The work that is described here is part of a larger project to develop student assessment items in science and mathematics that are precisely aligned with content standards. In this poster, we focus on how pilot test data can be used to determine the appropriateness of specific terminology in clarification statements and related assessment items.

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The use of the descriptive phrase “plates press together” instead of the term “converge.”

Although Benchmarks for Science Literacy uses the term “bedrock” at grades 3-5, concern about how familiar this term is to students and how useful it is in test item development led to the writing of two items that are identical except that one uses the term “bedrock” and the other uses the descriptive phrase “solid rock.” The students who were tested had had typical instruction related to this content, i.e., instruction that was not necessarily targeted to the meaning of the word “bedrock.” In the pilot test, half of the students in each class were randomly given the “bedrock” version of the test item and half were given the “solid rock” version.

### Student Responses to Terminology Example #1

#### Student understanding of “bedrock.”

Although Benchmarks for Science Literacy uses the term “bedrock” at grades 3-5, concern about how familiar this term is to students and how useful it is in test item development led to the writing of two items that are identical except that one uses the term “bedrock” and the other uses the descriptive phrase “solid rock.” The students who were tested had had typical instruction related to this content, i.e., instruction that was not necessarily targeted to the meaning of the word “bedrock.” In the pilot test, half of the students in each class were randomly given the “bedrock” version of the test item and half were given the “solid rock” version.

#### Item Version 1 with “solid rock”

Which of the following are part of earth’s plates?

- A. Solid rock of continents but not solid rock of ocean floors
- B. Solid rock of ocean floors but not solid rock of continents
- C. Solid rock of both the ocean floors and the continents
- D. Solid rock of neither the ocean floors nor the continents

<table>
<thead>
<tr>
<th>Is Answer Choice Correct?</th>
<th>A (continents only)</th>
<th>B (ocean floor only)</th>
<th>C (both)</th>
<th>D (neither)</th>
<th>% Correct N=51</th>
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<tr>
<td>Yes</td>
<td>11</td>
<td>26</td>
<td>1</td>
<td>1</td>
<td>51%</td>
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<td>No</td>
<td>36</td>
<td>54</td>
<td>14</td>
<td>39</td>
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<tr>
<td>Not Sure</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>11</td>
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</table>

#### Version #2 with “bedrock”

Which of the following are part of earth’s plates?

- A. Bedrock of continents but not bedrock of ocean floors
- B. Bedrock of ocean floors but not bedrock of continents
- C. Bedrock of the ocean floors and the continents
- D. Bedrock of neither ocean floors nor continents

<table>
<thead>
<tr>
<th>Is Answer Choice Correct?</th>
<th>A (continents only)</th>
<th>B (ocean floor only)</th>
<th>C (both)</th>
<th>D (neither)</th>
<th>% Correct N=64</th>
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<td>11</td>
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<td></td>
</tr>
<tr>
<td>Not Sure</td>
<td>27</td>
<td>27</td>
<td>23</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

Students who answered the “bedrock” question were also asked a follow-up question: What is bedrock?

35 of 57 (61%) students responded that they did not know. Six students (11%) responded with explanations that are correct.

Students who attempted to define the term wrote explanations such as:

- “The bed of rocks on the ocean floor”
- “The bottom layer of a rock”
- “Like the ocean floor”
- “It is the part that supports the ocean floor”
- “The deep rock of the crust”
- “Bedrock is rock that is in the ground”
- “Rocks on the bottom of the ocean”
- "Rock Maybe"

“...It is the rock that is on the bottom of an ocean plate”

“A type of layering of loose pebbles that have been fused together”

Analyze:

There were more “unsure” responses when “bedrock” was used. The item using “bedrock” had an average of 41% “unsure” responses to the answer choices, while the item using “solid rock” had an average of 11% “unsure” responses.

Of the 48 students who responded to this item, only one indicated being confused by the phrase “plates press together.” In a follow-up question, students were explicitly asked: “What does it mean when we say that plates press together?” Their responses fell into 5 categories:

1. Plates converge, or converge and subduct. 7/42 students (17%)
2. Plates collide, crash, or run into each other. 9/42 students (21%)
3. Plates collide, but slowly. 2/42 students (5%)
4. Plates push, come, move, or are forced...together. 23/42 students (55%)
5. Don’t know. 1/42 students (2%)