, microscopes

Tiny Neighbors Field Investigation

Fifth grade students and their teachers from Bryant Elementary in Seattle teamed up with Homewaters Project to connect the indoor-learning from the STC Microworlds Unit to the real world. By exploring the diversity of micro-organisms living at the nearby Union Bay Natural Area, students discovered how even the tiniest creatures play a role in an ecosystem. The group also looked at how humans impacted the natural area and practiced taking detailed notes and drawings in their field notebooks. Students took their samples back to school to investigate further under the microscope. Having collected their own samples, students had a new level of ownership over their microscope investigations.

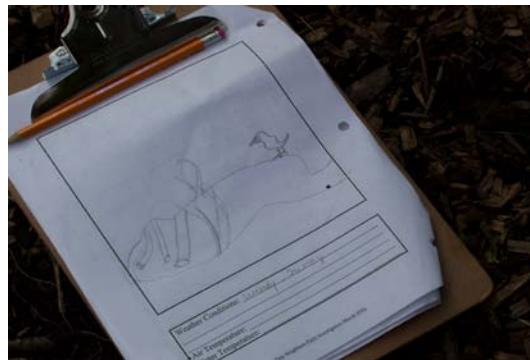
Resource Links:

<http://www.homewatersproject.org>

Assessment:

- Pre/Post Test
- Complete science notebooks

Contact: Kate Bedient, Homewaters Project, kbedient@sccd.ctc.edu



Grade Level: 5

Context/Scope: Unit/Science
Classroom Module Extension of Land and Water Unit

Subject Area:

- Science
- Reading/Writing
- Communications

Goals:

- Compare a real stream to the stream table made in the classroom.
- Study how surrounding land and water affect the health of salmon.
- Explore how humans impact the health of a stream ecosystem.

Content Integration:

- Science (Extends STC Land and Water Unit): Systems, Inquiry, Application, Life Science
- Reading/Writing: scientific information/vocabulary, field notebooks and data collection
- Communications: cooperative learning, team work, communicating ideas to others

ESE Standard(s): 1, 2, 3

- **Science** EALR 1- SYS(A-D), EALR 2 – INQ (A, B, D, F) EALR 3 – APPD, EALR 4 – PS1B, ES2 (B, C, D, F) LS1 (A-D), LS2 (A-F)
- **Social Studies** EALR 3 – 3.2.3, 3.2.3
- **Communications** EALR 1 – 1.2, EALR 2 – 2.1, 2.1
- **Writing** EALR 2 – 2.2.1

Key Words: field investigation, watershed, observations, erosion, deposition, macroinvertebrates

Land and Water Field Investigation

Fifth grade students from Laurelhurst Elementary in Seattle teamed up with Homewaters Project to connect the indoor-learning from the STC Land and Water Unit to the real world. By exploring the land and water at a real creek, the concepts of the in-class unit came alive. The group replicated activities done with their in-class stream tables, identifying areas of erosion and deposition, measuring stream speed, and making observations about the role of vegetation on stream health. The students used this information to talk about salmon habitat and the impact of humans on the stream's ecosystem. Students also studied macroinvertebrates collected in the stream to make inferences about the health of the water.

Resource Links:

<http://www.homewatersproject.org>

Assessment:

- Completed science notebooks

Contact: Kate Bedient, Homewaters Project, kbedient@sccd.ctc.edu



Grade Level: 4-6

Context/Scope: Year-long project based learning

Subject Area:

- Science
- Math
- Social Studies
- Reading/Writing
- Communications

Goals:

- Learn about how water is used at school and how to measure it
- Develop knowledge of the ways that water can be conserved at school and at home
- Design, plant and maintain a small demonstration water-wise garden at their school
- Educate the community (other students, teachers, parents) about ways to conserve water

Content Integration:

- Science: Application, Life Science
- Math: Data collection/ interpretation, multiplying multiple numbers, rate, measuring, area, graphing
- Social Studies: Ethnobotany
- Reading/Writing: reading and comprehension of scientific data and information/vocabulary, completing field notebooks, expository writing
- Communications: cooperative learning, team work, communicating ideas to others

ESE Standard(s): 1, 2, 3

Core Content Standard(s):

- Science EALR 1-SYSA, EALR 2-INQA, INQB, INQH, EALR 3-APPA-D
- Social Studies EALR 2-2.1, 2.4, EALR 3-3.2
- Math 4.1 A-F, 4.2 A, B, 4.3 B, D, 4.4 D
- Communications EALR 1-1.1, 1.2, EALR 2-2.1, 2.2, 2.3
- Reading EALR 1-1.2, 1.3, 1.4, EALR 3-3.2
- Writing EALR 2 – 2.2.1

Watershed Gardens

Third-fifth grade students and their teachers at Seattle's Salmon Bay School engaged in a year-long project based learning experience focused on water conservation. They received support and materials from Homewaters Project. Students analyzed their water use at home/school and discovered where their water comes from. They measured their school's water use by conducting audits. To demonstrate how to beautify landscapes while using less water and to create an outdoor classroom, students researched, designed and installed an 1100 square foot native water wise garden on school grounds. Students inventoried the site, sheet mulched to decompose grass, spread compost, researched and selected native plants, learned about the plants historical use by Native Americans, planted, mulched and irrigated. Throughout the year, students shared what they were learning with the rest of the school community and their families. At the end of the year, student representatives made presentations to a group of 200 adults at an event to share their project and what they learned about water and native plants.

Resource Links:

<http://www.homewatersproject.org>

Assessment:

- Pre/Post Test
- Graphs illustrating amount of water used by school
- Completed native plant garden on school grounds
- Communication about findings with school community and general public

Contact:

Linda Versage, Homewaters Project, versage@sccd.ctc.edu



Key Words: water conservation, watersheds, sustainability, water audits, percolation, native plants, school garden, outdoor classroom

Middle and High School Stories from the Field

Grade Level: 6-8

Context/Scope: Lesson

Subject Area(s):

- Interdisciplinary
- CTE (Natural Resources)
- Language Arts.

Goal: Students explore what environmental, biological and economic factors influence the process of turning a living tree into lumber.

Content Integration:

- CTE - Natural Resources, Forestry, History of Pacific NW Forests; Economics of the Forest Industry; Tree Species Identification; Timber Forestation Practices
- Science – systems, inquiry, application, life, earth science
- Social Studies – civics, policy, law
- Language Arts – writing and speaking
- Math – measurement

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: forestry, Forest Stewardship Council, natural resources, resource extraction, transformational education

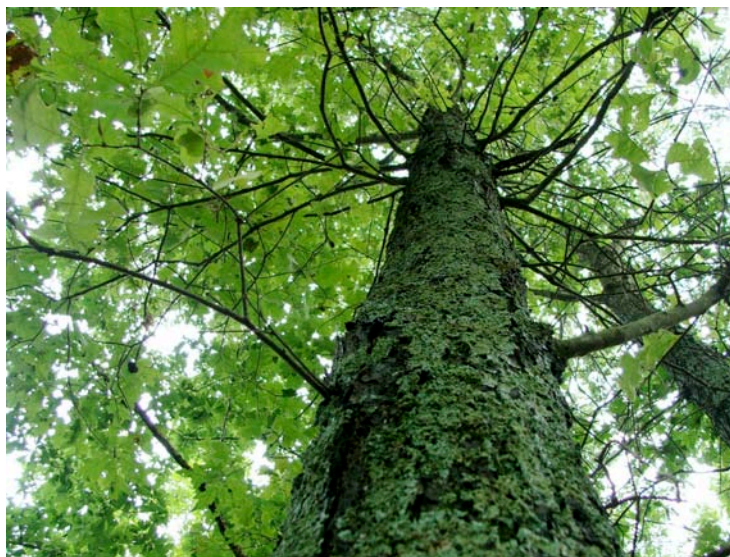
Sustainable Forestry Practices

Students in WSU At Home At School (AHAS) program involved in building a green building/outdoor natural classroom studied the economic and environmental impacts of extracting and processing wood with the goal to see where their lumber comes from and how to better appreciate and evaluate natural resources.

Resource Links: www.projectgreenbuild.org

Assessment: Students articulate their appreciation for local forests and for responsible forest management practices for lumber production through speaking and writing.

Contact: Brandon Tauscher, Tauscher@projectgreenbuild.org



Grade Level: 6-8

Context/Scope: Unit

Subject Area: Science

Goal: Engage students in a meaningful challenge to clean a sample of “foul” water in order to apply knowledge of mixtures and solubility. We want students to learn that they have the science knowledge to complete a challenge, to protect water quality, and to make a difference in their local and global community.

Content Integration:

- Science – Solutions and Pollutions
- Science – SCTM Properties of Matter lessons #11, #12, #13, #14, and others
- Mixtures, Solutions, Water Quality

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: water quality, solutions, solubility, water scarcity, resource conservation

Clean Water Challenge

Water **you** doing? 6th grade Scientists from Eckstein Middle School take the Clean Water Challenge. Water is precious. Only 1% is available for use. We discover how easy it is to pollute our water with salt, detritus, oil, and soap. We use concepts and techniques learned from the semester to purify our dirty water. Oil has a lower density so it rises to the top; How can you skim it off? Natural filters like sand and gravel help filter out insoluble substances. Distilling water is a model of the water cycle. Finally our water is clean enough to drink, and our teachers do just that.

Resource Links:

http://www.amgen.com/pdfs/aaste/WA_Levine.pdf

<http://www.seattlescience.com/2008/02/13/solutions-pollution-current-events>

Assessment:

- lab inquiry to clean a sample of foul water
- Written reflection of process and experience

Contact: Jessica Levine, Ms.Green.Levine@gmail.com



Grade Level: 6-12

Context/Scope: Course

Subject Area(s):

- Interdisciplinary
- CTE (Natural Resource)
- Science
- Social Studies
- Language Arts
- Math

Goal: Students understand and apply green building practices and processes from materials extraction to building completion.

Content Integration:

- CTE - Natural Resources, Forestry
- Science – systems, inquiry, application, life science
- Social Studies – civics, policy, law
- Language Arts – writing and reading
- Math – measurement, geometry

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: green building, service learning, experiential education, At risk students

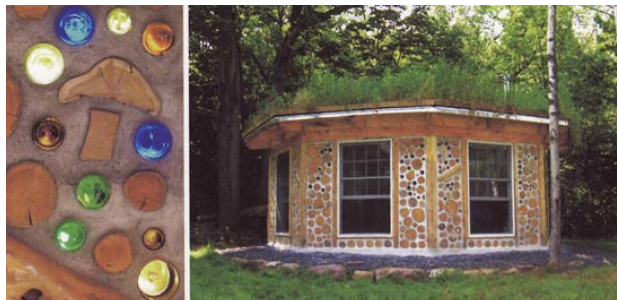
Building a Natural Outdoor Classroom

An outdoor green building classroom is being built on the Vancouver, WA Columbia Springs Environmental Education Center and will be used by more than 7,500 students each year to engage in hands-on environmental learning. Youth from WSU-Vancouver's At Home At School (AHAS) program, which provides after school and summer education for K-12 students who are homeless or living in transitional housing, will be lead by Project Green Build to construct the classroom. The classroom is a replicable project that links K-12 sustainability standards to core content curriculum. The approximately 700 square foot classroom is being built using cordwood construction and will be able to fit 32 students and instructors.

Resource Links: www.projectgreenbuild.org

Assessment: The building meets industry standards

Contact: Brandon Tauscher, Tauscher@projectgreenbuild.org



Grade Level: 9-12

Context/Scope: Course

Subject Area: Interdisciplinary

Goal: students understand and apply habitat restoration skills; understand interconnections between history, science, and sustainability; and develop employment skills.

Content Integration:

- Social Studies: Civics, Geography, Economics, History, Social Study Skills
- Science: Environmental Science, Systems Thinking, Inquiry
- Language Arts: reading and writing

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: service learning, sustainability, watershed

Workin' the Watershed: Green-Duwamish River Restoration

At-risk Foster High School students got paid to learn and serve the community by restoring a local watershed habitat. The project was a collaborative enterprise involving the Community Schools Collaboration, Tukwila School District, King County Worksource/Stay in School, and Green-Duwamish Watershed Alliance. Students studied local history and the ecology of the Green-Duwamish watershed, restored habitat on the Duwamish Riverbend Hill and the Duwamish shoreline, hosted local tribal and community leaders, and participated in a variety of field trips including a ropes course, visit to Seattle Aquarium, and field studies at various restoration sites along the river. For their culminating project, students created a storybook for elementary students that described the life lessons they learned during the watershed socials studies course.

Resource Links:

Assessment: Storybook, Exam, Employment Review

Contact: Brooke Alford & Ayora Berry, berrya@edmonds.wednet.edu



Grade Level: 6-8

Context/Scope: Unit

Subject Area: Science: physical science/chemistry

Goal: The purpose of this activity is to engage in a meaningful exploration of the cycle of stuff.

Content Integration:

- Science – SCTM Properties of Matter Lesson #10 Anchor Activity

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: material science, matter, resource consumption, resource conservation

Cradle-to-Cradle Analysis

What is your stuff made of? Why were those materials selected? Where did they come from? Where do they go?

Students at Eckstein Middle School in Seattle research the cycle of everyday things from materials extraction, properties of matter, manufacturing, distribution, consumption, and disposal. Students recognize the interconnectedness and complexity of even simple household objects. Final projects include a presentation of the research, a “Thanks-for-our-stuff” celebration, and a possible extension to create something new from the waste of the old!

Resource Links:

<http://www.nsta.org/recommends/ViewProduct.aspx?ProductID=12166>
<http://www.storyofstuff.com/>

Assessment:

- Pamphlet or other presentation
- Written reflection of process and experience

Contact: Jessica Levine, Ms.Green.Levine@gmail.com



Grade Level: 6-8

Context/Scope: Unit/Lesson

Subject Area: Social Studies, Media Literacy/Technology

Goal: The purpose of this activity is to engage in a meaningful exploration of the social and cultural aspects of everyday things.

Content Integration:

- Social Studies – research is focused on the place, culture, economy, and people where materials in/stages of the cycle are found.
- Media Literacy/Technology – Inspiration Software

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: resources, gross domestic product, economy, politics, commons, wages, trade

Product Pathway Project

Where is your stuff made? Who lives there? How are they impacted by the production of your things?

Middle School students at University Prep in Seattle researched the pathways of an everyday object from source to consumption. Students recognized the interconnectedness of people involved in each step of the way, and how a country's resources, landscape, and economic and politic structure affect the outcome of the product. Final projects include a visual presentation of the research using Inspiration Software, and a "Thanks-for-our-stuff" celebration and reflection.

Resource Links:

<http://books.heinemann.com/shared/onlineresources/E00570/chapter4.pdf>
www.storyofstuff.com

Assessment:

- Presentation of Inspiration graphic
- Written reflection of process and experience

Contact: Jessica Levine, Ms.Green.Levine@gmail.com



Grade Level: 7-8

Context/Scope:

Part of Science Inquiry

Subject Area:

- Science

Goal:

To participate in citizen science projects and plan and conduct own field investigation

Content Integration:

- Science, communication, writing

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Science: INQA, INQB, INQC, INQF, INQG, INQI, LS1C, LS2A, LS2C, LS2D, LS2E

Key Words:

inquiry, field studies, field investigations, citizen scientist, research



Citizen Scientists

In 2000, cougar specialists from WDFW invited Cle Elum schools to assist in their research on cougar populations in the Cle Elum area. Initially, the study involved scientists that allowed high school students to shadow them in the field. As time went on, students and scientists became more active partners and middle school students were brought into the program. The annual program worked best with scientists visiting classrooms to update students as to where they were in the project and to invite interested students to a mandatory safety meeting. As citizen scientists, these students would share stories from the field with classmates and others.

Using a similar format, our middle school became partners in CWU WATERS grant where a graduate student shares science expertise in classrooms. The focus is on the creation of a digital map with permanent GPS points where student will conduct a bioblitz, or biodiversity inventory, annually. Our first attempt will be with Middle School students, staff, and some parents.

Students' love of the outdoors is most obvious when the 7th graders choose quantitative comparative research questions for group field investigations to study over the school year. Students gather data weekly and share results as a poster presentation at our districts' student learning celebration and this year at CWU SOURCE day with college students. Younger students know what the 7th graders are doing outside each year so look forward to their turn.

All these activities have been sparked by our original CAT project where school and community spent time outdoors getting a sense of our place that we share with cougars

Resource Links:

Citizen Science-Project CAT

<http://www.projectcat.net/>

Field Investigation Guide:

<http://www.pacificeducationinstitute.org/resources/pdf/Field%20Investigation%20Guide%20updated%20April%202009.pdf>

The Truth About Science by Kathryn Kelsey and Ashley Steel

Assessment:

Recording accurate data. Analyzing data and written conclusions. Posters from field investigation.

Contact: Trish Griswold, griswoldt@cleelum.wednet.edu

Grade Level: 7-9

Scope: Sustainability model for Science course

Subject Area:

- Science, Social Studies

Goal: Develop Environmentally aware students, enhance citizenship, build confidence and foster individual action.

Content Integration:

- Science
- Social Studies
- Citizenship
- Stewardship

ESE Standard(s): 1, 2, 3

Core Content:

Systems, Inquiry, Application, Physical, Earth and Life Science

Key Words:

Ecology, Social, Natural and Built Environment, Sustainability, Citizenship



Earth – A Limited System Model

Since 2004 the staff at Skyview Junior High School has been working to craft an Integrated

Environmental & Sustainability science program based on an evolving model named Earth – A Limited System. This model drives our Science program & guides our school community's sustainability efforts. Key curriculum components, aligned with the WA State's Science and IS&E standards, were created to relate science and sustainability concepts to future citizens. Components can be used separately to grow student knowledge, awareness, foster citizen growth and individual action. As other components are added each additional piece created a stronger, more powerful, learning effect in students. The end result has been more aware, capable, confident and active citizens. Key components are:

- **Environmental Grounding**
- **Outdoor Learning**
- **Environment Principles & Issues**
- **Sustainability, Stewardship, and Citizenship**

See individual write ups for each component.

Description: Earth – A Limited System model graphically frames a science curriculum so students can positively link science concepts to individual and group actions. They can also link actions to the health of the environment. In this holistic approach students learn the key components of life in context with their own school and community. Science and IE&S processes and concepts are presented in this framework through the year. Using this approach students see environmental issues in a continuum from the key components of life through to the delicate balance that exists when creating a sustainable society... the balance between human values & knowledge on one side and human actions on the other

Resource Links:

<http://www.goscienceseven.com/ecosystems/classnotes/IMAGES/sustainabilityconsolid.jpg>

Assessment: Individual and Group formative and summative assessments are used throughout the school year.

Contact: John Schmied, jschmied@nsd.org

Grade Level: 7-12

Scope: Necessary goods and services for a healthy environment

Subject Area:

- Science, Social Studies

Goal: Develop Environmentally aware students, enhance citizenship, build confidence and foster individual action.

Content Integration:

- Science
- Social Studies
- Citizenship
- Stewardship

ESE Standard(s): 1, 2, 3

Core Content:

Systems, Inquiry, Application, Physical, Earth and Life Science

Key Words:

Ecology, Social, Natural and Built Environment, Sustainability, Citizenship



Environmental Grounding

Student-citizens possessing a firm knowledge and value the key components of life in the environment, as well as the systems that provide these vital resources to us, become more environmentally grounded and appreciate the value of living sustainably. The key components of life are identified in Skyview's [Earth – A Limited System model](#) as Clean Air, Clean Water, Healthy Soil, Sustainable Energy, & Space.

The assertion above is based on observations that students have a hard time appreciating what they don't understand. Further, that if citizens don't value these key components, each can be treated with disrespect. This may show up as wasting resources, polluting resources, or simply refusing to vote for sufficient monies for upkeep or enhancements of the systems providing these resources

Description & Resource Links: Environmental grounding assignments help student-citizens develop a firm knowledge and appreciation of the value of the key components of life. Each job serves to help students build a sense of place. Students become grounded in their community. The assignments are spread over $\frac{3}{4}$ of the year. (Population 911 is ongoing.) Results show students become aware, capable, confident and active student-citizens after doing & discussing the assignments. Key components are:

[Where does your Water come from?](#) Students track potable water through the system from the water's source to their own home.

In [Where does your waste go?](#) Students track mixed solid waste, recycling, and yard waste through the waste system.

In the [Waste Systems Analysis](#) students track matter and energy through all three legs of the waste system.

[Where does your Wastewater Go?](#) tracks wastewater from the home through the wastewater system to the outfall in Puget Sound

[Where does your Electricity come from?](#) identifies all sources & locations of electricity through the electrical grid to a student's home.

[Where does your Natural Gas come from?](#) tracks natural gas from the fields through the system to student's homes.

Finally, in [Population 911](#) (Space) students record world population from the World Population Clock data monthly. In each succeeding month students record the data, calculate the gain, then color the population gain over state equivalents. A powerful graphic emerges, bringing home the growing demand for world resources as well as loss of space for growing food and for homes.

Modification: All jobs can easily be modified to any geographic location using each of the above assignments as a template.

Assessment: Individual and Group formative and summative assessments are used throughout the school year.

Contact: John Schmied, jschmied@nsd.org

Grade Level: 9-12

Context/Scope: Activity

Subject Area: Biology, Environmental Science, Life Science, Media

Goal: Students design infomercials about ecosystem services provided by forests or grasslands.

Content Integration:

- Environmental Science, Biology, Life Science – ecosystem services
- Media – Planning, execution, and editing of a short film.

ESE Standard(s): 1, 3

Core Content Standards Met:
Science SYSB, APPA, APPE, LS2F
Social Studies 2.1

Key Words: ecosystem services, forest, grassland, video

Ecosystem Services

After a lecture on ecosystem services, Environmental Science students at Olympia High School were asked to produce a 1-3 minute infomercial on the ecosystem services provided by either forests or grasslands. The teacher then asked the local public access television station to air the infomercials.

Resource Links:

[Professional example for oceans](#)

[Class favorite](#)

[Other examples](#) (see the left side of the page)

[Rubric](#)

Assessment:

Students were assessed on the content accuracy, completeness and clarity. They were also assessed on the product appropriateness, lack of distracters, and creativity. See [Rubric](#) for more details.

Contact: Heidi Kirk, hkirk@osd.wednet.edu



Grade Level: 9-12

Context/Scope: Ecology and Sustainability Unit Assessment

Subject Area: Biology or Environmental Science

Goal: The purpose of this activity is to assess student understanding of, and ability apply, principals of ecology/sustainability to solve a challenging problem.

Content Integration:

- Physical Science - energy systems.
- Social Studies – systems of governance, law, education, etc. that enhance sustainability.
- Art

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Science 9-12 APPB, ES2C, ES2D, ES2A, LS2F

Key Words: sustainable systems, carrying capacity, limited resources, cycling of matter, energy flow, energy systems, resource conservation, renewable resources, renewable energy, waste reduction, product life cycle, cradle-to-cradle

Deep Space 3000

As a summative assessment of a unit on ecology and sustainability, students are presented with a scenario where the Earth has become uninhabitable and people must leave Earth to survive. Students are challenged with the task of designing a spaceship that is capable of keeping 1,000 people alive and healthy for 3,000 years before returning to Earth. The spaceship is a closed system where only light can come in and only heat can go out. Using basic principles of ecology and sustainability, students work in small groups to design their spaceship including systems that continually supply clean air, clean water, healthy soil, provides for adequate food, shelter, clothing and energy, and processes/recycles “waste” for the duration of the trip.

Extension: Integrate with social studies by requiring students to create systems of governance, law, economics, education and more that promote and maintain social justice, economic equity and environmental sustainability.

Resource Links:

Engaging Students Through Global Issues: Activity Based Lessons and Action Projects

www.facingthefuture.org/Home/CurriculumDetails/tabid/131/Default.aspx?ItemID=ESTGI

It's All Connected: A Comprehensive Guide to Global Issues and Sustainability (student reader)

www.facingthefuture.org/Home/CurriculumDetails/tabid/131/Default.aspx?ItemID=IAC

Assessment: Poster of spaceship, written description of components and systems of spaceship and verbal presentation.

Options: Presentation to NASA-like decision-making body with real aero-space engineers.

Contact: David Ketter, dketter@sequim.k12.wa.us



Grade Level: 11-12

Context/Scope: End of unit activity

Subject Area: Environmental Science, Drafting

Goal: Students apply sustainable urbanization techniques to designing new LEED certified construction.

Content Integration:

- Biology – population growth and sustainability
- Environmental Science – urbanization
- Drafting – creating a workable space

ESE Standard(s): 3

Core Content Standards Met:

Science 9-12 LS2, APPC, APPE, APPF

Key Words: urbanization, sustainability

LEED the Way

As part of the culminating project on urbanization and sustainability, students at Olympia High School break up into groups and create a new piece of construction conforming to LEED certification. Students must earn enough points for silver, gold, or platinum certification by accumulating points listed on pages vi and vii on the LEED document below. To do this, they use Google Sketchup to design a building with water and energy efficiency, good indoor environmental quality, multiple uses, etc. They then choose a site to place the building on Google Earth that is near bus lines, business, school, and commerce. Students also turn in a list of sustainable materials and resources that would be used in construction.

Resource Links:

Green construction TV links ([1](#),[2](#),[3](#))

[LEED document](#)

<http://www.usgbc.org/> (for LEED information)

<http://sketchup.google.com/download/>

<http://earth.google.com/download-earth.html>

<http://tincan.org> (I took the eco-mapping professional development from this organization to increase my Google Earth and Sketchup skills)

Assessment:

Students are assessed using the LEED standard. Platinum = A, Gold = B, Silver = C

Contact: Heidi Kirk, hkirk@osd.wednet.edu



Grade Level: 9-12

Context/Scope: Club/Event

Subject Area:

- Science
- Social Studies

Goal: Waste Reduction

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: recycling, energy, service learning, public awareness

Super-Recycling

Bellevue High School's Earthbound Club has been very involved in the school's recycling efforts since its inception 19 years ago. Two years ago, the club initiated a plastic cap recycling, in conjunction with Aveda cosmetics company. They attached small plastic boxes to all of our in-building recycling barrels, labeled "Plastic Caps." Students & staff now bring in caps that otherwise would become garbage and drop them in the boxes. Earthbound students go around the school weekly to collect the caps. When they have a box full, they are packed up and mailed to Aveda, using pre-paid UPS labels provided by Aveda. So far, the club has sent nearly seventy pounds of caps to Aveda.

The club has also been collecting used batteries for about five years. The district has been paying the hazardous waste fee for recycling those, but that program has become so successful that it is a major expense for the district; the club is now investigating alternative avenues for used batteries.

More recently, the club has started collecting wine bottle corks, which can be recycled at Whole Foods stores. The club is now investigating the vendor to whom Whole Foods sends the corks, with the hope that they can expand the program community wide and begin sending the corks directly to the vendor.

Contact: Ted Cox, Science Teacher & Earthbound Club Faculty Advisor; coxt@bsd405.org



Grade Level: 11-12

Context/ Scope: Lesson

Subject Area:

- AP Environmental Science

Goal: Understanding of importance of macroinvertebrates to stream health

Content Integration:

- Science
- Social Studies

ESE Standard(s): 2

Key Words: Macroinvertebrates, ecology, environmental science, water quality, bio-indicators, biodiversity

Why Study the Stream?

Students in the Bellevue High School AP Environmental Science classes spend one class day reading about macroinvertebrates that are commonly expected to be found in Mercer Slough, our local stream. They meet a stream biologist at the floating dock, where she supervises the “netting” of floating flora, then the sorting of the critters that the students are able to locate in their samples. The students are able to distinguish the various types of macroinvertebrates that identify a healthy stream. The lesson finishes with a discussion about human influences on the stream and its water quality.

Resource Links:

Contact: Ted Cox, coxt@bsd405.org



Grade Level: 9-12

Context/Scope: Event

Subject Area:

- Science
- Social Studies

Goal: Public Education; Community Involvement

ESE Standard(s): 1, 2, 3

Key Words: Sustainability, Recycling, Energy, Public Awareness

Sustain(able) Bellevue--II

Bellevue High School's Earthbound club is sponsoring their second evening event to “spread the word” about how the people of our community can live a more sustainable life, without sacrificing quality of life. The first event was focused on BHS students & parents. We chose to expand this year, so the City of Bellevue is partnering with us, and hosting the evening at Bellevue City Hall. All the schools in the city, including private schools, are being invited to participate. The event will feature a Keynote Speaker, and about twenty “mini-workshops” (20 minutes each), focused on a variety of related issues. There will also be information tables sponsored by various relevant agencies, groups and businesses.

Contact: Ted Cox; coxt@bsd405.org

All Grades (K-12) Stories from the Field

Grade Level: K-12

Context/Scope: Program

Subject Area(s):

- Interdisciplinary
- Science
- Language Arts
- Social Studies
- Mathematics

Goals:

- Integrate an environmental focus both inside and outside the classroom
- Practice resource conservation and protection, and toxics reduction
- Provide a climate where students are engaged to become environmental stewards.

ESE Standard(s): 1, 2, 3

Core Content Standards Met:

Key Words: green schools, energy, water quality, toxics, air quality, waste reduction

Washington Green Schools

How do our campus operations and daily choices affect the environment? Washington Green Schools is a voluntary, web-based program your school can use to reduce its environmental and carbon footprint. This program provides resources and tools to involve your school community in assessing the current status of your campus and taking action.

Resource Links: www.wagreenschools.org

Assessment: Certification at each level (Energy Efficiency, Recycling & Waste Reduction, Toxics Reduction & Indoor Air Quality, Transportation & Outdoor Air Quality, Water Quality & Conservation) is achieved by:

- Choosing an Environmental Category and completing an Assessment,
- Addressing the Assessment findings with a long-lasting environmental change,
- Implementing one action item in each of the other four Environmental Categories

Contact: Marty Fortin (fortin@awsp.org) or Meredith Lohr (meredith@soundfootprint.com)



Template for Stories from the Field

If you have a story from the field that you would like to share, please use the template below and send to gilda.wheeler@k12.wa.us.

<p>Grade Level:</p> <p>Context/Scope: [lesson, unit, course, after school program, etc]</p> <p>Subject Area: [list the subject areas in which this lesson/unit/course is taught]</p> <ul style="list-style-type: none">• <p>Goal: [bullet list of goals]</p> <ul style="list-style-type: none">• <p>Content Integration: [bullet list of the core content areas that are integrated through this lesson/unit/course]</p> <ul style="list-style-type: none">• <p>ESE Standard(s): [list the ESE Standards that this meets e.g. 1, 2, 3]</p> <p>Core Content Standards Met: [List the core content standards that are meet through this lesson/unit/course]</p> <p>Key Words: [Include a few key searchable words]</p>	<p>[Title]</p> <p>[Brief description – 1 to 2 paragraphs]</p> <p>Resource Links:</p> <p>Assessment: [Brief description of how student learn is assessed in this lesson/unit/course]</p> <p>Contact: Name, title/school, email</p> <p>[Insert small photo or graphic]</p>
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