

Elaine Matthews
Unit Plan Marine Biologist

Elaine Matthews
Socioscientific Issues Unit Lesson Plan

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Topic **Unit Marine Biologist/** What is happening in the Ocean?
Grade STEM Enrichment/ Second Grade
Time 11 sessions 45 min sessions

Justification

The oceans play a vital role in the global climate system, generating oxygen and absorbing carbon dioxide from the atmosphere. The changing climate, brought about by increasing levels of greenhouse gases in the atmosphere, will thus lead to changes in the oceans, including sea-level rise and ocean acidification, which will put marine ecosystems and coastal communities at risk. In this unit students will be investigating the career of a marine biologist and the ocean ecosystems they study. The lessons will be focused towards the second-grade audience. Students will engage in various lessons directed towards building knowledge of what marine biologists do and how they study the marine ecosystems. This will be performed over a series of 11- 45 min. class periods.

The Earth's Oceans are an integral part of the climate system and better understanding this environment will help students make connections to real world problems about what is happening to the ocean. Having access to the entire second grade student body enables the students to collaborate together as a grade level. Providing a variety of ways for students to engage in learning is valuable and fun for the students as well as the teacher.

Elaine Matthews
Unit Plan Marine Biologist

Prior to learning about Marine Biologist students complete a unit focused on What does a Chemist do? (Investigating matter)

The final investigation in this unit involved observing chemical reactions and mixing matter. Students mixed materials to make new substances, observed properties of matter and compared chemical reactions with baking soda, water and vinegar, they also investigated what happens when water and oil are mixed. These investigations provided building blocks for future investigations related to oil spills and coral bleaching.

Learning Objectives

Through a series of lessons, the learner will:

- Investigate the career of a marine biologist.
- Identify the various roles related to marine biology and how marine biologists help the environment.
- Recognize the different parts of the coral reef.
- Demonstrate how marine biologists learn about the coral reef.
- Describe different types of life that live in and near the coral reef.
- Measure, collect and record data.
- Create parts of the coral reef by using readily available materials. They will incorporate basic design and modeling skills.
- Make connections which help students understand the importance of the ocean and how changes affect the environment.

Elaine Matthews
Unit Plan Marine Biologist

Standards Addressed

Science NJSLS 2020 (2-ESS1-1) New Jersey Department of Education December 2020 Page 42 of 200

2-LS2: Ecosystems: Interactions, Energy, and Dynamics

: • 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.] Science and Engineering Practices Disciplinary Core Ideas Crosscutting Concepts Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. Make observations (firsthand or from media) to collect data that can be used to make comparisons. (2-LS4-1)

LS4.D: Biodiversity and Humans There are many different kinds of living things in any area, and they exist in different places on land and in water.

(2-LS4-1) N/A Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence Scientists look for patterns and order when making observations about the world.

Connections to NJSLS - English Language Arts •

W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

(2-LS4-1) • W.2.8 Recall information from experiences or gather information from provided sources to answer a question.

(2-LS4-1) Connections to NJSLS - Mathematics • MP.2 Reason abstractly and quantitatively

(2-LS4-1) • MP.4 Model with mathematics.

(2-LS4-1) • 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-LS4-1)

Connections to NJSLS - English Language Arts • RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1) • RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1) • W.2.6

Elaine Matthews
Unit Plan Marine Biologist

With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1) • W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1) • W.2.8 Recall information from experiences or gather information from provided sources to answer a question.

Grade 2 • SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1) Connections to NJSL - Mathematics • MP.2 Reason abstractly and quantitatively. (2-ESS1-1) • MP.4 Model with mathematics. (2-ESS1-1) • 2.NBT.A Understand place value. (2-ESS1-1)

3-LS2: Ecosystems: Interactions, Energy, and Dynamics Students who demonstrate understanding can:

• 3-LS2-1 Construct an argument that some animals form groups that help members survive. Science and Engineering Practices Disciplinary Core Ideas Crosscutting Concepts Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model.

(3-LS2-1) LS2.D: Social Interactions and Group Behavior Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size

(3-LS2-1) Cause and Effect Cause and effect relationships are routinely identified and used to explain change.

3-LS4: Biological Evolution: Unity and Diversity

3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.] •

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

[Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.]

[Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.] Science and Engineering Practices Disciplinary Core Ideas Crosscutting Concepts Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing

Elaine Matthews
Unit Plan Marine Biologist

quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. Analyze and interpret data to make sense of phenomena using logical reasoning

. (3-LS4-1) Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses t

LS2.C: Ecosystem Dynamics, Functioning, and Resilience When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4) LS4.A:

Evidence of Common Ancestry and Diversity Some kinds of plants and animals that once lived on Earth are no longer found anywhere.

(3-LS4-1) Cause and Effect Cause and effect relationships are routinely identified and used to explain change.

(3-LS4-2), (3-LS4-3) Scale, Proportion, and Quantity Observable phenomena exist from very short to very long time periods.

(3-LS4-1) Systems and System Models A system can be described in terms of its components and their interactions.

3-ESS3: Earth and Human Activity Students who demonstrate understanding can: • 3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard. [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.] Science and Engineering Practices Disciplinary Core Ideas Crosscutting Concepts Engaging in Argument from Evidence Engaging in argument from

evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1)

ESS3.B: Natural Hazards A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.

(3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.) Cause and Effect Cause and effect relationships are routinely identified, tested, and used to explain

change. (3-ESS3-1) Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science on Society and the Natural World

Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones). (3-ESS3-1) Connections to Nature of Science Science is a Human Endeavor Science affects everyday life. (3-ESS3-1)

Elaine Matthews
Unit Plan Marine Biologist

Next Generation Science Standards

2-LS4-1 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

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

[Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.]

[Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

The performance expectation above was developed using the following elements from the NRC document A Framework for K-12 Science Education:

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

*Make observations (firsthand or from media) to collect data which can be used to make comparisons.

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

Scientists look for patterns and order when making observations about the world.

Disciplinary Core Ideas

LS4.D: Biodiversity and Humans

There are many different kinds of living things in any area, and they exist in different places on land and in water.

Crosscutting Concepts

Observable features of the student performance by the end of the grade:

1) Identifying the phenomenon under investigation

a. Students identify and describe the phenomenon and purpose of the investigation, which includes comparisons of plant and animal diversity of life in different habitats.

2) Identifying the evidence to address the purpose of the investigation

a. Based on the given plan for the investigation, students describe the following evidence to be collected:

Elaine Matthews
Unit Plan Marine Biologist

- i. Descriptions based on observations (firsthand or from media) of habitats, including land habitats (e.g., playground, garden, forest, parking lot) and water habitats (e.g., pond, stream, lake).
 - ii. Descriptions based on observations (firsthand or from media) of different types of living things in each habitat (e.g., trees, grasses, bushes, flowering plants, lizards, squirrels, ants, fish, clams).
 - iii. Comparisons of the different types of living things that can be found in different habitats.
- b. Students describe how these observations provide evidence for patterns of plant and animal diversity across habitats.

3 Planning the investigation

- a. Based on the given investigation plan, students describe how the different plants and animals in the habitats will be observed, recorded, and organized.

4 Collecting the data

- a. Students collect, record, and organize data on different types of plants and animals in the habitats.

K-2-ETS1-1 Engineering Design

Students who demonstrate understanding can:

K-2- ETS1-1.

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

The performance expectation above was developed using the following elements from the NRC document A Framework for K-12 Science Education:

Science and Engineering Practices Asking Questions and Defining Problems

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

-Ask questions based on observations to find more information about the natural and/or designed world(s).

-Define a simple problem that can be solved through the development of a new or improved object or tool.

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting

Engineering Problems

A situation that people want to change or create can be approached as a problem to be solved through engineering.

Asking questions, making observations, and gathering information are helpful in thinking about problems.

Before beginning to design a solution, it is important to clearly understand the problem.

Elaine Matthews
Unit Plan Marine Biologist

Crosscutting Concepts

Observable features of the student performance by the end of the grade:

1 Addressing phenomena of the natural or designed world

a. Students ask questions and make observations to gather information about a situation that people want to change.

Students' questions, observations, and information gathering are focused on:

- i. A given situation that people wish to change.
- ii. Why do people want the situation to change?
- iii. The desired outcome of changing the situation.

2) Identifying the scientific nature of the question

a. Students' questions are based on observations and information gathered about scientific phenomena that are important to the situation.

3) Identifying the problem to be solved

a. Students use the information they have gathered, including the answers to their questions, observations they have made, and scientific information, to describe the situation people want to change in terms of a simple problem that can be solved with the development of a new or improved object or tool.

4) Defining the features of the solution

a. With guidance, students describe the desired features of the tool or object that would solve the problem, based on scientific information, materials available, and potential related benefits to people and other living things.

Elaine Matthews
Unit Plan Marine Biologist

CONTENT AREA:

21st CENTURY LIFE AND CAREERS STRAND A:

CAREER AWARENESS

Vision: To integrate 21st Century life and career skills across the K-12 curriculum and in Career and Technical Education (CTE) programs to foster a population that:

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4.A.2 Identify various life roles and civic and work-related activities in the school, home, and community.

9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

9.2.4.A.4 Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP12. Work productively in teams while using cultural global competence.

RP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Elaine Matthews
 Unit Plan Marine Biologist

NJ Math Standards Measurement and Data

2.MD

A. Measure and estimate lengths in standard units.

1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
3. Estimate lengths using units of inches, feet, centimeters, and meters.
4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

NJ ELA Standards

Unit 2 Speaking and Listening Standards	Unit 2 Speaking and Listening Critical Knowledge and Skills
<p>SL.2.1. Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.</p> <p>SL.2.1.A. Follow agreed-upon norms for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).</p> <p>SL.2.1.B. Build on others' talk in conversations by linking their explicit comments to the remarks of others.</p> <p>SL.2.1.C. Ask for clarification and further explanation as needed about the topics and texts under discussion.</p>	<ul style="list-style-type: none"> ● Participate in a variety of grade-appropriate, collaborative, rich, structured conversations ● Assume various roles in conversations (e.g., participant, leader, and observer) ● Use norms of conversations (e.g., eye contact, taking turns, etc) ● Connect comments to build on remarks of others ● Ask questions and further explanations about topics and/or texts

Elaine Matthews
Unit Plan Marine Biologist

National Arts Standards

Visual Arts

Creating

Enduring Understanding: People create and interact with objects, places, and design that define, shape, enhance, and empower their lives.

Essential Question(s): How do objects, places, and design shape lives and communities? How do artists and designers determine goals for designing or redesigning objects, places, or systems? How do artists and designers create works of art or design that effectively communicate?

VA:Cr2.3.2a Repurpose objects to make something new.

Connecting

Standard 10: Synthesize and relate knowledge and personal experiences to make art.

Enduring Understanding: Through art-making, people make meaning by investigating and developing awareness of perceptions, knowledge, and experiences.

Essential Question(s): How does engaging in creating art enrich people's lives? How does making art attune people to their surroundings? How do people contribute to awareness and understanding of their lives and the lives of their communities through art-making?

VA:Cn10.1.2a Create works of art about events in home, school, or community life.

Theatrical

Creating

Enduring Understanding: Theatre artists rely on intuition, curiosity, and critical inquiry.

Essential Question(s): What happens when theatre artists use their imaginations and/or learned theatre skills while engaging in creative exploration and inquiry?

TH:Cr1.1.2.b. Collaborate with peers to conceptualize scenery in a guided drama experience (e.g., process drama, story drama, creative drama).

Anchor Standard 6: Convey meaning through the presentation of artistic work.

Performing Anchor Standard 5: Develop and refine artistic techniques and work for presentation.

Enduring Understanding: Theatre artists share and present stories, ideas, and envisioned worlds to explore the human experience.

Essential Question(s): What can I do to fully prepare a performance or technical design?

Elaine Matthews
Unit Plan Marine Biologist

Performing

Essential Question(s): What happens when theatre artists and audiences share a creative experience?

TH:Pr6.1.2.a. Contribute to group guided drama experiences (e.g., process drama, story drama, creative drama) and informally share with peers.

NJ Standards

Content Area: Visual and Performing Arts

Standard 1.3 Performance: All students will synthesize those skills, media, methods, and technologies appropriate to creating, performing, and/or presenting works of art in dance, music, theatre, and visual art.

Strand D. Visual Art

Content statement : Visual statements in art are derived from the basic elements of art regardless of the format and medium used to create the art. There are also a wide variety of art media, each having its own materials, processes, and technical application methods for exploring solutions to creative problems.

Indicator #: 1.3.2.D.1 31

Indicator Statement Create two- and three-dimensional works of art using the basic elements of color, line, shape, form, texture, and space, as well as a variety of art mediums and application methods.

Content Standards: Knowledge of visual art media necessitates an understanding of a variety of traditional and nontraditional tools, applications, possibilities, and limitations.

Indicator # : 1.3.2.D.4

Indicator: Explore the use of a wide array of art mediums and select tools that are appropriate to the production of works of art in a variety of art media. Visual awareness stems from acute observational skills and interest in visual objects, spaces, and the relationship of objects to the world.

Content Standard: Visual awareness stems from acute observational skills and interest in visual objects, spaces, and the relationship of objects to the world.

Indicator #: 1.3.2.D.5 Create works of art that are based on observations of the physical world and that illustrate how art is part of everyday life, using a variety of art mediums and art media.

Content Standard: Plays may use narrative structures to communicate themes.

Indicator # 1.3.2.C.1 Portray characters when given specifics about circumstances, plot, and thematic intent, demonstrating logical story sequence and informed character choices.

Indicator # 1.3.2.C.1 Portray characters when given specifics about circumstances, plot, and thematic intent, demonstrating logical story sequence and informed character choices.

	<p>Day 1 (45 mins) Who is a Marine Biologist?</p>
<p>Engage The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>Show image of marine biologist diving (image from Rozzy Career Adventure) Utilize Smart board if available</p> 
<p>Explore (10 min) The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>Question- What do you observe in this picture? Allow students to share ideas Where do you think this person is? What do you think they are doing?</p>

Elaine Matthews
Unit Plan Marine Biologist

<p>Explain (10 mins) The purpose for the EXPLAIN stage is to provide (students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>Marine Biologists are scientists that study the ocean, the plants and the animals that live in the ocean and are concerned with keeping the ocean environment healthy and safe for all living things. Raise your hand if you have ever been to the ocean? What are some things you observe? Allow students to describe things about the ocean. What types of things live in the ocean? Do plants grow in the ocean? Where do the animals live?</p>
<p>Elaborate/Extend (10-20 mins) The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Writing Activity; Activity Sheet Rozzy Learning -Easy level Students will draw themselves underwater. Write a sentence about what you see underwater. -Advanced writing activity Pretend you want to be a marine biologist. Fill out a job application by answering the following questions. -What does a marine biologist do? -Why do you want to be a marine biologist? -Do you like the water? Include a picture of yourself underwater</p>
<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Observe students as they are working to access their knowledge of a marine biologist. “Say one word” Allow students to share one thing they learned in today’s lesson</p>

Elaine Matthews
Unit Plan Marine Biologist

Day 2 (45 min) Introducing Oil Spills	
<p>Engage (5 min) The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>Show a bottle with colored water and oil from previous chemistry lessons.</p>
<p>Explore (5 min) The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>Ask students to recall where the oil is in the bottle and where the water is?</p>
<p>Explain (5 min) The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>Turn over the bottle and allow students to observe the water and oil mixing and separating. Question: What happens? Why ? The oil and water in the bottle represent what happens when oil is spilled into lakes/ rivers/ocean</p>
<p>Elaborate/Extend (15 min) The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Read “Oil Spill” <u>Oil Spill</u> by Melvin Berger Throughout the story stop and check for understanding allowing students to make connections to informational text and illustrations. After the story Ask- Why are marine biologists concerned with oil and other forms of pollution when they come in contact with the water?</p>
<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Ask students to say one thing that they recall from today’s lesson (Just one word) Draw a picture showing how oil floats on top of the water.</p>

Day 3 45 mins Cleaning up Oil Spills Continued	
<p>Engage (5 min) The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>Show the bottle of oil and water. Explain that today they will be working like marine biologists and engineers to clean up an oil spill.</p>
<p>Explore (5 min per group) The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>In small groups students will use various tools to try to clean up the oil spill. Materials (large container to hold water) vegetable oil, pipette or eye droppers, sponge (absorbent pads), dish detergent.</p>
<p>Explain The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>Explain how scientists/engineers use models to help them find solutions to problems. Teacher- Create a boom by threading string through straws to create a boom system to try contain the oil spill. Move the container to create waves, discuss how the water moves and the oil on top mixes up and moves as well. Explain how the ocean is always moving and changing which makes it difficult to contain and clean up the oil spill.</p> <p>Working in a small group (4 students) Have students select different tools to remove the oil. Allow the students 2 mins to do their best job to clean up and remove the oil. Have students compare the results of the various tools. Ask: Who was able to remove the most oil? Did they get more oil or water? Where they are able to clean up all the oil. Teacher: Place one or two drops of dish detergent in the oil/ water to show what happens when detergents are used to try to clean up the oil. Students will observe the oil spreading, moving away from the detergent. Ask: What did they observe? Did the detergent remove the oil?</p>

Elaine Matthews
 Unit Plan Marine Biologist

<p>Elaborate/Extend The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Activity Extensions Cleaning Oily Feathers Experiment: In this experiment, students look at the way oil affects bird feathers and try out different cleanup methods to find out which works best. Clean oil from feathers https://response.restoration.noaa.gov/sitemap, https://response.restoration.noaa.gov/resources/education **while teacher is working with students in small group provide coloring activity page on oil spills**</p>
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<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Draw the tool that worked best to clean up the oil spill. Write one sentence explaining why it is difficult to clean up oil spills in the ocean,</p>
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Student Name	3 	2 	1 	0 
Followed Directions				
Understood Task				
Used Materials/Tools Correctly				
Used Time Wisely				

Elaine Matthews
 Unit Plan Marine Biologist

Made Connections to lesson				
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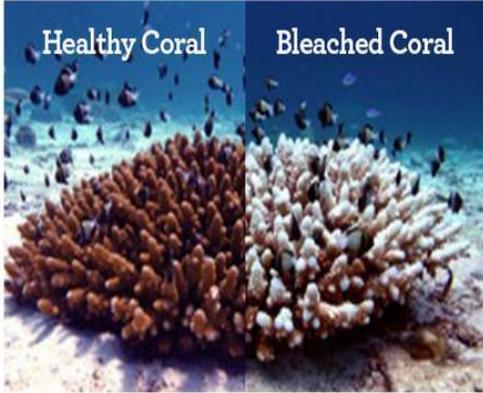
Day 4 (45 mins) Introducing the Coral Reef	
<p>Engage The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>(Lessons modified by Rozzy Careers) Show a picture of a Marine biologist working near the coral reef. Introduce coral reefs and ask students what they know about coral reefs.</p> 
<p>Explore The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>Use the Coral Reef book to show pictures of the coral reef. Have examples of Coral for students to observe.</p>

Elaine Matthews
Unit Plan Marine Biologist

<p>Explain The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>Coral reefs are made up of tiny living animals. Explain to the students that marine biologists investigate the coral reefs and make sure they stay alive and healthy in the ocean. Explain to the students that the coral reefs are dying and marine biologists are trying to figure out why. Explain to students that marine biologists have determined one reason that coral is dying. When people use sunscreen the chemicals get into the water and kill small living organisms that live on the coral. When this happens, the coral reef loses its color this is called coral bleaching. Show examples of Bleached Coral</p>
<p>Elaborate/Extend The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Allow students to observe pieces of coral</p>
<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Exit ticket: Share something you learned today. Just one word. (Students say either one word or a sentence about what they learned from today's lesson)</p>

	<p>Day 5 45 mins Coral Bleaching Activity</p>
<p>Engage The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>TLW observe bleaching Working in a small group with teacher supervision, students will build a model of the coral reef out of colored construction paper by bending, rolling, cutting and folding paper into various shapes and sizes.</p>

Elaine Matthews
Unit Plan Marine Biologist

<p>Explore</p> <p>The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>Discuss how models are used to simulate situations or circumstances. Colorful paper represents the living coral reef. Teacher- Spray paper with Bleach Students – observe reaction when bleach comes in contact with the colored paper Ask the students what they observe happening to the paper. (The paper will change or lose color when bleach comes in contact with the paper. .</p>
<p>Explain</p> <p>The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>Explain how this is similar to coral bleaching. Coral bleaching happens when chemicals in the water kill the living organisms that the coral rely on.</p> 
<p>Elaborate/Extend</p> <p>The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Extra work -A Coral Reef coloring activity page is provided to students while they are waiting to work with the teacher in a small group. After teacher lead activity Students will draw a picture of the coral reef before bleaching and after bleaching background for students and teacher https://climatekids.nasa.gov/ocean/</p>

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<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Exit ticket Students-Explain what happens to coral when it becomes bleached. Draw a picture of your observations today.</p>
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Student Name	3 	2 	1 	0 
Followed Directions				
Understood Task				
Used Materials/Tools Correctly				
Used Time Wisely				
Made Connections to lesson				

Day 6 -45 mins Creating the Coral Reef (Art Integration) & Day 7 Magic School bus Video

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<p>Engage The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>Explain to the students that we will be creating/building our own model/ mural of the coral reef from paper. Show pictures of different coral types. Teacher- Model how to trace hand & arms to create pieces of branch coral, (those pieces can be layered to create large branch coral) Teacher- Model how to use toilet paper tubes, and construction paper to create Sea anemone. Show how to fold and curl paper to create different effects.</p>
<p>Explore The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>Students will imagine and create parts of the coral reef out of construction paper. Students will trace their hands & hands and arm onto construction paper, Students will cut out tracings Students will use toilet paper tubes and construction paper to create Sea Anemones Various art materials will be needed to allow students the freedom to explore and create pieces. All work will be collected and combined by the teacher for future activities. Students also created kelp forest from green construction paper. ** Some students will also color various size sea turtles to be included in the future investigation activity)</p>
<p>Explain The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>Discuss how scientists use models to examine, explain or demonstrate ideas and phenomena. Models are crucial for research and promote a better understanding of communicating theories and test results.</p>
<p>Elaborate/Extend The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Day 7 45 mins Students will watch the Magic School bus Magic School Bus Takes <u>a Dive</u> (partners in the reef) (35 mins) Draw 4 partnership of the reef from the Magic school bus video (10 mins)</p>

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<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Day 6 Students were able to create parts of the coral reef from construction paper. Use rubric below</p> <p>Day 7 Students were able to recall and draw partnerships of the reef.</p>
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Student Name	3 	2 	1 	0 
Followed Directions				
Understood Task				
Used good Craftsmanship				
Used Time Wisely				
Used Materials/Tools Correctly				

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<p>Engage The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>Teacher tells the students We are going on a field trip to a secret location!! Explain to the students that today they will be acting like marine biologists and exploring our mural of the coral reef. Explain that divers are very careful not to disrupt the reef and work very carefully. Rules for diving is never dive alone, always stay with your partner. Briefly discuss how marine biologists might communicate with each other and collect data about the reef. As we leave the classroom, students are reminded to put a bubble in their mouth “no talking under the water” as we pretend to swim to the secret location.</p>
<p>Explore The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>In small groups students will use flash lights to investigate the coral reef. They are challenged to discover as many different features of the reef and animals that are living within the reef system. The mural will be placed on the stage in a dark location behind the curtain. As students are waiting their turn they are reminded to practice communicating using hand signals, 'no talking under the water'.</p>
<p>Explain The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>After all, students who have visited the reef in the dark reveal the created reef with the lights on. Compare how different the reef looks when the lights are turned on. Why might a marine biologist need to use a flashlight to help them see. Could places under the water be dark? Are all the animals easy to see in the reef? Explain how some animals camouflage in order to hide from predators.</p>
<p>Elaborate/Extend The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Continue to explore the reef counting, measuring, and recording their findings. Students will use data collection sheets to count the different types of animals in the reef. Students will use rulers to measure and count sea turtles. Data collection activity sheet https://docs.google.com/document/d/1ARhlil1oPLCMxleHMHXHHvQGj6rpKgup8hH1BckbkBo/edit?usp=sharing</p>

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<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Draw a picture of you (marine biologist) investigating the reef. Label your drawing show different characteristics of the reef</p>
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Class work rubric

Student Name	3 	2 	1 	0 
Followed Directions				
Understood Task				
Demonstrates understanding of the main ideas of the lesson.				
Used Time Wisely				
Used Materials/Tools Correctly				

5E Lesson Plan	Day 10 & 11 (45 min. sessions)
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<p>Engage The purpose for the ENGAGE stage is to pique student interest and get them personally involved in the lesson, while pre-assessing prior understanding.</p>	<p>Teacher reads Pout Pout Fish Cleans the Ocean Discuss Plastics in the Ocean Brainstorm Ideas for Recycling.</p> <p>Explain to the students that we will be acting like marine biologists and exploring our mural of the coral reef again. Explain that divers are very careful not to disrupt the reef and work very carefully. Rules for diving is never dive alone, always stay with your partner. Briefly discuss how marine biologists might communicate with each other and collect data about the reef. As we leave the classroom, students are reminded to put a bubble in their mouth “no talking under the water” as we pretend to swim to the secret location.</p>
<p>Explore The purpose for the EXPLORE stage is to get students involved in the topic; providing them with a chance to build their own understanding.</p>	<p>In small groups students will use flash lights to investigate the coral reef. They are challenged to discover changes in the reef and animals that are living within the reef system. Teacher note (Add plastic litter to the reef and remove some sea life. Remove or replace some colorful coral with brown or off white paper to simulate coral bleaching.) Have students record observations and collect trash to simulate cleaning the ocean. Discuss the changes they observed.</p>
<p>Explain The purpose for the EXPLAIN stage is to provide students with an opportunity to communicate what they have learned so far and figure out what it means.</p>	<p>Compare how different the reef looks. What changes do they see? Count the animals and compare results from previous dive. Teacher explains The oceans play a vital role in the global climate system, generating oxygen and absorbing carbon dioxide from the atmosphere. (This could be a great lead into Climate and Weather Unit) Data collection activity sheet https://docs.google.com/document/d/1ARhli1oPLCMxleHMHXHHvQGj6rpKgup8hH1BckbkBo/edit?usp=sharing</p>

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<p>Elaborate/Extend The purpose for the EXTEND stage is to allow students to use their new knowledge and continue to explore its implications.</p>	<p>Sorting trash recycling activity. https://www.turtlediary.com/game/recycling-waste.html technology connection recycling scavenger hunt created by ematthews</p>
<p>Evaluate The purpose for the EVALUATION stage is for both students and teachers to determine how much learning and understanding has taken place.</p>	<p>Students can identify items that should be recycled, put in the garbage, or composted.</p>

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Material List

<p>Day 1 -Image of Marine Biologist working -Writing Activity Sheet (Rozzy Learning)</p>	<p>Day 2 -Previously created bottle of colored water and vegetable oil. -Large clear plastic water bottle with colored water (food coloring), -vegetable oil -Book <u>Oil Spill</u> by Melvin Berger</p>	<p>Day 3 -Large Basin to simulate ocean (clear is best) -Water -Vegetable Oil -Dawn dish detergent -Pipe cleaners -Straws -Pippets or eye droppers, -Sponge or absorbent pads -Small cups for student to use during activity **Paper towels and wipes to easily clean hands and table) -Extra work Oil spill coloring activity</p>	<p>Day 4 -Coral Reef Book -Examples of Coral for student to observe -Magnifying glass</p>
<p>Day 5 -Plastic basin -Colored construction paper -Scissors -Pipet or small spray bottle -Bleach -Protective eyewear if available</p>	<p>Day 6 -Magic School Bus <u>Takes a Dive</u> Video</p>	<p>Day 7 -Construction paper -Variety of colors (red, orange, green, pink, yellow purple) -Scissors -Pencils</p>	<p>Day 8-11 Location for mural stage with curtain is best -Flash lights (at least 1 per pair of students 4-15 depending on class size) -Rulers -Activity Dive Sheet</p>

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-Extra Work Coral Reef -Coloring paper				
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Suggested books and Videos and games

Coral Reefs by Jason Chin begins as an ordinary story of a girl visiting the library, but soon water pours into the library and coral grows around her as she swims through the plants and animals of the coral reefs. The watercolor illustrations are realistic and detailed, and the pages are packed with facts about all of the creatures of the amazing coral reefs.

Oil Spill by Melvin Berger Did you know that an oil spill occurs somewhere in the world almost every day of the year? Oil spills can have many different causes, but the result is the same. Oil harms plants and wildlife that make the oceans and coastlines their home. Scientists are learning the best ways to combat oil spills. Learn how you can help, too!

Coral Reefs by Gail Gibbons (one of my favorite science authors for kids!) is packed with geography lessons on coral reefs, facts on the creatures that live there, how the coral reefs grow, and the difference between the day and night colonies.

Reef Life: A Guide to Tropical Marine Life by Brandon Cole contains 800 stunning color photographs of more than 400 species from the coral reefs. The identification guide informs us of their names, species, habitats, ranges and a description particular to the marine animal covered. Kids will pour over the photographs!

Over in the Ocean: In a Coral Reef by Marianne Berkes and Jeanette Canyon not only has a catchy rhyme packed with marine creatures that live in coral reefs- the images in the book are also phenomenal! The artist has created an underwater world entirely of polymer clay, which was then photographed in brilliant color.

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The Incredible Coral Reef, by Toni Albert, winner of a Teachers' Choice Award and a Parents' Choice Approval, invites kids to explore the dazzling coral reefs and to learn how we can help protect them. The Incredible Coral Reef is meticulously researched, contains up-to-date information, beautiful photos and artwork, and helpful references.

Magic School Bus Takes a Dive, Mrs. Frizzle takes the class on a field trip under the ocean to discover some lost treasure from her ancestors, in order to find it the students are transformed into different sea creatures throughout the video. To survive, some plants and animals sometimes form the most surprising partnerships. The students learn about the unique partnership coral has with algae and how marine biologists try to help save the reef.

(The Pout-Pout Fish) The Pout-Pout Fish Cleans the Ocean, by Deborah Diesen, Dan Hanna (Illustrator) The Pout-Pout Fish discovers a big big mess.

<https://climatekids.nasa.gov/>

<https://www.turtlediary.com/game/recycling-waste.html> Copyright © 2021, Turtlediary.com. All rights reserved

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References

STEM Career Adventures is the STEM program used “Rozzy Career Adventures” © 2005-2018 **ROZZY LEARNING COMPANY**

Next Generation Science Standards