Writing Coherent 3-D Prompts

The vision of the Next Generation Science Standards is for students to engage in the science practices in order to learn science ideas using the lenses of the crosscutting concepts. In others words, we want students to learn in a 3-Dimensional manner. How do we support this type of learning?

One way to support students is to have a series of 3D tasks that you give across a unit of instruction as formative assessment checks. To mimic phenomenon-based instruction, it makes sense to have these tasks all connect to a phenomenon around which students are trying to make sense. Below is a guide for how to create a coherent set of 3D tasks that will allow you to assess your students.

Process for writing coherent 3-D prompts

Step 1: Identify the target standards
Step 2: Unpack the target standards to determine the CCC(s), SEP(s), and DCI(s) you want to target in the 3-D prompts.
Step 3: Brainstorm relevant phenomena that require the DCI(s) to explain.
Step 4: Identify data, evidence, and/or resources connected to the phenomena.
Step 5: Create 3D prompts connected to the phenomenon identified in step 3 using language that targets the DCI(s), SEP(s), and CCC(s) identified in step 2 and information from the resources identified in step 4.
Process for writing coherent 3-D prompts

Steps 1 & 2: Identify the **target standards**. Unpack the target standards to determine the **CCC(s)**, **SEP(s)**, and **DCI(s)** you want to target in the 3-D prompts.

**Unit Bundle** *Insert your performance expectations in the table below (add rows, if necessary). Use the standard to identify the components of each dimension in the other columns.*

<table>
<thead>
<tr>
<th>Performance Expectation</th>
<th>DCI(s)</th>
<th>SEP(s)</th>
<th>CCC(s)</th>
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<tbody>
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Based on the bundling matrix, what SEPs and CCCs will be the primary focus of the unit?

Which of these dimensions will you target with your assessment(s)? Consider which ones are the "heaviest hitters" or the most important for your place in the year.

Where do you see potential for integration of multiple dimensions? How will you make it authentic integration?

To address your target assessment dimensions, what do your students need to **know**? What do your students need to **be able to do**? Write down everything they need to know and do to successfully address and integrate the three dimensions on their assessment(s). *(Look to the **CCC**, **SEP**, and **DCI** progressions to identify appropriate depth)*

<table>
<thead>
<tr>
<th><strong>Students need to know</strong>…</th>
<th><strong>Student need to be able to do</strong>…</th>
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<tbody>
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<td></td>
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How can students demonstrate their learning in both columns above (i.e. what evidence will you accept that students have met the 3D expectations?)
Step 3: Brainstorm relevant phenomena that require the DCI(s) to explain.

Next, brainstorm phenomena that students could make sense of over the course of the unit and that connects to your target dimensions.

A few helpful ideas:
1. Look to open-source data, scientific articles, and popular press resources (e.g., NYT "What's Going On in this Graph?", Science News for Students, Scientific American, ScienceFriday Educator Phenomenon Forum).
2. Consider what is currently happening in the students' community. Can you connect any events to the DCI(s) you are targeting?
3. Brainstorm where you have observed the DCI(s) in action in your own life.

(Write down phenomena ideas here. Include any pertinent links.)

Phenomenon & Related Links/Resources (Of the brainstormed phenomena, identify the phenomenon you want to use for these tasks. Write it here.):

BIG Question (Write the overarching question students will try to answer about this phenomenon.):

Complete Explanation (Write an explanation that answers the big question and incorporates all the dimensions you identified in Steps 1 and 2.)
Step 4: Identify **data, evidence, and/or resources** connected to the phenomena.

Now that you have selected your phenomenon, identify potential data, evidence, or resources that students would need to have in order to make sense of the phenomenon. This could be qualitative or quantitative data, text, data visualizations (tables, graphs), or pictures.

Consider the SEP(s) you are targeting (Steps 1 & 2) to help you determine what types of evidence you should find.

**Data and Evidence you will give students:** (include links, brief descriptions, etc.)
**Step 5: Create 3D prompts** connected to the phenomenon identified in step 3 using language that targets the DCI(s), SEP(s), and CCC(s) identified in step 2 and information from the resources identified in step 4.

**3D Task Coherence** (Using your explanation in Step 4, divide the ideas into separate tasks that could be given at different points throughout the unit. These will become the formative assessment tasks you give throughout the unit and will ensure coherence across them.)

<table>
<thead>
<tr>
<th>Task</th>
<th>Coherence</th>
<th>Teaching 3D</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the task?</td>
<td>What components of the BIG question/Phenomenon does this task address?</td>
<td>Which dimensions will you target?</td>
<td>What do you need to give your students to be able to do the task (e.g., what data, pictures, information)?</td>
</tr>
</tbody>
</table>
Now it is time to write the 3D prompts. Write the prompts for each task below. Turn language that targets the SEPs blue, the CCCs green, and the DCIs orange. Draw from the STEM Teaching Tools (briefs #30 & #41) and dimension progressions (see NGSS CCC, SEP, and DCI progressions OR NGSS appendices) in what you write.

*Look at STEM Teaching Tools briefs #30 & #41 to help identify language specific to each SEP and CCC.

Assessment Task 1:

Assessment Task 2:

Assessment Task 3:

(Add more tasks, if needed)

Checkpoint - Do your prompts achieve the following?

- Each task asks students to address all three dimensions (though some prompt might only address one or two dimensions)
- Students are asked to integrate multiple dimensions (i.e., few or no prompts ask students to only address one dimension)
- The task asks students to engage the 3Ds at grade band-appropriate levels
- Prompts ask students to make sense of the phenomenon
- Phenomenon is relevant and accessible to students