

A close-up photograph of a person wearing a bright yellow jacket, sitting and writing in a notebook. The person's right hand holds a black pen, and their left hand rests on the notebook. The notebook is open, showing handwritten text on the left page and printed text on the right page. The background is dark and out of focus.

Connect, Explore, Engage: Environmental Education Activities for Teacher Educators

Edited by Rebecca L.
Franzen, Scott Ashmann,
Michael E. Beeth,
Victoria Rydberg

Acknowledgements

Higher education faculty in Wisconsin continue to work to improve how environmental education is integrated in their teacher education programs. This collection of instructional materials was funded by the Wisconsin Department of Public Instruction with a focus on connecting to the revised Wisconsin Standards for Environmental Literacy and Sustainability and providing free, publicly available resources in [WISELearn](#).

A planning committee consisting of Dr. Scott Ashmann (UW-Green Bay), Dr. Michael Beeth (UW-Oshkosh), Dr. Becca Franzen (UW-Stevens Point), and Ms. Victoria Rydberg (Wisconsin Department of Public Instruction) provided the space and opportunity for this work. Thank you for your efforts! Thanks, also, to presenters and facilitators Emma Keese and Kim Wahl (formerly of Project WILD, Wisconsin Green Schools Network) and Nicole Filizetti (Project Learning Tree, Wisconsin Center for Environmental Education).

The activities shared in this book were created by dedicated faculty, academic staff, and K-12 teachers who attended the workshop in June 2018. All participants and their institutional affiliations are listed below:

Tanzeem Ali, UW-Superior
Samantha Anderson, UW-Green Bay
Scott Ashmann, UW-Green Bay
Angela Bazan, Edgewood College
Mike Beeth, UW-Oshkosh
Jill Birren, Marquette University
Jennifer Centner, Milwaukee Public Schools
Yun-Wen Chan, UW-Madison
Craig Corn, Menominee Indian School District
Joel Donna, UW-River Falls
Vicky Eiben, Viterbo University
Nicole Filizetti, UW-Stevens Point
Kate Flick, UW-Stevens Point
Becca Franzen, UW-Stevens Point
Jennifer Faul-Stout, Marquette University
Kelly Hatch, UW-Whitewater
Emma Keese, FIELD Edventures
Ken King, UW-Eau Claire
Scott Kirst, St. Norbert College
Kathy Kremer, Concordia University of Wisconsin
Josh Lichty, Viterbo University
Kendra Liddicoat, UW-Stevens Point
Richard Lind, CESA 9

Amy Lindgren, Concordia University of Wisconsin
Shayla Mason, UW-Oshkosh
Heidi Masters, UW-La Crosse
Joy O'Neil, UW-Stevens Point
Connie Palmer, Schlitz Audubon Nature Center
Melody Peterman, Menominee Tribal School
Victoria Rydberg, Edgewood College
Chong Shimray, UW-Stevens Point
Yonela Sipeka, International Crane Foundation
Randa Suleiman, Alverno College
Liz Sutton, UW-Milwaukee
Corey Thompson, Cardinal Stritch University
Cherie Thunder, College of Menominee Nation
Lincoln Tice, UW-Madison
Marissa Vele, College of Menominee Nation
Kelly Voigt, New Berlin West Middle/High School
Leon Walls, University of Vermont
Cassandra Watson, College of Menominee Nation
Jan Wellik, UW-LaCrosse
Sara Wescott, Menominee Indian School District
Lenore Wineberg, UW-Oshkosh
Kevin Zak, Northland College

Designed by Melissa Ruether

Introduction

Why is Environmental Education important? Why this compilation?

Environmental education (EE) aims to increase environmental literacy, doing so by increasing awareness and knowledge, providing an opportunity to explore values and practice skills relating to environmental issues (UNESCO, 1978). As a result of environmental education, it is hoped that people will take action to protect and improve the environment, considering the social, ecological, and economic aspects (Hollweg, et al., 2011).

Under the guise of the [Teacher Educator Network for Environmental Education \(TENFEE\)](#), Wisconsin teacher educators first came together in the late 1990s to consider how they might improve EE in their teacher education programs. TENFEE doesn't have any formal membership or board, but is composed of teacher educators who might support EE at their respective institutions. Since 2010, the group has held annual gatherings and implemented a listserv to support each other in their work. In 2017, through a National Science Foundation grant, the group hosted two meetings which led to a compilation of [activities](#) for teacher education programs using place-based education. In 2018 the group met for two days (Appendix A - Schedule). The group continues to meet each year.

How this resource is organized

The activities in this resource are aligned with the 2018 [Wisconsin Standards for Environmental Literacy and Sustainability](#) (Appendix B). Participants were asked to create three activities that would address each of the three strands within the standards. Some participants linked them together. Others created activities that were separate from one another. Each activity includes the related standards and Appendix A identifies which activities address which standards. Additionally, the activities are linked to the North American Association for Environmental Education [Guidelines for Excellence: Professional Development of Environmental Educators](#) (Appendix C). Appendix D links the Guidelines to the Wisconsin Teacher Standards.

Table of Contents

Lessons

<i>My Digital Story: A Sense of Place and Well-being</i> , Tanzeem Iqbal Ali, University of Wisconsin-Superior	2
<i>Diversity and Resilience of Natural and Cultural Systems: Interpreting the Big Picture with Multiple Perspectives</i> , Tanzeem Iqbal Ali, University of Wisconsin-Superior	4
<i>Becoming Stewards of the Land</i> , anzeem Iqbal Ali, University of Wisconsin-Superior	6
<i>Nature Walk to Mill Pond</i> , Samantha Anderson, Menominee Tribal School	8
<i>Water, Water, Everywhere?</i> , Angela Bazan, McFarland High School	11
<i>Exploring Environmental and Community Impacts of Agricultural Practice</i> , Jill McNew-Birren, Marquette University	14
<i>How Do We Affect Lake Michigan?</i> , Jennifer Centner, Milwaukee Public School Teacher	16
<i>Geography, the Environment and the Human Beings!</i> , Yun-Wen Chan, University of Wisconsin-Madison ...	19
<i>Maple Sugar Camp</i> , Craig Corn, Menominee Tribal School	29
<i>Oh Say Can You See?</i> , Joel Donna, University of Wisconsin-River Falls	31
<i>Learn Your Student's Place - Student Community, Cultural, and Personal Bridges into Science</i> , Joel Donna, University of Wisconsin-River Falls	33
<i>Integrating Environmental Education "Talk Moves" into Our Lessons</i> , Joel Donna, University of Wisconsin-River Falls	35
<i>Systems Theory, an Organizing Framework for Interdisciplinary Instruction</i> , Vicky Eiben, Viterbo University ..	37
<i>Teaching and modeling Wisconsin's Standards for Environmental Literacy and Sustainability</i> , Becca Franzen, University of Wisconsin-Stevens Point	40
<i>What Might Happen If?: Animal Adaptations and the Consequences of Human Activity</i> , Jennifer Gaul-Stout, Marquette University	44
<i>On the Ice Age Trail: A Haunted Hike</i> , Kelly L. Hatch, University of Wisconsin-Whitewater	46
<i>On the Ice Age Trail: Woods Runner</i> , Kelly L. Hatch, University of Wisconsin-Whitewater	48
<i>On the Ice Age Trail: Service Learning with the Ice Age Trail Alliance</i> , Kelly L. Hatch, University of Wisconsin-Whitewater	50
<i>Science-Technology-Society: Overview and Introduction</i> , Ken King, University of Wisconsin-Eau Claire	52
<i>Science-Technology-Society: Implementation via the Use of Current Events</i> , Ken King, University of Wisconsin-Eau Claire	56
<i>Creating a Place-Based Field Trip</i> , Scott Kirst, St. Norbert College	61

<i>Needs vs Wants for Sustainability</i> , Kathy Kremer and Amy Lindgren, Concordia Univeristy Wisconsin	66
<i>Birds to Bugs to Us: A Sense of Perspective</i> , Josh Lichty, Viterbo University	72
<i>Dam! That's a lot of Water!</i> , Josh Lichty, Viterbo University	74
<i>Learning Together, Learning from One Another</i> , Josh Lichty, Viterbo University	76
<i>Introduction to Project WILD, Project Learning Tree, and LEAF Curriculum Guides</i> , Kendra Liddicoat, University of Wisconsin-Stevens Point	79
<i>The Grass is Always Greener</i> , Richard Lind, CESA 9 Excellence in Teaching Program	82
<i>Zooming In and Zooming Out: Considering Interdependence in the Environment</i> , Amy Lindgren & Kathy Kremer, Concordia Univeristy Wisconsin	85
<i>Signs of Fall</i> , Shayla Mason, University of Wisconsin-Oshkosh Student	89
<i>Quack! The True Story about Feeding Ducks</i> , Heidi Masters, University of Wisconsin-La Crosse	91
<i>Basin Ball</i> , Corinne Palmer, Schlitz Audubon Nature Center	95
<i>Rockin' the Schoolyard</i> , Melody Peterman, Menominee Tribal School	99
<i>Get to "Really" know Your Placement</i> , Randa Suleiman, Alverno College	101
<i>What is, what was and what will be: An Environmental Journey In and Around_____</i> , Corey Thompson, Cardinal Stritch University	104
<i>Exploring Your Place</i> , Cherie Thunder, College of Menominee Nation Sustainable Development Institute ...	111
<i>Eskotaew (Fire)</i> , Marissa Vele, College of Menominee Nation	114
<i>Water in Our Community</i> , Kelly Voigt, New Berlin West Middle/High School	118
<i>Personal Action Analysis</i> , Leon Walls, University of Vermont	120
<i>Take Care of the Earth - Understanding Connections Between Humans and the Earth Part 1</i> , Cassandra Watson, College of Menominee Nation	123
<i>Take Care of the Earth - Understanding Connections Between Humans and the Earth Part 2</i> , Cassandra Watson, College of Menominee Nation	125
<i>Take Care of the Earth - Understanding Connections Between Humans and the Earth Part 3</i> , Cassandra Watson, College of Menominee Nation	130
<i>Getting to Know You</i> , Dr. Jan Wellik, University of Wisconsin-La Crosse	132
<i>Ecosystems and Water Systems</i> , Dr. Jan Wellik, University of Wisconsin-La Crosse	134
<i>Water Mapping</i> , Sara Wescott, Menominee Indian School District	136
<i>Windy Weather</i> , Lenore Wineberg, University of Wisconsin-Oshkosh	138

<i>Using Phenology Journals to Investigate the Wisconsin Standards for Environmental Literacy and Sustainability</i> , Kevin Zak, Northland College	140
---	-----

Appendices

<i>Appendix A: Workshop Schedule</i>	147
<i>Appendix B: Wisconsin Standards for Environmental Literacy and Sustainability</i>	148
<i>Appendix C: Guidelines for Excellence: Professional Development of Environmental Educators</i>	154
<i>Appendix D: Guidelines for Professional Development crossed with Teaching Standards</i>	160

Lessons

My Digital Story: A Sense of Place and Well-being

Tanzeem Iqbal Ali, University of Wisconsin-Superior

tali1@uwsuper.edu

Context

The target group for the first activity are pre-service teachers preparing to teach in early childhood, elementary and middle school. This activity is a modified version of an existing assignment in a required course: Teaching Elementary and Middle School Science, offered in a 10 week summer online format and 16 week semester format both online and on campus.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.1 Questioning, analysis, and interpretation skills

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning

Materials

- Digital camera/phone to take pictures
- Access to any one: Prezi/Google slides/slide-show/Piktochart/Youtube/etc.
- Digital story using any media you are comfortable with: Prezi/Google slides/Infographic such as Piktochart/Youtube

Driving Question

What are some of the essential concepts needed to master in order to connect, explore and engage with place-based learning using the Wisconsin Standards for Environmental Literacy and Sustainability?

Step-by-step directions, Activity: Connect

Assignment for undergraduates:

1. Inform students that in order for you to understand their beliefs about environmental literacy and sustainability they need to create a digital story.
2. Students find 5-10 pictures that they have captured themselves close to their area of residence or work or search for images that closely represents their own experiences and beliefs about environmental literacy and sustainability.
3. Students should include either an audio or short written description of their belief about the following:
 - What represents environmental literacy and sustainability to you?
 - What does place-based learning mean to you?
 - What successes and challenges do you envision having for learners using place-based learning?
 - What sort of a science teacher do you aspire to be? List two areas you feel comfortable with and

two areas you want to learn more about (e.g. pedagogy/content/integrated skills/process skills/assessment/planning/instruction).

4. Each student creates their digital story and shares it in an online discussion board.
5. They must then comment on one another's digital story reflecting on common themes and unique features. Students will also create an individualized goal to achieve through completing the course.
6. Since the online students are spread across Wisconsin and beyond, having them use their own pictures helps them to strengthen their sense of place, exploring it and questioning their own beliefs related to their sense of place and wellbeing.

Assessment

Student learning will be assessed through completion and sharing of their digital story and setting individual goal for the course.



Diversity and Resilience of Natural and Cultural Systems: Interpreting the Big Picture with Multiple Perspectives

Tanzeem Iqbal Ali: University of Wisconsin, Superior

tali1@uwsuper.edu

Context

The target group for the second activity are pre-service teachers preparing to teach in early childhood, elementary and middle school.

This activity can provide a sense of active learning creating a link to real world issues and applications. By using the teaching strategy of argument driven inquiry, students will conduct research either with hard copy newspapers or digital versions to look for news topics in their local areas regarding environmental sustainability and economic welfare.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

- 1.3 Skills for understanding and addressing environmental issues
- 1.4 Personal and civic responsibility

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX3. Students assess how diversity influences health and resilience of natural and cultural systems

ELS.EX3.A: Multiple Perspectives

Materials

- Newspapers or digital sources that share local issues regarding environmental sustainability and economic welfare
- Internet access for conducting further research
- Papers and markers (optional)
- Access to Piktochart or other digital tool to create an infographic

Step-by-step directions, Activity: Explore

1. During the first day, have students research and collect data on news regarding environmental sustainability and economic welfare in their local areas.
2. Have students spend their second day organizing the claims made for environmental sustainability and economic welfare based on their research from the first day in a visual format i.e. listing out the claims.
3. Students should work on their own on the third day with guidance from the instructor to conduct their own research to verify the claims being made for each local issue i.e. look for evidence in support of those claims.
4. Students should spend another two-three days analyzing the evidence through the lens of grounded

theory to provide a justification of the evidence to support or refute the claim(s) and complete their choice of assessment.

5. Students should be provided the option to either work in pairs or in small groups.
6. For assessment purposes the students can choose one of the following
 - Write an argumentative essay
 - Create a zine
 - Write to local community members sharing their analysis
 - Present to a panel through role playing
 - Create an infographic

Additional information:

- The pre-service teachers will follow the inquiry based strategy of argument driven inquiry to explore diversity and resilience of natural and cultural systems: Interpreting the Big Picture with multiple perspectives.
- Each student/group works to demonstrate their deeper understanding on the topic linked to role of diversity and resilience of natural and cultural systems by choosing a format for assessment.
- They must then comment on one another's work.
- Since the online students are spread across Wisconsin and beyond, having them use their own local issues helps them to explore the standard with real world implications.

Becoming Stewards of the Land

Tanzeem Iqbal Ali, Affiliation: University of Wisconsin, Superior
tali1@uwsuper.edu

Context

The target group for the third activity are pre-service teachers preparing to teach in early childhood, elementary and middle school.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

- 1.3 Skills for understanding and addressing environmental issues
- 1.4 Personal and civic responsibility

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others' perspectives.

- 5.1 A climate for learning about and exploring the environment

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems

- ELS.EN7.A: Inquiry and investigation
- ELS.EN7.B: Design and Implementation
- ELS.EN7.C: Evaluation and Reflection

Materials

- Access to digital device to record and share
- Transportation to local places to study

Step-by-step directions, Activity 3: Engage

1. Allow students/small groups to choose which option to be stewards for:
 - The local forests/school forests
 - The local natural resources such as mining sites
 - The Great Lakes
 - Student provided option
2. Next, students should brainstorm and come up with their own inquiry question to study and design an investigation. During this step, the students/pre-service teachers will demonstrate the ability to work individually and collectively to resolve a sustainability issue through deliberation to consider alternatives, and balance interests for the sustainability of natural and cultural systems.
3. Students/groups should design and implement an individual or group experience to develop self-

efficacy and address an issue affecting a community's natural and cultural systems. Identify potential partners and evaluate the short and long term results.

4. Finally, have students reflect, evaluate and share the outcomes of a stewardship project in meeting goals to improve natural and cultural system health, and offer strategies for improving outcomes that will improve sustainability of natural and cultural systems.

Assessment

As a form of authentic assessment, students will be provided the option to choose any of the following to demonstrate their deeper meaningful learning and understanding of the stewardship project:

- Three video journals as they progress through this stewardship project.
- Write 3 blogs through the duration of their stewardship project.
- Write a report or essay based on the experience and have it published in local newspaper, magazine, or professional newsletters after completing.
- Present to the class three times: before, during and after completion.
- All the student work will be posted as attachment or links provided to their Google drive in the discussion post, so they can learn from one another, provide peer review and feedback from the instructor.

Nature Walk to Mill Pond

Samantha Anderson, Menominee Tribal School

Middle School Science

ssanderson@mitw.org

Context

This group of activities have been designed to be used with the middle school science program. It also incorporates the requirements from the math, language arts, and social studies program. This is a project approach activity involving the production of a group presentation on a student chosen animal that is observed on a Mill Pond excursion. Students will be asked to evaluate the effects that the removal of this animal from the ecological system would have on the cultural system. This project is estimated to take about two weeks with classes daily lasting about an hour (total time of 10 hours.).

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.2 Knowledge of environmental processes and systems

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.B.m Identify the relationship between parts of natural and cultural systems in connecting communities into regional systems (e.g., watershed areas, political jurisdictions, ethnic communities). Understand the relationships between the environment and geography of a locality and its history, culture, and economy. Gather data from primary sources to identify local needs and compare to perceived local, regional, or global needs. Investigate alternatives to meeting one's needs for food, water, and shelter.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.B.m Analyze the relationships between living (biotic) and non-living (abiotic) parts in an ecosystem and examine the impact of each on the system. Describe how relationships among humans and organisms, species, populations, communities, ecosystems, and biomes affect the sustainability of natural and cultural systems.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

ELS.EN6.A.m Identify and analyze complexities of decisions on natural and cultural systems now and in the future, and consider possible unintended consequences.



Identify positive and negative feedback and leverage points within a system, and suggest modifications to the structure to achieve intended outcomes.

Materials

- Composition books
- Writing tools
- Cameras and/or phones for taking pictures
- Research materials (ie., computer library and computers, t-chart, data collection chart guide)
- Example of how to write a formal letter
- Environmental scenarios for letter writing

Driving Question

Can the removal of one animal by man affect the culture that you live in and should our cultural system be able to regulate it?

Step-by-step directions , Activity 1-What bugs you!

1. Gather students and discuss the guidelines/safety for the nature walk.
2. Have students capture images of animals observed while on their nature walk.
3. After returning from the nature walk, have students share findings and make a decision about which animal they feel could be eliminated from the natural system and what effects that might lead to.
4. As a group, have students create a t-chart (on a whiteboard, smartboard, etc) to organize possibilities and a list of animals found.
 - Have students share images via the smartboard or projector.
 - The class should discuss and analyze the role of the animals discovered on the walk and how they work together as a system.
 - The list of animals found on our walk will be used to decide who will investigate which animal demonstrating the students' ability to use observation to connect with their sense of place.
5. Each student will choose one animal to remove from the system that “bugs” them and use this animal for activity 2.



Step-by-step directions Activity 2: Tell me about it!

1. During the course of this activity, have students go to the computer lab and research their animal.
2. Students will produce three slides for a class presentation that illustrates the animals they have chosen.
 - The slides will include basic facts (5 W's: who, what, why, where, when) of their animal including the picture from activity one, their theory about what would happen if this animal was removed from the natural system including two facts that support their viewpoint, and a chart or graph to illustrate their information.

Step-by-step directions, Activity 3: What would you do?

1. Present students with a natural system change scenario related to an issue in your community. The given scenario will force students to choose a pro or con viewpoint about the change the cultural system wants to make to the natural system.

- Model proper form for letter writing. Each student will receive a list of preselected issues of the place where they reside.
2. Then, have students write a persuasive letter to their local government supporting their viewpoint.
 - The letter will contain two scientific facts that support their viewpoint.
 - The letter will show proper form and contain five sentences, a heading, and a closing.
 - Students will use facts and information provided in the scenario on local cultural system issues.

Assessment

Formative Assessment: Participation in group list formation.

Summative assessment: Student letters and presentation. Students will be assessed using a formal rubric developed by the language arts (letter), social studies (cultural system and local government), mathematics (chart), and the science (slide presentation) departments.

Resources

- ProjectWild.org

Water, Water, Everywhere?

Angela Bazan, McFarland High School

bazana@mcfbsd.org

Context

Most high school students in the U.S. have the ability to flush a toilet, turn on a sink, access a water fountain, or refill a water bottle on a daily basis. But, where does that water come from? How long will it last? Where in the world is water scarce, and how can we support access to water in these areas? These activities form the basis for a short unit on the influence of water in our daily lives: locally, nationally and globally. It is intended for students in a world geography course at the high school, 9-12 grade level, but could also be used in science or environmental education undergraduate courses.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.3 Skills for understanding and addressing environmental issues

1.4 Personal and civic responsibility

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

ELS.EN7.A.h Evaluate the needs of a local community to identify potential projects related to environmental sustainability.

ELS.EN7.B.h Plan, execute, and evaluate a project that would bring awareness to a sustainability issue and contribute to creating a sustainable environment.

Wisconsin State Social Studies Standards

SS.Inq.5: Wisconsin Students Will be Civically Engaged

SS.Hist.1: Wisconsin Students Will Use Historical Evidence for Determining Cause & Effect

SS.Hist.3: Wisconsin Students Will Connect Past Events, People, and Ideas to the Present; use Different Perspectives to Draw Conclusions; and Suggest Current Implications.

Materials

- Computers/iPads/access to the internet
- Attached assignments (links within)

Driving Question

What are the causes and consequences of water scarcity locally, nationally and globally? How can you affect change?

Step-by-step directions, Day 1/Activity 1

1. Begin by asking students about how/when they use water in their daily lives? Students will respond with things like showering, drinking, toilets, cooking, etc. Make a list of these on the board. But what about making the products we use? Our homes vs. our school? Local businesses? How much water do we all use? Will we ever run out?
2. As a class, use the Water Works Calculator together to get an idea of how much water each one of us uses on a daily basis: [How Much Water Do YOU Use?](#) Students will reflect in discussion; is this more or less than they thought? Are there ways in which we use water on a daily basis that we may not have thought about? Where does all of this water come from?
3. Ask students to guess; where are there water shortages? What leads to a water shortage? They may be surprised to learn that there are water shortages in their own backyard. Break students into small groups, and each group will read a different article related to water shortage in the US on the internet:

- [Waukesha Seeks Solution to Water Shortage](#)
- [5 Things You Should Know About California's Water Crisis](#)
- [Rural America's Drinking Water Crisis](#)
- [World Water Day: America Has a Crisis No One is Talking About](#)
- [Eight States Running Out of Water](#)
- [Annual Drinking Water Quality Report; Madison, WI](#)

After each group has had time to read, each group will share out the key takeaways from what they read with the class as a whole. Create a chart on the board of causes and consequences of water shortage in the US.

4. As an assignment, ask students to think globally; how does the water problem extend beyond our local/national border? Students will be asked to complete a [Current Events Assignment](#) that asks them to look for an article about water scarcity on the global level.



Step-by-step directions, Days 2 & 3/Activity 2

1. Students will begin the class by sharing the information they discovered in their Current Events Assignment; current water issues globally. While they are sharing, have a world map up on a SMART Board or projector, and place a dot on each location to reflect; are there any connections? Geographic locations? Poverty?
2. Students will look at the same issue they did on Day 1; water footprint, but globally. How does their water footprint differ from that in other countries? What sort of things may influence this? [Average Water Use Per Person/Day World Wide](#)
[Water Footprint by Country](#)
3. Students will discuss similarities and differences between local/national and global water scarcity issues they have learned about. Each student will choose a [Water Scarcity Project](#) to research and complete on Day 3, and then share with the class.

Step-by-step directions, Day 4 & 5/Activity 3

1. After sharing their Water Scarcity Projects with the class to learn from one another, have students brainstorm a list of ways in which they can affect change for areas that are experiencing water scarcity.

Teacher's Experience (Activity 3)

"My class has always created a service project in which we have organized to raise money and fund a water well in different areas of need in Africa. We have done this through a partnership with Strides for Africa, a local organization that works to place water wells in underdeveloped areas in Africa. To do so, students break into different committees, each brainstorming ideas and taking action; fundraising, education/outreach, media/advertising and community resources. My students were paired with a school in Bassa Town, Liberia and we were able to write letters back and forth to students in the village and ask questions about how water scarcity affects their daily lives. My students created a presentation on the village and water scarcity and taught the lesson to all 6th grade students in our district, as education was a big part of our project. Those students then brainstormed ways they could raise money to help our project and it really became a community event. My students worked on Water Fundraising Project and were able to raise enough money to place the well in Bassa Town. If each school worked to do this, or partnered with other schools, think of what a change we could make!"

Assessment

Student Water Scarcity Project will be assessed using the [Water Scarcity Project Rubric](#). Water Fundraising Project will be assessed through student reflection on their role in the project and its success.

Resources

- [USGS Water Science School](#)
- [UN Water Project](#)
- [Strides for Africa](#)

Teacher's Experience (Resources)
My students also read the book, *A Long Walk to Water* by Linda Sue Park and did daily readings and reflections while working on our water project. In conjunction, they learned about the war in Sudan, the Lost Boys, the different tribes and their relationships, and how water was used in both Salva and Nya's lives.

Exploring Environmental and Community Impacts of Agricultural Practice

Jill McNew-Birren, Marquette University
jill.birren@mu.edu

Context

These activities will be used in a Modes of Inquiry course as a part of Marquette University's recently redesigned Core of Common Studies. The course explores a problem or issue from three different scholarly perspectives. The audience for the course is all undergraduate students. The plan encompasses one week of class, which includes two 50-minute class sessions with 60 students and a TA-led discussion session with 15-20 students.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K-12).

1.4 Personal and civic responsibility

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX4 Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

ELS.EN6 Students analyze the dynamic balance between natural and cultural systems.

ELS.EN7 Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- Data and research texts related to items in directions

Driving Question

How does an individual/small group concern become a community issue/crisis?

Step-by-step directions, Activity 1 - Becoming Activists

1. Have students review data excerpts (proprietary) regarding activists recalling their former emergent concern over local contamination and human impacts. Another option is to have students consider their own experiences with concern about human impacts on the environment.
2. Discuss what activism means, how activists are "made", and how activism is or is not effective in communities.
3. Ask students to consider different natural and cultural influences contributing to and controlling local environmental contamination concern. How are these contributions balanced or unbalanced? What innovations could enhance balance?

Step-by-step directions, Activity 2 - Activist contribution to policy conversations

1. Have students examine excerpts from participant contribution to public meetings and commentaries and consider these questions.
 - How do activists construct arguments?
 - What policies are referenced?
 - What science/local conditions do activists reference?
 - What local knowledge do activists reference?
 - Which arguments appear most influential?
 - What makes an effective argument?

Step-by-step directions, Activity 3 - Developing a position

1. Graduate assistants will lead students in developing a position regarding community environmental contamination and an argument/statement to present at a public meeting promoting a particular policy intervention.

Assessment

Students will submit their statement for a public meeting defending their position and arguing for a particular policy intervention. The statement will be graded based on its relevance to the particular public discussion and inclusion of scientific, local and political knowledge within a coherent argument.

Resources

- Data from research projects used is proprietary.

huckebjl@milwaukee.k12.wi.us

Context

Middle School, Science, Social Studies, English Language Arts, Technology

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.2 Knowledge of environmental processes and systems

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1 Students develop and connect with their sense of place and well-being through observation and questioning.

ELS.EX2 Students evaluate relationships and system structures to demonstrate the interdependence of natural and cultural systems

ELS.EX4 Students examine the interactions and outcomes of cycles and flows in natural and cultural systems.

ELS.EX5 Students investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EN6 Students analyze the dynamic balance between natural and cultural systems.

ELS.EN7 Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- Map of school property
- Create a legend of symbols to record their observations
- 1 golf ball per group
- Computers
- Worksheet (found at the end of the activity)

Driving Question

How do we affect Lake Michigan?

Step-by-step directions, Activity 1

1. In groups, students will use a map of the school to indicate where one can find the roof, parking lot, sidewalks, grassy areas, playground, and where courtyards drain. They will also indicate where they found litter, oil or gas, etc.
 - Students may use golf balls to recognize that water flows downhill and be able to indicate in what

Name: _____ Date: _____

Using the sites listed below, answer the questions.

<https://www.mmsd.com/what-we-do/wastewater-treatment>

http://city.milwaukee.gov/mpw/divisions/operations/sanitationoperations#.Wy6L_NI3nZ4

<http://city.milwaukee.gov/recycles>

<https://dnr.wi.gov/topic/water.html>

1. Where do storm drains empty?
2. Where does our toilet water, sinks, bathtubs, and bubblers empty?
3. What kinds of pollutants enter our storm drains?
4. What kinds of pollutants enter our sewer system?
5. What is the Deep Tunnel?
6. Where does our garbage go?
7. How does Milwaukee Metropolitan Sewerage District use landfill gas?
8. What happens to our recyclables?

direction the rain would drain.

2. After creating maps, students will hold a discussion in the classroom about what they have learned. This discussion will focus on the fact that much of our water empties into storm drains. Then ask, where do the storm drains empty? Do our toilets, sinks, and drinking fountains empty into these same drains? What kind of pollutants did you find? Where are those pollutants going? How does the city of Milwaukee deal with sanitation, stormwater, garbage, and recyclables?

Step-by-step directions, Activity 2

1. Ask students to investigate where the water, garbage, and recyclables go in Milwaukee.
2. Provide websites for students to answer questions about how our city deals with sanitation, stormwater, garbage, and recyclables.

Step-by-step directions, Activity 3

1. After learning about how our city deals with sanitation, stormwater, garbage, and recyclables, students will choose one topic to research further.
 - Specifically, encourage students to choose from a list of possible topics or create their own (with teacher permission). Disposal of medicine, disposal of hazardous materials, effects of fertilizer, automobile pollutants, garbage collection and landfills, recycling, plastic problems for the Great Lakes, pet waste disposal, road salt and our watershed, and lead in our drinking water are some of the possible topics to choose from.
2. The goal is that each student will create a teaching tool for younger students. This may be a Public Service Announcement, a coloring book, poster, etc.

Assessment

Student learning will be assessed using their completed project. Students will be asked to present to students in the elementary school what they have learned.

Resources

- <https://www.mmsd.com/what-we-do/wastewater-treatment>
- http://city.milwaukee.gov/mpw/divisions/operations/sanitationoperations#.Wy6L_NI3nZ4
- <http://city.milwaukee.gov/recycles>
- <https://dnr.wi.gov/topic/water.html>

Geography, the Environment and the Human Beings!

Yun-Wen Chan

Curriculum and Instruction, University of Wisconsin-Madison

ychan25@wisc.edu

Context

This is intended for a pre-service teacher methods course. The subject areas that could be covered include cultural geography, social studies education, and sustainability education.

Activities in this lesson can be targeted at grade 6-12, or even adult learners. Depending on the grade level, the instructor is encouraged to ask deeper questions and guide students to think deeply by using the three pillars of sustainability: environmental, social, and economic factors.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

- 1.1 Questioning, analysis, and interpretation skills
- 1.2 Knowledge of environmental processes and systems

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX3: Students assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX3.B.m: Examine the relationships among resources use, environmental quality, and human health and well-being.

ELS.EX3.C.m: Analyze the environmental, social, and economic aspects of community health and sustainability

ELS.EX5: Investigate and analyze how change and adaption impact natural and cultural systems.

ELS.EX5.B.i: Describe how living things respond to changes in natural systems. Explain how changes affect how organisms adapt and survive.

Materials

- Images of “students going to school” (found at the end of the activity)
- Worksheet A (found at the end of the activity)
- Worksheet B (found at the end of the activity)

Driving Questions

How does the environment affect the way people live?

How do human behaviors change the environment?

Introduction

When we talk about the relationship among geography, environment, and human beings, there are two

essential questions that we will need to consider: (1) How does the environment shape the way people live? (2) How do human behaviors change the environment?

The goal of this lesson is for students to understand how physical geography affects the way people live. Images will be used to accomplish this goal. There are three parts in this lesson plan: modeling, pedagogy reflection, and application as follows:

[MODELING]

This lesson will begin with modeling an image analysis activity “how do students go to school?” Then, students will be given a short lecture about “how to read an image” and then use these strategies to work on small group analysis.

[REFLECTION]

Subsequently, we will reflect on the benefits of pedagogies and generate ideas about how we could apply “image analysis” in different subjects and contents.

[APPLICATION]

Finally, pre-service teachers will work in small groups to design an activity targeted on “how do human behaviors change the environment?”



Step-by-step directions, Activity 1 - How do students go to school? [modeling]

Learning objectives:

- Students will be able to answer the question “How does the physical environment shape the way people live?” by analyzing images about “students going to school” in different cultural contexts.
- Students will be able to analyze images from three dimensions of sustainability: environmental, social and societal factors.

1. Students recall their experiences: Ask students “how do they go to school?” Students may come up with different ways, like taking the bus, walking, etc.
2. Show students the image of “U.S. school bus” and compare to their life contexts: “So I bet you’re pretty familiar with this situation?” Show students the U.S. school bus photo (Image 1), asking them their feelings about this image.

3. Connect students’ life experiences to students in other cultural contexts by observing the image: Show Image 2 to students. Guide students to guess and focus on observing the photo.

Guiding questions:

- What did you see in this photo?
 - What modes of transportation do they use to go to school?
4. How to read an image: Guide students to go through the steps for reading an image. How to Read a Photo? (Observe, Deduce & Infer)
 - People (Who are the people? One or a group? Gender? Age? Relationship to others?)
 - Time (What’s the time of day, season, period or century?)
 - Activities/Events (What are the people doing? What event is taking place?)

- Place (Is it urban or rural? Is it indoor or outdoors? Describe buildings, landscapes, and other features.)
5. Analyze the images: After observing Image 2, guide students to think about what factors may lead them to go to school in certain ways.
Guiding questions:
 - Why do you think these students travel to schools?
 - What are the environmental factors?
 - What is the landscape like?
 - What might be other factors? Economic, social or political factors?
 6. Analyze the images with three pillars of sustainability: Pass along the two worksheets found at the end of the lesson. Group students to work in groups of four. One pair works on worksheet A. The other pair works on worksheet B. Each pair should write down their observations and then share their ideas with the other pair in their group. Go around and check with every group, asking them questions to facilitate their analysis.
 7. Whole group sharing: Try to encourage them to think more deeply about the images. Then, give students the answer of the location of the image as well as providing them with some factual knowledge about the images (read the 1st link in resources).

Step-by-step directions, Activity 2 - Pedagogy Reflection [reflection]

1. Show students the discussion questions, ask for thoughts.
 - Why are images powerful in teaching?
 - What are the strengths of using images in teaching?
2. Show students what researchers say about the benefits of using images in teaching:
Benefits of Using Pictures in Teaching
 - Pictures can translate abstract ideas into more realistic forms
 - Pictures are helpful at different academic levels (e.g. English Language Learners)
 - Pictures in sequence can be used in free writing exercises.
 - Pictures are very important in helping students retell experiences or understand something since images can represent place, object, people, etc.

Step-by-step directions, Activity 3 [application]

Learning objective:

Pre-service teachers will be able to use images to design an activity to help their students explore “how human behaviors affect the environment.”

1. In groups of 4, ask students to design an activity to help students learn how human behaviors affect the environment. They will need to identify and come up with:
 - Learning objective
 - Grade level
 - Essential questions
 - Procedure (steps for teaching)

Assessment

The worksheet and activity description are the assessments of the students.

[accommodation] If there are ELL learners in your course, encourage to “draw” their answers.

Resources

- [25 Of The Most Dangerous And Unusual Journeys To School In The World](#)
- [10 Activities- Using Pictures in Class](#)
- [20 most dangerous ways to go to school](#)
- [How to Read a Photo](#)
- [Visual Literacy](#)
- [The Advantage of Using Pictures in Teaching Genre: Narrative, Recount, Procedure, Descriptive, and Report Text](#)

How Do We Affect Lake Michigan?

Jennifer Centner, Milwaukee Public School Teacher

Image 1



Image 2



Worksheet A



A. How do students go to school?

What do you see in these photos? (Examine these photos for a few minutes. Describe what you see.)

What modes of transportation are used by the students in these photos?

B. Why do you think these students travel to school in this way? (Use evidence from the photo to support your conclusion.)

What are the environmental factors that shape the way in which these students go to school?

What other factors (economic, political, social) might shape the way these students go to school?

C. Where do you think this takes place? (Which country and why?)

D. What other questions do you have about these photos? (Where could you find answers for them? What can you infer?)

Worksheet B



A. How do students go to school?

What do you see in these photos? (Examine these photos for a few minutes. Describe what you see.)

What modes of transportation are used by the students in these photos?

B. Why do you think these students travel to school in this way? (Use evidence from the photo to support your conclusion.)

What are the environmental factors that shape the way in which these students go to school?

What other factors (economic, political, social) might shape the way these students go to school?

C. Where do you think this takes place? (Which country and why?)

D. What other questions do you have about these photos? (Where could you find answers for them? What can you infer?)

Maple Sugar Camp

Craig Corn, Menominee Tribal School
K-5 Menominee Language Teacher
cornca@mitwmts.org

Context

This lesson looks at the who, what, where, when, how and why of maple sugaring camp along with all the cultural teachings and vocabulary in the Menominee language. For grades 3-5. Best completed in late March/early April (2-3 weeks).

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of the natural and cultural systems.

ELS.EN7.A.i. Describe and analyze ways that youth, acting as individuals or members of a group, create beneficial change, meet individual needs, and promote the common good. Investigate sustainability issues that need attention in a school or community, and brainstorm potential solutions, considering perspectives of multiple stakeholders.

Materials

- Taps
- Drills
- Pails
- Hammer
- Containers
- Tobacco
- Boiling pans
- Boiling equipment



Driving Question

Why do we go and participate in maple sugar camp? Is this part of our Menominee history/culture?

Step-by-step Directions, Activity 1

1. Show students how to identify a hard/sugar maple tree. Identify what time of year that we start the sugaring process. Put down tobacco and say prayers to the maple spirits.

2. Show students how to identify the west side of the tree. Drill and clean out hole. Pound in the tap. Set pail/bag up to catch sap.
3. Share Menominee oral stories. Promote long term sustainability.
4. Discuss effects that climate change has on our history & culture of Menominee sugar camps. Incorporate as much Menominee language as possible.

Step-by-step Directions, Activity 2

1. Boil sap down to syrup.
2. Share equations with students about the sugar content.
3. Boil syrup down to cakes or sugar.
4. Incorporate as much Menominee language as possible.

Step-by-step Directions, Activity 3

1. Share our finished maple syrup product with school community, and community stakeholders (elders, veterans, parents). Incorporate as much Menominee language as possible.

Assessment:

The students will have an expanded Menominee language vocabulary and expanded knowledge of Maple sugar camp & the whole process of gathering and processing maple sugar/syrup.

Resources

- Written/Oral history



Oh Say Can You See?

Joel Donna, University of Wisconsin - River Falls

joel.donna@uwrf.edu

Context

This activity will be used within a pre-service elementary science methods course.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.3 Planning for instruction

Wisconsin Standards for Environmental Literacy and Sustainability

ELS. C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.B.e - Identify the natural and cultural parts that make up one's community (e.g., natural and built environments, habitats, family, school, cultural diversity), identify relationships between parts, and the role and impact of humans in those systems.

ELS.C1.C.e Explore outdoors, observing changes over time; describe and ask questions about patterns in natural and built environments.

ELS.C1.D.e - Recognize emotions relating to daily sensory observations and learning during integrated nature play.

Materials

- Colored pencils
- Sketch books

Driving Question

How can we integrate observation, inference, and wondering skills into our lessons?

Step-by-step directions

1. Define observations and inferences (qualitative/quantitative) and wondering.
2. Share guiding question - "How can we integrate observation, inference, and wondering skills into our lessons?"
3. Explain that we will be going outside to practice our observation skills.
4. Bring students outside to an urban environment and find a tree to look at. First, students will observe the tree from far away, then we will move close, and then even closer.
5. Students will then find natural objects in a small area to sit and sketch. They will label observations and come up with at least two wonderings and two inferences. This will take 10 minutes.
6. Students will work with their groups using a Think - Pair - Share protocol
 - What are some things you inferred? What did you wonder about?
 - What are some properties of your object that you observed?

- How did these natural objects interact as part of a system? With humans?
 - What emotions did this activity evoke for you? How did this feel being in this space?
7. Students will then examine the NGSS science and engineering practices - Engaging in Argument from Evidence
 8. Students will examine the Wisconsin Standards for Environmental Literacy and Sustainability - ELS.C1.C.e / i
 - ELS.C1.B.e - Identify the natural and cultural parts that make up one's community (e.g., natural and built environments, habitats, family, school, cultural diversity), identify relationships between parts, and the role and impact of humans in those systems.
 - ELS.C1.C.e - Explore outdoors, observing changes over time; describe and ask questions about patterns in natural and built environments.
 - ELS.C1.D.e - Recognize emotions relating to daily sensory observations and learning during integrated nature play.
 9. Students will then spend time integrating observation skill development into their lessons and connect to various standards.

Assessment

Evidence of observation integrated into lessons

Resources

- [Integrating Environmental Education into Science Education](#)

Learn Your Student's Place - Student Community, Cultural, and Personal Bridges into Science

Joel Donna, University of Wisconsin - River Falls

joel.donna@uwrf.edu

Context

This activity will be utilized by students after they have prepared science lessons to help them make asset connections to their students' environments.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.3 Planning for instruction

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX3. Students assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX4: Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

ELS.EX5: Investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

Materials

- Access to science standards

Driving Question

How can we use the natural and cultural phenomena and natural and designed world systems of our students' school yards, homes, and communities as bridges into the science we will teach?

Step-by-step directions

1. Have students investigate science standards that relate to natural and cultural systems.
2. At their field placement, they will go on a walkabout with their peers examining the schoolyard and the neighboring environment (where their students may live).

3. Students will list phenomena (e.g. observable events in nature) that could be related to students' personal, community, or cultural assets.
4. Students will identify one natural or designed system - describe the parts and how they interconnect (explain how humans impact the system).
5. Students will explain how environmental quality of system might be improved.
6. Students will explain how cultural systems (humans) influence the natural systems.
7. Students will think about how they might then integrate the schoolyard and community into their instruction such as through phenological study (e.g. looking at a particular tree or bush).

Assessment

Students will answer the questions above and submit to course instructor.

Resources

- [Integrating Environmental Education into Science Education](#)



Integrating Environmental Education “Talk Moves” into Our Lessons

Joel Donna, University of Wisconsin - River Falls

joel.donna@uwrf.edu

Context

This activity will be used within a pre-service elementary science methods course.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.3 Planning for instruction

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX3. Students assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX4: Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

ELS.EX5: Investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

Materials

- Lesson Plans
- Wisconsin Standards for Environmental Literacy and Sustainability

Driving Question

How can we integrate standards for environmental literacy by adding higher order questions during the debrief of our science lessons?

Step-by-step directions

1. Students will review the “[Science Talk Primer](#)” with a specific focus on the “[Checklist for Productive Discussions](#).” Students will also review higher order stems.
2. Teacher will engage students in discussion of differences in pedagogy and goals between

environmental education and science education using the “[Integrating Environmental Education into Science Education](#)” resource with a focus on integrating higher order thinking questions into the investigation debrief and clarification phases of science learning segments.

3. Students, in groups of three, will be assigned to review selected Wisconsin Standards for Environmental Literacy and Sustainability at their grade band. They will think about the lessons they are planning to teach and how they might develop question stems related to their lessons. They will select one lesson from the group that would be easiest to integrate questions into (e.g. those that investigate natural systems).
4. Groups will generate three higher order questions on a whiteboard aligned to the assigned standards. For example, a teacher may be teaching a lesson on Monarch Butterfly gardens in grade 1. They could look at the sense of place learning priority C1.B and ask a question such as “How do we humans impact the monarch garden system?”
5. A gallery walk will be used to solicit feedback from other groups.
6. The teacher will then hold a reflective discussion about what it was like to try to integrate the questions.
7. Work time will take place in which students will integrate at least one higher order question.

Assessment

- Students’ integration of a higher order thinking question into their lessons
- Students’ use of higher order thinking questions in their practice lessons

Resources

- [Integrating Environmental Education into Science Education](#)



Systems Theory, an Organizing Framework for Interdisciplinary Instruction

Vicky Eiben, Viterbo University

veiben@viterbo.edu

“When we try to pick out anything by itself, we find it hitched to everything else in the Universe.”

John Muir

Context

The target group for this activity are junior or senior pre-service teachers preparing to teach K-8 grades. The specific course in which this set of activities would be embedded is Interdisciplinary Instruction, which is a required course for elementary education majors. These lessons would be taught in the early weeks of the course as part of providing a rationale and framework for interdisciplinary instruction as well as supporting student development as systems thinkers.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.A.i: Analyze a system to break it down into its component parts to understand their interconnectedness in forming the whole system.

ELS.EX2.A.m: Recognize a system through analyzing alternative boundaries, perspectives, relationships.

Compare the relationship between two wholes by comparing the relationships of the parts.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

ELS.EN6.A.i: Make connections between parts, systems, relationships, and perspectives in a system to identify how things work.

Materials

- Articles to introduce the concept of systems theory—from Capra and/or Stone or other articles as identified
- Drawing paper and colored pencils
- Chart paper and markers

Driving Question

How can an understanding of systems thinking support interdisciplinary teaching?

Step-by-step directions, Activity 1—Molecules in Motion

This activity is a modification of Molecules in Motion-Project Wet (pg. 33).

1. Each student is to imagine being a molecule that is “bonded” to two other molecules. (Draw what this might look like on the board.) The goal is for each person to maintain an equal distance from each of the two molecules. As one person moves, it will cause a chain reaction of movements throughout the room.
2. Discuss
 - What did students observe?
 - How have students seen this kind of reaction in their lives, at work, in the classroom?
 - What does this model have to do with teaching?
 - What does it have to do with interdisciplinary teaching?
 - What is a system?—see various definitions (Capra, authors in Stone, Betts, etc.)

Step-by-step directions, Activity 2—Systems Thinking Definitions

1. In preparation for this day, students have read an article/articles by Capra or from the Stone collection.

Vocabulary

- Paradigm
 - Mechanistic Paradigm
 - Natural Systems
 - Cultural Systems
 - Learning Systems
 - Networks
 - Systems and Nested Systems
 - Systems Thinking
 - Interdisciplinary Instruction
2. Whole Group: Begin with an instructor led form drawing that illustrates the dynamic and interrelated nature of systems and provides a time of relaxation and focus for the students.
 3. Instructor presentation on the mechanistic worldview and the influence of this worldview on our education system.
 4. Group Work: In groups of two or three, each group is given a vocabulary word and a formal definition. The group provides examples, expands on their understanding of the definition, and discusses how the concept relates to their work as a pre-service teacher. After time for discussion, each group is given a large chart paper to make a graphic representation of their term along with their own definition/description.
 5. Gallery Walk: This is followed by a gallery walk with groups rotating among the charts and a couple minutes for discussion at each chart.

Step-by-step directions, Activity 3

1. Begin with an instructor led form drawing that illustrates the dynamic and interrelated nature of systems
2. Review the developing understanding of what systems theory is. Use a brief video to reinforce what has been learned so far. Possibilities are:
 - [Peter Senge Introduction to Systems Thinking - YouTube](#)
 - [Systems Thinking white boarding animation project - YouTube](#)

- [The Value of Systems Thinking - YouTube](#)
 - [What is Systems Thinking? - YouTube](#)
 - [Systems Thinking: A Group Demonstration - YouTube](#)
3. Identify key pieces from the video. What does this mean for how we teach?
 4. Instructor—Compare and Contrast a Mechanistic Worldview with a Systems Worldview (see Resources).
 5. Provide students with a graphic for note taking.
 6. With elbow partners, discuss how systems theory can influence/inform your work as a teacher. How can systems theory influence our work in Interdisciplinary Methods, Science Methods, or Social Studies Methods?
 7. Lead a whole group share.
 8. Give reflection time to draft a paragraph description of what systems theory means for their work as future teachers.

Assessment

Performance Indicator—ELS.EX2.A.m

Students/the pre-service teachers will write a paragraph description of what systems theory is and what it means for their work as a teacher.

Content Understandings

- Systems thinking is a holistic approach to analysis that focuses on the way that a system's constituent parts interrelate and how systems work over time and within the context of larger systems. The systems thinking approach contrasts with traditional analysis, which studies systems by breaking them down into their separate elements.
- Systems Thinking has grown into widespread use because it offers people a way to approach complex and persistent problems more effectively.
- Systemic thinking, unlike analytical thinking, requires multiple skill sets to establish a holistic view of a system and explain its behavior. On the contrary, analytical thinking is used to break down a system into simpler parts in order to identify the pieces and examine how they work together.

Resources

- Betts, F. (1992) How systems thinking applies to education. *Improving School Quality*, 50 (3), pp. 38-41.
- Eiben, V. (2007). Systems thinking, fragmented schooling, and educational transformation. Unpublished paper for Systems Theory course at Fielding Graduate University.
- Rodriguez, V. (2013). The potential of systems thinking in teacher reform. 2(7). *International Mind, Brain, and Education*.
- Stone, M. & Barlow, Z. (Eds.). (2005). *Ecological literacy: Educating our children for a sustainable world*. San Francisco: Sierra Club Books.

Teaching and modeling Wisconsin's Standards for Environmental Literacy and Sustainability

Becca Franzen, University of Wisconsin-Stevens Point

bfranzen@uwsp.edu

Context

These activities are intended to be taught in a course for pre-service teachers that introduces environmental studies and environmental education. It is anticipated that each activity would take approximately 50 minutes.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Two: Foundations of Environmental Education

Educators must have a basic understanding of the goals, theory, practice, and history of the field of environmental education.

Theme Three: Professional Responsibilities of the Environmental Educator

Educators must understand and accept the responsibilities associated with practicing environmental education.

Wisconsin Standards for Environmental Literacy and Sustainability

Although all standards will be reviewed due to the nature of the activities, we will hone in on the following:

ELS.C1. Students develop and connect with their sense of place and well-being through observation and questioning.

ELS.EX2. Students evaluate relationships and system structures to demonstrate the interdependence of natural and cultural systems.

ELS.EN7. Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

Activity 1

- Access to electronic copy of [ELS standards](#)
- Worksheet (found at the end of the activity)

Activity 2

- [Worksheet](#) from Places We Live

Activity 3

- Materials for [Working Together](#) from LEAF's Urban Forest Lesson Guide

Activity 4

- Check with contact for necessary materials

Driving Question

How can the Environmental Literacy and Sustainability standards drive instruction?

Step-by-step directions, Activity 1

1. Introduce the standards to the students, highlighting some of the background material provided in the beginning of the standards document. Explicitly point out that these are intended to be interdisciplinary and used by all teachers.
2. Tell students to visit <https://dpi.wi.gov/environmental-ed/standards> to open an electronic copy of the standards. Using the worksheet, students will examine the standards more closely by looking for performance indicators that could be examples of other content areas. Students will document these on their worksheet. You could also choose to create a Google doc that students use at the same time to enter in their ideas.
3. Lead a discussion about the interdisciplinary nature of the standards and their appropriateness for all subject areas.

Each of the next three activities will highlight one strand of the standards.

Step-by-step directions, Activity 2

This activity will illustrate Connect.

1. Taken from Personal Places (an activity in Places We Live by Project Learning Tree), have students draw their place as they remember it, from when they were 10 years old. Where did they live? What did it look like? Have students draw a map from memory. Then, have them think about where they live now. Is the community special to them? Why or why not? What are special qualities of the community? Would others view them as being special? Have them partner up and share their responses.
2. Lead a discussion that links this activity to ELS standards. Point out that this activity clearly links to Standard 1.

Step-by-step directions, Activity 3

This activity will illustrate Explore.

1. Introduce Working Together. Hand out the needed supplies, as described in the activity. Students will get to work deciding how they will lay out their own piece of property. Once they are finished, begin to put together their various properties into a single neighborhood. Allow for discussion.
2. Lead a discussion that links this activity to ELS standards. Point out that this activity clearly links to Standard 2.

Step-by-step directions, Activity 4

This activity will illustrate Engage.

1. Set up an environmental service project for your students at your campus. Make sure to link the project to your class content.
2. Lead a discussion that links this activity to ELS standards. Point out that this activity clearly links to Standard 7.

Assessment

Check for student understanding during discussions. Additionally, ensure that students appropriately use the standards in a future lesson plan assignment, if applicable.

Resources

- ELS Standards: https://dpi.wi.gov/sites/default/files/imce/standards/New%20pdfs/Wisconsin_Standards_for_Environmental_Literacy_and_Sustainability_2018.pdf
- <https://www.uwsp.edu/cnr-ap/leaf/Pages/default.aspx>
- <https://www.plt.org/curriculum/places-we-live/>

Exploration of ELS Standards

Identify Performance Indicators that would enable you to teach environmental education within at least 4 of these content areas. Write the appropriate number in the table below (ELS.CI.A.e).

Subject Area	Performance Indicator
Life Science	
Physical Science	
Earth and Space Science	
History	
Civics/Economics	
English Language Arts	
Physical Education	
Health Education	
Art/Music/Performing Arts	
Foreign Language	
Mathematics	
Technical Education/ Technology and Engineering	
Family and Consumer Science	
Geography	
Business	
Psychology	

What Might Happen If?: Animal Adaptations and the Consequences of Human Activity

Jennifer Gaul-Stout, Marquette University

jennifer.gaul@marquette.edu

Context

The described activities will be conducted in an elementary science methods course (Teaching Elementary and Middle School Science). This semester (15 week) course is required for all elementary pre-service teachers and meets twice a week for 75 minutes. The activities are meant to be models of planning and instruction for the benefit of pre-service teachers. Each activity is between 15 and 30 minutes in length for the purpose of pre-service instruction but may be adapted and extended for use in 3-5 classroom periods. These activities also meet NGSS 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 change.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Three: Professional Responsibilities of the Environmental Educator

Educators must understand and accept the responsibilities associated with practicing environmental education.

3.1 Exemplary environmental education practice: Educators understand their responsibility to provide environmental education that is appropriate, constructive, and aligned with the standards of the field.

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.A.i Analyze a system to break it down into its component parts to understand their interconnectedness in forming the whole system. Identify a familiar system, differentiate and relate ideas, identify nested systems, consider perspectives and alternative boundaries, and name parts of relationships. Describe how perspective is comprised of both a point and a view.

Materials

- Whiteboard and markers
- Images of various animals
- Observation worksheets
- PPT with various animals with unique adaptations
- Construction paper
- Glue

Driving Question

How can human activity alter environments and drive physical changes in organisms?

Step-by-step directions, Activity 1

1. Students will be given a picture of an organism and be asked to identify any unique characteristics observed.
2. They will then be asked to brainstorm environments in which that characteristic would be useful for survival.
3. Students will be asked to consider why some characteristics match certain environments but not others.
4. Finally, students will be given resources (trade books, websites, etc) to further connect environments to the unique characteristics of their organisms.
5. The concept of adaptation will be introduced.

Step-by-step directions, Activity 2

1. Continuing with their data from the previous day, students will consider the implications of a drastic change in their assigned environment.
2. They will collaborate to determine what adaptations organisms may need to undergo (discussion of scope of time is important here) for the species to survive in the altered environment.
3. They will then create a torn paper collage that depicts their organism with new adaptations in the altered environment (tutorial found here <https://www.youtube.com/watch?v=OvOzDwxSIrQ>).

Step-by-step directions, Activity 3

1. Oh Deer activity (see pages 42-50 in Project WILD). Students will participate in Oh Deer, including a discussion on human impacts on deer populations.

Assessment

Students will show real-time problem solving and will be able to 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 change while engaging in the various activities. Final assessment will consist of students submitting a presentation on the impacts of human activities on ecosystems and animal populations.

Resources

- Animal artistry from Project WILD (2018 edition)
- Oh Deer activity adapted from Project WILD (2018 edition)
- <https://www.youtube.com/watch?v=OvOzDwxSIrQ>

On the Ice Age Trail: A Haunted Hike

Kelly L. Hatch, The University of Wisconsin-Whitewater

hatchk@uww.edu

Context

This series of three activities is designed for pre-service teachers who are preparing for licensure in grades K-9. This particular course, Children's Literature, is taught in the Literacy area of Curriculum and Instruction. The course is worth 3 credits and includes a service-learning component. Pre-service teachers will spend a significant portion of their class time outdoors on the Ice Age Trail near campus and will be required to give 15 hours of service to the Ice Age Trail Alliance in order to help maintain and sustain this vital resource. This lesson is appropriate for early elementary age students.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K-12).

- 1.1 Questioning, analysis, and interpretation skills

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

Materials

- Collection of children's picture books with "spooky" or Fall theme
- Notebook
- Pencils

Driving Question

How may pre-service teachers teach literacy outdoors on the Ice Age Trail?

Step-by-step directions

1. **Introduce.** To begin, meet at a segment of the Ice Age Trail or other outdoor space. Explain to students that they will explore children's literature with a Halloween/fall theme. Each student will be given a "spooky" or fall-themed children's picture book to read at any point of their choosing on the trail. Students shall explore their books as they consider ways that they may use the book with their young learners. They must consider the environment and how that may support or deter from the enjoyment of the text. 10 minutes
2. **Practice.** Students will disperse along the trail to read and think about their books. 20 minutes.
3. **Share.** Meet students back at the trailhead to discuss and share the books. Specifically, students will discuss specific activities/lessons they may integrate into the reading/sharing of their book. 20 minutes.
4. **Reflect.** Students will post the following in our classroom discussion folder:
 - Book title/author

- Brief description of book
- Brief analysis of book
- Description of lesson/activity
- Content areas that will be addressed in lesson/activity
- Considerations of how environment may support children’s understanding/participation in this activity/lesson.

Assessment

Use student reflections to track their progress on the Environmental Literacy continuum (Roth).

Resources

- Roth, C. E. (1991). Towards shaping environmental literacy for a sustainable future. *Standardization News*, 19, 42-45.

On the Ice Age Trail: Woods Runner

Kelly L. Hatch, The University of Wisconsin-Whitewater

hatchk@uww.edu

Context

This series of three activities is designed for pre-service teachers who are preparing for licensure in grades K-9. This particular course, Children’s Literature, is taught in the Literacy area of Curriculum and Instruction. The course is worth 3 credits and includes a service-learning component. Pre-service teachers will spend a significant portion of their class time outdoors on the Ice Age Trail near campus and will be required to give 15 hours of service to the Ice Age Trail Alliance in order to help maintain and sustain this vital resource. This lesson is appropriate for upper elementary age students.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K-12).

1.1 Questioning, analysis, and interpretation skills

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

Materials

- Woods Runner by Gary Paulsen
- Compasses
- Maps of trail segment

Driving Question

How may pre-service teachers teach literacy outdoors on the Ice Age Trail?

Step-by-step directions

1. **Introduce.** Meet students at the Ice Age Trail or another trail system for this activity. The students will have read the book *Woods Runner* by Gary Paulsen. When meeting at the trailhead, discuss the ways that young students may participate in discussions around the text in order to facilitate their comprehension. Explain an activity that these pre-service teachers may ultimately use with their young learners.
 - a. In groups of four, students will discuss the challenges that Samuel, the 13 year-old male protagonist faced during the American Revolution. Students may then



discuss how they would feel if they were in Samuel's shoes and experienced those types of challenges. They may, for instance, discuss the responsibility of guiding his family through the woods safely to Philadelphia. During this time, he used a compass. Assuming that students have learned the basic terms of a compass, the remainder of the lesson will involve navigation by compass.

- b. Model how to use a compass to find directions with a few students at a time. For instance, you can demonstrate the following:
 - Keep the compass flat and straight in front of you.
 - Line up the desired dial direction with direction of go arrow.
 - Turn with the compass until the needle is in the shed.
 - Encourage students to practice a few times with a partner before they disperse.
 - c. Give each group a map with specific directions that they must follow. They will need to use their compass in order to navigate their individual routes. As they complete their hike, ask students to consider the strengths and weaknesses of using an activity like this with young learners. Also ask them to think about the ways that the environment supports or deters from the objectives of the lesson. Finally, have students think about ways that they would modify the lesson to meet the needs of a wide range of learners.
2. **Practice.** Have students disperse in their groups of 4 to complete their hike. 30 minutes.
 3. **Share.** Reconvene at the trailhead to discuss student experiences. Each group will report about their route, as well as the challenges that they faced in navigating that route. Discuss the challenges that students imagine they may face if completing this activity with young learners. 30 minutes.
 4. **Reflect.** Students will post the following information in the classroom discussion folder:
 - What are the strengths of this activity?
 - What are the challenges? How would you address these?
 - How may this lesson be differentiated in order to meet the needs of students of all abilities?
 - In what ways did the environment either enhance or detract from the lesson?

Assessment

Discuss the experience with students in order to understand their general perceptions of the activity. Use student reflections to track their progress on the Environmental Literacy continuum (Roth).

Resources

- Ice Age Trail Atlas (2017-2019 edition)
- Roth, C. E. (1991). Towards shaping environmental literacy for a sustainable future. *Standardization News*, 19, 42-45.

On the Ice Age Trail: Service Learning with the Ice Age Trail Alliance

Dr. Kelly L. Hatch, The University of Wisconsin-Whitewater

hatchk@uww.edu

Context

This series of three activities is designed for Pre-service teachers who are preparing for licensure in grades K-9. This particular course, Children's Literature, is taught in the Literacy area of Curriculum and Instruction. The course is worth 3 credits and includes a service-learning component. Pre-service teachers will spend a significant portion of their class time outdoors on the Ice Age Trail near campus and will be required to give 15 hours of service to the Ice Age Trail Alliance in order to help maintain and sustain this vital resource. This lesson is appropriate for students from grades K-12.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K-12).

1.4 Personal and civic responsibility

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- McLoed Hoes
- McLoed Rake
- Loppers
- Pulaski Axe
- Pick Mattock
- 5 gallon buckets
- Leather gloves

Driving Question

How may pre-service teachers become stewards of nature in order to encourage their own young learners to do the same?

Step-by-step directions

1. **Introduce.** Meet students at a segment of the Ice Age Trail or other trail system. Invite Ice Age Trail Alliance partners to join for this activity, as they have the appropriate tools and understanding to support this activity. Discuss the importance of addressing erosion along the Ice Age Trail and other trails. Show a segment of the trail that has become eroded and demonstrate how we may manage

the trail in order to allow for appropriate water flow and drainage. Ask trail volunteers to CUSS (Care, Usage, Safety, Storage) the tools, demonstrating how each may be used safely. Follow this by demonstrating how students may address erosion of the trail by simply re-grading the slope of the trail's edge using a McLoed Hoe. Demonstrate the importance of removing any roots or shrubs that may be growing up into the trail and impeding proper water drainage. Explain to students how they may work with the tools, or how they may follow with buckets to remove the newly dug dirt and material. Instruct students to collect the material and deposit it well off of the trail. Ask trail volunteers to clarify the value of this work in maintaining and sustaining the Ice Age Trail or other trails. 30 minutes

2. **Practice.** Students will disperse along the segment of eroded trail in order to work. 60 minutes.
3. **Share.** Reconvene with students to debrief the experience. Ask students to tell me how they felt before beginning the work (for instance, hesitation/apprehension/irritation/excitement), how they felt while doing the work (for instance, fatigue/exhilaration/irritation/frustration/enjoyment) and upon completing the work (fatigue/exhilaration/relief/excitement). Ask them if they would consider doing this type of activity with their own young learners. 20 minutes.
4. **Reflect.** Ask students to post the following in classroom discussion folder:
 - Would you consider doing this type of activity with your own young learners? If yes, would you modify it in any way? How/Why? If no, explain why you wouldn't choose this type of activity.
 - Explain the challenges/limitations of doing this type of work with young learners.
 - What did you learn today?

Assessment

Use student reflections to track their progress on the Environmental Literacy continuum (Roth).

Resources

- Iceagetrail.org
- Roth, C. E. (1991). Towards shaping environmental literacy for a sustainable future. Standardization News, 19, 42-45.

Science-Technology-Society: Overview and Introduction

Ken King, UW-Eau Claire

kingkp@uwec.edu

Context

This lesson was developed to meet the needs of pre-service teacher education students. It provides a foundation for essential concepts in Science-Technology-Society (STS) as an approach to organize science instruction. This lesson is designed to be presented as part of a required science education or social studies education methods course. This lesson is the first of two lessons provided as an introduction to STS.

The driving force behind the STS movement is to provide a real-world connection for the student between the classroom and society. The process should give the student practice in identifying potential problems, collecting data with regard to the problem, considering alternative solutions, and considering the consequences based on particular decisions.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education Educators

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.3 Planning for instruction

4.7 Curriculum planning

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX5: Investigate how change and adaptation impact natural and cultural systems

EX.5.A. Decision making

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems

EN7.A. Investigation and inquiry

Lesson Objectives

Students will...

- Define Science-Technology-Society and state its value as a means of organizing instruction
- Analyze a sample lesson from the perspective of STS-based instruction
- Identify topics that can be used to develop STS-based instruction

Materials

Activity 1

- Scenario/context essay, laminated (one per student group) from "Grave Mistake" activity from Project WET
- Community Map, laminated (one per student group) from "Grave Mistake" activity from Project WET

- Data Set, laminated (one per student group) from “Grave Mistake” activity from Project WET
- Water-soluble markers (two per student group, 2 different colors)
- Loaf pan, clear/transparent
- Kool-aid (1 package)
- Play sand (500 ml)
- Spray bottle, with water (250 ml)

Activity 2

- Broad street area, London (1840s)
- Water-soluble markers (two per student group, 2 different colors)
- Duplication materials (victim cards, clue cards - 1 set for each team) from “Poison Pump” activity from Project WET

Driving Question

What is STS and what advantages are there to using STS as an organizational framework for classroom instruction?

Lesson Outline

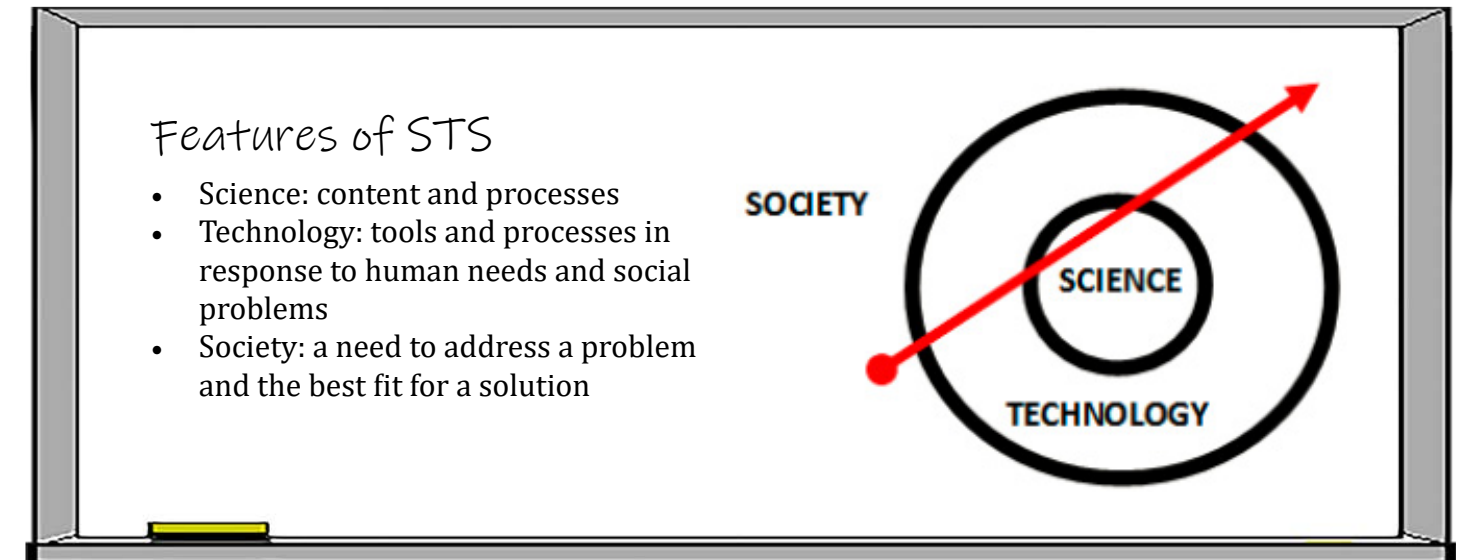
Step-by-step directions, Activity 1

Engagement

1. Carry out the “Grave Mistake” activity from the Project WET curriculum. The activity presents a scenario that challenges students to identify a polluter and to analyze the consequences of managing the source of the pollution. Consequences for each action present a challenge to determine the “best” outcome to ameliorate the pollution and the additional challenges associated with actions and consequences precipitated by actions.
2. Use the activity as a platform to discuss the richness of a real-world setting for grounding learning.

Exploration

3. Work with students to explore how each of the following points was present in the “Grave Mistake” activity. Ask them to explain, as each point is covered, how this sort of interdisciplinary instruction is more “real” than a strict, discipline/content based approach to teaching.
 - What was the role of scientific knowledge?
 - What was the role of technology?
 - What is the role of society?
 - What were the challenges faced by community members in this activity?
 - How did the decision making process take place?
 - Was there a single “best” solution?
 - How is this like the “real world”?
4. Work with students to clarify that the classroom activities that we typically experience tend to offer a significant departure from the “real world.” STS, by basing instruction in real-world questions, provides a foundation for students to solve real problems and take action on those challenges.



Step-by-step directions, Activity 2

Extension

1. Designing STS Instruction
 - Problem selection
 - Research/investigation
 - Proposed solution

Key points to cover in the discussion above: that a “good” question is one that provides an opportunity to ask and answer a question using data collected and analyzed by students. There may be multiple solutions; some of the solutions may be challenging from the perspective of having consequences that create additional problems. In the end, in addition to finding a solution to a challenge, carrying out an activity to solve a problem provides an opportunity to engage in constructive social action to solve the problem.

2. Designing your own STS Investigation
Brainstorm a possible topic. Use the points above (“Features of STS”) to provide substance to the outline of your investigation. Explain, based on previous course knowledge, how you would set learning objectives and assess a community-based experience such as this.
3. Carry out the “Poison Pump” activity from Project WET.
The activity presents a scenario that challenges students to identify a point source of contamination, to use evidence to locate that source, and to analyze the consequences of managing the source of the pollution. Issues related to economics and social class may be used to further develop understanding of the experience.
Use this activity to assess student understanding of the points above noted as “Features of STS” to confirm student mastery of content for lesson.

Assessment

What will you assess?

- Define Science-Technology-Instruction and state its value as a means of organizing instruction
- Analyze a sample lesson from the perspective of STS-based instruction

- Identify topics that can be used to develop STS-based instruction

How will you assess it?

- Define Science-Technology-Society and state its value as a means of organizing instruction - prompt students for a working definition of STS during the debrief of the “Poison Pump” activity. Use classroom discussion to help students move to a common working definition of the concept
- Analyze a sample lesson from the perspective of STS-based instruction - evaluate student discussion of the “Poison Pump” activity to ensure accuracy of understanding
- Identify topics that can be used to develop STS-based instruction - evaluate student responses to the discussion under the “Extension” portion of this lesson.

NOTE: these points will be further developed during the next lesson.

Resources

- Aikenhead, G. (1992). The integration of STS into science education. *Theory into Practice*, 31 (1), 27-35
- Henning, M. B., Peterson, B. & King, K. P. (2011). Infusing Science-Technology-Society into an elementary teacher education program: The impact on pre-service teachers. *Teacher Education & Practice*, 24(1), 46-65.
- Milson, A. J. & King, K. P. (2001). Investigating science-technology-society issues with prospective elementary school teachers. *The International Social Studies Forum*, 1(2), 77-87.
- Project WET. (2011). Project WET Curriculum and Activity Guide v 2.0. Bozeman, MT: The Watercourse

Science-Technology-Society: Implementation via the Use of Current Events

Ken King, UW - Eau Claire

kenneth.p.king@gmail.com

Context

This lesson was developed to meet the needs of pre-service teacher education students. It provides an extension for previously developed concepts in Science-Technology-Society (STS) as an approach to organize science instruction. This lesson is designed to be presented as part of a required science education or social studies education methods course. This lesson is the second of two lessons provided as an introduction to STS.

The driving force behind the STS movement is to provide a real-world connection for the student between the classroom and society. The process should give the student practice in identifying potential problems, collecting data with regard to the problem, considering alternative solutions, and considering the consequences based on particular decisions.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education Educators

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.3 Planning for instruction

4.7 Curriculum planning

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

C1.A. Perspective

ELS.EX5: Investigate how change and adaptation impact natural and cultural systems

EX.5.A. Decision making

Lesson Objectives

Students will...

- Apply Science-Technology-Society instruction concepts to develop an interdisciplinary lesson
- Explain how current events can be used to develop instruction

Materials

- Graphic organizer (attached at end of lesson)
- Water cycle posters from “Poison Pump” activity from Project WET
- Water cycle dice, construction guided by “Poison Pump” activity from Project WET
- Newspaper articles

Driving Question

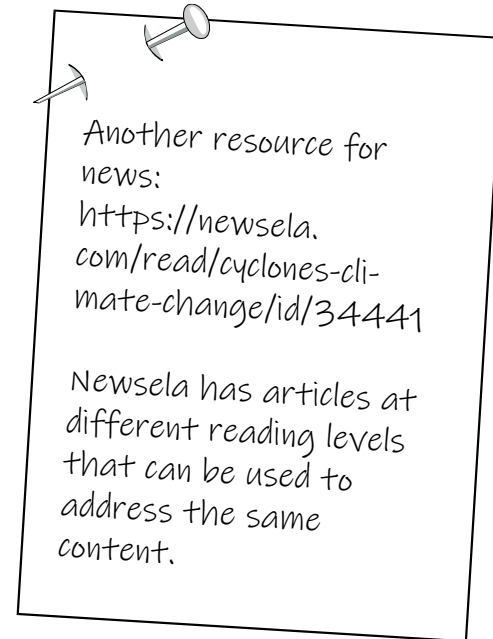
How can current events serve as an organizing principle for classroom instruction?

Step-by-step directions

Engagement

- Using the newspaper articles provided, identify content knowledge/skills from the following disciplines:
 - Social Studies
 - Science [+ Math]
 - Technology [+ Engineering]

Use the graphic organizer to organize your review. As you prepare to share your findings with members of the class, make note of the following: how does the proposed lesson (1) provide an opportunity for collection and analysis of information across multiple disciplines, (2) provide an opportunity for students to use a real world setting/context to support learning, and (3) provide students with an opportunity to engage in some degree of social action?



Exploration

- Report out by participants
 - What are some content areas that you identified?
 - What sort of questions did you come up with?
 - What sort of learning experiences could be developed from what you generated?
- Carry out the “Incredible Journey” activity from Project WET. The activity serves as a more comprehensive model for the water cycle. One point of interest in the model developed through the “Incredible Journey” activity is that it shows the dynamic relationship between clouds and the ocean. The movement of water (evaporation and precipitation) between the ocean and the atmosphere provides an opportunity to examine why hurricanes can be such devastating events.

Explanation

- The previous lesson had a somewhat stronger focus on science content. Have students evaluate the impact of catastrophic weather events on social science content, particularly with respect to economic and resource issues.

Social Studies Perspective

- Basic Economics Concepts: Productive Resources
- Human resources
- Natural resources
- Capital resources

Basic Economics Concepts: Engineering and Technology Applications

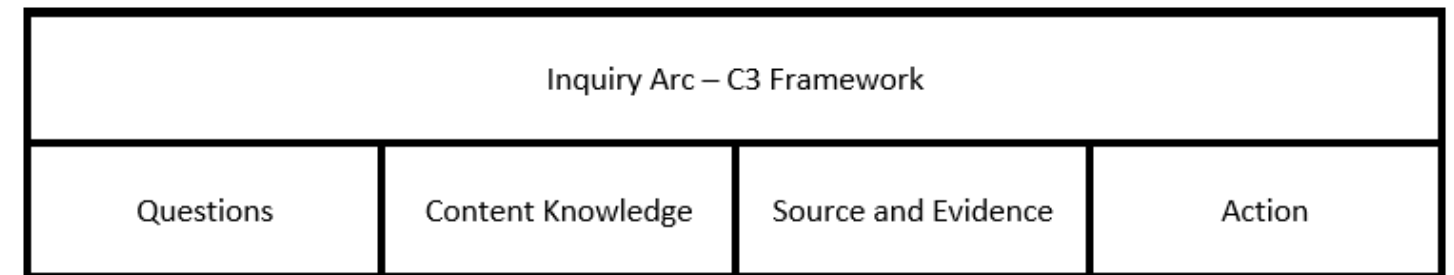
- Scarcity: Our wants are unlimited, but resources are limited.
- Opportunity Cost: We give up something each time we make a choice.
- Goods and Services: Goods are things we use, and services are things people do for us.
- Producers and Consumers: Producers are those who make and sell things; consumers are those who buy and use things.
- Productive Resources: Natural, human and capital resources are combined to satisfy our economic wants.
- Specialization: By doing what they do best, humans can become more productive.

Current Events Through an STS Framework

- Students can be introduced to economic and geographic thinking, through literature related to science, technology, engineering, and math.
- Children’s literature contains lots of STS and STEM content
- Understanding economic concepts is the first step toward economic and financial literacy and better decision-making.
- Mastering decision-making skills in elementary school helps students make wise choices throughout their lives.

Social Studies as a Process

- How does this inquiry arc for social studies education relate to carrying out STS instruction?
- What do social studies instruction and science instruction have in common?



Elaboration

Structuring the Curriculum Using STS

- Relevance
- Vocations
- Historical connections
- Philosophical
- Sociological
- Problematique

- Based on this framework of STS instruction, how is it different than traditional discipline-centered instruction?

Take this opportunity to update your graphic organizer to incorporate new content, perspectives, ideas into the document. Be prepared to discuss the following: how the proposed lesson (1) provides an opportunity for collection and analysis of information across multiple disciplines, (2) provides an opportunity for students to use a real world setting/context to support learning, and (3) provides students with an opportunity to engage in some degree of social action

Problematique: The complex of issues associated with a topic, considered collectively; specifically the totality of environmental and other problems affecting the world.

Key Takeaway

Science, technology and society (STS) is an interdisciplinary approach to curriculum and instruction. It considers how social, political, and cultural values affect scientific research and technological innovation, and how these, in turn, affect society, politics and culture and offers students an opportunity for social action based on what they learned through the investigation.

Assessment

What will you assess?

- Explain how current events can be used to develop instruction

How will you assess it?

- Develop a concept map that shows key questions around which instruction can be developed. Direct students to develop and revise a graphic organizer and evaluate how effectively the ideas extracted from the article provides a foundation for instruction. Look for evidence that the proposed lesson (1) provides an opportunity for collection and analysis of information across multiple disciplines, (2) provides an opportunity for students to use a real world setting/context to support learning, and (3) provides students with an opportunity to engage in some degree of social action

Resources

- Newspaper articles - related to hurricanes
- Bybee, R. W. (1987). Science education and the science–technology–society theme. *Science Education*, 71(5), 667–683.
- Henning, M. B., & King, K. P. (2005). Implementing STS curriculum: From university courses to elementary classrooms. *Bulletin of Science, Technology, & Society*, 35(3), 254–259.
- Henning, M.B. & King, K. P. (2017, October). The Science and Social Studies of Hurricane Harvey and Current Events. Presentation at the annual Illinois Council for the Social Studies State Conference, Palatine, IL.
- Project WET. (2011). Project WET Curriculum and Activity Guide v 2.0. Bozeman, MT: The Watercourse
- Yager, R. E. (1996). *Science/technology/society as reform in science education*. Albany: State University of New York.

DESCRIPTION OF THE ISSUE - STS ANALYSIS		
SCIENCE CONCEPTS	TECHNOLOGY CONCEPTS	SOCIAL SCIENCE CONCEPTS
WHAT QUESTIONS ARISE?	WHAT QUESTIONS ARISE?	WHAT QUESTIONS ARISE?
WHAT ACTION CAN YOU TAKE?		

Creating a Place-Based Field Trip

Scott Kirst, St. Norbert College

scott.kirst@snc.edu

Context

This activity will assess pre-service teachers on their ability to connect to, explore, and create a field trip based on a place of their own choosing. Additionally, the pre-service teachers will develop a plan on how to engage in the stewardship and sustainability of the natural and cultural systems of that place. This activity is designed for pre-service teachers who will teach intermediate and middle school students.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

Activity 1

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.B.i: Describe natural and cultural histories of a locality, explain the relationship between the two from a variety of perspectives, and identify how that creates a sense of place.

ELS.C1.C.i: Investigate and classify natural and designed objects, formulate questions about the relationship between physical and natural characteristics of the environment (e.g., soil/plants, water/animals), identify patterns, make predictions, and solve problems through sensory observations and active exploration outdoors.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.A.i: Analyze a system to break it down into its component parts to understand their interconnectedness in forming the whole system. Identify a familiar system, differentiate and relate ideas, identify nested systems, consider perspectives and alternative boundaries, and name parts of relationships. Describe how perspective is comprised of both a point and a view.

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

ELS.EN7.B.i: Design and implement a plan to address a sustainability issue, weighing the pros and cons of proposed solutions

Materials

- Class set of 8.5" x 11" pieces of construction paper or copy paper and pens to make the mini-journals
- A place to explore
- Technology, including cameras, audio recorders, or scientific instruments (temperature, humidity, water testings, etc.) to gather evidence
- Internet access

Driving Question

How and why do people connect to, learn from, and have a sense of well-being, while consciously present in a place?

Step-by-step directions, Activity 1

1. Introduce the objective: Pre-service teachers will be able to analyze why they feel a sense of place and experience a feeling of well-being through observation and questioning.
2. Identify end-of-class expectations: Students should create a script of investigatory questions to use while exploring their own place at the college.
3. Introduce the idea of place-based learning:
 - a. Read William James' quote:
"I am done with great things and big things, great institutions and big success, and I am for those tiny, invisible, molecular moral forces that work from individual to individual by creeping through the crannies of the world like so many rootlets, like capillary oozing of water, yet which, if you give them time, will rend the hardest monuments of man's pride."
 - b. Ask the question: "What does this quote mean to you?"
 - c. Ask the question: "What does this have to do with systems thinking?"
 - d. Check for understanding and see if they recognize the system's approach of the parts of the whole and how small things affect larger things.
4. Ask the pre-service teachers "Where do you feel most connected on campus to your senses and well-being?"
 - a. Take five minutes and write where and why
 - b. Listen to their responses
 - c. Find common themes and ideas and list on the board. Examples could be:
 - Calming
 - Friends are there
 - Nature
 - Sounds
 - The feeling I get
 - d. Have them create a mini-journal to ask questions and document observations. An example can be found [here](https://static1.squarespace.com/static/5ee0db3c0b265d54c310b289/t/5eff0fec837deb5ea5ffc93d/1593774069861/make_a_six-page_book_out_of_one_sheet_of_paper.pdf): https://static1.squarespace.com/static/5ee0db3c0b265d54c310b289/t/5eff0fec837deb5ea5ffc93d/1593774069861/make_a_six-page_book_out_of_one_sheet_of_paper.pdf.
 - e. Have them add a title page on the first page (e.g. My Field Guide).
 - f. Label the pages as:
 - Page 2 - What do I see?
 - Page 3 - What do I hear?
 - Page 4 - How do I feel?
 - Page 5 - What "I Wonder..." questions do you have?

- Page 6 - What do you think was here 100 years ago? 1000 years ago? 1,000,000 years ago?
 - Page 7 - What other disciplines do you see represented here from the natural sciences?, social sciences?, art and humanities?, business and economics?, others?
 - Page 8 - Where can I find answers to my “I Wonder...” questions?
5. (Modeling) After sharing out, the facilitator will take them to a place on campus that they feel connected to and have a sense of well-being. One place that would work well would be the main hall on campus.
 - a. Ask students to look around at main hall for 10 minutes and, using their mini-journal, document some of their thoughts on what they see, hear, and feel on page 2, 3, and 4
 - b. The students will now listen to the (spoken) facilitator’s thoughts when sitting on the steps. Tell them that the facilitator will pretend they are not there and just wants to model what their brain does when engaged in connecting with a place using observation and questioning.
 - “I wonder if these steps are natural, or designed?”
 - “Why are there trilobite fossils in the rock?”
 - “Why is the building red? Is it an environmental or designed color?”
 - “Is there a significance to the architecture of the building? What do all of the symbols and etchings mean?”
 - “Why was the building built here, next to a waterway in cold Green Bay?”
 - “What were/are the native trees and bushes?”
 - “What cultures lived here, in this place, in the past?”
 - “What are some natural systems I can see?”
 - “What are some designed systems I can see?”
 - “How do I define the line between natural and designed systems? Is there a line?”
 - “How do each of the systems interact with each other?”
 - c. The instructor will start talking and have them listen and document the various perspectives the facilitator has when viewing main hall (e.g. economist, environmental educator, politician, child, urban planner)
 - d. Have them observe the facilitator’s movements and internal thoughts as they explore the place.
 6. Assessment
 - a. Review the questions the facilitator internally dialogued when they model an exploration of a place.
 - b. Ask if there are questions they would like to ask themselves as they explore their special place on campus.
 - c. Students will go to their place on campus and create a script of questions that will: 1) help them to identify their place they will be exploring; 2) the reasons (prior to exploring it with this critical eye) why it made them feel connected and contributed to their well-being and 3) engage them in exploring the natural and cultural systems of that place. Criteria will include:
 - An answer to why they feel connected to this place (10%)
 - An answer to why their well-being is enhanced by this place (15%)
 - Four questions related to the natural systems of their place (25%)
 - Four questions related to the cultural systems of their place (25%)
 - Four questions to explore the interconnectedness between natural and cultural systems (25%)

Step-by-step directions, Activity 2

1. Introduce the objective: Pre-service teachers will be able to describe a place, identify the components

2. Identify end-of-class expectations: Students should orally share a description of their place, create a concept map of the natural systems and cultural systems of that place, and describe the relationships between these systems.
3. Students will share their preliminary answers and questions they designed from the prior activity. On the board, the facilitator will identify common themes for their answers:
 - a. What are some common themes as to why people feel connected to a place?
 - b. What are some common themes as to why people feel a place can enhance their well-being?
4. Students will now go to their place for 20 minutes on campus and answer the four questions related to the natural systems of their place, four questions related to the cultural systems of their place, and four questions related to the interconnectedness between the two systems.
5. Students will come back and dialogue as to what they thought about and what they learned. Additionally, the facilitator will ask: “What are four additional questions you can ask to explore that place more deeply?”
6. Students will then use a concept map to identify the natural and cultural systems to identify what they saw in their place.
7. Students will then draw connections, with descriptions of the connections, between the various natural and cultural systems they identified.
8. The facilitator will address any issues and direct students to local and global resources to answer their questions they came up with during the exploration of their place.
9. Pre-service teachers will hand in their concept map as a formative assessment for the facilitator. Criteria will include:
 - a. Identification of natural systems in their place (25%)
 - b. Identification of cultural systems in their place (25%)
 - c. Descriptive links within the natural and cultural systems (25%)
 - d. Descriptive links between the natural and cultural systems (25%)

Step-by-step directions, Activity 3

1. Introduce the objective: Pre-service teachers will be able to describe different perspectives on the balance between natural and cultural systems for their place.
2. Identify end-of-class expectation: I am looking for you to write three proposals to change the balance of your place to more natural systems, keeping it the same, and developing more cultural systems.
3. Ask the pre-service teachers questions: “Is there a balance between the natural systems and cultural systems of your place?” “What would you change?” “What would you keep the same?”
4. Have the pre-service teachers discuss what other perspectives could be held about their place. Examples of different perspectives could be a community member, environmentalist, entrepreneur, child, investor, etc.
5. Ask the pre-service teachers which perspectives would want to increase the cultural systems? Which perspective would want to increase the natural systems?
6. Have the pre-service teachers choose their own perspective and one perspective for more natural systems and one perspective for more cultural systems.
7. Taking the role of one of the perspectives that would like more natural systems, have the pre-service teachers take 10 minutes to research what evidence and values that perspective may have.
8. Taking the role of the other perspective who would like more cultural systems, have the pre-service teachers take 10 minutes to research what evidence and values that perspective would have.

9. It is now time for a bit of critical thinking. Using the evidence provided by the pre-service teachers, take the time to discuss if this is biased towards one way or the other? Is the line clear between cultural and natural systems? Is the evidence peer-reviewed? Is there qualitative or quantitative data and analysis you can review? Is this evidence valid? Why or why not?
10. The pre-service teachers will now write a persuasive presentation script based on the three different perspectives. Criteria for evaluation would include:
 - a. Identification of where the balance fulcrum is during natural and cultural systems. Is it too far towards natural, cultural, or is it just right? (20%)
 - b. Citation of evidence that supports the idea that the fulcrum of the balance should be shifted or kept the same. Three citations are proficient (50%)
 - c. An outline of specific steps that should be done to change, or not change, the sustainability and/or fulcrum of the balance between natural and cultural systems. (25%)
 - d. Proper spelling and grammar (5%)
11. As an additional supplement to the lesson, you can have the pre-service teachers share their persuasive script with others and identify which perspective they agree with more.

Assessment

At the end of this unit, the pre-service teachers will facilitate a 20 minute field trip based on their place. They will provide an outline of five major talking points as they guide their colleagues as they explore.

Criteria will include:

1. Identifying the essential question and learning objective for the field trip (15%)
2. Document the responses that you would expect to hear when asking the questions
 - “What do you see, hear, and feel?”
 - “What do you wonder about?”
 - “What is the history of this place?”
3. How will you lead your colleagues to identify the natural and cultural systems?
4. How will you lead your colleagues to defend whether or not there is a balance between natural and cultural systems?
5. Outline the interdisciplinary subjects you will be pointing out (directly or indirectly) in your investigation of your place. Examples could include anything from the natural sciences, social sciences, arts, humanities, business, or economic disciplines.

Needs vs Wants for Sustainability

Kathy Kremer and Amy Lindgren, Concordia University Wisconsin

kathleen.kremer@cuw.edu, amy.lindgren@cuw.edu

Context

This lesson will be used with early childhood or elementary pre-service education students in a required science methods course within a three-hour block. Pre-service students will conduct these activities themselves, experiencing the content and strategies first hand. Subsequently, students should discuss how these activities could be implemented to effectively teach young learners the associated concepts. The intended purpose is for pre-service educators to learn how to teach young children the necessity of good stewardship to achieve sustainability of needs for human survival. A simple game is used as a simulation to develop real world awareness of this concept. The game is repeated, using a different lens, in each of the three activities.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others’ perspectives.

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX3: Students assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX4: Students analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

ELS.EX5: Students investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- Activity Sheet (at the end of lesson)
- Candy (at least two types), or any other wrapped item; non-food tokens could be used as well
- Paper Plates

Driving Question

How do wants impact needs individually and collectively? How can needs and wants be sustainable?

Introduction

The first activity begins by having learners identify needs and wants. The goal of this discussion is to recognize that needs are necessary for survival, whereas wants make surviving more comfortable. A need can become a want if it is used in excess. This discussion is followed by a game to demonstrate how greed (resulting from want) can result in the needs of others not being met and their survival being compromised.

The second activity allows learners to propose a strategy, based on good stewardship, to achieve sustainability - meeting the needs of all individuals within a community for an indefinite period of time. This strategy is tested as the game is replayed and challenged as the rules of the game change to mimic changes in the environment.

The third activity further extends sustainability to all communities as learners strive to help other communities survive through mutually beneficial relationships, good stewardship, and caring for one another.

At the end of each activity, in Step 4, learners make a real world connection to a survival need, water. Using a water calculator or survey, learners ask and answer the questions: How much water do I use? How do I compare to others' usage? How can I conserve? How do environmental water issues impact the water available for my use? This step could be modified or optional depending upon appropriate developmental level of students. The full activity would likely be most appropriate for upper elementary students, unless significant supports were implemented.

Step-by-step directions, Activity 1 - Needs and Wants Game

1. Have learners create a list of needs and wants. Discuss the difference between them.
2. Play a game to demonstrate the importance of needs for survival of individuals and communities. At this point the goal is to survive each round. Do not explicitly discuss the goal of sustainability before the game is played as this will be extracted after the game.
 - a. Divide learners into groups of 4 (ideally).
 - b. Put a plate of candy in the center of the group. The number of pieces on the plate should be $3N + 2$, where N represents the number of learners in the group. (For a group of 4, the plate would have 14 pieces of candy.) Each piece of candy represents a need, such as a glass of water. For

motivation, learners will be able to keep the candy that they take during the game.

- c. Each learner will maintain an activity sheet with the following column headings for five rounds (rows).
 - i. Round Number
 - ii. Number of pieces of candy on the plate
 - iii. Number of pieces of candy taken by you
 - iv. Number of pieces of candy left on the plate
 - v. Number of people in the group that survived
 - d. Explain the game rules as follows:
 - i. There is to be no talking/discussing during the game.
 - ii. For each round, each player **MUST** take at least one piece of candy ("need") to survive. Players **MAY** take more. (Remind learners that they get to keep what they take. Be careful not to specifically tell learners that there will be five rounds to the game, even though their data sheet is set up to record data for this number of rounds.)
 - iii. Players must record the appropriate data after each round.
 - iv. After each round, candy will get replenished with one new piece for every remaining two pieces.
 - e. Play the game one round at a time. Stop after each round to check which individuals survived and which communities survived. Replenish the candy for each community, as appropriate.
 - f. At the end of round five, continue with round six, even though there is no row for it in the data table. This is intended to simulate the need for future sustainability.
3. Debrief the game by asking the following questions:
 - a. How many individuals survived?
 - b. How many communities survived?
 - c. Is there a way that the entire community can survive indefinitely? How or why not? Learners will document their strategy on the Activity Sheet.
 4. Real World Connection: Discuss the impact of learners' decisions during the game on their individual survival and that of their community. Have learners evaluate their own usage of a need, water, and compare this to the average use of water in their community. (Use the Water Calculator in the Resources.)

Step-by-step directions, Activity 2 - Sustaining the Community: Stewardship (How long can you keep your community going?)

1. Have learners try their strategy from Activity 1 Step 3c, to determine if their community can be sustainable indefinitely for a given need by repeating the game and allowing learners to talk with their group members during the game.
2. After several rounds, challenge the resiliency of the community by:
 - a. Not replenishing the candy (mimics an environmental mishap)
 - b. Removing some of the candy (mimics a natural disaster)
 - c. Adding another member to the community (mimics population growth)
3. Debrief the activity by discussing the stewardship that is required to keep a community sustainable and resilient indefinitely, despite environmental changes. Discuss any further strategies of good stewardship that could be used to ensure resiliency.
4. Real World Connection: Have learners discuss/determine if there is enough water in the world for everyone to use water as they do. Use their data from the Water Calculator in Activity 1 Step 4 to

guide the discussion. Have learners propose ways that they can conserve water so that everyone can have enough water to survive. (See activity sheet in Resources.)

Step-by-step directions, Activity 3 - Sustaining the Community: Sharing

1. Using the same or refined procedure from Activity 2, repeat the game. At selected times, introduce one of the challenges in Activity 2 Step 2 to one community (or a couple), allowing the other communities to thrive as usual.
2. As communities are in need of additional candy that they do not have for survival, allow them to obtain candy from other groups through sharing, borrowing, or bartering.

OR

1. Following the same game rules in Activity 1, introduce a second need to each group in the form of another candy type. Each group gets a plate of two candy types, using an equal combination of the following configurations:
3N + 3 of Candy 1 and 3N - 1 of Candy 2
3N - 1 of Candy 1 and 3N + 3 of Candy 2
2. As communities are in need of additional candy that they do not have for survival, allow them to obtain candy from other groups through sharing, borrowing, or bartering.
3. As communities become sustainable with both needs, challenge these selected communities with one of the challenges in Activity 2 Step 2, forcing them to acquire needs (more candy) from other communities as in Step 2.

EXTENSION

Community sustainability can be further challenged by:

- Adding more needs in the form of additional candy types
 - Requiring more or less of a given need per round (day)
 - Changing the replenishment rate of a need (or eliminating this feature)
4. Real World Connection: Have learners explore a local or globally known water supply or contamination issue and discuss how it impacts the sustainability of water as needed for survival.

Assessment

Activity 1

Activity sheet will be completed with game data and a strategy for improving sustainability will be documented. An evaluation of learner's personal water usage will be recorded and compared to averages.

Activity 2

Successful completion of the activity with sustainability prior to environmental change challenges. Discussion of the effects of environmental challenges on continued sustainability. Ways to conserve water are proposed.

Activity 3

Successful strategy for sharing/borrowing/bartering needs with other communities to achieve sustainability, prior to environmental change challenges. Discussion of the effects of environmental

challenges on continued sustainability. Discussion of real world local and/or global water supply issues and suggest actions that could be taken to maintain sustainability.

Resources

- Project Learning Tree: Pre K-8 Environmental Education Activity Guide (Activity 14, pp 69 - 74) (2016). Washington, D.C.: American Forest Foundation.
- Renewable or Not. Retrieved from: https://jondyer.weebly.com/uploads/5/8/7/9/58794479/80.3_energy_renewable_or_not_lab.pdf
- NPS Daily Water Use Student Activity including sheet for water conservation ideas. Retrieved from: <https://www.nps.gov/teachers/classrooms/daily-water-use.htm>
- 2017 Alliance for Water Efficiency/NFP waterworks Water Calculator – How Much Water Do You Use? Retrieved from: <https://www.home-water-works.org/calculator>
- JournalSentinel article, Waukesha Common Council approves 40-year agreement to buy Lake Michigan water from Milwaukee, December 7, 2017. Retrieved from: <https://www.jsonline.com/story/news/local/milwaukee/2017/12/05/waukesha-common-council-approves-40-year-agreement-buy-lake-michigan-water-milwaukee/921232001/>

Name: _____

Need vs Greed

Round	Number of Pieces	How Many Pieces I Took	How Many Pieces Were Left	Did Everyone Survive?
1				
2				
3				
4				
5				

If I did this again, next time I would:

Birds to Bugs to Us: A Sense of Perspective

Josh Lichty, Viterbo University

lichty67@gmail.com

Context

The target group for the activity would be K-8 pre-service teachers. This would be in their science methods and/or technology integration course and take two class periods.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

- 4.1 Knowledge of learners
- 4.2 Knowledge of instructional methodologies
- 4.3 Planning for instruction
- 4.4 Knowledge of environmental education materials and resources
- 4.5 Technologies that assist learning
- 4.6 Settings for instruction
- 4.7 Curriculum planning

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.A: PERSPECTIVE

Materials

- Drone
- Laptops
- Computer
- Projector
- Notepad
- Pencil

Driving Question

How can all students understand how their perspective of the world around them is similar to and different from those of other organisms, and how does that change their attitude about human impact on the environment?

Step-by-step directions, Activity 1 - Bird's Eye, Bug's Eye

1. Have pre-service students go outside and find an area that they can observe living and non-living organisms, preferably bugs or small animals. They should make a diagram of this scene from the perspective of a standing human. 15 minutes



2. Get together and discuss what they observed, the interactions of the living organisms, and the systems.
3. Fly the drone overhead to 400 ft. Pan around the area and straight down, making sure to get human movement recorded.
4. Head back into the classroom and play the recorded video. Record student observations of the living and non-living components from the drone/bird's eye view.
5. Make connections to what goes on for tiny organisms to that of humans. What similarities and differences are there?
6. Ask how does perspective influence our beliefs on all types of organisms?

Step-by-step directions, Activity 2

1. Play movie clips from A Bug's Life, Pacific Rim, Bee Movie, King Kong, Transformers and others to show them ways to get students to experience or understand the perspective of a tiny organism. Get them to discuss how it can change their thinking of their own behavior.
2. List pros and cons of disturbing nature. Is it always necessary? What can be avoided?
3. Debate questions-pick sides of the room and defend your side.
 - a. Should sidewalks be used at all times possible?
 - b. Should bugs inside of the house be caught and released?
 - c. Should there be protections for bugs just as there are for other animals?
4. Students browse for other movie clips that could be shown to highlight the idea of perspective. They will be housed in a Google Drive.

Step-by-step directions, Activity 3

1. Look at the standard of ELS.C1.A for e, i, and m and the performance indicators for each. Discuss the Know, Understands, and Dos (KUDs) for these standards. List out the age appropriate vocabulary to know, the actions to do, and then the big ideas to understand for each section to see the vertical and spiraled connections.
2. Split into age level groups and brainstorm interdisciplinary activities for math, literacy, art, music, social studies that can be incorporated into this lesson of perspective and connection to the sense of place. Is there any literature/picture book to use? How about a song? Can students write a story for different perspectives? Come up with one activity per subject area.
3. Come up with 3 modifications to differentiate these activities based on academic or behavioral needs. They can be for extension as well.

Assessment

Assessment will be based on the interdisciplinary activities and how well they tie to the standards addressed and at the appropriate grade level. Do they have complete KUD charts filled out for their activities? They must have realistic adaptations to their activities to meet the needs of their diverse learners.

Resources

- YouTube videos from Bug's Life, Bee Movie, King Kong, Pacific Rim, and Transformers that show perspective.

Dam! That's a lot of Water!

Josh Lichty, Viterbo University

lichty67@gmail.com

Context

The target group for the activity would be K-8 pre-service teachers. This would be in their science methods and/or technology integration course and take two class periods.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Three: Professional Responsibilities of the Environmental Educator

Educators must understand and accept the responsibilities associated with practicing environmental education.

- 3.1 Exemplary environmental education practice
- 3.2 Emphasis on education, not advocacy
- 3.3 Ongoing learning and professional development

Wisconsin Standards for Environmental Literacy

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.C.e: Identify ways in which people are dependent on natural resources and how access to resources can lead to conflict and cooperation. Identify rulemakers and why rules are made related to the environment.

ELS.EX2.C.i: Investigate how Wisconsin's natural systems have shaped the state's cultural systems. Investigate how access to renewable and nonrenewable natural resources necessary for survival influences human interactions between and within geographic regions. Identify the basic role of the legislative, executive, and judicial branches of government in regard to the environment and sustainability.

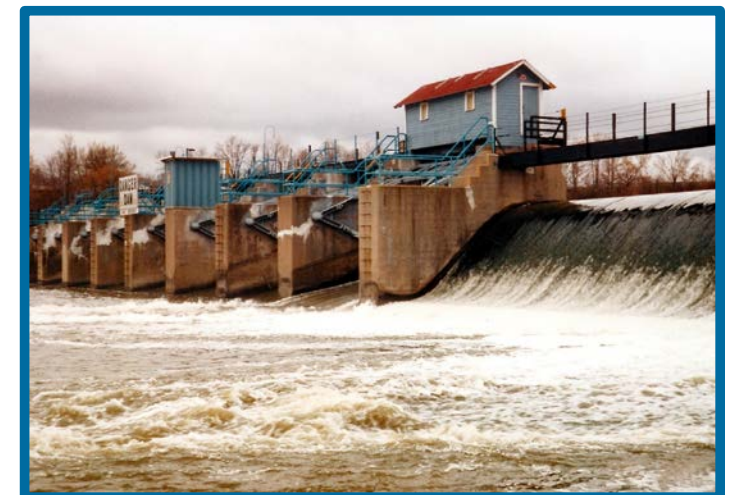
ELS.EX2.C.m: Analyze the impact of security, resource scarcity, cooperation, competition, and conflict on natural and cultural systems at the local, state, tribal, and national levels. Compare and contrast the roles of government at local, state, tribal, national, and international levels in setting and enforcing environmental policies, and encouraging sustainability.

Materials

- Map of the Mississippi Lock and Dam system
- River Road Videos

Driving Question

How can all students understand how their perspective of the world around them is similar to and different from those of other organisms, and how does that change their attitude about human impact on the environment?



Step-by-step directions, Activity 1

1. The Mississippi is important to both humans and other animals/plants. Who is it more important to? We will split up the class and debate this topic. Students will list off the reasons for each and eventually vote.
2. Watch a short video on the Lock and Dam system on the Mississippi.
3. Share what you know about these dams from personal knowledge or the video.
4. Brainstorm ideas for all ages as to why it is important for students to know about the lock and dams and how it relates to the environment.

Step-by-step directions, Activity 2

1. Students will be told that there is an additional lock and dam being considered. They will pick a side (for or against), research it, and write a letter to the editor in support of building it or not. They must provide solid evidence to support their answer that incorporates the natural AND cultural systems.

Step-by-step directions, Activity 3

1. An Army Corps of Engineers representative or Wildlife Refuge employee will come to speak about the natural and cultural systems that are involved in lock and dams. They can explain how the river has evolved and what can or will happen with it in the next 500 years.
2. Students should create a Google Slideshow that presents the history of the Lock and Dams, information about the systems involved, and add some questions at the end to pose to others. This could include a Google Form with open ended responses to allow for more opinion questions.
3. Students will come up with a comprehensive, Step-by-step plan that involves booking a field trip to a lock and dam or the local wildlife refuge. Their plans should include details with school permissions, bussing, timings, communication for families, communicating with the dam or refuge, field trip learner objectives, accommodations for special needs, backup plans, and follow ups. This will teach them the process of planning for field trips and making sure the field trip pertains to the educational outcome.

Assessment

The editorial essay must have at least three pieces of evidence to support their side and be written with proper form and grammar.

The Google Slideshow and Form will have facts and questions that pull information from the students that show they know and understand facts and principles associated with Wisconsin's systems shaping the cultural systems.

The field trip form must have the proper educational outcomes that deal with the natural systems and cultural systems.

Resources

- River Road Videos <https://experiencemississippiriver.com/interactive-tools/videos/>
- Speaker from the dam or refuge.

Learning Together, Learning from One Another

Josh Lichty, Viterbo University

lichty67@gmail.com

Context

The target group for the activity would be K-8 pre-service teachers. This would be in their science methods for three class periods.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others' perspectives.

- 5.1 A climate for learning about and exploring the environment
- 5.2 An inclusive and collaborative learning environment
- 5.3 Flexible and responsive instruction

Wisconsin Standards for Environmental Literacy

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

ELS.EN7:A.e: Explore ways people work together to create positive change and how their actions have made a difference. Discuss sustainability issues that need attention in a school or community and explore ways to address the issue.

ELS.EN7:A.i: Describe and analyze ways that youth, acting as individuals or members of a group, create beneficial change, meet individual needs, and promote the common good. Investigate sustainability issues that need attention in a school or community, and brainstorm potential solutions, considering perspectives of multiple stakeholders.

ELS.EN7:A.m: Explain the importance of civic responsibility and their duty to be advocates for change. Identify instances when citizen action and public opinion have influenced change, and evaluate the effect of citizen action on environmental quality and sustainability for the common good. Examine sustainability issues that need attention in the school or community, identify perspectives of various stakeholders, and consider how different perspectives could contribute to solutions.

Materials

- Cultural questionnaire
- Computer
- Trifold
- Poster paper
- Butcher paper
- Markers



Driving Question

How diverse are the beliefs and customs of the peoples of La Crosse, and how does this culture influence the natural and cultural systems within the Coulee Region?

Step-by-step directions, Activity 1

1. Read *It's a Small World* by Disney and play the accompanying song. Discuss the meaning of that for the students, and what a middle and elementary student would believe it to mean. How does that look in the La Crosse area?
2. Brainstorm a list of different ethnicities, religions, and economic classes that are prevalent here. List out what the class knows or believes about each group, recognizing where the gaps are in our understandings.
3. Then, discuss the different ways those groups interact or contribute to the natural and cultural systems in our area. The list will likely include rural families, Amish communities, and others in our area.
4. What are ways we can learn more about these cultural groups? How can we learn from them? Explain they will be working to connect and learn from a specific group that they are unfamiliar with. The goal is to grow in understanding about their culture, beliefs, practices, and recognize their importance to the sustainability of the natural and cultural systems in La Crosse.
5. They select a subgroup with a partner, create a questionnaire that focuses on their cultural practices that impact the natural and cultural systems in our area. Students should submit the questionnaire to the instructor for approval.
6. Work on making contacts with someone in the area they can meet with in place of class time.

Step-by-step directions, Activity 2

1. Out of class activity - meet with and interview representatives from a subgroup in the area. Ask questions and record responses, enjoying learning from the conversation. Audio or video record if able to help review answers later on.
2. Create a presentation highlighting the importance of the culture, especially how they impact the natural and cultural systems in the Coulee Region. Be prepared to present the next class period.

Step-by-step directions, Activity 3

1. Set up a gallery walk/presentation in the room and have students spend time reading and listening. While doing so, they should be answering these questions:
 - a. What is a misconception about this culture that others should know?
 - b. What value/belief/practice of this culture could others apply to their own lives?
 - c. What are ways that this culture is or is not showing responsibility to the natural systems? How about the cultural systems of La Crosse?
2. Complete Venn Diagrams that deals with question C, how they are impacting the natural and cultural systems of the area.
3. After discussion and analyzation of the sub groups, think about the so what. What can students know, understand, and do about the population and practices of our people? Is there any extension or education that can take place beyond this activity? How might what they learned be relevant for them in their future role as a community member and classroom teacher?

Assessment

Assess the questions they decided to ask their cultural representative. Does it provide a well-rounded picture of the people and practices? Were they able to provide information about their impact on natural and cultural systems?

Their presentations should include all aspects of the assignment. It should be engaging and offer a thorough description of the culture.

Students' answers to the gallery walk will also be assessed. Could they answer the three questions for each subgroup? If not, was it because the presentation was incomplete?

The discussion following the presentation will also be assessed. Students should participate and share their views on what our elementary and middle school students need to know, understand, and do based on this activity.

Extra credit will be given to any extensions developed and implemented by the students.

Resources

- Local cultural leaders, representatives (HMOOB Cultural Center and Agency La Crosse, Ho-Chunk Nation Three Rivers House, Centro Latino, Black Leaders Acquiring Collective Knowledge (B.L.A.C.K.), Islamic Othman Bin Affan Mosque, and any other community groups with a large prevalence
- *It's a Small World* by Disney

Introduction to Project WILD, Project Learning Tree, and LEAF Curriculum Guides

Kendra Liddicoat, University of Wisconsin-Stevens Point

kliddico@uwsp.edu

Context

This is one of two consecutive discussion section meetings (each is 110 minutes) introducing Project WILD, Project Learning Tree, and LEAF curriculum materials to pre-service elementary, early childhood, and special educators. The students receive the associated books as part of the course and will teach activities from them in local elementary schools later in the semester. There are approximately 20 students in the discussion section. The activities below are written for fall semester.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

- 1.2 Knowledge of environmental processes and systems
- 1.4 Personal and civic responsibility

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

- 4.4 Knowledge of environmental education materials and resources
- 4.5 Technologies that assist learning

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.C.i: Investigate and classify natural and designed objects, formulate questions about the relationship between physical and natural characteristics of the environment (e.g., soil/plants, water/animals), identify patterns, make predictions, and solve problems through sensory observations and active exploration outdoors.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.B.i: Explain how living and nonliving things can affect survival of organisms. Recognize ways that organisms depend on other organisms (e.g., plants depend on animals for pollination and seed dispersal) and that each has a role in the function of the ecosystem (e.g., producers, consumers, and decomposers).

ELS.EX2.B.m: Analyze the relationships between living (biotic) and non-living (abiotic) parts in an ecosystem and examine the impact of each on the system. Describe how relationships among humans and organisms, species, populations, communities, ecosystems, and biomes affect the sustainability of natural and cultural systems.

ELS.EX5: Students investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EX5.B.i: Describe how living things respond to changes in natural systems. Explain how changes affect how organisms adapt and survive. Observe and compare changes in weather and climatic patterns and how each affects natural systems.

ELS.EX5.C.i: Identify historical or contemporary cultural events that have shaped perspectives about a sustainability issue. Identify how humans have shaped and managed natural systems, cultural systems, and the impact of change on both systems.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

ELS.EN6.B.i: Analyze the role of civic and personal ideals in enhancing natural and cultural systems. Analyze the short- and long-term impact of personal choices on the environment and sustainable communities. Investigate how individual and societal rights and responsibilities relate to healthy environments and sustainable communities.

Materials

- Project WILD guides (K-12)
- Project Learning Tree guides (pK-8)
- LEAF 2-3 guides (online)
- LEAF Urban Forest guides (online)
- Paper or notebook for each student
- Pen or pencil for each student
- Phone or iPad with a tree ID app for every 3 or 4 students
- Tree ID book for every 3 or 4 students (these can be ordered for free through Project Learning Tree)
- 2 sets of each LEAF board game with cards

Driving Question

How can activities from Project Learning Tree, Project WILD, and LEAF serve as foundations for interdisciplinary lessons that follow the 5E model?

Step-by-step directions, Activity 1 (ELS.C1)

1. Take students outside to an area with at least 6 different native tree species.
2. Break students into groups of 3 or 4 and assign them to trees (of different species).
3. Introduce Poet-Tree (PLT p. 31) and allow time for students to write poems using their senses while seated at their assigned trees. Share as time allows.
4. Have students observe the trees more carefully following the prompts in Part A of Adopt a Tree (PLT p. 97).

Step-by-step directions, Activity 2 (ELS.EX2)

1. Ask students to identify and research their tree using two methods, a tree ID field guide and a tree ID app. (Include instruction on use if not previously introduced in class). Encourage students to compare and contrast information gathered. Require that they find at least one cultural use/fact as well as information about the role of the tree in its ecological community.
2. Introduce the “Each One Teach One” approach of having groups teach each other about their tree. Be the first learner at each station to ensure accuracy of information and assess research skills and

knowledge acquisition. Complete the activity such that all groups have a chance to teach and to learn.

Step-by-step directions, Activity 3 (ELS.EX5 and ELS.EN6)

1. Return to the classroom. Complete parts of Phenology at Play (WILD p. 167). Have students read the script individually, study graphs as a class, and discuss components of a second skit.
2. Ask groups of students to create a Budburst account or log in to the class account. Discuss the role of citizen science in gathering phenological data. Have students explore the Budburst website.
3. Go back outside to gather phenological data on assigned trees. Submit data to Budburst after returning to the classroom (a one-time observation entry).
4. Split class into 4 groups. Have two groups play “Lesson 6 - I can be a forest steward” (LEAF 2-3 guide) and two groups play “K-4 Lesson 3 - Taking care of urban forests” (LEAF Urban Forest guide). Discuss perspectives and actions in each game.
5. Conclude with a discussion of how management practices in the LEAF games could impact the trees observed and taught about earlier.

Assessment (Wrap-Up)

Students will complete a graphic organizer listing activities modeled, where they would fit in a 5E lesson or unit, into which content areas (science, social studies, ELA, math, etc.) they could be integrated, and how they meet Wisconsin ELS standards.

Resources

- Project WILD K-12 Curriculum and Activity Guide (2018 edition)
- Project Learning Tree Pre K-8 Environmental Education Activity Guide (2016 edition)
- LEAF Urban Forest Lesson Guide <https://www.uwsp.edu/cnr-ap/leaf/Pages/Urban-Forest-Lesson-Guide.aspx>
- LEAF 2-3 Wisconsin Forestry Lesson Guide <https://www.uwsp.edu/cnr-ap/leaf/Pages/K-12-Forestry-Lesson-Guides.aspx>
- Budburst <https://budburst.org/>

The Grass is Always Greener

Richard Lind, CESA 9 Excellence in Teaching Program

rlind@cesa9.org

Context

The activities will allow all teachers at all levels to experience the CONNECT, EXPLORE, and ENGAGE in the [Wisconsin Standards for Environmental Literacy and Sustainability](#). The activities may also be applicable at grades 6-12 as students explore the Wisconsin Standards for Science (SCI.LS2) and Next Generation Science Standards (MS-LS-2 and HS-LS-2) to understand the concept of biodiversity and how human actions may impact biodiversity.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

- 1.1 Questioning, analysis, and interpretation skills
- 1.3 Skills for understanding and addressing environmental issues

Theme Two: Foundations of Environmental Education

Educators must have a basic understanding of the goals, theory, practice, and history of the field of environmental education.

- 2.1 Fundamental characteristics and goals of environmental education

Theme Three: Professional Responsibilities of the Environmental Educator

Educators must understand and accept the responsibilities associated with practicing environmental education.

- 3.2 Emphasis on education, not advocacy

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

- 4.1 Knowledge of learners
- 4.2 Knowledge of instructional methodologies
- 4.3 Planning for instruction
- 4.4 Knowledge of environmental education materials and resources
- 4.5 Technologies that assist learning
- 4.6 Settings for instruction

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others’ perspectives.

- 5.1 A climate for learning about and exploring the environment

5.2 An inclusive and collaborative learning environment

5.3 Flexible and responsive instruction

Theme Six: Assessment and Evaluation

Environmental educators must possess the knowledge, abilities, and commitment to make assessment and evaluation integral to instruction and programs.

6.1 Learner outcomes

6.2 Assessment that is part of instruction

6.3 Improving instruction

Prior to Activity:

Prior to each activity the teacher will discuss the focus standard. Students will select and use the Performance Indicators for each standard to develop a rubric assessment for each activity that aligns with previous classroom assessment and expectations.

Wisconsin Standards for Environmental Literacy and Sustainability

Activity One

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

Activity Two

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX3. Students assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX4: Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

ELS.EX5: Investigate and analyze how change and adaptation impact natural and cultural systems.

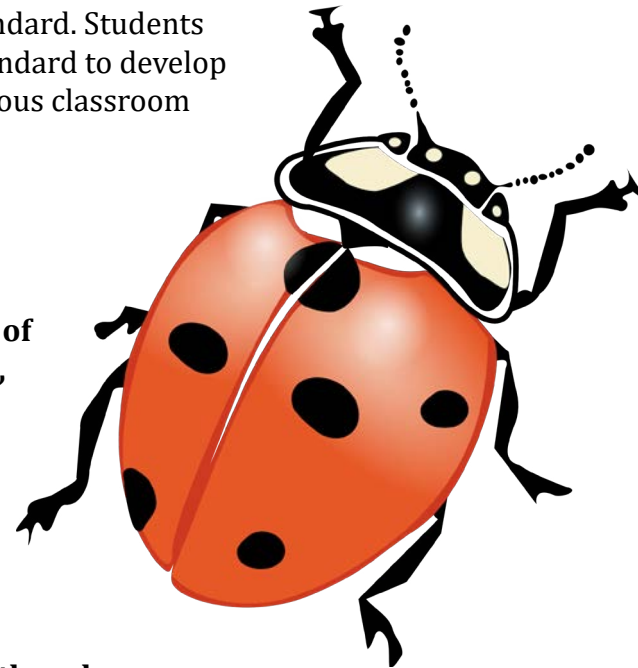
Activity Three

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- Ranging from lawn with little or no interventions, beyond mowing, to lawn with significant human interventions beyond mowing (i.e. fertilizer, weed control, insect control, irrigation)



Driving Question

How does human activity impact the biological diversity in a lawn?

Step-by-step directions, Activity 1

1. Students (individually or in small groups) select and record the plants and animals (predominantly insects) in a small area of selected lawns. Selections should vary from lawns with minimal human interactions, beyond mowing, to those which have a high degree of human influence.
2. Students may record and share via a Google document or any other method.

Step-by-step directions, Activity 2

1. Students organize data from Activity 1. (Option--students can create a variety of graphical displays to communicate the data collected.)
2. Students generate questions based on the organized data. Questions should include, but not be limited to:
 - What plants are present? (students can use identification keys as developmentally appropriate)
 - What animals (insects) are present? (students can use identification keys as developmentally appropriate).

Step-by-step directions, Activity 3

1. Students group data on species of plants and animals from each sample. Groupings may include number of distinct species as well as deeper classifications of species present (i.e. broadleaf and grasses).
2. Students generate questions and communicate from general to specific trends in the overall classroom data.
3. OPTIONAL: Students generate and test hypotheses related to the the data.

Assessment:

Students and teacher will utilize the collaborative rubrics generated prior to the activities..

Resources

- Wisconsin Standards for Environmental Literacy and Sustainability
- Book (additional reading for extension 9-12) Pollan Botany of Desire
- Video: Botany of Desire (alternate to book to support students with reading challenges). Available on Amazon Prime.

Zooming In and Zooming Out: Considering Interdependence in the Environment

Amy Lindgren & Kathy Kremer, Concordia University Wisconsin

amy.lindgren@cuw.edu & kathy.kremer@cuw.edu

Context

This activity will be used with early childhood (birth to age 8) or elementary pre-service education (Kindergarten to 5th Grade) candidates. These activities are designed to allow pre-service educators to hone their skills of observation, connect with a sense of place through perspective-taking, and evaluate interdependent relationships within an environment. These skills are foundational for the development of ecological perspective-taking. These activities will be taught in a required science methods course within a three hour block taken during the junior or senior year. Pre-service educators will both participate in the activities as well as reflect upon how these activities could be facilitated with young students. Thus, these activities are designed with young children in mind and could be easily utilized by pre-service teachers in their own classrooms to develop ecological perspective-taking, skills of detailed observation, a sense of place, and an early recognition of the interdependent relationships in an environment.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others' perspectives.

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX5: Students investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

Materials

- Ideally in an outdoor space with natural elements; however an indoor space can also work for these activities. It may be easier to complete the opening discussion and Activity 3 indoors.
- Natural Materials
- Pencils
- Card Stock with One Square Inch Opening in the Center
- Drawing Utensils
- Square Foot Card Stock
- Clipboards
- Additional Journaling Paper

Driving Question

What is in this place and what could live in this environment?

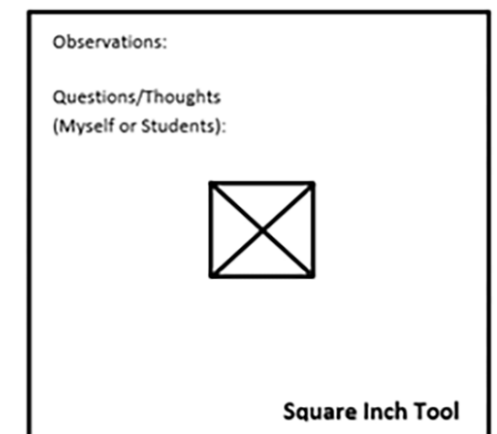
Introduction

These activities are intended to follow an introductory lecture and discussion on Zooming In and Zooming Out (Chaille, 2008). Chaille (2008) writes, “This big idea capitalizes on something that children find fascinating – changing perspectives and one that gets at some very important concepts for children to ponder, concepts relating to the very small and the very large, looking closely and magnification, geography and culture, and physical, ecological, and social perspective-taking” (p. 81). Within this opening discussion, we consider the concept of observation through different perspectives such as through magnification or a changed physical position (zooming in or zooming out). Next, we consider ecological or social perspective taking: What are the needs or feelings of another person or another creature? During this part of the discussion, students are asked to find and share a resource in which a unique perspective is considered. Students might suggest a children’s movie which is told from the perspective of toys, bugs, or cars. Additionally, a variety of children’s stories are told from the perspective of an organism, an inanimate object, or through a very specific voice of an individual. Resources suggested are submitted with a rationale to a digital blackboard for future use. In considering these resources, pre-service educators begin to see the value of not only honing observation skills to develop a sense of place, but the value in considering the needs and perspectives of what is being observed. Lastly, pre-service educators reflect upon the interconnectedness of the many perspectives within an environment.

Step-by-step directions, Activity 1 – Perspective

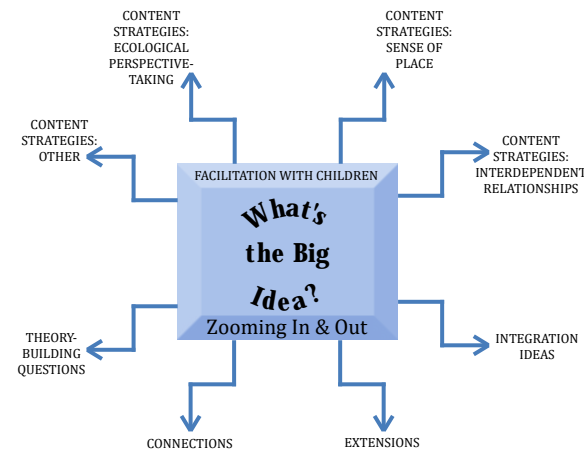
Observations: My Square Inch

1. Begin with a discussion about perspective taking as described in the introduction section above.
2. Prepare: Provide the students with a piece of card stock and ask students to prepare a square inch opening in the center. Move to the location of the exploration. Tell students that they will individually take some time becoming familiar with the location through observation. Ask them to slowly walk around the area and “zoom in” or observe small spaces using the square inch tool.
3. Explore: As students zoom in on each space in the



environment, ask the students to use the outside of the square inch tool to either sketch or jot down a list of observations in that small space. Students should consider what a child might be thinking or what questions they or a child might have if they were observing the same small space. They can write these questions and thoughts down as well. Students should identify, and spend time observing and analyzing at least three different spaces.

4. Discussion: Following the square inch observations, facilitate discussion in small groups focused on what the pre-service educators found, discovered, and questioned. The small groups can then share overall impressions with the whole group.
5. Application: In small groups, pre-service educators will use the brainstorming tool to reflect upon how this activity could be utilized to facilitate a sense of place, theory building about interdependent relationships in an environment, and ecological perspective taking in young children.



Step-by-step directions, Activity 2 – Zooming Out: Create an Environment

1. Review: Brief discussion about previous Activity 1 related to careful observation (zooming in) and perspective taking.
2. Explore and Create: Using Square Inch Tool and notes from previous activity, students will individually locate one zoomed in area to enlarge. Students should attempt to select an area similar to one they observed during the previous activity. Students will carefully enlarge the square inch area captured in the window of their tool to one square foot in size. In doing so, detailed characteristics of the tiny environment will be enlarged and captured for better consideration and focus on that small sense of place. Students will utilize their own perspectives to enlarge the tiny environment, and thus a variety of media options should be offered. (Older students could be asked to enlarge to scale.)
3. Discussion & Sharing: Following the creation of the enlarged tiny spaces, students should share their created environment with others. It is important to discuss novel elements that students observed, thought about, or have questions about during the zooming out process. Often times, drawing can further focus our observations or thinking. Additionally, a second encounter with a space can provide additional insight and wonder. Students should be prompted to ask questions about their colleagues' environment and to offer their own perspectives on the zoomed in space.
4. Application: In small groups, pre-service educators will again utilize the brainstorming tool to reflect upon how this activity could be utilized to facilitate a sense of place, theory building about interdependent relationships in an environment, and ecological perspective taking in young children. They should add to their previous brainstorming grid in a new color to delineate theory building throughout the three different activities.

Step-by-step directions, Activity 3 – Zoomed Out Environments: Who Lives Here?

1. Using the square foot environment enlargements as well as peer feedback from Activity 2, students will consider their environment as a habitat. They will generate a list of the characteristics of their environment, focusing on what a potential organism who lives in that environment might need and how those needs could be met.

2. Turn and Talk: Students will share their ideas with a partner. This opportunity provides for new perspectives about the environment as well as habitat considerations or organism needs that might have been overlooked. This collaborative activity allows the pre-service educator to practice asking questions that facilitate thinking as they would do when working with young children. This activity could have more than one round, allowing for more practice in facilitation as well as additional perspectives.
3. Create: Students will use the feedback they have received as well as their own brainstorming to create the organism that is best suited to survive in the square foot environment they created during Activity 2. This organism can be real or imaginary. Allowing for imaginary animals in this case generates extended and imaginative thinking about the interconnected needs, behaviors, and characteristics of habitats and the organisms adapted to that particular space. A variety of utensils and media should be provided for individuals to create their organism. The organism should be created on a new piece of paper, cut out, and glued to the original square foot environment.
4. Literacy Connection: Students will then develop a short story about the organism as the main character and the created environment as the setting. Within this story, students should introduce their organism and the square foot environment it is adapted to. Within this story, the students can provide information about the needs, behaviors, and characteristics of the organism along with a rationale as to how the environment meets the organism's needs.
5. Show and Tell: To conclude illustrated habitats, organisms and stories will be shared with the whole class. The audience should be prepared to ask the author questions in order to extend or facilitate additional thinking about perspective taking and interdependence in environments.
6. Application: Finally, pre-service educators will reflect once again on the brainstorming tool. They should add to their previous brainstorming grid in a new color to delineate theory building throughout the three different activities. In particular, ask students to take note of facilitation questions generated during the Turn and Talk and Show and Tell components of Activity 3.

Assessment

My Square Inch Tool: Students will submit their own thinking and questions related to perspective taking and interdependent relationships.

Brainstorming Grid: Group discussion related to the facilitation of these activities with students will take place at the end of each activity. Groups should add notes to the grid in three colors to delineate a growth of thinking after each square inch activity about the facilitation of observation skills, making connections, developing a sense of place through perspective-taking, and evaluating interdependent relationships within an environment in young students.

Story and Illustrated Habitat for an Organism: Students should share and submit an illustrated environment containing an adapted organism along with a companion story. The story should incorporate information about the needs, behaviors, and characteristics of their organism along with a rationale for why the environment meets the organism's needs.

Resources

- Chaille, C. (2008). *Constructivism across the curriculum in early childhood classrooms: Big ideas as inspiration*. Boston: Pearson.

Signs of Fall

Shayla Mason, University of Wisconsin-Oshkosh Student

masons51@uwosh.edu

Context

The target group for this lesson are Pre-K students. These activities allow students to explore the signs of fall and observe the seasonal changes in nature.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.2 Knowledge of environmental processes and systems

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX5: Investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EX5.B.e: Identify changes that take place in natural systems (e.g., weather, water, day length).

Materials

Activity 1

- Bags to collect items
- Paint samples
- Magnifying lenses

Activity 2

- Large graph
- Leaf cut outs
- Leaves that students collected on their nature walk

Activity 3

- Large fabric/material to be used as bird wings
- Chalk

Driving Question

As the temperature gets cooler (or, as Fall approaches), how are the animals and plants changing?

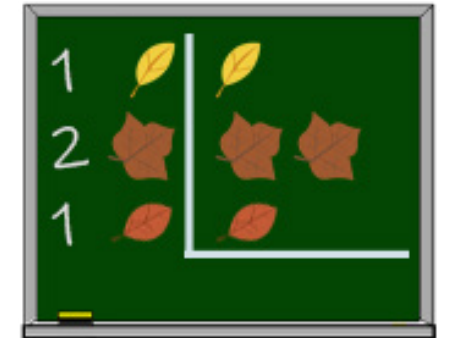
Step-by-step directions, Activity 1 - Fall Adventure

1. When the leaves start to fall and change color, take students for a walk around the school or the neighborhood.
2. Have students collect fallen leaves (to use in activity 2), seeds, nuts, etc, for them to bring in to use in the classroom (e.g. bring collections into the art center, to use in games, or to use for science investigations).
3. Note changes in the temperature (e.g. Ask if there is frost on the grass or if you can see your breath).

4. If possible, observe animals preparing for the cooler temperatures (e.g. squirrels collecting nuts or birds migrating south).
5. Listen for sounds your feet make when walking on the leaves or on frosty grass.
6. To conclude walk: Take a rest and lie down under a tree.
7. Observe falling leaves and talk about how they move.

Step-by-step directions, Activity 2 - Leaf Graph

1. Using a large sheet of paper, create a simple graph (x and y axis).
2. Glue leaves (or leaf cut-outs) of different colors along the y axis. Inside of the graph, have the students glue leaves (that they collected on their walk) of the same color.
3. Make a total of how many leaves are in each row.
4. Repeat this activity with leaves of different sizes or shapes.



Step-by-step directions, Activity 3 - Outdoor Play

1. Provide students with large pieces of fabric that they can use as wings to fly around their play area outside.
2. Create a compass on the ground using chalk marking North, South, East, and West.
3. Have the students observe what direction birds are flying by.
4. Discuss with them why some birds need to fly South for the Winter to find food.

Assessment

Throughout your activities, observe your students and take notes on the following:

- New vocabulary that the students are using in their conversations
- Questions that the students are asking and if they show awareness of the seasonal changes and the effects of those changes
- Indications that the students have formed new ideas, have drawn conclusions, or are asking new questions based on their observations

Ask students open ended questions:

- What signs do you see that winter is approaching?
- How do leaves change after they fall? Before they fall?
- Why do you think leaves change in fall?

Resources

- Project Learning Tree: Environmental Experiences for Early Childhood: Signs of Fall/Activity 5
- Project Learning Tree: Pre K-8 Environmental Education Activity Guide: Patterns of Change/Activity 78

Quack! The True Story about Feeding Ducks

Heidi Masters, University of Wisconsin - La Crosse

hmasters@uwlax.edu

Context

The target group for this lesson are elementary teachers and students, grades 3-5. The lesson and its activities will take 4-5 1 hour sessions to complete.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others' perspectives.

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX4: Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

EX4.A.i: Explain how energy can be converted from one form to another (e.g., animals break down the food they eat to obtain energy and material to build body structures).

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

EN6.A.i: System Structures and Outcomes: Identify cause and effect relationships and examine how a system's structure or behavior needs to change to achieve intended outcomes.

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

ELS.EN7.B.i: Design and implement a plan to address a sustainability issue, weighing the pros and cons of proposed solutions.

ELS.EN7.C.i: Reflect on the immediate and potential future outcomes of a stewardship experience, and strategize options that would minimize risks while maximizing outcomes for sustainability of natural cultural systems.

Materials

Activity 1

- Duck Observation Sheet
- Digital notebook (optional)

Activity 2

- Duck - <https://kids.kiddle.co/Duck>

- Mallard Duck - <https://kids.nationalgeographic.com/animals/mallard-duck/#mallard-male-swimming.jpg>
- What do ducks eat? - <https://www.thespruce.com/what-do-ducks-eat-386552>
- Ducks - <https://www.youtube.com/watch?v=ndiVL4plQDI>
- Please Don't Feed the Ducks - <https://www.youtube.com/watch?v=oCPAAmlNXxI>

Driving Question

How does feeding ducks bread/crackers affect them?

Step-by-step directions, Activity 1

1. Take students to a river, lake, and/or pond where there are ducks that are fed bread/crackers by the public.
2. Ask the students to make observations of the ducks' behaviors in the local environment using the duck observation sheet (e.g., how they move, how they eat, what they eat, where they get their food, etc.). Students could also record videos and incorporate the clips in a digital notebook to differentiate for students or to incorporate technology.
3. Have students share out some of their duck observations with the whole group. (Goal: For students to notice that people were feeding the ducks bread/crackers).
4. Engage the students in a discussion to allow students to share their perspective about the people feeding the ducks bread/crackers. (Some students may think it is good people are feeding the ducks bread/crackers and others may think it is bad).
5. Explain to the students that over the next few days they will investigate the following question: How does feeding ducks bread/crackers affect them?

Step-by-step directions, Activity 2

Review the driving question if this activity occurs on a different day.

1. Provide time for students to investigate what ducks eat. Simple readings and/or video can be used depending on the learning needs of your students. A few options are:
 - Readings
 - Duck - <https://kids.kiddle.co/Duck>
 - Mallard Duck - <https://kids.nationalgeographic.com/animals/mallard-duck/#mallard-male-swimming.jpg>
 - What do ducks eat? - <https://www.thespruce.com/what-do-ducks-eat-386552>
 - Videos
 - Ducks - <https://www.youtube.com/watch?v=ndiVL4plQDI>
2. Have students share out what they learned from the readings and/or video regarding what ducks eat.
3. Ask students if any of their resources mentioned feeding ducks bread/crackers.
4. Play "Please Don't Feed the Ducks" <https://www.youtube.com/watch?v=oCPAAmlNXxI> to help students understand the effects of feeding ducks bread/crackers.
5. Engage the students in a discussion regarding the risks of feeding ducks bread/crackers.

Step-by-step directions, Activity 3

This activity could take 2+ days.

1. Review the problem the students are trying to address if this activity is completed on a different day.
2. Ask students to work in small groups to brainstorm possible solutions to the problem of people feeding ducks bread/crackers.

3. Have each small group share out their solution ideas with the group. Engage the students in a discussion to select a solution they would like to pursue as a class.
4. Teach students how to write a formal letter to convince others to consider using their solution to solve a problem.
5. Write a letter to the Mayor of the city and/or the Park and Recs department to see if they would consider using their solution plan to reduce the number of people feeding ducks bread/crackers. Ask students to include immediate and future outcomes in the letter if their solution is utilized
6. Optional: If plan is actually accepted by the Mayor of the city and/or the Park and Recs department have the students follow through with the solution plan development and implementation. Then provide an opportunity for the students to observe and reflect on whether the solution is effective (NOTE: additional class sessions would be needed for this).

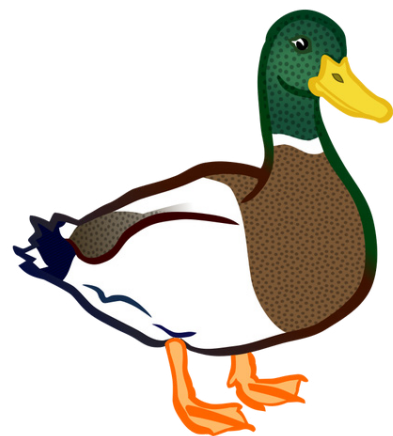
Assessment

Informal - Duck observations, Duck research on what they eat and why they shouldn't eat bread/crackers

Formal - Solution to people feeding ducks bread/crackers

Resources

- Duck - <https://kids.kiddle.co/Duck>
- Ducks - <https://www.youtube.com/watch?v=ndiVL4plQDI>
- Mallard Duck - <https://kids.nationalgeographic.com/animals/mallard-duck/#mallard-male-swimming.jpg>
- Please Don't Feed the Ducks - <https://www.youtube.com/watch?v=oCPAAmlNXxI>
- What do ducks eat? - <https://www.thespruce.com/what-do-ducks-eat-386552>



Name: _____ Date: _____

Duck Observations

1. How do the ducks move?
2. What do ducks eat?
3. Where do the ducks find their food?
4. How do the ducks eat their food?
5. Other observations:

Basin Ball

Corinne Palmer, Schlitz Audubon Nature Center

cpalmer@schlitzaudubon.org

Context

The target group would be 5th grade and up. This is an ecology program about watersheds, water pollution, etc.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX4: Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

Materials

- 4-5 balls (per field of play)
- 3 cones or more (per field of play)
- Several bandanas (equal to half the students playing)
- 2 poly spots, preferably blue and green (per field of play)
- Flipchart paper (1 sheet per field of play)
- Green, blue, and black markers
- Black duct tape

Driving Question

What is the importance of watersheds?

Introduction

A brief explanation of what a watershed/basin is necessary to understand why the game is played the way it is played:

A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place. John Wesley Powell, scientist geographer, put it best when he said that a watershed is:

“That area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community.”

Watersheds come in all shapes and sizes. They cross county, state, and national boundaries. No matter where you are, you’re in a watershed!

If possible, use a map with a watershed delineated on it to explain a river watershed. Discuss the different sizes of watersheds and how they are delineated. Then use the mechanics of the game to explain how a watershed works.

Step-by-step directions

1. Layout of the Playing Field

- a. A large, long triangular playing field is laid out approximately 20 yards by 30 yards by 30 yards or larger, depending on the size of the group. This triangular field represents a watershed/basin. The discharge point of the watershed (the point past which all water in the watershed will eventually flow) is the point at the long end of the triangle.
- b. One base is placed just inside the triangle at the discharge point. This first base represents the discharge point. The other base is placed opposite the first base at the other end of the triangle, a yard inside the line. This second base represents evapotranspiration (water used by trees). These bases are the goals for the two teams. Add a boundary around the goals that the opposing team can’t stand inside (as in capture the flag).
- c. One team is Gravity, and their goal is the base at the discharge point. The other team is Trees, and their goal is the base opposite the discharge point.

[Concept: Gravity pulls water down slope to the discharge point. Trees (and other plants) pull water “up slope” against gravity. Thus, the “Trees” goal is up slope. The ball (or other object) represents water.]

2. Play of the Game

- One team is distinguished from the other by wearing bandanas.
- The players can stand randomly around the field.
- The referee throws the ball up in the middle of the field (rainfall). The team that catches it has possession of the ball.
- A player holding the ball may not move. The ball is moved by throwing it from one player to another.
- A team scores when one of their players catches the ball while standing on their base. They may NOT catch the ball then step on the base.

Record the score of the game on flipchart paper. Use a bar graph. One bar is for “Gravity” in blue marker. The other bar is for “Trees” in green marker. (If gravity scores a point with a ball that has the pollution tape on it, record the point in black. See below for instructions regarding pollutants as part of the game.) Make a new bar graph for each round.

When the ball is not in someone’s possession, it is “fair game” for any player to pick up, unless the ball goes out of bounds (marked by the cones). When the ball goes out of bounds, the last team that touched the ball loses possession, the other team throws the ball in from that point (similar to soccer or basketball).

The ball may be blocked while in the air, but swatting the ball out of a player’s hands is against the rules.

This is a no contact game. Any player that gets rough should be expelled from the game for at least 1

minute. When a student must sit out for roughness, this represents either a loss of trees/vegetation from the watershed, or a detention or loss of water (through man-made means) within the watershed.

3. Activity/Round One

Start with teams that are stacked in favor of the “Trees” team. Hopefully, the trees will score 75% of the time. This represents a healthy watershed. (Most healthy watersheds discharge approximately 25% of the rainfall that lands within it. The other 75% of the rainfall is “lost” through evapotranspiration. Unhealthy watersheds produce the opposite result.)

Add one additional ball or more to the game. Each additional ball represents increased rainfall.

4. Activity/Round Two

Development begins in the watershed, resulting in some impermeable surfaces: parking lots, roads, and buildings. Impermeable surfaces = less trees/vegetation = more runoff.

Create more balanced teams by moving some of the kids to the “Gravity” team. Hopefully, scoring will be 50/50.

Start with one ball. Then add several additional balls to mimic large rain events.

One or two staff members should be added to the game to represent pollution in the watershed (the more staff members in the game, the more possible sources of pollution in the watershed). If the staff member is able to catch the ball, they will put a piece of duct tape on the ball (more than one piece of tape may be placed on a single ball). Thus, the water is now polluted. If a “Tree” catches a ball with a piece of tape on it, they may remove the tape. (The “Trees” should be instructed to stick the tape to their clothing, as to avoid tape litter on over the field of play.) A “Tree” removing tape is representative of the filtering action of vegetation in a watershed.

5. Activity/Round Three

The watershed continues to be degraded by increased development and point and non-point sources of pollution.

Remake the teams in favor of “Gravity.” Scoring should sway toward “Gravity.” This represents increased runoff from impermeable surfaces.

Start with one ball, but quickly add additional balls to mimic large rain events (at least 3-4 additional balls).

As in Round 2, add 2-4 staff members to add tape to balls to represent pollution.

Assessment

Discuss the importance of water in our lives. How have you used/consumed water, today? Where did that water come from? How did it get there?

Review the scoring bar graphs and discuss how the physical changes in the watershed impact water quality and quantity.

Talk about PCBs, agricultural runoff, and/or impermeable surfaces (streams/rivers “die” when their watershed is 40% covered by impermeable surfaces).

Why should we be concerned about polluted water? Fishing, swimming, environmental quality,

biodiversity, and the expense to purify drinking water.

Ecological concerns: Use a familiar lake as an example of a high-quality watershed. What is the land like that surrounds it? What lives in the water? Would you want to swim or fish in the water? Why? Why not? What about drinking the water? How did the water get this way?

What might cause the quality of this water to change? Then, what would happen to the life in this water? (Biodiversity decreases as water is increasingly polluted.) Now, would you want to swim or fish in that lake? What about drinking the water?

Extensions

Have students design a model watershed (this could be a small indoor model, or digging in sand/soil)

Students can play online Watershed games: <http://games.bellmuseum.umn.edu/watershed/>, <http://www.northlandnemo.org/watershedgame.html>

Resources

- Nature’s Classroom Institute of WI Class Curriculum
- <https://discovernci.org/>

Rockin' the Schoolyard

Melody Peterman, Menominee Tribal School

petermm@mitw.org

Context

This is intended for use with any group of students.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

Activity 1

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.C: Curiosity and Wonder

Activity 2

ELS.EX3: Student assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX3.C: Cultural Systems Emphasis

Activity 3

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

ELS.EN7.B: Design and Implementation

Materials

- Anchor Chart Paper
- Clipboards
- Paint
- Paper & Pencils/Markers
- Rocks
- Journals

Driving Question

How to improve student buy-in to outdoor classrooms and school outdoor spaces?

Step-by-step directions, Activity 1

Connect: Explore outdoors and ask questions about set up.

1. Take class out for a “tour” of the playground/outdoor spaces.
2. As the group walks the grounds, have students point out areas they notice or important features of the

- area (school garden, trees, playground equipment) and create a map of the land on their papers.
3. After tour, students retell tour for teacher to draw on larger paper.
4. As the group looks at the map created, ask students why they think current areas are the way they are? Why is the playground set up the way it is? Why is the wooden area left the way it was? As areas are discussed, circle them on the map in red and chart answers.
5. Extending activity: Revisit this activity during different seasons, reference original map in fall and in winter, what has changed? Again in spring, what has changed?

Step-by-step directions, Activity 2

Explore: Designing new areas of the playground/green spaces

1. Revisit outdoor space tour and mapping.
2. Once tour summary completed, have the students find one area that they feel could be shared spaces between everyone in the school and how we work together to maintain the area. (Trees by softball field- Provide shade on hot days so breaking branches/ swinging from branches takes away the shade for everyone)
3. After this discussion, let students know that they will be helping to create a rock garden. Begin brainstorming and developing this plan. Where should it go? What should it look like? How will we get the job done?
4. As a group, consider ways others can positively respect the outdoor space so everyone can enjoy it.

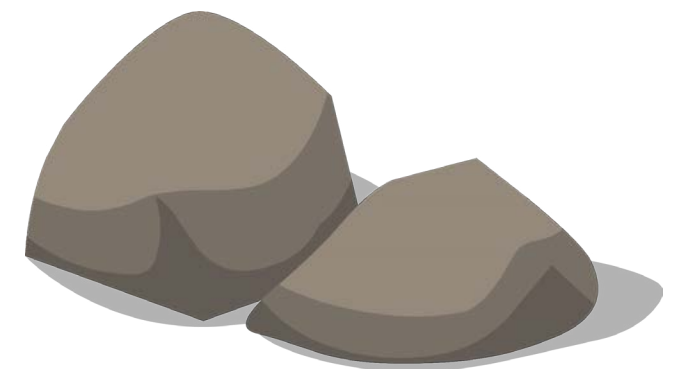
Step-by-step directions, Activity 3

Engage: Creating school rock garden

1. Students will prep the area for the new rock garden as planned in past activities.
2. Once area has been cleared, landscape fabric/newspaper is down, and edging has been placed, students will draft their rock design. Students can use positive sayings, words (Menominee or English), and/or pictures from nature (flowers, bugs, etc.) to decorate their rock to make it meaningful for them.
3. After drafts have been drawn on paper/computer model, students paint their final design on their rock.
4. After all rocks are painted and dry, each student places their rocks in the school rock garden.
5. After all classes have laid their rocks, complete a school walk-through. Students will look for their individual rocks, rocks others have painted that may match/go along with their own, notice difference, and see how all the different rocks go together.
6. Optional: Write journal entry in regards to the process and reflection on activity and viewing the garden.

Assessment

Instructor should look for evidence that students are meeting standards.



Get to “Really” know Your Placement

Randa Suleiman, Alverno College

randa.suleiman@alverno.edu

Context

Field experience course for pre-service elementary teacher candidates. It can be adapted for all pre-service teachers and field courses. Teacher candidates are placed in the classroom at a specific grade level in an urban school. Candidates are required to spend a specific number of hours observing, teaching a number of lessons, and completing other course assignments. This is a required log for the field experience course. The goal is to encourage teacher candidates to get to know their school, community, and available resources.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.1 Knowledge of learners

4.2 Knowledge of instructional methodologies

4.3 Planning for instruction

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well being through observation, exploration, and questioning.

ELS.C1.A: Perspective

ELS.C1.B: Sense of Place

ELS.C1.C: Curiosity and Wonder

Materials

- Journal to take notes and record observations
- Phone or camera
- Resources to design the presentation/write a narrative

Driving Question

What have you learned about your school community?

How will this learning translate into teaching and learning opportunities for you, and your students, in this context?

Step-by-step directions, Activity 1

Observation and Gathering Information

Can be done independently or in a small group

1. Walk around the school, the neighborhood, and close community
 - As you walk, write down what you observe (looks like, feels like, smells like, sounds like).
 - Include information about the diversity of the population, types of businesses, languages on

- signage, modes of transportation (walking, buses, etc.)
 - What questions or wonders come to mind?
2. School Walkthrough
 - As you walk, write down what you observe (looks like, feels like, smells like, sounds like).
 - Stop by the school office, library, gymnasium, music room, lunch room, ..etc.
 - What questions or wonders come to mind?
3. Classroom Walkthrough
 - As you walk, write down what you observe (looks like, feels like, smells like, sounds like).
 - Stop by the classroom library, bulletin board, teacher desk, student work, etc.
 - What questions or wonders come to mind?
4. Interview - What do you want to know?
 - Prepare 2-3 questions to ask at least four different individuals during your walkthroughs (student, teacher, parent, school staff, bus driver, neighbor, community member, business owner). Make sure at least one is from the neighborhood.
 - Conduct the interview and record your findings.
5. Photography and Videography
 - Identify what will best highlight the character of the school, classroom, and the community.
 - Identify subjects and ways of shooting them to reflect the school, classroom, and community.
 - Try to take action shots/footage that include people so others can see how they interact.
 - Take lots of pictures/shoot footage and keep good notes on each for later reference.
 - For photographs: Provide captions/short blurbs for each photograph selected.
 - For the videography:
 - Take footage that will help others get a feel for the sites without being there.
 - Walk through the sites so the audience feels like they are on the tour.
 - If possible, add narration to the videos for the audience. Think about using audio/video clips from interviews.

Step-by-step directions, Activity 2

Narrative

Should be done independently

1. Prepare 2-3 page narrative. Organize the narrative in three parts:
 - Part 1: Reflection
 - How does this experience impact your own thinking about the field placement?
 - How will this experience impact your interactions with students and families; ways you engage with the school community; ways you engage with the community at large?
 - What are you noticing about your own thinking as a result of doing the walk and the interviews?
 - Part 2: Impact on planning, instruction, and assessment
 - Describe the impact of what you learned about your school, classroom, and community on your planning, instruction, and assessment. Give at least 2 specific examples for each.
 - How do you see some of these variables impacting curriculum and instruction?
 - Based on the above information, what kind of support services and personnel would you expect to be available either within the school staff or district services?
 - Part 3: Culturally responsive practices
 - What evidence do you see that the school embraces culturally responsive practices?

- What evidence do you see that the classroom embraces culturally responsive practices?
- How well does the evidence collected represent multiple cultures, different types of families, religions, and disabilities?
- Does your school/classroom represent the cultures, families, religions of the students who attend?
- How are these diverse groups considered in the learning process?
- What would you do differently to embrace culturally responsive practices?

Note: When you discuss culturally responsive practice refer to: race, ethnicity, religion, language, family, disability, and socioeconomic status.

Step-by-step directions, Activity 3

Presentation

Can be done independently or in a small group

1. Prepare a brief presentation of your school community. Think of this as a kind of descriptive review of the community. You may present in any way you wish – PowerPoint, Prezi, Collage, Poster, Simulation, Video, etc. Every presentation should be digitized so that even if you do a poster, for example, you should photograph it or videotape it.

Assessment

Refer to activities 2 and 3. These two phases will be used as the assessment.

Resources

- [Culturally Responsive practices](#)
- [Culture in the classroom](#)
- [Culturally responsive practices: Theory, Research and Practice](#)

What is, what was and what will be: An Environmental Journey In and Around _____

Corey Thompson, Cardinal Stritch University

clthompson@stritch.edu

Context

ED 100 is the first education course taken by undergraduate education majors at Cardinal Stritch University and it is required. Within the course, you may have elementary as well as secondary education majors. The course is taught in both fall and spring semesters; sometimes it is taught twice within the spring semester, if the numbers warrant. The course is designed to introduce teacher candidates to the teaching profession and the variety of schools available to them (private/public/parochial/rural/urban/suburban).

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

Wisconsin Standards for Environmental Literacy and Sustainability

Activity 1

ELS.C1: Students develop and connect with their sense of place and well-being through observation and questioning.

ELS.C1.B.e Identify the natural and cultural parts that make up one's community, identify relationships between parts and the role and impact of humans in those systems.

Activity 2

ELS.EX3: Students assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX3.A.e: Review information from multiple perspectives and ask questions about books, photos, artifacts, websites, and other sources used to learn about natural and cultural systems.

ELS.EX5: Students investigate and analyze how change and adaptation impact natural and cultural systems.

Activity 3

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

ELS.EN7.B.e: Identify steps and engage in an experience to address a sustainability issue at school or in the community.



Materials

- Journal, writing instrument
- Old photographs of the chosen school
- Phones or cameras
- Whatever materials are needed to complete the project

Driving Question

What is/what was/what will be _____? (teacher candidate fills in the blank with the name of the school of his/her choice)

Introduction

Teacher candidates (TCs) are told that now begins their transformation from having been a K-12 learner to becoming a K-12 teacher. As a way of helping them in this transition, they will now start to look at schools from the perspective of a new teacher. TCs will be allowed to choose their “focus school.” (As an aside, many TCs tend to pick schools they themselves had been a student at; others pick schools where they hope to be employed in the future.)

After selecting their school site to visit, TCs must obtain permission to visit the school and explain the assignment to the appropriate people: TCs are visiting to get a 360 view of a school, from the perspective of a new teacher at that school (YOU!). TCs determine how much time they will need to spend at the school observing and interacting with staff and students, choosing 20 slides that capture the life of the school from at least five different aspects (extracurriculars, academics, student demographics, adult demographics and physical environment, etc.). DO NOT TAKE DIRECT PICTURES OF CHILDREN. If someone asks TCs about the project, explain the images are not being shared with anyone outside of their education course. TCs will share their Pecha Kucha in class on the assigned day.

Step-by-step directions, Activity 1

1. The entire ED 100 class visits an area “sample” school close to Cardinal Stritch University. TCs are given a tour of the school by a school official and are allowed to ask questions of their observation. Prior to the tour, the instructor will explain that the TCs should employ their various senses as a way of experiencing the school on the tour.
2. At the end of the tour, the class will circle up outside of the school and process their observations, both in small groups as well as in a whole group setting. Great focus will be placed upon the outdoor environment around the school.
3. As a class, TCs will create a whole class Pecha Kucha about the sample school and then be charged with doing this same activity individually or in a pair with a school of their own choosing.
4. TCs will share their Pecha Kucha with a small group of their peers during a later class period.

Step-by-step directions, Activity 2 - What it Was

1. After having created a Pecha Kucha about a school of their choice and then presenting it to their peers, TCs will return to their chosen school to interview the current administration about the history of the school: when was it built? Was it always at its present location? If not, what other locations may it have been in? Why did it move? What changes have taken place in terms of both physicality and demographics (both community and students)?

These interview questions could be generated by the students during a class session and we could do this at our “sample school” so as to build a model for them.

Important note: because the current administration may not have the history of the school, additional resources may be made available for students to explore. Here are some examples of what those resources might be (using Milwaukee Public Schools as an example):

- https://en.wikipedia.org/wiki/Golda_Meir_School
- <http://www5.milwaukee.k12.wi.us/school/goldameir/>
- <http://www5.milwaukee.k12.wi.us/school/goldameir/about/history/>
- <https://onmilwaukee.com/raisemke/articles/goldahigh.html>

2. Using a medium of their choosing, students will design a product that shows how their school has changed and adapted over time to impact both the natural landscape and the cultural landscape of the school. These products will be presented to their peers (presentation should be 7-10 minutes in length) but also given to the respective schools for their own archival records (maybe to be shared at open houses or back-to-school nights). Examples of products could be:
 - A commercial
 - A poem
 - A poster
 - A reenactment (video)
 - A research paper

Step-by-step directions, Activity 3 - What it Will Be

1. Now that TCs have a greater understanding of what the school was and what it is, TCs will travel back to the school to examine what it might take to sustain this space for the future. TCs can approach this assignment in one of two ways:

Option 1: What will it take to keep the space the same as it is today? (in terms of the natural and cultural systems)

Or

Option 2: What might the future of this space look like in terms of the natural and cultural systems?

1. Regardless of their approach, TCs must interview at least 3 different people connected to the school (neighbors, students, administration, parents) and project at least 10 years into the future.
2. In addition to the interviews, TCs must revisit the school and do a walk-through of the inside and outside of the building, stopping at times to put themselves into the space in the future. A drawing pad would be good for this time.
3. TCs should create a blueprint for their school for the future as well as a sustainability plan for the futuristic space.

Assessment

Rubrics for Activities 1,2, and 3 are found on the next three pages respectively.

Resources

• **Tips to help you construct the Pecha Kucha**

- Pecha Kucha is usually pronounced in three syllables as “pe-chaku-cha”, is the onomatopoeic Japanese word for the sound of conversation. The equivalent English term is “chit-chat”. This presentation format was devised in 2003 in Tokyo.
- The idea is simple: you have 20 slides and each one is shown for 20 seconds. The slides are advanced automatically, and at the end of 6 minutes and 40 seconds you are finished.
- Building a pecha kucha presentation is easy—just have 20 slides and set the auto advance to 20 seconds. The content of the slide is limited. I suggest that you completely abandon bullet points. These hideous things are really of little help in getting ideas across. Instead, look for images and diagrams that you can explain in 20 seconds. Go back over your presentation and remove any element that does not add value to what you are saying. I strongly suggest that you use paper and pencil to sketch out your presentation before launching Keynote or PowerPoint. You only have 6:40, make sure you are talking about one good idea, and not trying to discuss several unrelated topics.
- You can get samples of pecha kucha presentations on the web. And I would also recommend visiting Garr Reynolds site for pointers on slide content.

Rubric for Pecha Kucha

Teacher Candidate: _____ Date: _____

Instructor: _____

Scoring (Each performance indicator is worth 4 pts.)	Proficient (4)	Basic (3)	Minimal (2)	Indicator Not Met (1-0)
Amount of Slides	20 slides are featured	15-19 slides are featured	10-14 slides are featured	1-9 slides are featured
Comprehensiveness of Slides	At least 5 different aspects of the school are featured in the slides (including cultural and natural components, relationships, etc.)	4 different aspects of the school are featured in the slides	2-3 different aspects of the school are featured in the slides	Only 1 aspect of the school is featured in the slides
Time	Time limit met (6 minutes, 40 seconds)			Less than half of the required time limit
Total Points: _____ Average (Total /3): _____	Comments:			
Grade: _____	A 4.0-3.68 A- 3.67-3.34	B+ 3.33-3.01 B 3.00-2.68 B- 2.67-2.34	C+ 2.33-2.01 C 2.00-1.68 C- 1.67-1.34	D+ 1.33-1.01 D 1.00-.68 D- .67

What it Was Project Rubric

Teacher Candidate: _____ Date: _____

	Proficient (4)	Basic (3)	Minimal (2)	Indicator Not Met (1-0)
Presentation quality	Project was clearly defined and presented for audience	Project was defined nicely and presented with some things unclear to the audience	Project had many areas of unclarity for the audience	Project was hard to understand; poorly presented
Impacts on natural world	More than two impacts are explained	Two impacts are explained	One impact is explained	No impacts are explained
Impacts on cultural systems	More than two impacts are explained	Two impacts are explained	One impact is explained	No impacts are explained
Time length of presentation	Presentation is between 9:01 and 10 minutes in length	Presentation is between 8-9 minutes	Presentation is between 7-7:59 minutes in length	Presentation over/under time limit (<7 minutes) or >11 minutes)
Total Points: _____	Comments:			
Average (Total /4): _____				
Grade: _____				

Blueprint & Sustainability Action Plan Rubric

Teacher Candidate: _____ Date: _____

Scoring (Each performance indicator is worth 4 pts.)	4 (A) Requirements Met	3 (B) Requirements Mostly Met	2 (C) Some Requirements Met	1 – 0 (D-F) Most Requirements Not Met
Blueprint Description	Description of the blueprint is detailed, clear and thorough	Description of the blueprint is clear and thorough	Description of the blueprint to lacks specificity	Description of the blueprint is vague
Paper Organization	Paper is well organized	Paper is fairly organized	Paper is not well organized	Paper is poorly written
Writing/ Grammar	Well written with few or no grammatical errors	Written with few or no grammatical errors	Contains some grammatical errors	Contains five or more grammatical errors
Sustainability Action Plan Content	Action plan contains 3 or more specific actions the teacher candidate recommends for the future of the school site	Action plan contains 2 specific actions the teacher candidate recommends for the future of the school site	Action plan contains 1 specific action the teacher candidate recommends for the future of the school site	Action plan contains no recommendations by the teacher candidate recommends for the future of the school site
Total Points: _____	Comments:			
Average (Total /4): _____				
Grade: _____				

Exploring Your Place

Cherie Thunder, College of Menominee Nation Sustainable Development Institute

cthunder@menominee.edu

Context

These activities are designed for high school students participating in the Sustainability Leadership Cohort (SLC). The SLC is a summer-long learning experience for high school students taking place at the College of Menominee Nation. The goal of the SLC is to support high school youth in the Menominee Nation to develop college and career readiness and leadership skills. In addition, the youth will be guided and given support through a SLC mentor team to assist them in connecting their culture and language to STEM concepts.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.B.h: Analyze relationships between parts of local and global natural and cultural systems.

Compare and contrast historical and current resource use, and analyze the effects on local, regional, and global natural and cultural systems.

ELS.C1.C.h: Investigate and analyze one's own curiosities about patterns that emerge from outdoor exploration to develop new questions, draw conclusions, or formulate new ideas or solutions. Reflect and share how one's perspectives influence personal curiosity, the pursuit of knowledge, and respect for others and the environment.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.B.h: Compare and contrast the competitive, predatory, and mutually beneficial interactions between different species and ecosystems and evaluate the impacts of each on the system.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

ELS.EN6.A.h: Analyze the role of feedback loops in reinforcing the interconnectedness of parts within a system and the consequences of actions by each of those parts on the whole. Identify and analyze leverage points and cause and effect relationships within a system. Demonstrate how ideas, parts, relationships, and perspectives change over measures of supply, demand, impact, and payback.

Materials

- Forest materials-structure building
- Notebook
- Pen/pencil/colored pencils
- Access to computer/library

Driving Question

How do we take care of the forest? How does the forest take care of us?

Step-by-step directions, Activity 1

1. Students will take a walk and observe things in two different forest environments. --One place in the forest will be close to a water source, the other further away.
2. What do you hear, smell, feel, see? What can be used as a food item in this environment?
3. Write about experience (journal entry, poem, or song).
4. Draw a picture.
5. Verbally express feelings to group.

Step-by-step directions, Activity 2

1. Imagine that you moved to this place with no prior knowledge of the land. How can you immediately relate to these places?
 - What is here now?
 - What animals, plants, bodies of water are part of this land currently?
 - What is the relationship among things in the forest?
 - How do they work together? Work against each other?
2. Students will be posed the questions:
 - Where did your ancestors live?
 - How did they live?
 - Why did they live the way they did?
 -in relation to the land?
3. The students will have time to research online or in the campus library answers to these questions. They will also be allowed to interview elders or other knowledgeable people about these questions. All information gathered will be recorded in student journals or with a camera.

Step-by-step directions, Activity 3

1. The students will revisit their journals to recall what they observed in the forests in activities one and two. With those observations and research in mind, the students will gather materials within the forest and construct a livable structure.
 - How much material will be needed for a family-size structure?
 - What type of material is best for creating the structure you need?
 - How much time is needed?
 - Will your structure last throughout each season?
 - Will you need to move from season to season?
2. The students will be introduced to a project that will happen in the summer at the Menominee Cultural Museum. A demonstration bark lodge will be built by high school students with the help of Menominee elders and an archaeologist. The SLC will help construct this bark lodge and compare the

structures they have built to the demonstration lodge.

Assessment

The students' journals will be recorded and analyzed.

Sharing circles will be used to discuss student learning at the end of every activity.

During the last sharing circle, students will be asked these questions:

How did their research impact the materials used, type and placement of structure within the forest?

How did their perspective of the forest area and/or prior knowledge influence materials used, type and placement of structure within the forest?

Eskotaew (Fire)

Marissa Vele, College of Menominee Nation

velem_0618@students.menominee.edu

Context

These activities are designed for high school students participating in the Sustainability Leadership Cohort (SLC). The SLC is a summer-long learning experience for high school students taking place at the College of Menominee Nation. The goal of the SLC is to support high school youth in the Menominee Nation to develop college and career readiness and leadership skills. In addition, the youth will be guided and given support through a SLC mentor team to assist them in connecting their culture and language to STEM concepts.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.1 Questioning, analysis, and interpretation skills

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.5 Technologies that assist learning

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others' perspectives.

5.2 An inclusive and collaborative learning environment

Wisconsin Standards for Environmental Literacy and Sustainability

Activity 1

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.A.m: Integrate new perspectives into a mental model, and explain how new ways of thinking can lead to changing attitudes and behaviors.

ELS.C1.B.m: Identify the relationship between parts of natural and cultural systems in connecting communities into regional systems (e.g., watershed areas, political jurisdictions, ethnic communities). Understand the relationships between the environment and geography of a locality and its history, culture, and economy. Gather data from primary sources to identify local needs and compare to perceived local, regional, or global needs. Investigate alternatives to meeting one's needs for food, water, and shelter.

ELS.C1.C.m: Ask questions about patterns and cause and effect relationships in natural and cultural systems observed outdoors daily, seasonally, and over time. Examine how curiosity and wonder help



formulate questions to pursue knowledge about everyday experiences.

Activity 2

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.C.m: Analyze the impact of security, resource scarcity, cooperation, competition, and conflict on natural and cultural systems at the local, state, tribal, and national levels. Compare and contrast the roles of government at local, state, tribal, national, and international levels in setting and enforcing environmental policies, and encouraging sustainability

ELS.EX3: Students assess how diversity influences health and resilience of natural and cultural systems.

ELS.EX3.A.i: Compare and contrast the perspectives of people from various cultures who have had an impact on the environment and sustainability. Examine the accuracy, reliability, and biases of sources used to learn about environmental and sustainability-related topics.

ELS.EX3.C.m: Analyze how one's cultural identity influences perspectives about shared natural resources and their role in maintaining the health and resilience of those resources. Analyze the environmental, social, and economic aspects of community health and sustainability. Analyze cases where historically marginalized groups have been impacted by environmental decisions. Examine ethics of societal actions and their effect on others.

ELS.EX5: Investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EX5.A.i: Explain how one's cultural identity and views can influence decision-making and sustainability in natural and cultural systems. Identify parts, relationships, and perspectives present in a local issue, and examine the impact of individual and group choices on natural and cultural systems.

ELS.EX5.C.m: Examine how historical and contemporary factors shape a sustainability issue. Evaluate how historical and contemporary natural resource use, practices, and distribution has affected human geography and analyze the impact on natural systems.

Activity 3

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

ELS.EN7.A.m: Explain the importance of civic responsibility and their duty to be advocates for change. Identify instances when citizen action and public opinion have influenced change, and evaluate the effect of citizen action on environmental quality and sustainability for the common good. Examine sustainability issues that need attention in the school or community, identify perspectives of various stakeholders, and consider how different perspectives could contribute to solutions.

ELS.EN7.B.m: Demonstrate ability to work individually and collectively to resolve a sustainability issue through deliberation to consider alternatives, and balance interests for the sustainability of natural and cultural systems.

Design and implement an individual or group experience to develop self-efficacy and address an issue affecting a community's natural and cultural systems. Identify potential partners and evaluate the short- and long-term results.

Materials:

- Clipboard or hard surface to write on
- Markers
- Paper/Science Notebook
- Pencil
- Poster Paper
- Smartphone/Tablet (access to wi-fi)

Driving Question

What role does fire play in forest ecosystems and how is it important to our community?



Step-by-step directions, Activity 1

Perspective Taking

1. Students will need to have writing materials ready and will need to be taken into a forest or wooded area.
2. The students will need to separate and pick one object in the forest to focus on. It could be a rock, tree, bird, etc.
3. Students will take on the perspective of the object and write silently for 20 minutes. They can write about how the object feels with its different senses, or they can create a story from the perspective of the object.
4. After 20 minutes, students will come back together in a talking circle and share with their peers. Students can discuss and make connections to others' perspectives and will also talk about what would happen to their object if a fire went through the area. Would their object still be there? Would it change?

Step-by-step directions, Activity 2

Scavenger Hunt

1. Facilitator will create a scavenger hunt that students can access with a smartphone or tablet. The scavenger hunt can be created on a free app called Actionbound.
2. Students will need to download the app before entering the game. They can play as individuals or as partners. In this app, you can have students go to certain locations, answer questions, give open ended questions, or upload pictures of their findings.
3. In this scavenger hunt/quiz, include some questions about fire and its impact on the environment and community. Other questions could lead them to the library and have them look and locate a book about fire, or find a traditional story about fire. You could also send them into the woods to find certain items.

Step-by-step directions, Activity 3

Interview and Presentation

1. Students will develop questions for a local forester and elder about the use and importance of fire within the forest community.
2. They will then take a trip out into the forest where they will be asking those questions. The area or areas visited will preferably be recently burned or past burned sites to help generate discussion and learning.

3. After students get back from the forest, they will create a presentation that they will share with younger children. They can talk about the importance of fire and possibly give the story of fire to the children in a circle setting.

Assessment

Student learning will be assessed through completion of the scavenger hunt and the final presentation to younger children.

Resources

- Project Learning Tree-Focus on Forests. Page 87, The Nature of Fire.
- Actionbound Scavenger Hunt App
- Project Wild. Page 236, Fire Ecologies

Water in Our Community

Kelly Voigt, New Berlin West Middle/High School

kvoigt2@gmail.com

Context

This lesson was written to be used in a middle school science class during an ecology unit. Students will be studying the hydrologic cycle and examining water use in their own homes and community. Students will first learn about where the water comes from (connect), then collect data on water usage in their own homes (explore), and finally develop a plan to conserve water in their own community (engage).

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- Project WILD
- STEM Hero Curriculum (<https://stemhero.com/>)
- Student computers

Driving Question

Where does our water come from? Is there a need for water conservation in our community?

Step-by-step directions, Activity 1 - My Water Footprint (30 mins)

Students will create a water footprint.

1. Have students trace their right foot with their shoe on.
2. Then, have students draw another smaller footprint inside the footprint they traced.
3. In the center of the footprint have students write the name of their water source (body of water or well).
4. Have students brainstorm individually and then as a class to list the ways they use water. This list should be written inside the smaller footprint.
5. Then, introduce indirect water use, have students brainstorm and write this list in the larger exterior footprint (shoe).

6. If possible, hang the footprints up in the classroom to serve as a visual reminder.

Step-by-step directions, Activity 2

1. Use the STEMHero curriculum to have students gather data on water usage in their own homes.
 - Students will first need to be taught how to use the online interface and how to read a water meter. Reading a water meter can be challenging for students. Younger students may want to do this with a parent, middle school students should be taught in class using a picture of a water meter and then practice several times before attempting to collect data on their own. As the teacher, you can decide the frequency and length of time you would like your students to collect data for.

Assessment

Students will create a presentation to display what they have learned.

Personal Action Analysis

Leon Walls, University of Vermont

lwalls@uvm.edu

Context

This activity is for all pre-service teachers, for all learners and all individuals who have an impact on sustainable development...which is all of us. This is a required course in the elementary education program at the University of Vermont. The course this activity falls under is titled "Science of Sustainability" (SOS); covering sustainable development, environmental science, and action research; the activity serves as a culmination project that runs through the entire semester; course and activity are mainly geared to future K-5 teachers.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EN6 Students analyze the dynamic balance between natural and cultural systems.

ELS.EN7 Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- Internet
- Tokens and prizes

Driving Question

How does analyzing one's own personal practices, with respect to their ecological footprint, affect one's understanding of sustainability and change resource consumption?

Step-by-step directions, Activity 1

1. Students are introduced to Action Research (AR) and the AR cycle
2. Explain each step of the AR Cycle (there are several variations of the AR cycle, but generally they include the following):
 - Identifying and limiting the topic (research question)
 - Gathering information
 - Reviewing the related literature
 - Developing a research plan (procedures--may want to use the 5E model)
 - Implementing the plan and collecting data (hands-on activity that produces data)
 - Analyzing the data (looking at the data to see what it's telling you...trends, patterns, etc.)
 - Developing an action plan
 - Sharing and communicating the results

- Reflecting on the process and cycle begins again
 - For example in step #1 students: Identify and limit their topic (research question). Since this is an ecological footprint type activity, students narrow the focus of their personal analysis to one or more aspects of resource consumption
3. Students are then told that they will utilize each step of the cycle to run their own Personal Action Analysis. Allow time and provide support for students to complete the cycle.

Step-by-step directions, Activity 2

This activity comes from the Project WILD text titled “Sustainability: Then, now, later”. Although it was never directly mentioned in the original lesson, this is a perfect activity to demonstrate the concept of ‘tragedy of the commons’.

The tragedy of the commons is a term used in social science to describe a situation in a shared-resource system where individual users acting independently according to their own self-interest behave contrary to the common good of all users by depleting or spoiling that resource through their collective action.

1. Prepare a large pile of tokens, providing for a total of ten tokens per student (e.g. every 10 students will require a total of 100 tokens).
2. Place $\frac{1}{4}$ of the tokens into a separate “starting” pile in the middle of the participant group (e.g., if you have a total of 100 total tokens on the main pile, place 25 in the middle).
3. Arrange students in a circle surrounding the middle starting pile of tokens. If the group is large, feel free to have multiple sub-groups (e.g. 50 students, maybe 5 groups of 10).
 - *Do not explain the significance of the tokens prior to the activity. Instead, read from the script below exactly:
 “These tokens belong to all of you...when we begin, music will be played. While the music plays, everybody may take tokens from the center pile...you may not return tokens to the pile once you have removed them. However, you may trade in 10 tokens for a piece of candy (or desired item chosen by the teacher)...when the music stops playing, I will double the number of tokens that are left in the center, then we will continue the activity with another round...the maximum number of tokens that the center pile can hold is what you see at the beginning of this activity, the pile cannot hold more than that...you may not speak or otherwise communicate with classmates during the activity.
4. Conduct one round of the activity...when the music stops, exchange students’ tokens for prizes. Then count the number of tokens left in the center. If no tokens remain for a group, explain to the students that it is impossible to double zero; therefore, the activity is over (for that group if there are more than one group). Have those students return all of the tokens to the pile and restart the activity. If tokens do remain in the pile, quickly double the center pile for the next round. Remember that the number of tokens after doubling should not exceed the initial number...this is important to represent limits to the rate at which resources are renewable.
5. Repeat the activity two more times without allowing students time to communicate between rounds. (Try to maintain consistency in the time used to double tokens between rounds, keeping it under two minutes.)
6. Once you get to the fourth round, announce that students may now communicate during the activity to discuss strategies.

7. After a couple more rounds, pause to discuss the activity with students before proceeding. Ask students to construct an argument for a method that would allow more of them to obtain their ten-token goal without depleting the pile of tokens. Continue additional rounds using strategies suggested by students.
8. Ask students if this simulation reminds them of anything related to human behavior. If needed, prompt them to consider how the activity is similar (or dissimilar) to how humans interact with the environment.

Take Care of the Earth - Understanding Connections Between Humans and the Earth Part 1

Cassandra Watson, College of Menominee Nation

Cwatson@menominee.edu

Context

These activities are designed for high school students participating in the Sustainability Leadership Cohort (SLC). The SLC is a summer-long learning experience for high school students taking place at the College of Menominee Nation. The goal of the SLC is to support high school youth in the Menominee Nation to develop college and career readiness and leadership skills. In addition, the youth will be guided and given support through a SLC mentor team to assist them in connecting their culture and language to STEM concepts.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.2 Knowledge of environmental systems and processes

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

4.3 Planning for instruction

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.B.h Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.B.m Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

Materials

- 1 Forest Organism Card Necklace for each student
- Chart paper
- Yarn or string, scissors
- Teacher Page 4.2A Recording Relationship Web Information
- Teacher Page 4.2B Recording Scenarios of Forest Change
- Large poster of the word Netāēnawemākanak

Driving Question

How can you be a good steward of the Earth?

Step-by-step directions, Menominee Forest Relationship Web: Types of Relationships

Suggested time: 60 minutes

This lesson would be great to do outdoors.

1. Introduce the lesson question, How are the Things found in the Menominee Forest related?
2. Have students put on their Forest Organism Card Necklaces. Discuss the common needs for each Thing.
3. In small groups, have students brainstorm about the types of relationships that exist between and among Things in the forest.
4. Generate a class list of types of relationships. In addition to food relationships, there might also be providing nutrition, providing protection or shelter, or promoting reproduction.
5. Assemble the class into a circle.
6. Lead students to build a class model, using the yarn or string, that represents how they think Forest Organisms are connected.
7. Review the meaning of Netāēnawemākanak in light of the relationship web just constructed.
8. Help students identify patterns in the way the web is constructed and recognize that not all relationships are represented.
9. If time is available, use the scenarios from Teacher Page 4.2B along with the class relationship web to model effects caused by changes/events in the Forest.
10. Summarize key ideas from this lesson, including: types of Forest relationships, the complex nature of interconnectivity in the Forest, and direct/indirect types of cause and effect relationships in the Forest.

Assessment

Have students write a reflection on: What does Netāēnawemākanak mean to you based on what you have learned during this lesson?

Resources

- Adapted from Netāēnawemākanak resource book, CAF 4 Lesson 2: Menominee Forest Relationship Web: Types of Relationships. For more information, see: <http://posohproject.org/grade-7-unit>

Take Care of the Earth - Understanding Connections Between Humans and the Earth Part 2

Cassandra Watson, College of Menominee Nation

Cwatson@menominee.edu

Context

These activities are designed for high school students participating in the Sustainability Leadership Cohort (SLC). The SLC is a summer-long learning experience for high school students taking place at the College of Menominee Nation. The goal of the SLC is to support high school youth in the Menominee Nation to develop college and career readiness and leadership skills. In addition, the youth will be guided and given support through a SLC mentor team to assist them in connecting their culture and language to STEM concepts.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.2 Knowledge of environmental systems and processes

1.4 Personal and civic responsibility

Theme Three: Professional Responsibility of the Environmental Educator

Educators must understand and accept the responsibilities associated with practicing environmental education.

3.2 Emphasis on education, not advocacy

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

ELS.EX2.C.h: Assess the roles of individuals, government, and special interest groups in setting policies at the local, state, tribal, national, and international level; analyze the cultural and environmental dimensions of the policy; and propose a strategy to address concerns related to the policy. Design a solution for a natural resource scarcity issue using available resources in a different way or developing a new resource, and analyze intended and unintended consequences on sustainability in natural and cultural systems.

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

ELS.EN6.A.m: Identify and analyze complexities of decisions on natural and cultural systems now and in the future, and consider possible unintended consequences. Identify positive and negative feedback and leverage points within a system, and suggest modifications to the structure to achieve intended outcomes.

ELS.EN6.B.h: Evaluate and justify one's own civic ideals by providing examples of personal rights and responsibilities related to one's place. Analyze and evaluate impacts of personal and collective responsibility on the environment and community and develop solutions to conflicts that arise to

minimize the impact on natural and cultural systems. Analyze environmental laws created for local and global environments.

Materials

- Copies of “Decision-Making Topics” student pages - pages 130-133 from Project Learning Tree's Exploring Environmental Issues: Places We Love
- Chart paper
- Markers

Step-by-step directions, Activity 2 - Far-Reaching Decisions

Suggested time: Two or three 50-minute periods

PART A

1. Ask the class, What decisions have you made today? Examples might include what to wear, what to eat, or how to get to school. Categorize those responses (i.e. transportation, food, shopping, etc.).
2. Have each student draw a diagram illustrating the connections between a decision they made over the past 24 hours and everyone and everything that might have been affected by it. The diagram should indicate the nature of each consequence. Consider using graphic organizer software.
3. Invite several students to share their diagrams. (Or hold a gallery walk with all the diagrams posted around the room.) Discuss the extent of the consequences, and ask the following questions: How far away were the consequences felt? How many people were affected? What was the nature of the connections (i.e. economic, emotional, environmental, physical, etc.)? Can anyone else think of other possible repercussions? Did students list any positive impacts? Did the decision-maker consider any or all of those effects when making the decision? Would doing so have made a difference? Students could update their diagram with any additional connections from the discussion.

PART B

1. Have students calculate their ecological footprints on <http://www.footprintcalculator.org/>. How do students' footprints compare to the average American's footprint? (This step is optional and will add extra time to the activity especially if students want to discuss their findings.)
2. Divide the class into four teams, depending on how many students you have. Give the members of each team a copy of their assigned “Decision-Making Topic”. (See Resources)
3. Each team should assign a note-taker to record key points made by all team members and a mediator to ensure that all voices are heard and that no one dominates. Instruct the teams to read about their topic and to discuss the issue, using the questions at the end as a guide. The purpose of the discussion is for each person to share, explore, and clarify his or her own thoughts, not to convince others of any one opinion.
4. After 15 minutes of group discussion, have students stop and write independently for 10 minutes on the topic. Instruct them to use the questions in their discussion topics as writing prompts.
5. Explain that each team will be responsible for developing a presentation about its topic. The goal of the presentation is to convey the team members' ideas about how an individual's actions can affect distant communities. If needed, time could be given for independent research to strengthen the presentations, even so far as to assign research as homework for the following day.
6. Invite the teams to deliver their presentations to the class.
7. Use the following questions to lead a final discussion:
 - a. What do the four different topics have in common? How do they differ?

Teacher Page 4.2B Scenarios of Forest Change

After students construct the class Forest Relationship Web, using their *Thing* Necklaces and yarn or string, repeat the following process to individually introduce and discuss the implications of the following four scenarios at the bottom of the page.

1. Explain that students will listen to a scenario as it is read aloud and then use their relationship web to simulate how the Forest would respond by using shaking yarn (or string) to represent change as follows:
 - a. Decide which population(s) would be affected first.
 - b. Students representing those first affected population(s) begin to shake the yarn moderately fast to model that they are experiencing change.
 - c. Next, as other students begin to feel the yarn shake, they call out "I'm affected!" and begin to shake the yarn gently to show that their population is now experiencing change, too.
 - NOTE: With these scenarios it is important to use the relationship web model to show the difference between direct and indirect effects by having students shake the yarn at different rates.
 - d. Direct students to notice when each population becomes affected and repeat the same modeling at a slower rate so that students notice more carefully when each population becomes affected.
2. Repeat this activity for all four scenarios described below.

Scenario 1: A hot, dry summer causes poor growing conditions for the Wild Rice. Who will be affected?

Scenario 2: A new dam was built on the Wolf River and the sturgeon can no longer make it to their spawning place. Who will be affected?

Scenario 3: Menominee community members are working with the Shawano community to build a fish ladder that will enable the sturgeon to jump over the dam so that they can swim upstream and increase their spawning area to parts of the Wolf River on the Menominee Reservation. Who will be affected?

Scenario 4: A tornado blows down a large area of trees in the Forest. Who will be affected?

Take Care of the Earth - Understanding Connections Between Humans and the Earth Part 3

Cassandra Watson, College of Menominee Nation

Cwatson@menominee.edu

Context

These activities are designed for high school students participating in the Sustainability Leadership Cohort (SLC). The SLC is a summer-long learning experience for high school students taking place at the College of Menominee Nation. The goal of the SLC is to support high school youth in the Menominee Nation to develop college and career readiness and leadership skills. In addition, the youth will be guided and given support through a SLC mentor team to assist them in connecting their culture and language to STEM concepts.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

1.4 Personal and civic responsibility

Theme Five: Fostering Learning and Promoting Inclusivity

Educators must enable all learners to engage in culturally relevant open inquiry and investigation, especially when considering environmental issues that are controversial and require learners to seriously reflect on their own and others' perspectives.

5.2 An inclusive and collaborative learning environment

Wisconsin Standards for Environmental Literacy

ELS.EN6.B.m Students analyze the dynamic balance between natural and cultural systems.

Materials

- Paradise Lost? Examples <http://wiscience.wisc.edu/project/paradise-lost-climate-change-north-woods>
<https://paradiselost2.wordpress.com/>
- Art items the students may need - use recycled or natural materials when possible

Step-by-step directions, Activity 3

Science Inspires Art Inspires Society

Suggested time: 2-4 hours

1. Have students research climate change to spur ideas for their own art project. Encourage students to think outside the box while researching and come up with creative ways to learn about climate change.
2. Ask students to pick any topic related to climate change and design an art project around it. Be as creative as possible and stretch your imagination. Ideas for projects could include a painting, song, drawing, poem, poster, collage, photo, recyclable material sculpture, etc.
3. Have students write an explanation of their art piece. Why did they choose their medium? What

information are they communicating to the public? What do they want people to know or learn after viewing their artwork?

4. Have an “Art Gallery Night” during one of the family potluck events.

Assessment

Have students write a reflective journal entry relating this art project to the leadership domains we are trying to teach them about during the SLC.

Resources

- Adapted from Climate Change: A Wisconsin Activity Guide - Grades 7-12 resource book from Wisconsin Department of Natural Resources, Lesson 5A: Science Inspires Art Inspires Society

Getting to Know You

Dr. Jan Wellik, Associate Lecturer - Environmental Studies

UW-La Crosse

jwellik@uwlax.edu

Note: Activities written by Jan Wellik are not to be used for publication as they are owned and copyrighted by her environmental education business, Eco Expressions, LLC.

Context

Intended audience for this activity is ENV 201: Introduction to Environmental Studies course offered each semester at UW-La Crosse. Each section has about 32 college undergraduate students from freshman to senior. It is a General Education course, and all majors are welcome to enroll. It is the first course in the ENV minor. It generally meets twice a week for 1 hour and 25 minutes.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

Materials

- A notebook/journal
- Colored pencils & pen
- A guidebook or online resource (at home)

Driving Question

How can we establish a place-based connection?

Step-by-step directions, Activity 1

This activity promotes place-based connection.

1. Spend time exploring one living thing in this place. For example, a bird, plant, insect, tree, mammal, etc. Sit close to it and observe.
2. Write down what you see, hear, smell and feel in your journal. What are you learning about this living being? What does it show you about this environment? What questions do you have about this species? For example: How did it get here? What does it do here? What impact does this living species have on other species? How do humans impact this species?
3. For homework: Study up on this living species in a guidebook or online resource. What did you learn about how it eats, survives, where it lives, etc? How does this correlate to your own first-hand observations?

Assessment

Students will answer questions for weekly journal related to these activities to think critically and reflect on these ideas.

Resources

- Wisconsin bird book
- Wisconsin tree book
- Wisconsin wetlands book
- Midwest insects book
- Wisconsin mammals book

Ecosystems and Water Systems

Dr. Jan Wellik, Associate Lecturer - Environmental Studies

UW-La Crosse

jwellik@uwlax.edu

Note: Activities written by Jan Wellik are not to be used for publication as they are owned and copyrighted by her environmental education business, Eco Expressions, LLC.

Context

Intended audience for this activity is ENV 201: Introduction to Environmental Studies course offered each semester at UW-La Crosse. Each section has about 32 college undergraduate students from freshman to senior. It is a General Education course, and all majors are welcome to enroll. It is the first course in the ENV minor. It generally meets twice a week for 1 hour and 25 minutes.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX2: Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.

Materials

Activity 2

- Students will bring body care products from home
- Instructor will bring a few body care product samples to discuss

Driving Question

How do we as individuals impact our local ecosystems?

Step-by-step Directions, Activity 1 - Systems at Play

1. Students will learn about an ecosystem of our area (prairie), relationship of predator and prey, and how humans impact natural ecosystems. This activity will also serve as an icebreaker and connecting activity among students during the start of the semester.
2. During week 1 of the course, students will participate in a Systems Thinking Activity to learn how we are interconnected and interdependent with other species. Assign 6-8 different species (about 4-5 students per species), for example 4 students will represent eagle, 5 students will represent rabbits, 4 students will be snakes, 5 will be dragonflies, 5 will be milkweed plants, and 5 will be monarch butterflies. Pick outdoor space on campus with grassy area to move around.
3. Imagine we are all part of the same ecosystem, and each species needs to stay equidistant between its predator and prey. Instructor will give directions related to potential human impacts and environmental impacts, for example: wildfire, oil spill, frac mining, urban development & suburban

sprawl, extinction of species, etc. Students will move around in correlation to the introduction of these situations and figure out how it impacts that species which they are role playing.

Step-by-step Directions, Activity 2 - What's in your shower?

1. In the middle of the semester, students will prepare for the Wastewater Treatment Plant Tour by thinking about their own use of water and their impact on the health of the water.
2. Students will be asked to answer the following questions in their journals:
What's in your shampoo, soap, and other body care products that you put on your body today?
In advance of class, they will look at the products in their dorm/home that they use on their body.
Pick at least 3 items and investigate the name of the product; Who produces this and where? What ingredients are in it? What are these? What impact do they have on your body? Bring an item to class.
3. Use Skin Deep database to investigate your health/beauty products: www.ewg.org
4. Discussion questions in class:
 - Think about these items going down the drain of your shower, where do they go from there?
 - What impact might these have on the Wastewater Treatment Plant? What impact do these have on the Mississippi River, where water drains?

Step-by-step Directions, Activity 3 - Class Fieldtrip to Wastewater Treatment Plant

1. After thinking about systems and how we influence ecosystems and water systems, students will tour the County Wastewater Treatment Plant to ask questions and think critically about human impact on the Mississippi River watershed.
2. Each student will prepare at least 5 questions in advance to ask during tour. Don't worry if you are concerned they won't be able to answer the question, ask it anyway!
Sample questions:
What impact do parabens in shampoo have on the Mississippi River?
How are these toxic chemicals affecting our waterways?
How do you clean the water that comes from showers and toilets?
What would be the best way to take care of our drinking water?
What do you think is the biggest problem with our wastewater in La Crosse?

Assessment

Students will answer questions for weekly journal related to these activities to think critically and reflect on these ideas.

Resources

- La Crosse County Wastewater Treatment Plant
- Mississippi River watershed maps - USGS
- Skin Deep database: www.ewg.org

Water Mapping

Sara Wescott, Menominee Indian School District

swescott@misd.k12.wi.us

Context

This activity is intended for school age students, specifically for the youngest grade band included in the Environmental Literacy Standards (K-2). There is no specific time-frame for the students to participate in the activity nor is there any limitation for the amount of time to be spent on this activity.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme 1 Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K-12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

ELS.C1.B.e: Identify the natural and cultural parts that make up one's community (e.g., natural and built environments, habitats, family, school, cultural diversity), identify relationships between parts, and the role and impact of humans in those systems. Identify where one's food and water comes from and where it goes. Identify different levels that make up one's sense of place (local, regional, national, global).

ELS.EX4: Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.

ELS.EX4.A.e: Recognize that animals (including humans) get the nutrients, energy, and hydration needed to grow and function from the food and water they consume. Identify places where water is found in different forms on Earth.

Materials

- Internet accessibility, will need to reference the following websites:
<https://dnr.wi.gov/topic/wateruse/withdrawalsummary.html> (Wisconsin Water Withdrawal)
<https://www.google.com/maps> (Google Maps)
https://www3.epa.gov/npdes/pubs/centralized_brochure.pdf (U.S. Environmental Protection Agency)
- Wisconsin State map

Driving Question

Where do we fit in the water cycle?

Introduction

Look at the environment around you. Take it all in. Close your eyes. Remember. Imagine what you saw is still in front of you. Now open your eyes. What do you see? What can you feel, smell, hear, touch? In what ways do you think water impacted those things, what are those relationships with water? How

much water do you think is consumed on a local level, regional, level, state level, national level, and global level? What is your impact and how will that affect future generations?

Step-by-step directions, Activity 1

1. Examine the ways you use water at home and in the community. Keeping a local perspective will require the students to reflect on their current uses and to consider where their sources of water are located and where their water goes after it goes down the drain.
2. Identify the major sources of water in comparison to the school, their homes, and any other significant locations.
3. Discuss the impact of these waterways on their everyday lives as well as the livelihood and dependence of the plants and wildlife.
4. Use Google Maps to navigate the reservation/county to identify various bodies of water.
5. Use a state map to identify bodies of water around the state, pick specific waterways such as major rivers, lakes, and bays for the students to locate.

Step-by-step directions, Activity 2

1. Where does water go once it disappears down the drain? Look at the U.S.E.P.A. brochure (pdf) and discuss what happens locally.
2. Have students draw a house, perhaps their own, and illustrate what happens to the water once it leaves the sink, toilet, or shower.

Step-by-step directions, Activity 3

1. Water Cycle.... In nature. Select a location within the community.
2. Have students create a poster that shows the water cycle based in that area. Encourage the students to post their informative posters in the community to engage conversation.

Assessment

Students should produce hand written/drawn materials that demonstrate their understanding and interpretation of the content.

Resources

- <https://dnr.wi.gov/topic/wateruse/withdrawalsummary.html> (Wisconsin Department of Natural Resources)
- dnr.wi.gov/topic/WaterUse/documents/WithdrawalReportDetail.pdf
- https://archive.usgs.gov/archive/sites/wi.water.usgs.gov/water_conditions/legends.html (United States Geological Survey)
- <http://worldwaterday.org/> (United Nations World Water Day)
- <https://wpt.pbslearningmedia.org/resource/plum14.sci.life.lpwater/water-in-your-world/#.WyAS4tVKjIU> (PBS.org LearningMedia-Water in Your World)
- <https://www.awwa.org/Portals/0/files/resources/publicaffairs/images/ValueofWaterUSA.pdf> (American Water Works Association)

Windy Weather

Lenore Wineberg

wineberg@uwosh.edu

Context

These three windy weather activities would take place outdoors for three - four year old children. In specific, the focus is to model these for early childhood pre-service teachers.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme 1: Environmental literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

Wisconsin Standards for Environmental Literacy and Sustainability

ELS.EX5 Investigate and analyze how change and adaptation impact natural and cultural systems.

ELS.EX5.B.e: Identify changes that take place in natural systems (e.g., weather, water, day length).

Identify how plants and animals are adapted to habitats that provide the food, water, and protection needed for their sustainability. Observe and identify patterns in weather and day length.

Materials

- Homemade binoculars with two toilet paper rolls for each child
- Homemade kite: Directions and related supplies (<https://www.my-best-kite.com/kite-making-for-child.html>)
- Scarves

Driving Questions

What do you see that is moving outside, e.g. trees etc.?

How can we get our kite to go up in the air? What is happening?

How will we dance outside when the wind is fast? Slow?

Step-by-step directions, Activity 1

1. Before walk, ask the children what things the wind can move?
2. During walk, use binoculars to identify things that move.
3. After the walk, talk about what things they saw that was moved by the wind. To enrich activity, share with families how they can take a walk and talk about what is moving and what causes things in nature to move.

Step-by-step directions, Activity 2

1. Make a kite with a variety of art materials. You can make a collage and use crayons or chalk. This can be made outdoors. Ask the children how we can get our kite to go up in the air. What is happening? To enrich activity, share with families how they can go outside and see what happens with the kite. Ask, what causes the kite to go up in the sky?

Step-by-step directions, Activity 3

1. Do a wind dance with scarves. Suggest to the children that the wind is moving fast-how would they move? The wind is moving slow-how would they move? Suggest how they would move if the wind was fast and they were a bird? Let them suggest other animals.
2. Sing a song...
This is the way the wind does blow ,wind does blow, wind does blow, (2 times)
So early in the morning. (To the tune of This is the way we brush our teeth.) To enrich activity, share with families how they can go outside and take a scarf and run or skip and what actions affect the movement of the scarf. Ask what makes the scarf move?

Assessment

Activity One

Informally observe what responses the children say before, during and after and if they gain understanding through observation.

Activity Two

Engage in open ended questions.. What happens when the kite goes up in the air? What is happening? Informally observe what responses the children say before, during and after and if they gain understanding through observation.

Activity Three

Informally observe how the students move with the different prompts. Observe if the students are able to imitate the prompts.

Resources

- Before and during activities, read books about the wind.

Using Phenology Journals to Investigate the Wisconsin Standards for Environmental Literacy and Sustainability

Kevin Zak, Northland College

kzak@northland.edu

Context

These activities are designed for elementary pre-service teachers (K-8) as a part of a required environmental education methods course (EDU 210: Teaching Environmentally). The use of a phenology journal will require students to make regular and repeated observations of a specific place over the course of the semester.

North American Association for Environmental Education Guidelines for Professional Development of Environmental Educators

Theme One: Environmental Literacy

Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).

- 1.1 Questioning, analysis, and interpretation skills
- 1.2 Knowledge of environmental processes and systems

Theme Four: Planning and Implementing Environmental Education

Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.

- 4.2 Knowledge of instructional methodologies
- 4.3 Planning for instruction
- 4.4 Knowledge of environmental education materials and resources
- 4.6 Settings for instruction
- 4.7 Curriculum planning

Wisconsin Standards for Environmental Literacy and Sustainability

Activity 1 (Weeks 1-7, & 11)

ELS.C1: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.

Activity 2 (Weeks 8-9, 11)

ELS.EX2: Students evaluate relationships and system structures to demonstrate the interdependence of natural and cultural systems.

ELS.EX5: Investigate and analyze how change and adaptation impact natural and cultural systems.

Activity 3 (Weeks 10-11)

ELS.EN6: Students analyze the dynamic balance between natural and cultural systems.

ELS.EN7: Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.

Materials

- Outdoor space (campus, local stream, lake, park, etc.) for making observations
- Student Phenology Journals
- Project Learning Tree
- Project WILD

Driving Question

How can you use phenology journals to integrate the new WI Environmental Literacy and Sustainability standards into your teaching and align them with additional content area standards?

Step-by-step directions

You will find a specific place outside that you will visit at least once per week to make observations over the course of the semester. Find a setting of interest to you that will allow you to utilize several of your senses to make these observations. At least once each week, create an entry that contains the following sections:

1. Date
2. Title or caption
3. Weather conditions (temp., sky conditions, wind direction & speed, precip., etc.)
4. Observations (List: What you are noticing. What is similar/different to previous observations?)
5. Drawing of your selected setting (with labels on the drawing, color, and anything else you want to include)
6. Reflection/Summary: Compose a narrative summary of your observations and your thoughts about them.

Activity 1

Connect

As a part of the class, pre-service teachers will keep a phenology journal over the course of the semester. To introduce them to this assignment and the practice of making observations, the instructor will model and support their learning using the following outline:

Week 1: Outdoor Observations

1. Take students outside. Ask them to find a spot to make some observations. Have them use the template to compose an entry that includes: 1) Date; 2) Title or caption; 3) Weather conditions; 4) Observations; 5) Drawing of your selected setting; 6) Reflection/Summary. (also see below in assessments).
2. Gather class together and ask students to share what they noticed and recorded in their initial entry.
3. Homework: Ask students to explore outside and find THEIR spot to begin working on the phenology journal project. Have them think about where they might want to spend the semester completing this assignment. Have them consider what makes for an interesting place?

Week 2: Connecting to your place

1. Take students outside. Ask them to go to THEIR spot to make some observations. Have them use the template to compose an entry that includes: 1) Date; 2) Title or caption; 3) Weather conditions;



4) Observations; 5) Drawing of your selected setting; 6) Reflection/Summary. (also see below in assessments).

2. Gather class together and ask students to share what they noticed and recorded in their initial entry at THEIR spot. Discuss what makes for a quality entry. Get them to share specific examples from their classmates and think about the importance of details in their entries.

Week 3: Gaining perspective

1. Take students outside. Have students spend some time out at their spot making observations, sketching and reflecting on the experience by asking them to compose an entry in their phenology journal using the following perspectives (see Project WILD's "Learning to Look, Looking to See"):
 - In this first entry, draw from a small world perspective (<1 square meter). (15 minutes)
 - Regroup & discuss: What parts did you notice? How are these different parts connected & interrelated? What questions do your observations raise for you? Discuss similarities and differences as a whole group.
 - In a second entry, draw from a middle perspective. (4-5 square meters) (15 minutes)
 - Regroup & discuss: What parts did you notice? How might these parts be connected? What questions do your observations raise for you? How does this perspective relate and connect to your small world perspective?
 - In a third entry, draw from a landscape perspective. (> 30 square meters) (15 minutes)
 - Regroup & discuss: What parts did you notice? How might these parts be connected? What questions do your observations raise for you? How does this perspective relate and connect to your small world perspective?
 - In a fourth entry, create a map showing the location of your three perspectives in relationship to roads, landmarks, nearby buildings, other trees and shrubs, presence of unique features, animals, etc. Indicate the slope of the land, include a compass rose on your map, and suggest approximate scale.
2. Homework: How could you align these example activities to Environmental Literacy and Sustainability standards? How might you incorporate and align them to other standards (ELA, Math, Science, Social Studies, Art)? Prepare a two-minute introduction to a language arts, math, science or art activity related to your perspective observations that you will share in class.

Week 4: Connections and Shapes

1. Have students share content area activities and highlight connections to Environmental Literacy and Sustainability standards.
2. Analyze Project WILD's "Learning to Look, Looking to See" lesson plan activities and extensions. Compare and contrast their ideas with listed ideas.
3. Take students outside. Have students spend some time out at their spot making observations, sketching and reflecting on the experience by asking them to compose an entry in their phenology journal using the following perspectives:
 - For this entry, provide students with shape necklaces (see Project Learning Tree's "The Shape of Things"). Have them compose an entry that identifies and lists the different objects for each shape.
 - Regroup & make a compiled class list of objects for each shape. Discuss: What types of shapes do we tend to find where? What kinds of objects relate to each shape?
 - Discuss how you could align these activities to Environmental Literacy and Sustainability standards. How might you incorporate and align them to other standards (ELA, Math, Science,

Social Studies, Art)? Have students share ideas and highlight connections to Environmental Literacy and Sustainability standards.

4. Analyze Project Learning Tree's "The Shape of Things" lesson plan activities and extensions. Compare and contrast their ideas with listed ideas.

Week 5: Getting to Know Your Tree

1. Homework: At their spot, have students select a tree that they will be more closely observing over the next several weeks. Using the same provided template, have them use this tree as a focal point. In addition, have students calculate the height and width of their tree and include that information on their detailed sketch. Have students prepare a two-minute introduction to a language arts, math, science, social studies or art activity related to their tree that they will share in class.

Week 6: Tree and Twig Observations

1. Homework: Have students continue making observations of their tree using the provided template. At their spot, have them choose one twig and/or one leaf to follow over the next few weeks. They should tag the twig (one that's at eye level and reachable) and choose a leaf on the outside of their tree, preferably one that gets sun for at least four hours a day. Using their twig for their sketch, students will create a series of sketches to track color change in their leaves over the next several entries.

Week 7: Tree and Twig Observations

1. Homework: Have students continue making observations of their tree using the provided template and observe their one twig and/or one leaf that they are following more closely. Students will create a sketch tracking color change in their twig/leaf over the next several entries.
2. (Continue having students work on this observation over several weeks until the leaf has fallen off the tree. Note: This activity is designed for use on deciduous trees in climates where leaves fall off in autumn.)

Activity 2

Explore

Week 8: Exploring your place

1. Take students outside. Have students spend some time out at their spot making observations, sketching and reflecting on the experience by asking them to compose an entry in their phenology journal using the following perspectives:
2. For this entry, provide students with Project Learning Tree's "Field, Forest, and Stream" Team Chart and have them identify each of the prompts for soil, temperature, lay of the land, plant and animal life features from their spot.
3. Regroup students into groups of three. Have students share and record one another's findings.
4. Small Groups Discuss: What similarities and differences did you find? What did you find the most of in each location? The least? Why? How does water flow on each location? Why? Where does it go? What is of value on each of these locations? How do humans interact with these locations? How might humans use these locations?
5. Then, discuss these questions as a whole class, having students share their ideas.

Week 9: History of Place

1. Take students outside. As a class, have students spend some time out at their spot making

observations, sketching and reflecting on the experience by asking them to compose an entry in their phenology journal using the following perspectives:

2. For this entry, provide students with several historical images of the area (see Project WILD's "A Picture is Worth 1,000 Words"). Have them compose an entry that describes each of these images. What is happening in the image? Why? Who is involved? When did it happen? How are they using this place? Why?
3. Gather as a whole class. Discuss: What do these images represent? What is happening in these images? Why? Who is involved? When did it happen? How are they using this place? Why?
4. Then, discuss how you could align these activities to Environmental Literacy and Sustainability standards. How might you incorporate and align them to other standards (ELA, Math, Science, Social Studies, Art)? Have students share ideas and highlight connections to Environmental Literacy and Sustainability standards.
5. Analyze Project WILD's "A Picture is Worth 1,000 Words" lesson plan activities and extensions. Compare and contrast their ideas with listed ideas.
6. Homework: Have students research answers to the following questions in their phenology journal: What is the story of your place? What peoples have used your place? How have different peoples used your place over time? Ask students to find two additional images that represent these stories.

Activity 3

Engage

Week 10: Your Plan for Your Place

1. Take students outside. Have students in groups of four to compose an entry in their phenology journal using the following prompt:
2. For this entry, provide students with Project Learning Tree's "400 Acre Wood" and have them identify and discuss the forest management of 400 acres. Have them consider different perspectives and uses of the forest. Gather as a whole class and share different plans and each group's thinking behind them.
3. Have students think of local issues that are similar. Have them identify multiple perspectives on how they might approach some of these issues. Have them share how decisions might be made regarding these issues.
4. Homework: Have students compose an entry in their phenology journal with answers to the following questions: What are current issues that impact your place? How might it be affected? How would you manage your place? What should/could it be used for? Support your rationale.

Week 11: Final Reflection

1. Ask students to spend some time looking back through each of their phenology journal entries. After reviewing each of them, have them compose one entry addressing the following prompts:
 - Create a sketch that captures and represents the essence of your whole experience from this semester.
 - What have you learned about the importance of observation this semester?
 - What has your spot taught you this semester?
 - What is the most interesting thing that you learned about your spot that you didn't know before? Why is that important to you?
 - What does your experience with this phenology journal get you thinking about as a teacher?
 - How can/will you use a phenology journal to teach WI Environmental Literacy and Sustainability Standards to your future students?

Assessment

Phenology Journal

- Goals: To engage in using a journal as a tool to learn about the environment. To learn how to use journals in teaching environmental education. To observe, critically reflect upon, and develop a sense of place in the outdoors. To use journals as a tool for interdisciplinary learning.
- Detail: Students will utilize a phenology journal during the semester to reflect upon and provide evidence of learning about a specific place outdoors. Journals will be used to generate a record of your learning about this specific place over the semester and how it can be used to teach environmental literacy and sustainability standards.
- The journal can be scored out of 50 points, using the following rubric:

Phenology Journal Rubric

Domain	<38	At Standard			Above Standard			
		38	40	42	44	46	48	50
Entries		Journal contains required elements for each entry that provide evidence of candidates' learning about their selected setting and connections made through observations.					Journal contains required elements for each entry that provide thorough evidence of candidates' learning about their selected setting. Journal entries offer thoughtful and meaningful connections made through detailed observations and perspectives on experiences. Entries include unique aspects that enhance the phenology journal.	

Appendices

Resources

- Project Learning Tree K-8
 - The Shape of Things (p.17)
 - Field, Forest, and Stream (p.203)
 - 400 Acre Wood (p.217)
- Project WILD K-12
 - Learning to Look, Looking to See (p.278)
 - A Picture is Worth 1,000 Words (p.409)

Appendix A: Workshop Schedule

The schedule that was used for the workshop includes ample time for planning, as that is something faculty have reported needing in order to better integrate EE (Ashmann & Franzen, 2015).

Connect • Explore • Engage in Place-based Learning for Pre-service Educators

Monday, June 11	Tuesday, June 12
	7-8 a.m. Breakfast
8-9 a.m. Check in	
9-10 a.m. Introduce Environmental Literacy and Sustainability Standards	8-10 a.m. EE activities (Engage)
10-12 noon EE activities (Connect)	10-11:30 a.m. Work on curriculum related to Engage
12-1 p.m. Working lunch and networking; Affinity tables	11:30 a.m.-1 p.m. Working lunch; Taking action across campus and into the community
1-2 p.m. Work on curriculum related to Connect	1-2 p.m. Participants presenting activity and curriculum ideas
2-4 p.m. EE activities (Explore)	2-2:30 p.m. Next steps, wrap up
4-5 p.m. Work on curriculum related to Explore	2:30-4:30 p.m. Project Learning Tree, WET, WILD facilitator training OR continue work on activity and curriculum
5 p.m. Dinner (Recap of the day)	4:30 p.m. Departure
~~Optional evening gathering~~	

Appendix B: Wisconsin Standards for Environmental Literacy and Sustainability

	Connect	Explore	3. Students assess how diversity influences health and resilience of natural and cultural systems.	4. Students examine the interactions and outcomes of cycles and flows in natural and cultural systems.	5. Students investigate and analyze how change and adaptation impact natural and cultural systems.	Engage	7. Students engage in experiences to develop stewardship for the sustainability of natural and cultural systems.
Pg	1. Students develop and connect with their sense of place and well-being through observation, exploration, and questioning.	2. Students evaluate relationships and structures of natural and cultural systems and analyze their interdependence.					
142	My digital story: A sense of place and well-being		X				
	Diversity and resilience of natural and cultural systems: Interpreting the Big Picture with multiple perspectives						X
	Becoming stewards of the land						
	Nature walk to Mill Pond	X				X	
	Water, water, everywhere?						X
	Exploring environmental and community impacts of agricultural practice			X		X	X

	Connect: 1	Explore: 2	Explore: 3	Explore: 4	Explore: 5	Engage: 6	Engage: 7
Pg	Geography, the environment, and human beings!		X		X		
	How do we affect Lake Michigan?	X		X	X	X	X
	Maple sugar camp						X
	Oh say can you see?						
	Learn your student's place: Student community, cultural, and personal bridges into science	X	X	X	X		
	Integrating environmental education "talk moves" into our lessons	X	X	X	X	X	
	Systems theory, an organizing framework for interdisciplinary instruction					X	
	Teaching and modeling Wisconsin's Standards for Environmental Literacy and Sustainability	X					X

Pg	Connect: 1	Explore: 2	Explore: 3	Explore: 4	Explore: 5	Engage: 6	Engage: 7
		X					
	X						
	X						
					X		X
	X						
	X	X					
	X	X	X	X	X	X	X
	X						
		X					

Pg	Connect: 1	Explore: 2	Explore: 3	Explore: 4	Explore: 5	Engage: 6	Engage: 7
	X	X			X	X	
	X	X		X	X	X	X
	X	X			X	X	
					X		
				X		X	X
				X			
	X		X				X
	X						
	X		X				X
	X	X				X	
	X	X	X				
	X	X					X

	Connect: 1	Explore: 2	Explore: 3	Explore: 4	Explore: 5	Engage: 6	Engage: 7
Personal action analysis						X	X
Take care of the earth - Understanding connections between humans and the earth Part 1	X	X					
Take care of the earth - Understanding connections between humans and the earth Part 2		X				X	
Take care of the earth - Understanding connections between humans and the earth Part 3						X	
Getting to know you	X						
Ecosystems and water systems		X					
Water mapping	X			X			
Windy weather					X		
Using phenology journals to investigate the Wisconsin Standards for Environmental Literacy and Sustainability	X	X			X	X	X

Appendix C: Guidelines for Excellence: Professional Development of Environmental Educators

Pg	Using phenology journals to investigate the Wisconsin Standards for Environmental Literacy and Sustainability	Theme 1			Theme 2			Theme 3			Theme 4							Theme 5			Theme 6				
		1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	4.4	4.5	4.6	4.7	5.1	5.2	5.3	6.1	6.2	6.3	6.4
		X	X										X	X	X		X	X							

Appendix D: Guidelines for Professional Development crossed with Teaching Standards

Teacher Standards, Wisconsin	Guidelines for the Preparation and Professional Development of Environmental Educators	
1. Teachers know the subjects they are teaching.	Theme One: Environmental Literacy	
The teacher understands the central concepts, tools of inquiry, and structures of the disciplines she or he teaches and can create learning experiences that make these aspects of subject matter meaningful for pupils.	Educators must be competent in the skills and understandings outlined in Excellence in Environmental Education—Guidelines for Learning (K–12).	
2. Teachers know how children grow.	Theme Four: Planning and Implementing EE Programs	
The teacher understands how children with broad ranges of ability learn and provides instruction that supports their intellectual, social, and personal development.	Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.	
3. Teachers understand that children learn differently.	Theme Four: Planning and Implementing EE Programs	
The teacher understands how pupils differ in their approaches to learning and the barriers that impede learning and can adapt instruction to meet the diverse needs of pupils, including those with disabilities and exceptionalities.	Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.	
4. Teachers know how to teach.	Theme Four: Planning and Implementing EE Programs	
The teacher understands and uses a variety of instructional strategies, including the use of technology, to encourage children’s development of critical thinking, problem solving, and performance skills.	Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.	
5. Teachers know how to manage a classroom.	Theme Five: Fostering Learning	
The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.	Educators must enable learners to engage in open inquiry and investigation, especially when considering environmental issues that are controversial and require students to seriously reflect on their own and others’ perspectives.	
6. Teachers communicate well.	Theme Four: Planning and Implementing EE Programs	Theme Five: Fostering Learning
The teacher uses effective verbal and nonverbal communication techniques as well as instructional media and technology to foster active inquiry, collaboration, and supportive interaction in the classroom.	Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.	Educators must enable learners to engage in open inquiry and investigation, especially when considering environmental issues that are controversial and require students to seriously reflect on their own and others’ perspectives.

7. Teachers are able to plan different kinds of lessons.	Theme Four: Planning and Implementing EE Programs	Theme Five: Fostering Learning
The teacher organizes and plans systematic instruction based upon knowledge of subject matter, pupils, the community, and curriculum goals.	Educators must combine the fundamentals of high-quality education with the unique features of environmental education to design and implement effective instruction.	Educators must enable learners to engage in open inquiry and investigation, especially when considering environmental issues that are controversial and require students to seriously reflect on their own and others' perspectives.
8. Teachers know how to test for student progress.	Theme Six: Assessment and Evaluation of EE	
The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the pupil.	Environmental educators must possess the knowledge, abilities, and commitment to make assessment and evaluation integral to instruction and programs.	
9. Teachers are able to evaluate themselves.	Theme Three: Professional Responsibilities of the Environmental Educator	
The teacher is a reflective practitioner who continually evaluates the effects of his or her choices and actions on pupils, parents, professionals in the learning community and others and who actively seeks out opportunities to grow professionally.	Educators must understand and accept the responsibilities associated with practicing environmental education.	
10. Teachers are connected with other teachers and the community.	Theme Three: Professional Responsibilities of the Environmental Educator	
The teacher fosters relationships with school colleagues, parents, and agencies in the larger community to support pupil learning and well-being and acts with integrity, fairness and in an ethical manner.	Educators must understand and accept the responsibilities associated with practicing environmental education.	
	Theme Two: Foundations of EE	
	Educators must have a basic understanding of the goals, theory, practice, and history of the field of environmental education.	

