



## K-D-R Instructional Design (Know – Do – Reflect) Performance Assessment



Performance Task Title:	Net Primary Productivity Inquiry Lab	Duration:	2.5 weeks
Grade level(s):	11th Grade	Authors:	Sarah Berry, Natasha Clemons, Jeanette Lok, Rachel Howes
Discipline(s):	APES	Date:	11/18/13
Rubric used to assess assessment			

For additional information, hover the cursor over the **TIP** to see a screen tip that will help you.

<b>1. Essential Question</b>	<b>TIP</b>
How does water quality affect Net Primary Productivity in an ecosystem?	
<b>2. Big Idea /Understandings</b>	<b>TIP</b>
<b>3. Standards</b>	<b>TIP</b>
<b>College Board Standard</b> <ul style="list-style-type: none"><li>• Global Water Resources and Use: Agricultural water use, Surface and groundwater issues, Water conservation</li><li>• Energy Flow: Photosynthesis and cellular respiration, food webs, and trophic levels, ecological pyramids</li><li>• Natural Biogeochemical Cycles: carbon, nitrogen, phosphorus, water, conservation of matter</li></ul>	

4. Long Term Learning Targets	<u>TIP</u>	Supporting Learning Targets	<u>TIP</u>
<p>1. I can initiate a scientific inquiry</p> <p>2. I can plan and execute an investigation.</p> <p>3. I can represent, analyze and interpret my data.</p> <p>4. I can communicate my conclusions based on evidence</p>		<p>1. a) I can ask an empirically testable, scientific question.</p> <p>1. b) formulate a testable hypothesis that is directly related to my question.</p> <p>2. a) Identify and explains the independent and dependent variables in the hypothesis.</p> <p>2. b) Clearly communicates the details of the procedures so that they can be replicated by another group of students.</p> <p>4.b) Creates a detailed and clear data collection for all trials.</p> <p>5.b) I can conduct multiple trials.</p> <p>3. a) I can uses graphs to accurately summarize my data.</p> <p>3. b) I can use my graphs to examine relationships between variables.</p> <p>3. c) I can use mathematical conventions to accurately express relationships.</p> <p>3. d) I can analyze my data to identify patterns.</p> <p>3. e) I can identify possible sources of error in my data.</p> <p>3. f) I can suggest relationships between my variables worth further investigation</p> <p>4. a) I can communicate my conclusions with evidence through multiple methods.</p> <p>4. b) I can explain my conclusions discussing specific limitations</p>	

**5. Narrative****TIP****TASK BACKGROUND**

As you know, producers are an immensely important part of any ecosystem. Producers are responsible for converting the sun's energy into chemical energy stored in the bonds of organic molecules. These "food" chemicals provide energy for all other organisms. But how do external variables affect the rate of a plant's productivity? Are certain conditions optimal for plant productivity?

**6. Task Prompt / Scenario****TIP**

In this task, you will be taking the role of an ecologist who is concerned about the health of a large pond. Over the past month, you have noticed that there has been a large increase of algae and plant growth in the pond. You are worried about the overall health of the pond, determined by the dissolved oxygen content in the water (with less dissolved oxygen, more animals that use oxygen in the water will die). You decide to figure out what is happening in the pond.

There are some things that you notice that might be affecting the pond's health:

- The farmer near the pond is growing more corn, and using more chemical fertilizer.
- There has been runoff and erosion in the pond, causing the clarity of the water to change, from clear to murky brown.
- The last time that you were at the pond was in the fall, when the temperature was 15 degrees cooler than it is now

Your task is to conduct an experiment to assess the effect of different variables on dissolved oxygen levels in the water, and determine what has been happening in the pond. Some variables that you can investigate are pH, nitrogen, temperature, wavelength (color) of light, and transparency. To do this, we will first do an initial lab to practice calculating dissolved oxygen levels and net primary productivity. After we do this initial lab, you will design your own experiment to test how net primary productivity is affected by your chosen variable.

**7. Task Requirements****TIP**

You will write up a lab report to document your inquiry around the factors that affect Net Primary Productivity. This lab report should be 3-5 pages long, and you will turn it in to your teacher through google docs. This lab report must be your own individual work, though you may collaborate with your group mates to make sure you are in agreement especially around the procedures and data.