

Here's a portion of the Teaching Performance Assessment for which I created this assessment.

1. List the state-adopted academic content standards or state-adopted framework you will cover in this unit.

The state standards for this unit are as such:

Physical Science

2b: Students know light is reflected from mirrors and other surfaces.

2c: Students know the color of light striking an object affects the way the object is seen.

2d: Students know an object is seen when light traveling from the object enters the eye.

Investigation and Experimentation

5d: Predict the outcome of a simple investigation and compare the result with the prediction.

2. Describe the unit of study that addresses those standards.

This unit is based adapted from the district supported FOSS science curriculum. This unit took 4 class periods. In the first lesson, students used mirrors to explore reflection. They spent some time outside using mirrors to reflect light from the sun onto walls. Back in the classroom, I talked about how light travels in rays. We talked about how we see things using our eyes and light reflected off objects. With some student helpers, I demonstrated how mirrors can allow you to see things that are behind you thanks to the reflective properties of mirrors and the straight lines of light. They used mirrors to change the direction of the light from a flashlight. As a team they completed several challenges that required them to redirect light into a specific route. Individually, they recorded the position of the mirrors and light path on worksheets that they glued into their science notebooks.

The next day, as closure and a review, students worked in teams to brainstorm about the properties of light. Each group was given a bag of miscellaneous objects and was asked to think creatively about how each item reminded them of a property of light.

The second lesson was an introduction to colored light. The lesson started with a review about how we can see things. I introduced the idea that light not only can be reflected by things but it can be absorbed. Students passed around two colored, transparent water bottles with a tower of 6 differently colored unifix cubes inside. They tried to guess the true color of the cubes in the bottles. They recorded their guesses in their science notebooks. Some students shared with the class their hypotheses. To reveal the cubes' actual color under white light, I opened the bottles and pulled the towers out. To the students' surprise, the unifix towers colors in both bottles were identical. The students recorded the cube colors under white light right next to their hypotheses. The big reveal drove home the idea that objects under different colored light alters our perception of color.

To summarize the unit, we watched a 30-minute "Bill Nye the Science Guy" episode on light. This episode addressed all three of the physical science content standards for our unit.

3. What is (are) the academic learning goal(s) for this unit of study?

There are 7 academic learning goals for this unit, pulled directly from the FOSS Matter and Energy curriculum book:

"Students will learn that light is a form of energy that travels in straight lines from a light source.

Students will find out how light can reflect from the surface of a mirror.

Students learn that an object is seen only when light from that object enters the eye.

Learn that white light is a mixture of all colors of light.

Learn that light can be absorbed and reflected by matter.

Learn that the apparent color of an object is the result of the light it reflects.
 Predict outcomes of investigations and compare to results.”

11. Think about how you will sequence your implementation of the assessment. Describe your plan for implementing the assessment in the order in which it will occur.

Assessment Implementation Plan	Rationale
<p><u>Review Day: 1—30 min</u></p> <p>The first review we did was to read the science text that accompanies our science kit. The text was a section of the chapter summary on color and light, and was half in paragraphs, half in cartoon form. I read the text aloud to the students, pausing frequently to ask students the questions that were posed by the characters in the cartoon. At the end of the summary, I asked the students to discuss the review questions for that section with their tablemates. I picked name sticks to choose students to answer the questions.</p> <p><u>Review Day: 2—20 min</u></p> <p>Students worked in pairs with a computer and played two internet games. One game is from the FOSS website and it lets kids view paint splotches under colored light. It gives them more experience hypothesizing, and more time to think about how light can be reflected or absorbed by objects. The second game is an activity wherein students practice reflecting light with mirrors to illuminate particular locations.</p> <p>Game 1: http://fossweb.com/modules3-6/MatterandEnergy/index.html</p> <p>Game 2: http://www.sciencekids.co.nz/gamesactivities/howweseesee.html</p> <p><u>Assessment Day 30 min</u></p> <p>The first thing I said was, “We want to see how</p>	<p><u>Review</u></p> <p>We completed this unit a week ago and moved on to our other science units to complete it all before we had to return the equipment to the district. Since the lessons were so long ago, we are reviewing the material as a class. The ways we are reviewing are different from the ways we first taught the material so that we can reach all types of learners. Hopefully one of these ways will click with a student and she’ll finally understand. I like the particular section of text that I read aloud on the first review day because not only is it accurate, but it tells the story of a kid doing an experiment with colored light. I also like the balance of images and text. I asked students to discuss the review questions with their peers so they practice expressing themselves on this topic and to include more students in the discussion. I told the students that I’d be picking name sticks so that all students would be encouraged to participate in the discussion. Not knowing if he’d be picked, Student X would prepare an answer anyway. The review on day two is an interactive one. Students can experiment by trial and error if they have to, to learn how color and mirrors work. We don’t have enough computers for all students to have a personal one, so they will have to work together and this is all for the best. Students have just one more opportunity to verbalize the phenomena.</p> <p><u>Assessment Day</u></p> <p>This school does not encourage students to give</p>

well the master teacher and I taught you guys about light. This is your opportunity to show off how much you know.”

I posted the procedure for the assessment up on the document projector. As I read through the instructions, I introduced each of the assessment questions and where to find each question and where to turn them in.

I started by reading out step one. As I mention “Mirror Question” I brought out a copy of the question and read it aloud to the class. “Are there any questions about this piece of paper?” I read step two and three. I then showed them the box on the blue table in which they were to turn in the mirror question. The box was labeled, “Step 3: Mirror Question”.

I then read step 4 and pointed out where they could find the Letter Instructions, lined paper and graphic organizer. All of the boxes with these things were labeled “Step 4: Letter instruction, lined paper, graphic organizer.” I brought out a copy of the letter instruction and read it aloud to the class. “I want to explain the word ‘visit’. When you visit the dentist, do you bring your sleeping bag and move in? ‘Visit’ in this case means the same thing. Light visits the object and then leaves.” I pointed out the check-off boxes next to the features I wanted in the letter. I also recommended that they cross out the key words as they add them, to be sure they were included. I said that they could use a graphic organizer for the letter format if they were not sure about letter structure.

I read step 5 and told them that they could use their science journal glossary if they had forgotten the definition of any of the key words.

traditional pen and paper tests. So as not to stress the students, I communicated the purpose of this assessment as more of a test for me rather than a test for them. I still wanted them to try their best so I added a little taste of a challenge at the end.

The procedure, even though it has 7 steps, was valuable to keep students going and to reduce the number of questions I had to answer. Leaving it up on the document camera was essential to the flow of the assessment. It also helped me introduce the components of the assessment in a logical manner.

I asked for questions about the Mirror Question because this was the dedicated time for talking about the Mirror Question. Labeling the box helped students who weren’t paying attention and relieved me of procedural questions.

I communicated the scoring criteria for this assessment using the check-off list and the list of key words in the prompt itself. In a school that doesn’t test, I felt uncomfortable about showing them my rubric so I tried to include a form of the rubric in the question. I also drew their attention to what I wanted in the answer.

I anticipated confusion surrounding the word ‘visit’ in the instructions. To clear up confusion without revealing the answer, I used an analogy of visiting a dentist.

I am not testing them on their vocabulary. I think it would wonderful if they knew and could use the CALP from this unit, but the unit concepts are more important to me. For this reason I let them use their vocabulary bank.

<p>I read step 6. I pointed out each place I wanted things to be returned. I asked them to submit their science journal.</p>	<p>On assessment day, I didn't communicate the scoring criteria for the science journal. Even if I did, the activity was probably too far in the past for students to remember and further complete their records. During the unit, I impressed upon them that I wanted to see both their guesses and the correct answers, stopping children who were erasing their answers.</p>
<p>I handed out the mirror question and asked them to start with step one.</p>	<p>A quick reminder of step one jump started their work.</p>
<p>I roamed the room to further check for understanding and to field questions.</p>	<p>While I've asked for questions during the presentation of the directions, I couldn't be sure there won't be more questions. I especially wanted to catch students who have become frustrated but were too shy or ashamed or confused to ask for help.</p>

Adaptations for An English Learner

What evidence of student learning will you collect?

Decision	Rationale
<p>I will gather several measures of student learning: formative observations during the unit, the mirror question, the science journal, and the letter to Green. My formative observations, his mirror question and his science journal will be collected along with data about the rest of the class.</p>	<p>It's valuable to test in different ways to get a more accurate picture of understanding. In this summative assessment each question assesses different learning goals. I want to know how Student 1 is doing with each of the learning goals. The formative observations are always useful and only dependent on my skill and not his. The mirror question doesn't involve writing words so he should be able to handle it. The science journal only requires basic, one word records so the writing should not be a problem.</p>
<p>I made certain adaptations to the letter assessment. I split the letter into two components. One is a drawing component and the other is a scaffolded letter. The drawing component has pictures of the three objects from the letter instructions, the green backpack, the whiteboard, and the blue chair. He is asked to draw the path of a ray of blue light as it comes towards each of the objects.</p>	<p>Student 1 has difficulty writing clearly and coherently. If he penned the letter himself, it would be difficult to read and I don't think it would fully express his mastery of the topic. I want to give him two ways of expressing his knowledge, one visually and one linguistically. This gives him twice the opportunity to show his mastery. This gives me the opportunity to double-</p>

<p>He draws the blue light with a blue pencil. He does likewise with a green ray of light.</p> <p>In the scaffolded letter, I wrote sentence frames and gave him possible answers that he could pick from to complete the sentences. It is a mix of sentence frames, a word bank, and multiple choice.</p>	<p>check for flaws in his reasoning. I also imagined the picture page as a way for him to get his thoughts straightened out and down on paper visually before he delved into the linguistic side of things. The scaffolded letter and the drawing component checks for the same information—the reaction of different colors of light when they hit different colored objects.</p> <p>The adaptation is still about the same topic as the unadapted assessment because I want Student 1 to feel that he is answering the same question that I posed to the entire class. In addition, I won't have to explain an entirely new situation to him when he visits me for the adaptation.</p>
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How the ELL student assessment evidence will be measured or scored?

Decision	Rationale
<p>There will be no change in my evaluation of his science journals. There will be no change in my evaluation of the mirror question. There is no change in measuring mastery in the letter to Green.</p>	<p>Since I did not change my method of assessing his mastery of the learning goals associated with the science journal or the mirror question, I am not changing the scoring. I would only change the way the evidence is measured if the learning goal needed to be changed for that student. Since that is not the case, I'm not changing the scoring. I adapted the letter to Green for Student 1 and it will have it's own key but I will be looking for the same learning goal mastery as for the rest of the class.</p>

How will you implement the assessment for the ELL student?

Decisions	Rationale
<p>After I finished introducing all the steps in the assessment, I pointed out that the names of several students were written in the margins of the directions. I called out their names and asked them to come see me after step 3. These were the ones that I had targeted for the writing accommodation.</p> <p>When my accommodation students were done</p>	<p>I wanted to get through the entire list of steps that most of the class was going to follow before I started introducing exceptions to the plan. I called out students' names so they would know what to do next.</p> <p>I wanted to minimize the spotlight on my accommodation students so I pulled them aside</p>

<p>with the mirror question (step 3) they came to me and I showed them the drawing accommodation I had for them. I read aloud the instructions and asked if they had questions. For those who didn't understand the picture-based page, I did a brief demonstration of how to draw a blue ray of light coming towards the backpack. I gave each writing accommodation student a green and blue colored pencil so he could complete the drawing component. I then read the instructions for the scaffolded letter aloud. I explained what the word 'set' meant. I checked for understanding and answered questions.</p>	<p>midstream. I paid them the same courtesy of reading the instructions aloud as I did for the other folks. I could thereby check for understanding before they started. It didn't bother me to repeat instructions several times as the students finished the mirror question. I have a small class this year. I would structure things differently if I had a bigger class or more people needing accommodation. I introduced the drawing accommodation first because I wanted Student 1 to do that sheet first. Considering how frequently he forgets what he wants to say in class, I think he might not be a word-oriented person. Starting with something quick and visual may help his thoughts get out before he forgets them.</p>
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To what extent did the ELL student achieve the academic learning goals for this part of the unit?

Student 1 achieved mastery for most of the learning goals that I assessed.

Science Journal Learning Goal: Predict outcomes of investigations and compare to results. In Student 1's journal he has his hypotheses for both the red bottle and the green bottle. If his guesses were write, he left them there, alone in the square. If his guess was incorrect, he wrote the correct answer under his guess in the square. I would have preferred he write all the correct answers, even if they corresponded to his hypotheses; however, he clearly 'predicted outcomes' and 'compared to results'. He has mastered this learning goal for this unit. He will have other opportunities to practice investigative and experimental procedures like this.

Mirror Question Learning goals: Students will learn that light travels in straight lines, light can reflect from the surface of a mirror and an object is seen only when light from that object enters the eye. While Student 1's answer was unexpected and not as I envisioned the answer, I feel he has achieved most of the learning goals. Sticking to my rubric really helped me grade his answer without bias. Using my rubric as a guideline, I'll show you why I think he achieved the learning goals.

- 1) Light runs in straight lines. All the rays of light he used were as straight as can be expected using freehand.
- 2) Light bounces off mirrors. In his drawing, the mirrors are positioned at the correct angles to reflect light. If you connect all the rays of light that he has drawn, the angle of incidence correlates with the angle of the mirrors. I believe he knows that light bounces off mirrors.
- 3) Light path runs from the object to the eye. If all his rays of light are connected in his drawing, they would lead from the eye to the object. While strictly speaking, in order to see the object, the light would have to travel from the object to the eye rather than the other way around; I think this is a matter of visual semantics. Tentatively, I'd say that he knows how we see things but I'll have to double-check with him before proclaiming mastery of this learning goal.

Writing Prompt Learning Goals: light can be absorbed and reflected by matter and the apparent color of an object is the result of the light it reflects.

Looking at Student 1's responses in his adapted assessment, I would say that he has mastered these learning goals with respect to colored objects. There is, however, looking at his work, some confusion about how light behaves when it encounters a white object. Let's look at his work, starting with the drawing component. His green and blue lines are absolutely clear and correct for the backpack and the chair. However, the green light line approaches the whiteboard and ends in squiggles before it even touches the image. The blue line ends in a squiggle also but touches the whiteboard. I tentatively conclude that this means the light is absorbed by the whiteboard. I'll need to look at his response in the letter to see if he truly thinks that white objects absorbs blue and green light.

If I looked exclusively at the scaffolded letter I would say that Student 1 passed. The first and second sentences are correct except for the omission of the 'whiteboard' from each. I am attributing this omission to carelessness because he correctly identifies the whiteboard as the thing that both blue and green light can reflect off of. The fourth sentence is correct. Both assessments taken together show some achievement and yet some conflicting information. I believe that overall, his work shows that light can be absorbed and reflected by matter and that the apparent color of an object is the result of the light it reflects. He repeatedly shows that the blue chair reflects blue light and likewise for the green backpack. However I still want to know, does Student 1 believe that the whiteboard reflects or absorbs blue and green light?

What did you learn overall about the students' progress toward achievement of the academic learning goal(s) for this part of the unit?

Overall, the students did fantastically well. I'll look in depth at achievement towards each of the learning goals tested in this assessment.

1) Predict outcomes of investigations and compare to results.

All students except for one met this learning goal. About a quarter of the class recorded their hypotheses and correct answers separately as I had envisioned. Others were not quite so thorough or complete. Many only wrote the answer separately when their hypothesis was wrong. I attribute this to unclear directions. No one erased their hypotheses—the result of clear directions.

2) Students will learn that light travels in straight lines.

In the mirror question assessment, 21 students drew the light path using straight lines. 91% of the class has mastered this learning goal. Student 4 had no light lines at all. I will have to double-check with her to see if this was comprehension or carelessness. Student 18 drew straight lines that bent sharply without the help of a mirror.

3) Students will find out how light can reflect from the surface of a mirror.

20 students had light reflect off the surface of the mirror symbol in the mirror question. 87% of the class has mastered this learning goal. Student 4 had no lines, Student 18 had light reflect off thin air as well as off mirrors, Student 23 had light bend right before it hit each mirrors.

4) Students learn that an object is seen only when light from that object enters the eye.

19 students completed the line from the object to the eye. Student 4 had no light line, Student 18's light line made a loop that never made it to the object. Two more students had light lines that landed not in the eye but on her chin or forehead. Overall, students were successful with this objective.

5) Learn that light can be absorbed and reflected by matter.

6) Learn that the apparent color of an object is the result of the light it reflects.

In the writing assessment, learning goals 5 and 6 were grouped tightly together. Sixteen students passed the assessment and clearly achieved both of these goals. Students 4 and 16 were correct for all of the assessment but thought that white objects absorbed light. Four students' responses were off the mark. Students 17 and 3 understood learning goal 5 but had trouble with goal 6. Students 21 and 19 were using the heavily scaffolded accommodation so it's hard to know how comfortable they are with these two goals. 87% mastered goal five; 70% mastered goal six; 70 % of the students mastered both goals.