Science Assessment System Through Course Task

Can You See What I See?

Grade Level:
1

Phenomena:
Illumination Affects Visibility

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

Crosscutting Concepts:
Cause and Effect

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.

Can You See What I See? Task Annotation

After conducting an investigation (with guidance) *into how the amount of light affects the visibility of an object*, **develop an argument (statement supported by reasons)** for how *the amount of light* affects *the clarity/visibility of an object*. (Note: Student engagement in an investigation is not essential to engagement in the task but it is highly recommended that students are provided such an experience to foster content understanding.)

Overall intent

The overall intent of the task is to measure student ability to develop an argument, based on reasoning, in support of an evidence-based claim, demonstrating the understanding of a cause and effect relationship.

Phenomenon within the task

This task will provide evidence of student understanding of the cause and effect relationship between the amounts of light needed to see an object and the degree of clarity. Students will recognize that when the amount of light increases, the clarity and the precision in which objects are seen will typically increase as well.

Ideas for setting up the task with students

There is information included with the task in the form of a storyline which provides students with access to the knowledge that light is required to make objects clearly visible. Teachers should read this storyline to students as they follow along. Students can be encouraged to underline what Maria learned about light from her dad.

While the storyline provides information about the cause and effect relationship between light and visibility, making the task accessible for all students, it could also benefit students to actually participate in a pre-task investigation.

OPTIONAL: The following is an outline for a pre-task investigation. Although it is not required for the task, it is recommended that students have ample opportunities to participate in such investigations in order to obtain the content understanding that will be needed to engage with the task. This is only a suggested experience that the original developer of the task found to be useful with their students.

You will need:

- a dark area (preferably with no available light)
- smartphone with adjustable cell phone flashlight
- blindfolds
- crayons/colored pencils
- paper (folded in half–students are prompted to draw on the inside to help keep the mission a secret)
- an object (one with simple but relatively small details, e.g., a box with a design or print covering, a doll with a pattern on the dress or a pillow with a simple a pattern)
- resource page – light bar
- pre-task pages

Divide students into four "viewing" groups and give each group a name so they can be identified later as the groups share of the data collected. The first group does not need a light source since no light is to be used in the dark room. The remaining three groups will use varying degrees of light in the dark room. The idea is to increase the amount of available light each time a group enters the dark room. Using a cell phone flashlight works well for this investigation since you are able to control the brightness function.

Directions:

- Emphasize that this is a secret mission to encourage students to keep what they see a secret until the entire class meets to share their data.
- Prepare the "mystery object." For instance, I set a yellow box with a red lid and small red apples, on a shelf in my supply closet. When students entered the room, they were instructed to look on the top shelf for "a mystery object."
- The teacher should control the light source for consistency. When using the phone light in the dark room, shine a light in the center of the ceiling to provide indirect light during each experience. This will prevent students from shining the light directly on the object.
- Groups take turns entering the dark space to see what the mystery object looks like.
- After "looking at the mystery object' in the dark space, students will draw what they saw on a provided sheet of paper or use the pre-task document page provided.
- Once all the groups have experienced the dark room, allow students to share what they observed with other members of their group. Next, allow one person to share out from the each group.
- Plan to regroup students to form "collaboration groups" that are made up of at least one member from each of the 4

"viewing" groups. Collaboration groups will organize their observation/drawing sequentially from least to most details. We recommend using the task resource light bar to assist students in sequencing the drawings. Next, the students develop an explanation as to why each member of the group saw something different in the dark room.

- Lead students in placing all pictures in a sequence from seeing nothing to seeing the object clearly. Then help them associate the amount of available light, increasing with clarity of object. The results will resemble a bar graph.

Prompts to use with students:

- How does the light bar represent the amount of light used in the dark room?
- Why are the illustrations of the mystery object so different?
- What group's pictures had the most details? The least details? Why?

Intent of the Task for Assessment

The intent of this task for assessment is to elicit student's ability to make an evidence-based claim supported by the understanding of a cause and effect relationship.

Students are given a storyline that describes a brief scene in which a child is frightened by what she sees as a monster in her dark room. When her dad turns on the light, it is revealed that it is simply her backpack and jacket. She begins to understand that varying levels of light cause varying levels of clarity in what we see. Students will then transfer this knowledge to a scenario in which a brother and sister view the same object in their kitchen differently.

Students are asked to make a claim about what the sister and the brother see by circling "box" or "present". Students are then asked to make a claim about how much light was in the kitchen when the sister and brother viewed the object by indicating the amount of light on a gradient light bar. Students will provide evidence of the latter claim when answering the question, "Why do you think this?"

Lastly, students will provide evidence supported by the understanding of the cause and effect relationship between the amounts of light needed to see an object and to what degree of clarity it is seen when answering the question, "Explain what caused Oscar and Lizzy to see the same object differently."

Success Criteria

Evidence of Learning Desired based on Progression from Appendices

Engaging in Argument from Evidence (Appendix F):

- Construct an argument with evidence to support a claim.

Cause and Effect (Appendix G):

- Events have causes that generate observable patterns.

Success Criteria

Student correctly chooses the item seen in each scenario and indicates (on the light bar) the possible amount of light available in both scenarios based on:

- Information processed in storyline and through classroom experiences
- Sound reasoning for how the patterns of cause and effect relationships relate to the amount of light and the clarity in which an object can be seen

Possible Student Responses

- Student circles that Lizzy saw a present.
- Student marks the gradient light bar ***on or near*** the "full light" position. Student explains, "Lizzy could see a birthday present with a green bow because there was enough light in the kitchen for her eyes to see more details. In order to see clearly you need a lot of light.
- Student circles that Oscar saw a box
- Student marks the gradient light bar ***near*** the "no light" position. (Position marked must indicate less light than Lizzy*). Student explains, "Oscar couldn't see the detail on the box or the green bow because there wasn't enough light. There was some light because he saw a box on the table but not enough to make out all the colors and the ribbon."
- Student explains, "Lizzy and Oscar saw the same object differently because there were different amounts of light. The more light there is the more details can be observed. Less available light means you don't see all the details of the object."
- **a marking of "no light" may be considered inaccurate—with no light, Oscar wouldn't have been able to see anything.*

Extensions and/or other uses after the task is implemented

At home extension: Students go outside and look at things in moonlight. Compare to sunlight. They can see fewer details. In particular, in moonlight you don't see colors – black and white only. If first graders mention that observation, an age-appropriate teacher response might be to validate that color is a detail that you need brighter light (brighter than moonlight) to see. *Teacher information -There are two photoreceptors on the eye's retina, the rods that are responsible for low light vision and the cones that are responsible for color perception. Because of the low-intensity light, the cones don't 'fire off' signals to the brain. Since moonlight is too low intensity for the eye's cones to fire, we don't see color in moonlight.*

Why does the dentist use a bright light when cleaning/checking your teeth? (Have a picture of dentist chair with the light in case kids haven't experienced that or noticed that.) Kids would create an argument that the dentist needs to see lots of little details of your teeth, such as cavities, cracks, etc., in order to know if everything is OK.

Some people have a favorite reading chair in their home, and often there is a lamp right next to that chair (picture). Explain why people might have a lamp for reading. (Response includes the idea that, when reading, you need to see details of tiny letters to know what the word is, so you need bright light to see those details.)

If your family wants to surprise you with a birthday party, why might they leave the lights off when you first walk into a room? (Responses includes the idea that, little/no light means you won't

Through Course Task – Can You See What I See?

Storyline

Read aloud:

Maria's dad tucked her in for bed and turned out the lights as he left her room. She tried her best to fall asleep, but was certain she saw a monster in the corner. "Help! There's a monster in my room!" screamed Maria.

Her dad came running, "What's the matter, Maria?"

"Look! There's a monster in the corner." Dad turned on the lights and showed Maria that it was just her backpack and jacket. "Oh, I feel so silly. It looked so different in the dark," Maria said.

"You're not silly at all. When you do not have enough light, it causes you to see things unclearly." Dad tucked Maria back in and kissed her goodnight. This time he left on a nightlight so she could see things a bit more clearly.

Next, we will read about Oscar's Birthday. Use what Maria learned about light from her dad to explain why Lizzy and Oscar saw the same object differently.

"Can You See What I See?"

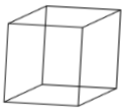
Name_____ Date_____

Tomorrow is Oscar's birthday.

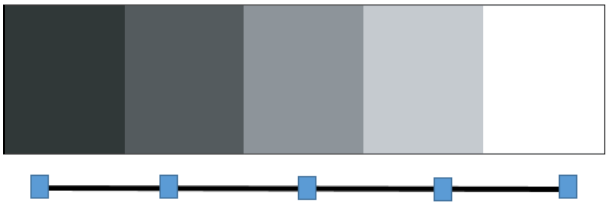
Lizzy, his sister, ran upstairs shouting, "Oscar! Oscar! Did you see your birthday present with a big green bow on the kitchen table?"

"I was just in the kitchen earlier getting a drink. I think I saw a square box. I don't think it was a present," said Oscar.

1. Circle what Lizzy saw on the table.

Lizzy saw a  box  present.

2. How much light do you think there was when Lizzy was in the kitchen?



What makes you think this?

_____

_____

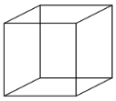
_____

_____

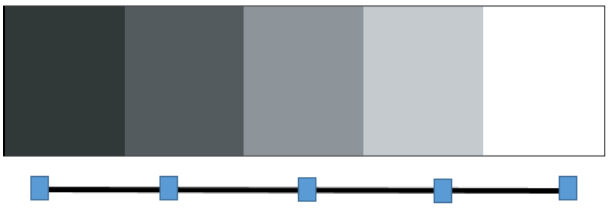
_____

_____

3. Circle what Oscar saw on the table.

 Oscar saw a  box  present.

4. How much light do you think there was when Oscar was in the kitchen?



What makes you think this?

_____

_____

_____

_____

_____

5. Explain what caused Oscar and Lizzy to see the same object differently.

_____

_____

_____

_____

_____