Lesson Plan for Implementing NETS•S—Template I
(More Directed Learning Activities)

Template with guiding questions

Teacher(s)
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Grade Level(s)   7th Grade

Content Area   Science

Timeline   6 Days

Content Standards: **S7L4.** Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments.
a. Construct an explanation for the patterns of interactions observed in different ecosystems in terms of the relationships among and between organisms and abiotic components of the ecosystem.

NETS*S Standards:

I.   **Creativity and Innovation (b)** – Students will create claims and justifications within collaborative groups.
II. **Communication and Collaboration (A, D)** – Students will communicate within their groups to express opinions and reach conclusions.
III. **Research and Information Fluency (A,D)** – The students will plan the investigation and/or experiment and decide what data is important to their claim.
IV. **Critical Thinking, Problem-Solving, and Decision-Making (C,D)** - Students will share claims and absorb opinions of their peers and use them to revise and change their reports.

Overview

Before the Argument-Driven Inquiry Food Webs lab begins students will be introduced to food webs and the basics of them through a Nearpod. This Nearpod will be done on day 1 and the following 5 the students will participate in the Argument-Driven Inquiry Food Webs lab. Students are expected to apply their understanding of ecosystems and food webs. The students will investigate and produce an argument to claim. At the end, the students will write formal reports discussing the whole process. These reports will first be peer reviewed and corrections and modifications will be made and recorded. Once the final report is completed the teacher will grade using the same rubric the peer reviewers used.

Essential Questions

Phenomenon: Students will watch <u>Wolves Change the Rivers</u> to see a real-world example of the impact of removing an organism from an ecosystem's food web.

Student Questions During:
- A = Adjective: List a word or two that describes something you saw or learned.
- E = Emotion: Describe how a particular part of the segment made you feel.
- I = Interesting: Write something you found interesting about the content/topic.
- O = Oh!: Describe something that caused you say "Oh!"
- U = Um?: Write a question about something you learned or want to learn more about.

Discussion Questions:
- How many consumers were in the ecosystem before/after the wolves' reintroduction?
- What impact did the overpopulation of elk have?
- How did the wolves have an impact on abiotic factors found in the biome?

Students will be able to answer the essential question and meet the I can Learning Targets stated below:

What effect would removing a member of a food web have on an ecosystem?

I can explain the factors that affect the energy flow through an ecosystem.

I can explain how organisms interact with each other and their environment.

I can Analyze and create food chains, food webs, and energy pyramids to demonstrate energy flow.

I can explain how cooperation and competition can change a population size.

I can explain the cause and effect of predator-prey relationships.

Assessment

Formative assessing will occur through teacher observations and asking stemming questions throughout:
- What data on the organism cards is most important for creating your food web?
- How will you understand what the current food web looks like?
- How do you know what is eating what?
- How did you determine the impact of removing an organism?
- How did you get and collect data?
- Why did you decide to present your data this way?
- How sure are you that your groups claim is accurate?
- What other ideas did your group consider? Why did you change your opinion?

Lab Report Assessment: Rubric at end of Lesson Plan

Student Claim Boards: Their claim will state which member of an ecosystem if removed would be the most impactful. They must use evidence and justify this claim.
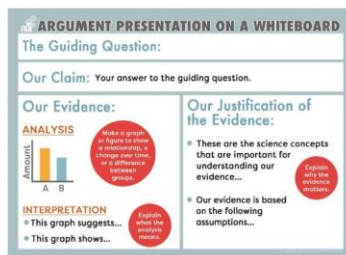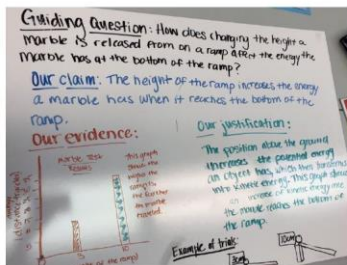
Feedback: Students will then give blind feedback creating an environment where students are debating, absorbing multiple opinions, and expanding their own. The feedback is from the student is the same form that the final report rubric is on. The students will use the peer feedback to edit and revise before finally submitting to the teacher.

Resources

Nearpod, Nearpod VR (3D Field Trips), Flipgrid, Padlet and ADI student handouts including a 24" x 36" dry erase board.

Instructional Plan Preparation

Students learned about food chains in 4ᵗʰ and 5ᵗʰ grade but have not done them since then. Students will have already been taught some background vocabulary in previous units and much of the vocabulary will have been repeated many times. The Nearpod lesson will address needed knowledge to successfully navigate and complete the Argument-Driven Inquiry lab. The videos in the Nearpod need to be embedded on Canvas for issues in playback. If a student cannot play on Nearpod having the video embedded will allow playback off Nearpod.

To dive interest the phenomenon needs to be shown and discussed. I like to use some sort of video sheet. Discovery Ed's AEIOU is a good document for ensuring engagement and is posted under the Essential Questions section.

Management

Nearpod – whole group instruction, students will use their student assigned computer to access Live Lesson.
    *If a computer is in the help desk partner the student with another unless you have access to an iPad.
    *It is recommended to get 2 iPads before, so that they are there if needed.
    *If Nearpod does not load in Canvas have students go to Nearpod.com and post the code.
    *Have power strips out for students to charge. Limit the movement to ensure seating chart stays complete
     so classroom management is not impacted.

Argument-Driven Inquiry lab – This will be done in groups of 3-4. Teacher must always move around to manage behaviors as well as motivating students through the challenges. It is important though that the teacher allows the students struggles so that they can overcome them by working as a team. While they are working the teacher should ask the stem questions to formatively assess throughout. During the feedback, the teacher must mandate good feedback and hold the students accountable to it. The student report is the only individual activity during the lab.

Instructional Strategies and Learning Activities –

To deliver content the teacher will us Nearpod and specifically Nearpod VR and Flipgrid will be used. VR will allow students to investigate a Marsh Ecosystem. A marsh is the ecosystem that the food web ADI lab is based on. At the end of the Nearpod students will create a Flipgrid describing the implication a member of a food web has on the whole ecosystem. This will prove the needed knowledge before beginning the ADI lab.

Students will work in heterogenous groups to plan, facilitate an investigation or experiment, and report findings. They will only be given an introduction and a guiding question. The principals applied are true practices of science and therefore create more authentic labs. Any differentiation must be done only to materials and not to the process. Changing the process will change the DOK level and the process in as important as the content being applied. Padlet will be used to view the completed boards. The students will ask questions and the groups will ask for recommendations. All to be applied before creating the final report for peer reviewing and final drafts being submitted.

The teacher serves only as a facilitator during the lab. Students should be allowed to work as a team to answer questions and find solutions. The teacher should only guide them when needed in an impassable roadblock is reached. The teacher must be strict and demanding when peer reviews are done. Students must be required to meet the level needed.

Differentiation

Differentiation Suggestions:

Reduce the number of organisms from 16 to 10. This will make the food web less confusing but keep the DOK level.

Simplify the wording on the cards to the appropriate Lexile levels for the groups. Use Rewordify to decrease while keeping the integrity of the material. This program will change the vocabulary and sentence structure but keep the academic vocabulary to lower the Lexile level. These materials will be placed on Canvas (LMS) where can be opened and students who need Immersive Reader can use. ELL students can also use Immersive Reader to translate the readings.

For the student report use sentence starters for ELL and low-level sped students. The attached template has this modification already done.

Reflection

The closing event is twofold. For the group sessions it is the Padlet and open forum for asking questions. The lab end will be the submission of the final draft and teacher review. A survey will be given to find out the student's perspective of the lab as a whole and used to adopt changes for the next ADI lab or next years.

Closure

This was a very fun lab for me and my co-teachers as well as the students according to their feedback. Students repeated said it was challenging but had fun. Many said they enjoyed how different this was than other research like looking up things for a WebQuest. Being the first time for many I do see room to expand to teach the steps better. Many of the concepts were brand new and beginning them took some guidance. The changes would be to the steps themselves but not the material of the overall process. I will look to do one of these for every unit next year. I would recommend anyone looking to teach true science thinking and teaching your kids real world problem solving to do this. You must be prepared though to see them struggle and be ok with it. Encourage them to keep trying and use their group and they will overcome it and shock you with what they can produce.

Draft Investigation Report

Introduction

We have been studying _____ In class, Before we started

this investigation, we explored _____

_____

_____

We noticed _____

_____

_____

Our goal for this investigation was to figure out _____

_____

_____

The guiding question was _____

_____

Method

To answer this question, _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Draft Investigation Report

Argument

We figured out _____

_____

_____

_____

The _____ below includes information about _____

_____

_____

_____
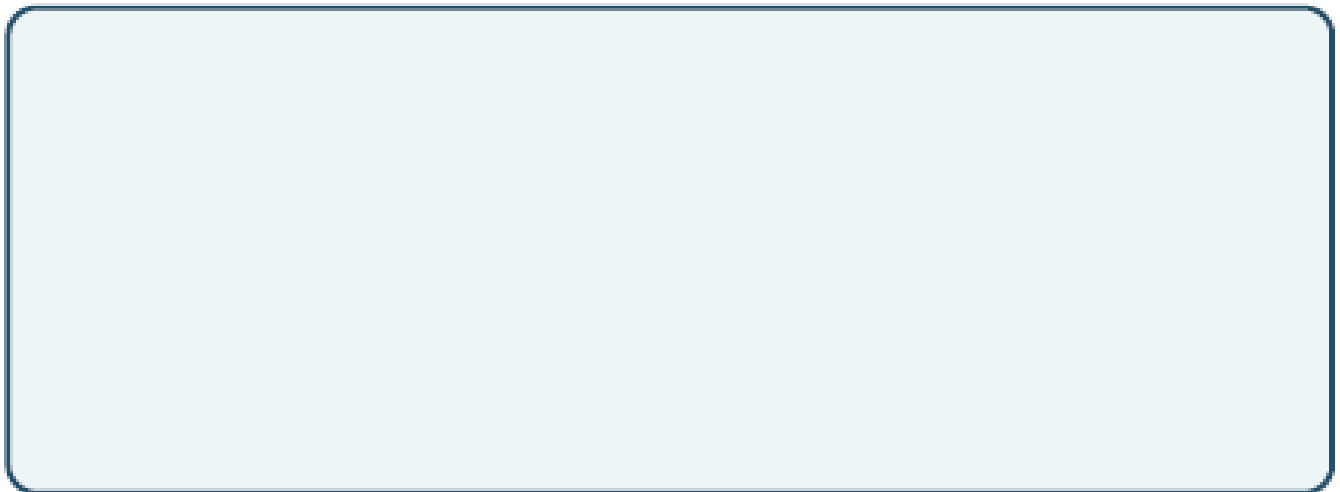
This analysis suggests _____

_____

_____

This evidence is based on several important scientific ideas. The first one is _____

_____

_____

_____

_____

_____

ADI Investigation Report Peer Review Rubric

Report By: _____ **Author:** Did the reviewers do a good job?   1   2   3   4   5
ID Number   Rate the overall quality of the peer review

Reviewed By: _____   _____   _____   _____
ID Number   ID Number   ID Number   ID Number

Section 1: Introduction and Guiding Question	Peer Reviewer Rating			Teacher Score		
1. Did the author provide enough *background information*?	☐ No	☐ Partially	☐ Yes	0	1	2
2. Did the author make the *goal of the investigation* clear?	☐ No	☐ Partially	☐ Yes	0	1	2
3. Did the author make the *guiding question* clear?	☐ No	☐ Partially	☐ Yes	0	1	2

Reviewers: If your group made any "No" or "Partially" marks in this section, please **explain how the author could improve** this part of his or her report.

Author: What revisions did you make in your report? Is there anything you decided to keep the same even though the reviewers suggested otherwise? Be sure to explain why.

Section 2: Method	Peer Reviewer Rating			Teacher Score		
1. Did the author provide a clear description of what he or she did during the investigation in order to *collect data* (the method)?	☐ No	☐ Partially	☐ Yes	0	1	2
2. Did the author describe *how* he or she *analyzed* the data?	☐ No	☐ Partially	☐ Yes	0	1	2
3. Did the author use the *correct term* to describe his/her investigation (i.e., experiment, systematic observation, interpretation of a data set)?	☐ No	☐ Partially	☐ Yes	0	1	2

Reviewers: If your group made any "No" or "Partially" marks in this section, please **explain how the author could improve** this part of his or her report.

Author: What revisions did you make in your report? Is there anything you decided to keep the same even though the reviewers suggested otherwise? Be sure to explain why.

Section 3: The Argument	Peer Reviewer Rating			Teacher Score		
1. Did the author provide an answer to the guiding question (**the claim**)?	☐ No	☐ Partially	☐ Yes	0	1	2
2. Did the author support his or her claim with **evidence** (analyzed data and interpretation of the analysis)?	☐ No	☐ Partially	☐ Yes	0	1	2
3. Did the author's claim make sense based on the evidence presented?	☐ No	☐ Partially	☐ Yes	0	1	2
4. Did the author *present the evidence* in an appropriate manner by*:* ▪ Including a correctly formatted and labeled graph (or table); ▪ Using correct metric units (e.g., m/s, g, ml); and, ▪ Referencing the graph or table in the body of the text?	☐ No ☐ No ☐ No	☐ Partially ☐ Partially ☐ Partially	☐ Yes ☐ Yes ☐ Yes	0 0 0	1 1 1	2 2 2
5. Did the author explain why the evidence is important (a *justification of the evidence*)?	☐ No	☐ Partially	☐ Yes	0	1	2
6. Did the author use scientific *terms* (hypothesis vs. prediction, data vs. evidence) and *phrases* (supports vs. proves) correctly?	☐ No	☐ Partially	☐ Yes	0	1	2

Reviewers: If your group made any "No" or "Partially" marks in this section, please **explain how the author could improve** this part of his or her report.

Author: What revisions did you make in your report? Is there anything you decided to keep the same even though the reviewers suggested otherwise? Be sure to explain why.

Mechanics	Peer Reviewer Rating			Teacher Score		
1. *Organization:* Is each section easy to follow? Do paragraphs include multiple sentences? Do paragraphs begin with a topic sentence?	☐ No	☐ Partially	☐ Yes	0	1	2
2. *Sentence Fluency:* Does the writing sound good when read out loud? There is no awkward wording.	☐ No	☐ Partially	☐ Yes	0	1	2
3. *Grammar:* Are the sentences complete? Is there proper subject-verb agreement in each sentence? No run-on sentences.	☐ No	☐ Partially	☐ Yes	0	1	2
4. *Conventions:* Did the author use appropriate spelling, punctuation, and capitalization?	☐ No	☐ Partially	☐ Yes	0	1	2
5. *Word Choice:* Did the author use the appropriate word (there vs. their, to vs. too, etc.)	☐ No	☐ Partially	☐ Yes	0	1	2

Teacher Comments:

Was the investigation rigorous and **appropriate** given the nature of the guiding question?	0 1 2

Total: _____ /40