Science Assessment System Through Course Task

Ecosystem Changes

Grade Level:
6

Phenomena:
Interdependency in Ecosystems

Science & Engineering Practices:
Developing and Using Models

Crosscutting Concepts:
Stability and Changes

Designed and revised by Kentucky Department of Education staff
in collaboration with teachers from Kentucky schools and districts.

Preparing to implement Through Course Tasks in the Classroom

What is a TCT?

- TCTs are 3-dimensional tasks specifically designed to get evidence of student competency in two dimensions, Science and Engineering Processes (SEPs) and Crosscutting Concepts (CCC), untethered from Performance Expectations (PEs)/standards. Tasks are sense-making experiences.
- Tasks are to be used formatively. The goal is for both students and teachers to understand areas of strength and improvement for the SEP(s) and CCC assessed within the task.

How do I facilitate a Through Course Task (TCT)?

- TCT facilitation is a collaborative process in which teacher teams calibrate understanding of the expectations of the task and refine strategies to be used during task facilitation.

Before the task:

1. Complete the TCT as a learner – compare understanding of task through the lens of success criteria (identified in the task) in order to understand expectations.
   Success criteria include:
   - What is this task designed to get evidence of?
   - What is the task asking the students to do?
   - What might a student response look like?
2. Identify the phenomenon within the task. Consult resources to assure teacher teams have a deep understanding of associated science concepts.
3. Collaborate to generate, review and refine feedback questions during facilitation.
4. Identify potential "trouble spots" and plan for possible misconceptions.

During the task:

5. Collect defensible evidence of each student's competencies in 3-dimensional sense-making for the task.
6. Ask appropriate feedback questions to support student access and engagement with the task in order to elicit accurate evidence of student capacities.

After the task:

7. Reflect on the task as a collaborative team.
8. Review student work samples to identify areas of strength and areas of need.
9. Determine/plan next steps to move 3-D sense making forward through the strengthening of the use of SEPs and CCCs.

Using the materials included in this packet:

- **Task Annotation:**
  - The task annotation is a teacher guide for using the task in the classroom. Additionally, the annotation gives insight into the thinking of developers and the task overall.

    - Each task has science and engineering practices, disciplinary core ideas, and crosscutting concepts designated with both color and text style:
        - **Science and Engineering Practices**
        - *Disciplinary Core Ideas*
        - Crosscutting Concepts
- **Student Task:** The materials to be used by students to complete the TCT.

Ecosystem Changes Task Annotation

After **developing a model** depicting *energy flow in an ecosystem*, **use the model to make a prediction** that describes changes to the *ecosystem if a primary consumer is removed*.

Overall intent

The intent of the task is to have students develop a model that they can use to effectively predict and explain how changes in one part of a system (the removal of one primary consumer) will cause changes to the overall system.

Phenomenon within the task

The phenomenon within this task is the interdependent relationships within an ecosystem's food web, and that a change to the system causes the system to rebalance. Some students tend to forget that all energy in ecosystems ultimately comes from the sun and that arrows, if used, demonstrate direction of energy transfer within that ecosystem. Some students have the misconception that a population would die out if one of its food sources was eliminated.

Ideas for setting up the task with students

Share ideas for setting up a positive learning climate in order to get best evidence of what the task is designed to measure. Students will need to be familiar with all levels within a food web and the role of each organism. The data selected will need to show populations of the different organisms within an ecosystem. This task would be a good next step after having students model a food web themselves, using yarn to illustrate energy flow, a food web card sort, etc.

Intent of the Task for Assessment

This task has three parts and it is important to understand the role of each. Part A and question #1 of Part B are part of the process. Part A asks students to create a table and record observations. This allows teachers to get evidence of these skills. In some learning experiences, a data table is provided and students simply fill it in. However, the cognitive load and skills developed by organizing data in a way that supports making meaning is developmentally useful for students, and provides useful information for both students and teacher when areas of struggle are revealed. Question 1 of Part B provides a snapshot of synthesis, and allows students

to connect their observations to prior knowledge about the particle nature of matter and the effect of temperature on the particles. These two parts provide much information about where students are on the Science and Engineering Practices progression.

Question #2 of Part B is the product. This is the part that shows a student's scientific understanding and ability to use cause and effect relationships to write an explanation.

Success Criteria

Evidence of Learning Desired based on Progression from Appendices

Developing and Using models

- Develop and/or use a model to predict and/or describe phenomena. Appendix F

Stability and Change

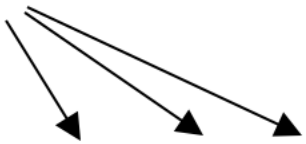
- Small changes in one part of a system might cause large changes in another part. Appendix G

Success Criteria

- The model shows accurate relationships between components of the ecosystem.
- The model shows the direction of energy transfer between components of the ecosystem.
- Student predictions and explanations show reasonable ways that two populations could change, based on the model, if the grasshopper population is removed.
- Student predictions and explanations show why these two populations would change, based on the model, if the grasshopper population is removed.

Possible Student Responses

Part A:



Part B:
Sample Responses

- "The grasses would overgrow now because the rabbit is the only thing eating it. The grass population would increase. Also, there would be less grains because the bird is eating the grains all the time. The grain population would decrease."
- "The birds and the owls will be affected because the birds will only have grains as food and the owls will only have mice for food because their other food source, the grasshopper, is now an extinct species. Both the owl and bird population might decrease because they are losing one of their food sources.

Other information teacher teams might find useful when preparing to use this task in the TCT process

- Food Web from Yarn Simulation: as an activity prior to implementation.
- It is suggested that prior to implementation of the task, students are taught that populations can increase or decrease depending on changes in their environment.

Extensions and/or other uses after the task is implemented

- Students could develop a writing piece (newspaper article, story) to include cause and effect.
- Students could develop a new food web, based on the elimination of the grasshopper population, or develop a new food web based on a different table, or better yet, based on a real outdoor environment. Then, use the food web to make new predictions.
- Students could revise their food web based on the introduction of an invasive species, or the introduction of a predator, etc.
- Students could develop an energy pyramid and discuss ways it differs from a food web.

Through Course Task – Ecosystem Changes

Name_____ Date_____ Period_____

Organisms	**Energy Source**
Carrots	Sun
Grasses	Sun
Grains	Sun
Grasshopper	Grasses, Grains
Mice	Grains
Rabbits	Carrots, Grasses
Foxes	Rabbits, birds
Owl	Mice, Grasshopper
Birds	Grasshopper, Grains

A. The data table above shows the energy flow within a local ecosystem. **Using** the data in the chart above **develop a model that shows how energy is transferred within this local ecosystem.**

B. A pesticide has removed the grasshopper population from this local ecosystem. Use the model you developed in Part A to predict and explain **how** two populations could be affected by the removal of the grasshopper and **why** these changes would occur.

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