

## LS2-6: Reflection on Student Work

### Description of Task

This task falls on the second day of an inquiry activity sequence on ecosystems and the interactions that occur within ecosystems. In the previous lesson students examined types of symbiosis as an introduction to the types of interactions they could find in an ecosystem. To transition, students created a graph showing the relationship between wolf and moose populations on Isle Royale in Michigan. This task asked them to analyze their graphs and find patterns. They then were asked to apply knowledge of relationships in an ecosystem as well as population limiting factors to this situation to explain those patterns. This activity took place after a brief discussion where students shared some of the patterns they saw.

**Comment:** I assess my students on a daily basis. I then analyze the students' responses to inform my teaching and make any necessary changes in lesson plans. I can also give students feedback and additional assistance for those students who may be struggling with a concept.

### Activity and Ideal Response

The following are the questions on the activity sheet as well as the ideal response, written in italics.

**Comment:** It is important that I first assess myself and determine what I am looking for in student responses. I can then use that as a baseline for the analysis of their work. I can compare their answers to my own and determine why our answers may have varied.

#### Wolf-Moose Population Questions

Look back at the graph of the wolf and moose populations you created yesterday to answer the following questions.

1. Can the island support an infinite number of moose? Why or why not?  
*No, without predators to reduce the moose populations, the moose population would grow larger. Eventually there would not be enough food or space for the moose to live in. This would limit the population.*
2. If there were no wolves on the island, what would determine the number of moose on the island?  
*Things like food, space, and disease could limit the number of moose on the island.*
3. Is predation a density-dependent or density-independent limiting factor? Explain your answer.  
*Predation is density-dependent. A density-dependent limiting factor affects populations based on density. If there are more moose (the prey), predators like wolves can eat more of the prey. This reduces the moose population more.*
4. When the moose population increases, what happens to the wolf population? Why do you think this happens?  
*The wolf population increase too because there is more prey for them to eat. More food means that they are able to reproduce more, since they do not have to spend time looking for food.*
5. What causes the moose population to decrease? Why?  
*Moose population decreases when the wolf population gets too large. This is because more wolves are going to eat more of the moose, decreasing their population.*
6. This relationship is called a predator and prey cycle. Why do you think the term cycle is used? Explain your answer.

*It is a cycle because it goes up and down but follows the same pattern. When one increases the other will increase not too far behind it. This then causes a decrease in the first population, followed again by a decrease in that second population. This cycle continues in the same order over and over again.*

7. Why do you think the predator-prey interaction is studied so much on Isle Royale?

*Isle Royale is a large island in Lake Superior. Because it is an island and there is no natural or artificial bridge, no species immigrate or emigrate. Since there is no changing of species going in or out, the system stays constant. With a constant environment it is easier to study changes in the species if you do not need to worry about species leaving the area or more species coming into the area.*

### Patterns in Students' Responses

Student responses can be found at the end of the document. Below are the patterns I found for each question.

1. All students recognized that the island would not be able to hold an infinite number of moose. Many cited carrying capacity, which we discussed in the previous unit as being a reason why there could not be more than a certain number of moose. Students pointed out specific limiting factors that affect carrying capacity such as limited resources and available space. This showed that students were drawing the connections from our previous unit and using that information to form new ideas related to our new content.
2. Most students here listed either a density-dependent limiting factor or stated that both density-dependent and density-independent limiting factors would be the determining factor in how many moose could live on the island. Some students simply pointed out that there would be many moose on the island because of a lack of predators. They recognized the interaction but it seems like they did not fully understand what the question was asking of them. Some students provided explanations or specific examples of density-dependent limiting factors that would limit the populations. This showed me that again they were connecting the information to new content.
3. When answering this question, all students stated that this is a density-dependent limiting factor. The students' levels of explanation varied however. Most students stated that the populations depended on the size of the other population. Based on our class discussion and previous unit, they demonstrated their understanding of what a density-dependent limiting factor is. Some students did not mention populations however and just said that the populations depend on each other. While this was not incorrect, they did not reference the actual density of the populations, which is an important part of these limiting factors.
4. When answering this question most students looked at their graphs and recognized that an increase in the moose population caused an increase in the wolf population. Many students explained that this means that there would be

**Comment:** Analyzing patterns in responses allows me to determine if there are misconceptions shared with the class. If there are I can make changes to the following lesson plans to address any specific misinformation. I can also determine if students were answering questions in a similar fashion or if there was a wide variety of answers to a question. This can then be used to assess the assessment and determine if I should make any changes to the assessment.

enough food for all of the wolves. There were a handful of students that said the wolf population would go down when the moose population increased. Based on their responses I believe they were looking a little too far ahead on the graphs, rather than observing the wolf population slightly after the increase in moose they were looking at what happens after the moose population peak.

5. For this response, all students stated that if there were too many wolves they would eat more of the moose, which causes a decrease in the moose population. They stated that this would decrease the amount of food available for the wolves so the wolves would start to die. Overall they were able to see the pattern and convey that information with their knowledge of species interactions.
6. Here students were able to recognize that it is a cycle because it keeps happening. They all stated that the population goes up and down and that it would keep going up and down. Not all students said why, but those that did explained that as one goes up, the other can go up, but at a certain point there is too many of one species, causing the populations to start decreasing. They were able to find the pattern and make the assumption based on data that it would keep happening.
7. Here student answers varied, however when analyzing the responses it was not that they were wrong, they just came up with more responses than I anticipated. Most students pointed out that the area was isolated which means that it is easier to observe the populations. Some students pointed out that it is important to study interactions in an ecosystem and that is why these populations are studied. There were a couple students that made the assumption that there were few other species, making the interaction easier to study. Overall I thought these answers showed a great deal of creativity and I was impressed by their answers.

### Implications for Prior Lessons and Assessment Task

The prior lesson was effective in allowing students to apply their knowledge of relationships in ecosystems to a new situation. Using this knowledge they could explain patterns and trends that they noticed when graphing a data set. In the previous lesson they did need to create three axis graphs, which was a challenge for some students. Because some graphs were difficult to read, as students worked on this assessment, I provided them with a graph of the data. Next time I work on this task I would like students to be able to create a graph but then also receive a copy of the actual graph to compare with their own graph. This way they have the correct graph and can see patterns but are also able to self-assess what their needs are when it comes to graphing

**Comment:** Here I am able to look at how the previous lesson contributed to student answers. This shows me the efficacy of that lesson and if there were issues I can make any necessary changes. I can then look at any changes that should be made to the actual assessment and how it is given based on student responses.

Based on student responses this task did work as a bridge between units. When analyzing the responses I did notice that not all students provided detailed explanations about why they saw certain patterns. This is likely because for some of these questions I did not ask them to provide the explanation. In the future I would modify the questions so that they asked for explanation. With the explanations I would be able to see their

thought process as they answered. Detailed explanations would also show me that students understood the concepts, not just recalled the names of concepts we discussed.

### **Implications for Following Lessons**

In the next unit we are going to discuss the complexity of relationships in an ecosystem. Students will be using their answers to the assessment questions as well as the results of an ecosystem simulation to create a graphic organizer showing the relationship between multiple organisms on Isle Royale. As a class we will first discuss what their thoughts on “complex interactions” and what that means in an ecosystem. This way we can review how density-dependent limiting factors, density-independent limiting factors, and carrying capacity play a role in these relationships. I can use this discussion to ensure that students do remember the specifics of these topics and can relate them to changes in an ecosystem. I will also make sure that as students create this graphic organizer I have them explain the relationships they are showing. This would let me assess their understanding and see what their thoughts are.

**Comment:** Based on all of my analysis I am able to determine the direction of my teaching and how we will approach the next lesson. I can build in review as necessary or find more ways to discuss a topic.

### **What I learned About How Students Learn- Implications for Teaching**

One thing that I noticed is that unless specifically asked to explain answers, students often just put what they think the answer is. While this is a start to answering questions, and not wrong, I would like them to provide more explanations. Through the explanations I can assess student understanding and see if they have any misconceptions. I can also determine if students are making the connection between new and old material. When students simply put the answer I cannot be sure that they understand the science or logic behind the answer unless they explicitly explain. I want to make sure they are not just repeating the key words or concepts. Their explanations can show me if they are able to see how this information can support new patterns or data they have seen.

**Comment:** The analysis of student work also helps me to improve my understanding of how students learn and develop an understanding of new material. I can then use this knowledge in all of my lessons.

I have also seen how important it is for students to see data and information in multiple ways. When looking at the data set alone, students would not have been able to make the connections they could when they graphed data. These graphs then made analysis much easier and allowed them to visually see patterns. I will continue to provide students data in multiple ways in order to give them the best opportunity to see patterns and complete analysis.