Using Art to Enhance Environmental Education Curriculum

By: Andrew Hilger

Hamline University

Saint Paul, Minnesota

Anticipated Submission Date: December 2017

How can art be used to enhance environmental education? The answer lies in examining these two seemingly opposing disciplines in the context of a classroom. I have created a curriculum that marries these two disciplines, addressing the concerns of the former through the influence of the latter. The course focuses on using techniques and ideas from art and art education to help students come to a more thorough understanding of the environmental issues facing Minnesotans today. The curriculum is divided up into ten individual units, and is designed for use by a classroom consisting of about twenty students.

The intended audience for my project is 4th grade teachers in Saint Paul, Minnesota. While I am not a formal teacher myself, I made sure that my curriculum caters to those who teach natural science courses in elementary schools. Several aspects of my project encourage participants to go outside to conduct small surveys and take stock of their immediate surroundings. The outdoor space necessary to accomplish components of a few of the units are very achievable and well within twenty minutes of most Saint Paul schools.

The project has been formatted using Wiggins and McTighe's Understanding by Design, wherein students complete their assignments in pursuit of several "Big Questions." These questions prompt students to investigate the subject matter in a way that encourages inquisitive learning. Students will seek to answer questions like, "where does our water come from?," and, "how does the water cycle function?" by addressing these questions, students do not simply memorize information and regurgitate it back onto tests

and quizzes. By using the Wiggins and McTighe structure, students become detectives of their surroundings. They are encouraged to be creative and seek answers through active consideration.

Each unit begins with a question. After that, students read the primary text, Water Ways, and then complete a project or assignment that has some basis in art. Because art is affective and encourages deeper thinking, students are encouraged to be creative in completing assignments. The reader will find that the course culminates in a group art project that addresses a water issue facing some Minnesotan population. The students will be assessed not on artistic merit, but on sufficiently addressing the project goals established in the curriculum.

Although art can be abstract and difficult to objectively assess, I have provided rubrics by which learning can be assessed in a concrete manner. My primary objective is to see that students are asking questions and coming to the answer to my "big questions" on their own terms. I want to see growth and effort, both in understanding the subject matter and in artistic application. I don't expect every student to create brilliant art. Rather, I want students to use art as a foil for understanding. That is why the reader will see several custom rubrics in my project resources.

Ultimately I would love for this project to be applied to multiple education departments and getting used both in science and art classes. I think cross-disciplinary learning encourages deeper understanding, so I would encourage teachers to use this plan interdepartmentally.

Williams and McTighe UbD Template 2.0

Unit 1-Intro to Water

<table>
<tr><td rowspan="8">ESTABLISHED GOALS

-Students will develop an understanding of the origins of Minnesota water and why water is unique.

-4.3.2.3- The Water Cycle. Water circulates through the earth’s crust, ocean and atmosphere in what is known as the water cycle.

Benchmarks:
4.3.2.3.1- The water cycle.

Big Idea: Water is a limited resource.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Develop a sense of place in terms of water use in Minnesota.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

• Water is integral to life
• Minnesota is a special place for water
• How we treat water affects how well it can
meet the needs of living things (including us)</td><td>ESSENTIAL QUESTIONS

-Where does water come from?

-Why is Minnesota a unique water source?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

-Key Terms:
Confluence
Weather
Climate
Mississippi River</td><td>Students will be skilled at…

-Explaining the significance of water as it pertains to living in Minnesota.

-Explaining how Minnesota’s unique location geographically influences the way we regard water.</td></tr>
</table>

Evaluative Criteria	Assessment Evidence
See Art Assessment rubric	PERFORMANCE TASK(S): Students will take the pre assessment quiz from the EPA. Students will use watercolor paints to illustrate one Minnesota-related thing that affects or is affected by water.

Summary of Key Learning Events and Instruction

Students will take the pre assessment quiz from the EPA.

Students will read chapter 1, pages 3-4 from Water Ways.

Students will use watercolor paints to illustrate one Minnesota-related thing that affects or is affected by water.

Unit 2-Science of Water

<table>
<tr><td rowspan="10">ESTABLISHED GOALS

-Students will learn about the water cycle and why water is necessary for life.

-4.3.2.3- The Water Cycle. Water circulates through the earth's crust, ocean and atmosphere in what is known as the water cycle.

Benchmarks:
4.3.2.3.1- The water cycle.

Big Idea: Water is a limited resource.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Describe the water cycle and its application in Minnesota.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

• Water has unusual characteristics
• Water is found in many places and many forms (phases)
• All water is connected through time and space as water cycles from the atmosphere to and through the ground and back to the atmosphere again</td><td>ESSENTIAL QUESTIONS

-How Is Water Unusual?

-How does the water cycle function?

-Why is water necessary for life?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

-Key Terms:
Hydrogen bond
Three Phases (liquid, solid, gas)
Cohesion
Adhesion
Capillary Action
Surface Tension
Solvent
Buoyancy
Water Cycle
Runoff</td><td>Students will be skilled at…

-Creating a representation of the molecular structure of water.

-Differentiating between density and adhesion.

-Explaining the role of temperature in the structure of water.</td></tr>
</table>

	-The difference between a solid, liquid, and a gas. -Students will demonstrate a basic understanding of why water is necessary for various forms of life.	

Evaluative Criteria	**Assessment Evidence**
Molecular structure group activity rubric.	PERFORMANCE TASK(S): Students will create water molecules using foam balls and toothpicks.

Summary of Key Learning Events and Instruction

Students will read chapter 1 of Water Ways, pages 5-12.

Students will watch Importance of Water on youtube.

Students will learn about the science behind water: it's molecular structure, three phases, and the water cycle.

Students will create water molecules using foam balls and toothpicks.

Students will understand the requirements for the final project.

Unit 3-Rivers and Streams

<table>
<tr><td rowspan="4">ESTABLISHED GOALS

-Students will learn about how the water cycle functions and why each aspect of a watershed is important.

-4.3.2.3- The Water Cycle. Water circulates through the earth’s crust, ocean and atmosphere in what is known as the water cycle.

Benchmarks:
4.3.2.3.1- The water cycle.

Big Idea: Water is a limited resource.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Understand and relay how human activity impacts the river and the surrounding waterways of Minnesota.

-Identify the components of a watershed.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

• Minnesota has bountiful supplies of water,
but it’s not equally distributed.
• Water in Minnesota exists in many forms and locations.
• The abundance of water in various locations varies with time and place
• Minnesota’s lakes and rivers are many and
varied.
• By studying lakes and rivers, we can learn
things that help us keep them healthy.
Water circulates through the earth’s crust, ocean and atmosphere in what is known as the water cycle.</td><td>ESSENTIAL QUESTIONS
-How does the water cycle function?

-What role does running water play in the water cycle?

-What forms does running water appear in in Minnesota?

-How does water get out of the air?

-What is the difference between weather and climate?

-What is “order” as it applies to rivers and streams?

-What is a floodplain?</td></tr>
</table>

	-Streams and rivers have a scientific "order."	
	Acquisition	
	Students will know…	*Students will be skilled at…*
	-Key Terms: Condensation Weather Climate Transpiration Floodplain Watershed Lakes Tributary Ponds Rivers Streams -The difference between weather and climate. -How a watershed functions. -How the water cycle functions. -The benefits of aquatic vegetation. -How to describe the "nature" of rivers and streams. -The characteristics of a floodplain.	-Recognizing the complexity of watersheds as they apply to a region's water supply. -Explaining the stages of the water cycle. -Identifying when water is impacted by climate and when water is impacted by weather. -Conveying the general "nature" of a given river or stream. -Labeling the "order" of a given river or stream.

Evaluative Criteria	Assessment Evidence
Paint-drip watershed grading rubric.	PERFORMANCE TASK(S): Create a "watershed painting," accurately labeling the various components of a watershed. They will do this by crumpling paper to create natural topography and dripping paint onto the surface, creating a paint-drip watershed.

Summary of Key Learning Events and Instruction

Students will read Water Ways chapter 2, pages 17-28.

Students will create a "Watershed Painting" which highlights the important components of a watershed and how it functions.

Unit 4-Lakes

<table>
<tr><td rowspan="8">ESTABLISHED GOALS

-Students will learn about the importance of lakes from the standpoints of biodiversity and recreation.

4.3.2.3- The Water Cycle. Water circulates through the earth's crust, ocean and atmosphere in what is known as the water cycle.

Benchmarks:
4.3.2.3.1- The water cycle.

Big Idea: Water is a limited resource.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Understand and relay how human activity impacts the lakes of Minnesota.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

• Minnesota has bountiful supplies of water,
but it's not equally distributed
• Water in Minnesota exists in many forms and locations
• The abundance of water in various locations varies with time and place
• Minnesota's lakes and rivers are many and
varied
• By studying lakes and rivers, we can learn
things that help us keep them healthy</td><td>ESSENTIAL QUESTIONS
-What does a Limnologist do?

-Why are healthy lakes important?

-What are the three levels of lakes?

-What factors influence the health of a lake?

-What happens when lakes mix?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

-Key Terms:
Oligotrophic
Mesotrophic
Eutrophic
Dimictic</td><td>Students will be skilled at…

-Relaying the seasonal mixing of lakes.

-Identifying the aspects of a healthy vs. unhealthy lake.</td></tr>
</table>

	Polymictic Monomictic Diatoms -How to describe the levels of a lake. -Why lakes mix seasonally, and how that affects life in that lake. -What happens to lakes over time.	-Identifying the Great Lakes.

Evaluative Criteria	**Assessment Evidence**
Key for Great Lakes worksheet. Rubric for creative writing essay.	PERFORMANCE TASK(S): -Complete the Great Lakes worksheet. -Students will complete a brief creative writing essay detailing an experience with lakes that has affected them in some way. This can be about their lake/cabin, someplace their family drives by frequently, or somewhere they'd like to go. They will identify which watershed their subject is a part of in their essay.

Summary of Key Learning Events and Instruction

Students will read Water Ways, Chapter 2, pages 29 to 33.

Students will complete the Great Lakes worksheet.

Students will complete a brief creative writing essay detailing an experience with lakes that has affected them in some way.

Unit 5-Wetlands

<table>
<tr><td rowspan="6">ESTABLISHED GOALS

-Students will learn about the configuration of out water infrastructure in Minnesota.

4.3.2.3- The Water Cycle. Water circulates through the earth's crust, ocean and atmosphere in what is known as the water cycle.

Benchmarks:
4.3.2.3.1- The water cycle.

Big Idea: Water is a limited resource.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Address why wetlands are important filterers for both people and aquatic life.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

-Students will understand how a wetland functions.

-Students will understand why wetlands are necessary for preserving the health of our ecosystem.

-Minnesota sits on a water table, and the water is not evenly distributed.</td><td>ESSENTIAL QUESTIONS

-Why are wetlands important?

-What would happen to us if we no longer had wetlands?

-What is a water table?

-What do we use water for around the state?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

-Key Terms:
Wetlands
Seasonal Wetlands
Groundwater
Water Table
Aquifer</td><td>Students will be skilled at…

-Recognizing the different kinds of wetlands that exist.

-Describing how a wetland helps filter our water.</td></tr>
</table>

	Unconfined Aquifers Confined Aquifers -Wetlands vary from place to place. -What a water table is. -How an aquifer functions. -What Minnesotans use water for in various capacities.	-Identifying which groundwater province they live in. -Explaining the utility of wetlands and the challenges they face.

Evaluative Criteria	**Assessment Evidence**
Rubric for assessing wetland sketches (resources)	PERFORMANCE TASK(S): Wetland Walk: Students will venture out to Mississippi River State Park and hike amongst the wetlands and floodplain forest by the Mississippi River. Students will sketch 5 things they find (plants, trash, animals, etc.). Instructor will highlight the importance of wetlands as filters, stopping things like trash from getting into waterways.

Summary of Key Learning Events and Instruction

Read Water Ways, chapter 3 pages 39 to 47

Wetland Walk: Students will venture out to Mississippi River State Park and hike amongst the wetlands and floodplain forest by the Mississippi River. Students will sketch 5 things they find (plants, trash, animals, etc.). Instructor will highlight the importance of wetlands as filters, stopping things like trash from getting into waterways.

Unit 6-Critters!

<table>
<tr><td rowspan="8">ESTABLISHED GOALS

-Students will gain an appreciation for the biodiversity of natural Minnesota waterways and the dangers they face.

4.3.2.3- The Water Cycle. Water circulates through the earth’s crust, ocean and atmosphere in what is known as the water cycle.

Benchmarks:
4.3.2.3.1- The water cycle.

Big Idea: Water is a limited resource.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Identify various Minnesota aquatic plants and animals and establish their role in our aquatic ecosystems.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

Students will understand the levels of aquatic communities.

Students understand that different types of bodies of water provide different settings for a variety of life.

Students will appreciate the niche that various animals play in their ecosystems.

There is a great deal of life at the intersection of water and land.</td><td>ESSENTIAL QUESTIONS

-What lives in our water?

-How are aquatic organism communities different than those on land?

-What are the levels of producers in aquatic communities, and what roles do they play?

-What happens if you eliminate one part of the aquatic food chain?

-What is turbidity?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

-Key Terms:
Primary producers
primary consumers</td><td>Students will be skilled at…

-Explaining the roles that plants and animals play in sustaining underwater life.</td></tr>
</table>

	secondary consumers tertiary consumers decomposers Macroinvertebrates Geomorphology Zones -Each animal plays an an important role in sustaining underwater life. -Which species are at risk and which are thriving.	-Identifying basic macroinvertebrates. -Identifying areas of potential harm to aquatic populations.

Evaluative Criteria	**Assessment Evidence**
See Caddis fly grading rubric in resources.	PERFORMANCE TASK(S): Students will go on a brief nature hike, collecting objects such as small rocks and leaves to create their caddis fly art. Students will create “caddis fly covering art” using found objects in nature.

Summary of Key Learning Events and Instruction

Students will read chapter 4, pages 53 to 63

Students will go on a brief nature hike, collecting objects such as small rocks and leaves to create their caddis fly art.
Students will create “caddis fly covering art” using found objects in nature.

Students will learn that water is crucial for all life to exist.

Unit 7-The Way We Use Water

<table>
<tr><td rowspan="5">ESTABLISHED GOALS

-Students will learn about the processes water goes through before and after use.

4.1.3.3- Society's Influence. The needs of any society influence the technologies that are developed and how they are used.

Benchmarks:
4.1.3.3.1- Describe a situation in which one invention lead to new inventions.

Big Idea: Many social practices and products of technology are shaped by scientific knowledge.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Decipher which industries use water in Minnesota, whether or not they are efficient, and the issues they face.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

• People use water in many ways

• Water influences where people live

• Most household water supplies in Minnesota
come from groundwater

• Water is important for generating electricity

• Water is important in manufacturing

• Agriculture depends on the right amount of
water at the right time

• Transportation uses can affect water</td><td>ESSENTIAL QUESTIONS

-How is water stored and treated?

-How is water used to generate electricity?

-What is the difference between instream and offstream use?

-Where does your drinking water come from?

-How is water treated?
-What food comes from Minnesota water?

-Which economic sectors use water, and how?

-Which industries that use water are in decline, and which are growing?</td></tr>
</table>

	• Minnesota's tourism industry depends on water when water becomes unsafe.	-What is one apparent water-related need that is not currently being addressed, or is not being looked at enough?
	Acquisition	
	Students will know… -Key Terms: Offstream Use Instream Use Industrial Use Agricultural Use Irrigation	*Students will be skilled at…* -Examining the cross-industrial impacts of water use. -Conveying the necessity of equitable water distribution. -Identifying the various water needs of Minnesotans.

Evaluative Criteria	**Assessment Evidence**
See attached invention grading rubric.	PERFORMANCE TASK(S): Water is used in so many varied capacities throughout modern society, particularly in a state like Minnesota. While the state has many sources of water, its quality and intended use varies dramatically. Students will begin by gaining general knowledge about how water is stored and treated. Next, **students will use commonly recycled materials to build a sculpture/model that addresses a water-related need in society.**

Summary of Key Learning Events and Instruction

Students will read Water Ways, pages 69 to 79.

Students will spend this lesson learning about why it is so important to maintain a clean and safe water infrastructure. Water is used in so many varied capacities throughout modern society, particularly in a state like Minnesota. While the state has many sources of water, its quality and intended use varies dramatically. Students will begin by gaining general knowledge about how water is stored and treated. Next, students will use commonly recycled materials to build a sculpture/model that addresses a water-related need in

society.

Unit 8-Danger! Potential harm pt. 1

<table>
<tr><td rowspan="8">ESTABLISHED GOALS

-Students will begin to learn about the dangers that out waterways face.

4.1.3.3- Society's Influence. The needs of any society influence the technologies that are developed and how they are used.

Benchmarks:
4.1.3.3.1- Describe a situation in which one invention lead to new inventions.

Big Idea: Many social practices and products of technology are shaped by scientific knowledge.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Identify why and how various Minnesota water sources become polluted.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

Students will understand that various human activity can help or harm water quality and life in area water sources.

Students will understand that people are capable and responsible for maintaining a healthy aquatic ecosystem.</td><td>ESSENTIAL QUESTIONS
-How does the water cycle change when we build up cities?

-How are pollutants, water cycle changes, and biological changes related?

-What is a "dead zone," and what is its cause?

-When is rain dangerous?

-What is bioaccumulation?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

--Key Terms:
Pollution
Point-source pollution
Nonpoint Source Pollution
Dead Zone</td><td>Students will be skilled at…

-Decreasing their impact as polluters of Minnesota waterways.

-Identifying point-source vs. nonpoint-source pollution.</td></tr>
</table>

	-Which chemicals are most harmful to aquatic life. -The difference between point-source and nonpoint-source pollution.	-Identify potential solutions for decreasing personal pollution.

Evaluative Criteria	**Assessment Evidence**
See rubric for grading students letters to students in Flint, MI.	PERFORMANCE TASK(S): Letters to Flint, MI students

Summary of Key Learning Events and Instruction

Students will read Water Ways, pages 85 to 92.

Students will write to students at a sister school in the Flint, Michigan area. They will ask questions pertaining to water use and how Michigan students lives have been affected by the water crisis. Since the Twin Cities are so heavily influenced by the Mississippi River and surrounding lakes, it is important to remember that this could happen to any of our communities at any time if citizens don't act responsibly.

Unit 9-Danger! Potential harm pt. 2

<table>
<tr><td rowspan="8">ESTABLISHED GOALS

-Students will continue to learn about the dangers our waterways face, and how they might be able to mitigate those.

4.1.3.3- Society's Influence. The needs of any society influence the technologies that are developed and how they are used.

Benchmarks:
4.1.3.3.1- Describe a situation in which one invention lead to new inventions.

Big Idea: Many social practices and products of technology are shaped by scientific knowledge.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

-Address challenges facing Minnesota waterways and propose solutions to pollution and overuse.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

• Human activities can harm or help water quality, the water cycle, and the biological characteristics of water bodies in many ways

• It's up to each of us to help keep water healthy</td><td>ESSENTIAL QUESTIONS

-What is "thermal pollution?"

-Why is ditching and draining so harmful?

-What can we do to help improve water quality in Minnesota?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

-Key Terms:
"Ditching and Draining"
Dams
Channels
Levees
Impervious Surfaces
Depleted Species

-What "Thermal pollution" is.</td><td>Students will be skilled at…

-Describing ways in which they are able to contribute to the health rather than harm of Minnesota water quality.

-Describe the options people have in fixing poor water quality around the state.

-Describing why fear has led to the destruction of wetlands.</td></tr>
</table>

	-Why particulates are a growing problem for aquatic life. -Why Lake Pepin is a cautionary tale.	-Analyzing the ways in which people have changed the shape of our landscape.

Evaluative Criteria	**Assessment Evidence**
See rubric for lesson 9 pt. 2	PERFORMANCE TASK(S): Students will consider a local water source and illustrate how it would have looked 200 years ago. Many people don't consider that what is here now has not always been around. We will be examining that relationship in the context of aquatic ecosystem health.

Summary of Key Learning Events and Instruction

Students will read Water Ways, pages 92 to 102.

Students will consider a local water source and illustrate how it would have looked 200 years ago. Many people don't consider that what is here now has not always been around. We will be examining that relationship in the context of aquatic ecosystem health.

Unit 10-Governing Water and Final Projects

<table>
<tr><td rowspan="6">ESTABLISHED GOALS

-Students will learn about who governs water and present final projects.
4.1.3.3- Society's Influence. The needs of any society influence the technologies that are developed and how they are used.

Benchmarks:
4.1.3.3.1- Describe a situation in which one invention lead to new inventions.

Big Idea: Many social practices and products of technology are shaped by scientific knowledge.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will be able to independently use their learning to…

Convey who is in charge of the water they use and how they can be effective water stewards.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS
Students will understand that…

-Students will understand the laws that dictate the use of Minnesota water.

-Students will understand that they can take real action to prevent further environmental damage and fix existing damage.</td><td>ESSENTIAL QUESTIONS

-Who is in charge of our water?

-Who makes the laws surrounding Minnesota's water use?

-Why is sprawl such a concern to water quality?

-What evidence of climate change do we see in Minnesota?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know…

-Key Terms:
Federal Laws
State Laws
Riparian Rights
Reasonable Use</td><td>Students will be skilled at…

-Sourcing water decisions- who is responsible for the state of water today?

-Identifying various invasive species in and around Minnesota waterways.</td></tr>
</table>

	-Why sprawl has such a negative effect on our ecosystem. -How climate change can be seen in Minnesota. How to identify various invasive species currently in Minnesota.	-Identifying and using resources that can be used to help avert declining water quality and climate change.

Evaluative Criteria	**Assessment Evidence**
See rubric for grading final group projects	PERFORMANCE TASK(S): Final project submissions.

Summary of Key Learning Events and Instruction

Students will read Water Ways, chapter 7 pages 109 to 113.

Students will present their final group projects to the class.

Primary Text:

Water Ways
http://files.dnr.state.mn.us/education_safety/education/project_wet/waterways/ww_complete.pdf

Unit 1: Water awareness pre assessment worksheet:

https://www.epa.gov/sites/production/files/2017-03/documents/ws-kids-test-your-watersense.pdf

Assessment: Rubric for evaluating watercolor painting:

	Projects Outcomes Criteria	4	3	2	1
Basic Skills	Follows Directions, Requirements Craftsmanship	Complete understanding of class dynamics Exceptional skill with media	Very good idea of the class Above average art skills	Barely average grasp of directions Shows some skill	Does not meet expectations
Higher Level Thinking Skills	Originality Creativity	Unique, very original, choices	Usually original, expressive	Seldom original Work possibly copied	No original ideas
Apply Knowledge- Lifelong Learner	Design Principles / Elements	Complete understanding, use of elements and principles	Has very good idea of art intent	Unclear thinking Little use of principles and elements	No concept of art principles or elements
Basic Social/Particiption Skills	Teamwork- Communication	Always Contributes- Excellent Communication	Contributes most of the time- Gets along	Seldom contributes.-- Sometimes uncooperative	No attempt to communicate - Argumentative or Disinterested

Total Possible Points: 16

Source: http://artismagic.blogspot.com/2010/09/art-grading-rubric-ms-poe.html

Unit 2:

Importance of Water video, by SuccessCDs Education

https://www.youtube.com/watch?v=rMAR0jFhp7E

Expectations for final project:

In small groups, students will collaborate on a group art project that highlights one environmental issue pertaining to water. This can be done through any medium (painting, sculpture, etc.) but must be done as a group and display understanding of water and its role in the lives of humans.

Rubric for Final Project

Content:	Possible Points:	Points Earned:
Project Illustrates an environmental problem dealing with water	20	
Attention-grabbing	10	
Text describing the problem	10	
Solution given	10	

Project displays effort	20	
Project displays understanding	20	
Total Possible Points:	90	

Credit: Andrew Hilger

Rubric for molecule structure group activity:

Content:	Possible Points:	Points Earned:
Demonstrates understanding of the molecular structure of water	4	
Displayed Effort	4	
Displayed group cooperation	4	
Neatness	4	

Total points possible: 16

Credit: Andrew Hilger

Unit 3:

Instructions for Watershed Painting activity:

1. Students will each be given a piece of construction paper and select one paint color to represent the water in their watershed.
2. Students will crumple the paper and then unfold it, creating a series of natural topographic ridges and dips.
3. Students will drop a golf ball-sized dollop of paint on their paper.
4. Using the straw, students will blow the paint around the paper, creating a natural collection of streams, lakes, rivers, and ponds.
5. Once the paint dries, students will label the following on their sheet of “river art”:
    a. The “order” of streams and rivers, labeled 1, 2, or 3.
    b. The following key terms:
        i. Watershed
        ii. Lakes
        iii. Ponds
        iv. Rivers
        v. Streams

Grading rubric for “river art” activity:

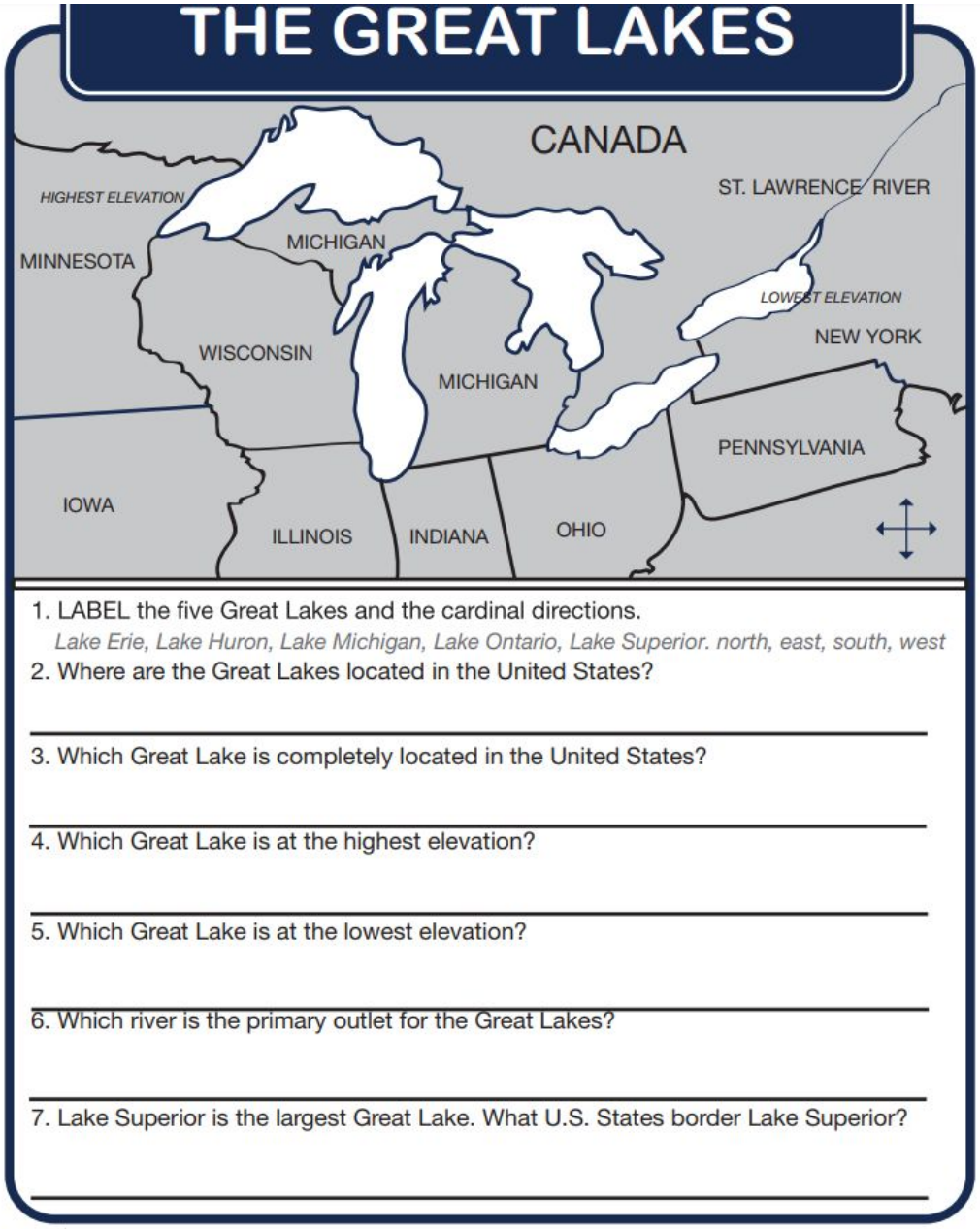
Content	Possible Points	Points Earned
Artistic content - Student displays effort in creating their watershed with paint	4	
Demonstrates understanding of stream and river order	5	
Demonstrates understanding of key terms	5	
Effort	4	
Neatness	4	
Total points possible	22	

Credit: Andrew Hilger

Unit 4:

Water Bodies video by Peekaboo Kids:

https://www.youtube.com/watch?v=bNWuQD7QHBc



Great Lakes worksheet from education.com:

https://www.education.com/download/worksheet/101888/the-5-great-lakes.pdf

Content:	Possible Points	Points Earned
Student correctly labels all lake components on worksheet	15	
Accuracy of labeling	5	
Possible Points	20	

Credit: Andrew Hilger

Creative writing activity:

Students will complete a brief creative writing essay detailing an experience with lakes that has affected them in some way. This can be about their lake/cabin, someplace their family drives by frequently, or somewhere they'd like to go. They will identify which watershed their subject is a part of in their essay.

Content	Possible Points	Points Earned
Student identifies a lake and its place in the Minnesota Watershed System	5	

Length: Must be 2-3 paragraphs long	5	
Total Points	10	

Credit: Andrew Hilger

Unit 5:

Rubric for assessing wetland sketches:

Content	Possible Points	Points Earned
Student sketches 5 objects found in wetland	5	
Effort is shown in sketches	5	
Total points	10	

Credit: Andrew Hilger

Unit 6:

Caddis Fly Art

Instructions:

1. Students will collect small objects on a class nature walk that will be used to create the casing for their caddis fly larvae art. They will keep their collection in a small plastic bag.
2. Students will draw a caddis fly larvae on cardstock.
3. Students will use the objects they collected to illustrate how a caddis fly larvae creates its casing using the objects around it.
4. Students will then write a paragraph describing why they chose what they did, and what that says about the environment they live in.

Grading rubric for caddis fly larvae assignment:

Content	Possible points	Points earned
Student accurately illustrates the head and abdomen of a caddisfly larvae	5	
Student collects objects that are representative of their surrounding environment to decorate the casing	5	
Total	10	

Credit: Andrew Hilger

Unit 7:

Template for Water Innovation activity:

Content	Possible Points	Earned Points
Student's invention addresses a water need for at least one industry	10	
Student is creative in their design	5	
Design displays thought and consideration in regards to potential issues within chosen industry	5	
Total	20	

Credit: Andrew Hilger

Unit 8:

Flint, Michigan water crisis article for kids from DOGO news:

https://www.dogonews.com/2016/1/20/the-water-crisis-in-flint-michigan

Article/video showing Girl Scouts writing to Michigan Governor:

http://abcnews.go.com/Health/flint-water-crisis-prompts-girl-scout-troop-write/story?id=36287232

Rubric for grading letters to Flint Students:

Content	Possible Points	Points Earned
Letter highlights a water issue facing Flint or Minnesota Students	5	
Letter is at least two paragraphs long	5	
Letter is respectful	5	
Total points	15	

Credit: Andrew Hilger

Unit 9:

Rubric for Changes Over Time assignment:

Content	Possible Points	Points Earned
Student selects a location in their local sphere to recreate in it's healthy form	5	
Student displays critical thinking and imagination in redesigning waterways	5	
Total Points	10	

Credit: Andrew Hilger

Unit 10: Project Presentation day (see rubric from Lesson 2)

WORKS CITED

CBSE NCERT Science, S. (2013, July 08). Importance of Water. Retrieved September 20, 2017, from https://www.youtube.com/watch?v=rMAR0jFhp7E

Department of Natural Resources. (2010). *Water Ways: A Minnesota Water Primer and Project WET Companion*. Retrieved October, 2017, from http://files.dnr.state.mn.us/education_safety/education/project_wet/waterways/ww_complete.pdf

Dolasia, M. (2017, December 12). The Water Crisis in Flint, Michigan. Retrieved December 1, 2017, from https://www.dogonews.com/2016/1/20/the-water-crisis-in-flint-michigan

Mohney, G. (2016, January 14). Flint Water Crisis Prompts Girl Scout Troop to Write Letters to Michigan Governor. Retrieved December 14, 2017, from http://abcnews.go.com/Health/flint-water-crisis-prompts-girl-scout-troop-write/story?id=36287232

Poe, M. (2010, September 09). ART IS MAGIC! - for sharing all things art: Grading Rubric. Retrieved October 17, 2017, from http://artismagic.blogspot.com/2010/09/art-grading-rubric-ms-poe.html

E. (2013, April 17). The 5 Great Lakes | Worksheet. Retrieved October 11, 2017, from https://www.education.com/worksheet/article/the-5-great-lakes/

P. (2015, May 06). The Water Bodies | The Dr. Binocs Show | Educational Videos For Kids. Retrieved September 20, 2017, from https://www.youtube.com/watch?v=bNWuQD7QHBc

United States EPA. (2017, September 20). WaterSense for Kids: Test Your Watersense. Retrieved October 11, 2017, from https://www.epa.gov/watersense/watersense-kids

Wiggins, G., & McTighe, J. (2005). *Understanding by Design*(2nd ed.). Retrieved April 3, 2017, from https://play.google.com/books/reader?id=hL9nBwAAQBAJ&pg=GBS.PR3