Science Assessment System Through Course Task

Class Pet

Grade Level:
2

Phenomena:
Engineering Design

Science & Engineering Practices:
Planning Carrying Out Investigations
Engaging in Argument from Evidence

Crosscutting Concepts:
Structure and Function

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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.

Class Pet Task Annotation

After evaluating the strengths and weaknesses of the structures *of various containers using defined criteria*, **students will state a claim** *about which of the containers they feel best meets the criteria, how it meets/does not meet the defined criteria then suggest changes to the design of the container to make it more effective*.

Phenomenon within the task

Class Pet was developed to highlight components of Engineering Design rather than a scientific phenomenon. So, rather than "make sense of a phenomenon" the students are asked to "solve a problem." The goal of Engineering Design is to find a systematic solution to a real world problem that is based on scientific knowledge (basic needs of living things) and models of the material world (containers that might be used as a home for the pet). Proposed solutions must balance the desired function of the solution within defined criteria or constraints. Students must consider the specific needs of the class pet they choose as well as their needs related to enjoying and caring for the pet. These needs become the criteria for evaluating the containers.

How the phenomenon relates to DCI

- Throughout this task students engage in multiple components of Engineering Design appropriate for Grades K-2.
- The primary Disciplinary Core Ideas are K-2- ETS1 A, Defining and Delimiting Engineering Problems: "Asking questions, making observations and gathering information are helpful in thinking about problems" and K-2-ETS1 C, Optimizing the Design Solution: "Because there is always more than one possible solution to a problem, it is useful to compare and test designs."
- Engagement in this task will help prepare students for ETS1 at the 3-5 grade band, "Define a simple design problem reflecting a need or a want that include specified criteria for success and constraints on materials, time or cost.

What information/data will students use within this task?

- Students will need to have a basic understanding of the needs of animals (see Appendix E ESSA "living things need water, air and resources from the land, and they live in places that have the things they need").
- They will also need some knowledge about properties of materials (sturdy, waterproof, comparisons of size, solid and so on) and suitability for different purposes (PS1). Student will also need to have some experience identifying and comparing observable properties of materials.
- Students should have some understanding of how the container will be used in the classroom.

- Students will be given choices of three possible containers. (See Container Evaluation Tool which consists of pictures of 3 different containers and corresponding charts.)
- Students will need to have a basic understanding what is a criterion and how we make daily decisions based certain criteria (whether defined and/or unknowingly). Using the phrase "must haves" helps students understand the concept of "criteria".
- Students will use data (collected through observations and recorded on provided evaluation tool charts) as evidence to support a claim.

Ideas for setting up the task with students

This task was designed to be somewhat open ended in that you and your students can decide on what the class met might be and develop appropriate criteria for the container in which the class pet will live. The resources needed for facilitation of the task can be modified to align with the decided upon class pet. As students engage with the evaluation tool, they are gathering data that will be used to support their claim about which of the containers best meets the defined criteria.

Based on previous facilitation of the task, we recommend that teachers follow the plan below or a plan that is very similar, to ensure that students can access the information needed to support their claim.

Suggested plan:

Essential Components needed:

- Container Evaluation Tool document (This piece becomes the data which the students use to support their claim.)
- Class Pet Student task page

Plan in Advance:

1. Decide whether to bring in 3 containers for students to evaluate or to use the pictures provided. Note: The containers provided on the Container Evaluation Tool were intentionally chosen so that they don't completely satisfy the requirements. This allows the opportunity for students to make modifications for the last part of the task.
2. Decide on the pet you are going to present to the class. The choice of pet will dictate the criteria that the class generates.

During the Task:

Day 1

1. Once students know what the pet is, have them brainstorm needs for that particular pet. This could be done as partners, small group, or whole group discussion. The needs identified will lead to the criteria. For example, frogs need to breathe, so the criteria would be the container must allow air to pass through (porous). A sample of the container evaluation tool sheet is provided with possible success criteria for a frog. A fish must have water to live, so the container must be made of a material that is waterproof.
2. Whole group: Develop the criteria for evaluating the different containers. Sample criteria are provided on the Container Evaluation Tool. Guide the discussion so that most of the criteria are connected to the properties of the container and the needs of the specific animal. You may need to guide students to prioritize the criteria. Students should consider no more than 4 - 5 criteria on day 2.

Day 2

Prior to day 2: Embed the criteria developed by your students on Day 1 into the blank Container Evaluation/ Data Collection Tool to create a data collection tool that is unique to your class pet choice.

*The following steps are to be completed by each student. It is not a collaborative component of the task.

1. Students use the criteria to evaluate each container exactly as it is shown. (See Container Evaluation Tool) This evaluation is the data students will use to when answering the task questions. Share the purpose of the evaluation/data collection with the students before they complete the evaluation. There should not be discussion between students during this portion of the task.
2. Students use the Class Pet Student Task sheet to identify the container they have chosen and give evidence from the data (collected on the Container Evaluation Tool) to support their choice. NOTE: Students should realize at this point that none of the containers satisfy all the criteria.
3. Students will use the criteria to identify weaknesses of the container they have chosen. They will also use the criteria to determine modifications to the container they have chosen so that it better meets the criteria.

Potential scaffolding questions/prompts that can be used to support individual students as they complete the task questions independently.

*What is the most important criteria?
*Why wouldn't you choose _____ option?
*What would make _____ a better option?
*How would you make the _____ better for the pet?

Intent of the Task for Assessment

Students will evaluate the structure of different containers to identify whether the function of the identified structures meet a set criteria for a home for a classroom pet. Then students will analyze the data they collect on each container to determine how well the containers meet the set criteria. Students use their analysis to support a claim as to which container would be the best home for the class pet. Note: Students may struggle to identify which is best due to the fact that none of the containers meet all of the set criteria. Students will then identify at least one way that the container does not meet the criteria and describe way(s) to modify/optimize the container to better meet the criteria.

"Making observations" is a unique in that it is a component of several different SEPs at primary level. Being able use observations to better understand materials, tools, patterns and relationships is a fundamental skill that should be emphasized at an early level. This requires that students have ongoing experiences that encourage the use of this skill.

It is important to note the similarities between Engineering Design DCIs and several SEPs. Both Analyzing and Interpreting Data and the ETS1 A suggest that students should make observations to gather information to use as evidence or to answer questions. This is also true for Constructing Explanations and Designing Solutions at the K-2 Grade band. Observations, as stated throughout the SEPs, can be used to construct an evidence based account, to describe patterns/relationships in order to answer questions and solve problems, to collect data that can be used to make comparisons and as a foundation for asking questions and planning investigations. Therefore, it becomes difficult to pinpoint a specific bullet from a specific practice for cLass pet because of the connection of observations to several of the SEPs. It is more important that you understand the evidence that the developers intended to elicit through the facilitation of this task: students must make observations that can be used to evaluate tools and to support a claim.

Success Criteria

Evidence of Learning Desired based on Progression from Appendices

Planning and Carrying Out Investigations:

- Make observations of a proposed object or tool or solution to determine if it solves a problem or meets a goal.

Engaging in Argument from Evidence

- Make a claim about the effectiveness of an object, tool or solution that is supported by relevant evidence.

Structure and Function

- The shape and stability of structures of designed objects are related to their function. (This is implied in task- no specific question addresses this CCC. Note: Almost all ETS PEs are composed of 2 dimensions. The majority of the PEs are void of CCCs)

Success Criteria

- Through observations of proposed containers (solutions) the student evaluates each of container against the defined criteria (needs of class and needs of pet).
- Student makes a claim about which container best meets the criteria and support their choice using information they gathered on their evaluation tool document as evidence.
- Student identifies a criterion/criteria that is not met for a specific container and proposes a successful solution(s).

Possible Student Responses

- Students use given or class developed criteria to determine if the structures of specific containers meet the defined criteria/goal.
- Look fors: The look-fors below are based on the criteria developed with our class. Look fors may change based on the criteria your students develop.
- Students complete the container evaluation tool based on their analysis of the given containers in relation to the criteria.
- Possible student responses must reflect the criteria defined on the evaluation tool:
    - Box
        - Will contain pet
        - Pet can breathe
        - *can't see pet so cut a hole and cover with plastic

- Basket
  - Can breathe
  - Can see the pet
  - *pet can escape so add piece of wood for lid
- Plastic Container
  - Can see pet
  - Will contain pet
  - *can get air so poke holes in lid

Suggestions upon reflection of task implementation

- Consider activating students' background knowledge of animal/pet needs using a read aloud. I used a general book about a pet, not specifically the one that we had presented as the class pet.
- The wording of the criteria must be carefully chosen. Students were confused by statements like "The pet can't get out" and response choices Yes or No. They seemed to think along the lines of "No the pet can't get out" instead of affirming that the container would hold the pet. After seeing this issue, we worded the criteria as a question so that students could more easily think about what was being asked, i.e. "Can the pet get out? Y or N."
- An exemplary answer will identify a problem with the container they have chosen, suggest a change to the container that would solve the problem and relate that problem solution to the need of the pet.

Through Course Task – Class Pet

Name _____ Date_____

Use the information you gathered on your Container Evaluation Tool to answer the following questions.

1. Based on your evaluation of each container, which one would you chose for your class pet.

_____

2. In what way or ways does the container you chose fit the criteria?

_____

_____

_____

_____

3. In what way or ways does the container **not** meet the criteria?

_____

_____

4. What change or changes would you make to the container to better meet the criteria and why?

_____

_____

_____

_____

_____

Container Evaluation Tool (blank)

Container A-Basket

Does the container meet the criteria?

Criteria	Y	N
	Y	N
	Y	N
	Y	N
	Y	N
	Y	N

Container B-Container/Lid

Does the container meet the criteria?

Criteria	Y	N
	Y	N
	Y	N
	Y	N
	Y	N
	Y	N

Container C-Cardboard Box

Does the container meet the criteria?

Criteria	Y	N
	Y	N
	Y	N
	Y	N
	Y	N
	Y	N

Container Evaluation Tool

(Frog example)

Container A- Basket

Does the container meet the criteria?

Criteria	Y	N
will keep pet in	Y	N
will let pet breathe	Y	N
will hold food & water	Y	N
will be able to see pet	Y	N
will be able to feed pet	Y	N

Container B- Container/Lid

Does the container meet the criteria?

Criteria	Y	N
will keep pet in	Y	N
will let pet breathe	Y	N
will hold food & water	Y	N
will be able to see pet	Y	N
will be able to feed pet	Y	N

Container C-Cardboard Box

Does the container meet the criteria?

Criteria	Y	N
will keep pet in	Y	N
will let pet breathe	Y	N
will hold food & water	Y	N
will be able to see pet	Y	N
will be able to feed pet	Y	N