

# Science Lesson Planning Template

## Context Issues of the Lesson

<b>Unit or Lesson Title:</b>	Ecosystems – Finding Solutions for Michigan Ecosystem Issues/Problems
<b>Grade Level</b>	High School – Advanced Biology - Freshman
<b>Topic/Theme/Nature of the Investigation:</b>	The students will select from a list of environmental/ecological issues in Michigan. They will have to do some degree of research to figure out what is the current problem. Once they figure the problem(s) out they will then have to brainstorm for different ideas to possibly solve the problem. They need to develop at least 10 possible solutions. Students will select one or two ideas and develop those ideas further.
<b>NGSS Performance Expectation(s)</b>	<b>LS2C- Ecosystems Dynamics, Functioning, and Resilience</b> HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]
<b>NGSS Dimension 1 component</b>  <b>Asking Questions</b>	<b>Questions:</b> <ul style="list-style-type: none"> <li>• How does the environment affect you?</li> <li>• Does the affect change as you get older?</li> <li>• What are some environmental issues in the World/United States that maybe you have seen in the news or have read about?</li> <li>• Do you believe the environmental problems are the same or different as those in Michigan as in comparison to the rest of the United States/world?</li> </ul>
<b>NGSS Dimension 2 component</b> <b>Developing &amp; Using Models</b>	Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show how relationships among variables between systems and their components in the natural and designed worlds. <ul style="list-style-type: none"> <li>•Develop a model based on evidence to illustrate the relationships between systems or components of a system. (HS-LS2-5)</li> </ul>
<b>NGSS Dimension 3 component</b> <b>Planning &amp; Carrying out Investigations</b>	<ul style="list-style-type: none"> <li>•Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-LS2-7)</li> </ul>

<b>Duration:</b>	<p><b>½ Class period:</b> Make lists on board of environmental issues/problems, watch YouTube video</p> <p><b>1 ½ Class periods:</b> Quick review from day one for clarification of activity – research in lab or this could have been assigned as homework so this could be a brainstorming day</p> <p><b>1 Class period:</b> Brainstorming group day with 3x3 sheet of white paper</p> <p><b>2 or 3 Class periods:</b> Solution idea development &amp; building of model – 2D or 3D or conceptual</p> <p><b>2 Class periods</b> – Presentations to class</p>
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## Planning Stages Within the 5-E Inquiry Model

<b>Engage</b>	
<p><b>PURPOSE:</b></p> <ul style="list-style-type: none"> <li>to convey the context of the lesson(s)/unit by conveying an important Key Question</li> <li>to engage students in investigations that reveal their thinking to themselves and the teacher</li> <li>to record the initial ideas of students</li> <li>to engage their interest</li> </ul>	
<p><b>What is the teacher doing? What are the students doing?</b></p> <ul style="list-style-type: none"> <li>Divide the board into three columns. Label each column – World, United States, Michigan, Flat Rock</li> <li>Make a list of environmental issues in the world.</li> <li>Make a list of environmental issues in the United States.</li> </ul> <p><b>Questions:</b></p> <ul style="list-style-type: none"> <li>What are some environmental issues in the World/United States that maybe you have seen in the news or have read about?</li> <li>Do you believe the environmental problems are the same or different as those in Michigan as in comparison to the rest of the United States/world?</li> </ul> <p>Let's make a list for Michigan. Let's watch short YouTube video: <a href="http://www.youtube.com/watch?v=5eTCZ9L834s&amp;list=PLF1104743F940378D">http://www.youtube.com/watch?v=5eTCZ9L834s&amp;list=PLF1104743F940378D</a></p>	
<b>Explore</b>	
<p><b>PURPOSE:</b></p> <ul style="list-style-type: none"> <li>to test ideas and develop knowledge using explorations, investigations, experiments</li> <li>to modify and record ideas as they change due to activities</li> <li>to develop new questions and testable hypotheses</li> </ul>	
<b>Activities (list)</b>	<b>Driving Question(s)</b>
<ul style="list-style-type: none"> <li>Students will be divided into groups of 3 or 4.</li> <li>Students will be given the list of project topics.</li> <li>One group representative will be come to front to pick a crumbled piece of paper. On that paper will be a number. That number will determine the order in which the groups will select topics. 1= first pick, 2 = second pick and so on</li> <li>Students will select a topic from one of the 14 listed on the project handout.</li> <li>Students will individually and collectively do some basic research on their topic to gain a degree of understanding. They will be given a guided question sheet to help them with acquiring information about their topic.</li> <li>Students will reconvene and share their findings and develop a question/problem they want to further investigate.</li> </ul>	<p>What causes there to be environmental problems that constantly need to be resolved by some other means. What seems to be the need for reducing the impacts of human activities on the environment and biodiversity</p>
<p><b>Student Communication Product:</b> (written report, oral presentation, poster, etc.)</p>	

(consider showing “Models” of student products to help student identify characteristics of quality)

**Using a big sheet of white paper 3 x 3**

- Students will brainstorm to find possible reason solutions for their Michigan environmental issue/problem.
- They will brainstorm a minimum of 10 possible ideas
- Once they have 10 ideas they will discuss the 10 ideas and further develop each idea. Things to consider: Cost, location, availability of materials, ease of use, impact on jobs, impact on society, promotion of idea, funding for idea, design, materials for models etc.
- Decide on one idea to develop a model

**Explain**

**PURPOSE:**

- to answer the Key Question through student explanations
- to provide students with relevant vocabulary, formal definitions and explanations of concepts

**Content Media: (written material, video, teacher lecture, technology)**

- What causes there to be environmental problems that constantly need to be resolved by some other means?
- What seems to be the need for reducing the impacts of human activities on the environment and biodiversity?
  
- Students will research their topic area
- Prior to this lesson students were already introduced to relevant vocabulary as well as teacher lectures.

**Student Communication Product: (assessment, unit test, written report, oral presentation, poster, etc.)**

- Writing assignment – students will be given the questions above and will be allowed to choose which to respond to. I will use my writing science writing rubric.
  
- When done students will share their response with their neighbor for peer evaluation.
  
- The class will divide into their original group projects and peer share their responses.

**Elaborate**

**PURPOSE:**

- to extend students' conceptual understanding through application or practice in new settings

**Activities:****Model Development**

- Using chosen idea develop a simplistic or elaborate model of how your idea could possibly solve or improve the Michigan environmental issue/problem topic. Be creative in your approach to developing your model. Work as a team to plan the needed materials and construction of your model.
- Models can be 2D, 3D or a concept that is explainable using materials that have a purpose to help better explain idea to rest of class.

**Content Media: (written material, video, teacher lecture, technology)**

**Extending/Application Questions for Whole/Small Group Discourse:**

1. After further research from when you first started what do you believe to be the main cause of this issue?
2. Write out the process for your model and how it applies or will work to better your topic problem or solve it.
3. Discuss your response in questions 2 above with your group. Is the response you have similar or dissimilar to other group members?
4. Do you believe there is a better solution than the one that your group presented?
5. What improvements would or changes would you make?

**Student Communication Product (assessment):** (unit test, written report, oral presentation, poster, etc.)

- Oral presentation perhaps a poster or a PowerPoint to better illustrate the solution or idea.

<b>Evaluate</b>	
<b>PURPOSE:</b> To determine if students were able to design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity	
<b>Skill/Reasoning Learning Objectives</b>	<b>Assessment Instrument</b>
<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Brainstorming</li> <li>• Designing &amp; evaluating designs</li> <li>• Problem solving</li> <li>• Leadership – roles</li> <li>• Follow-through</li> <li>• Meeting Deadlines</li> </ul>	<ul style="list-style-type: none"> <li>• Rubric</li> <li>• Observation</li> </ul>
<b>Knowledge Learning Objectives</b>	<b>Assessment Instrument</b>
<ul style="list-style-type: none"> <li>• To obtain an understanding of various Michigan environmental problems/issues.</li> <li>• To develop a deep knowledge of the impact of these environmental issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Summative Assessment</li> </ul>