Consideration for Meaningful Classroom Assessment of ELs in Math and Science

Getting Started:
Part II

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From Part I

- There is great value in integrating academic language and content instruction and wisely teaching ELLs both of these concurrently.
- This means teaching language and discourse in content context, while also providing enough support so students can access the content concepts and processes regardless of their language abilities.

- Good ASSESSMENT, however, is different.
- Here, in order to properly measure content and language knowledge and skills, it is important to tease mastery of these two apart.
- These webinars are about how to assess content.

From Part I

- Part I suggested ELL specialists build a ‘toolbox’ of *methods* and *strategies* that they can use in helping content teachers properly adapt their assessments for their ELL students.
- The *methods* use the students’ strengths.
- The *strategies* would be examples of how to use the methods. This includes examples of using methods
  - within particular subject contexts
  - when the learning objectives are at particular cognitive complexity levels.
- ELL specialists need to work with content teachers to come up with adapted assessment tasks for content assessment . Content teachers will not be able to do this very well on their own, with just your toolbox ideas. They need your help to learn and to practice.

From Part I

To begin filling the toolbox:

1. Make a list of the *methods* to use during content assessment. Think both about how teachers explain the questions to the students, and how students can explain what they know to teachers. For example:
   - demonstrating skills or concepts
   - acting out contexts, questions, parts contextual parts of responses
   - pointing out stimuli
   - using visuals, including videos, pictures, graphics
   - using sounds, including music and sounds related to phenomena
   - using related materials
   - using L1 in text or orally, even if they are not literate in their L1.

2. Find or come up with a list of action words or phrases related to measuring content knowledge and skills at low, middle and high cognitive complexity.

   The *strategie*s will be sorted by cognitive complexity levels.

From Part I

For instance, from Part I:

- Lower levels of cognition include recalling facts, lists, or definitions, and identifying or recognizing appropriate content information.
- Middle levels introduce abstract thinking abilities, such as categorizing, organizing, analyzing, relating information using a relatively limited amount of phenomena, and solving problems with more than one, but relatively few, steps.
- The higher levels of cognitive learning poses more complex problems, where students need to organize and carry though a multi-step plan, juggle a wider range of information, know how to distinguish relevant from irrelevant concepts and strategies, and when and how to use relevant information in a complex coherent way.

  As an example, higher levels of thinking could call for using information from multiple conceptual systems, synthesizing, or interpolating.

Getting Started: Finding Out What to Assess

To begin developing *strategies* to put in the toolbox:

3. Work with a teacher and one of her lessons. Find out what she *REALLY* wants to assess—what are the learning objectives of the lesson that the assessment is for?

- For example,

  As a science teacher, she generally asks students to write a summary of the experiment the teams performed and discussed in the previous class, including factors they investigated, procedures they used, what worked and didn't, what were the findings, what are the implications of the findings.

  So, what do you think the teacher want to assess?

Finding Out What to Assess

- Maybe a better way to phrase the question about assessment purpose is "What precisely does the teacher want to know that the students have learned?"
- The goal here is to probe to find out *exactly* what the teacher is looking for, so you can help her figure out alternate ways of collecting the same information.
- Chances are, in asking her summary question, she isn't terribly interested in whether the students can 'write' a summary. On the other hand, she appears to be interested in making sure they can clearly identify and 'communicate' (albeit perhaps in non-standard ways)
  - the relevant factors
  - the relevant procedures
  - the relevant findings
  - the key implications.
- What is the cognitive complexity of this task?

Making Adaptations

4. As you and the content teacher are considering adaptations, make sure the cognitive complexity is the same.

- In another example, a science teacher has finished a lesson about ecosystems, the roles of organisms and the implications of changes in ecosystems. To make sure students have learned the information he gave them the following task:

  " Explain the roles of the 5 categories of organisms (decomposers, producers, omnivores, carnivores, and herbivores). What effect would they have in the ecosystem if one of the categories of the food chain was eliminated or destroyed?"

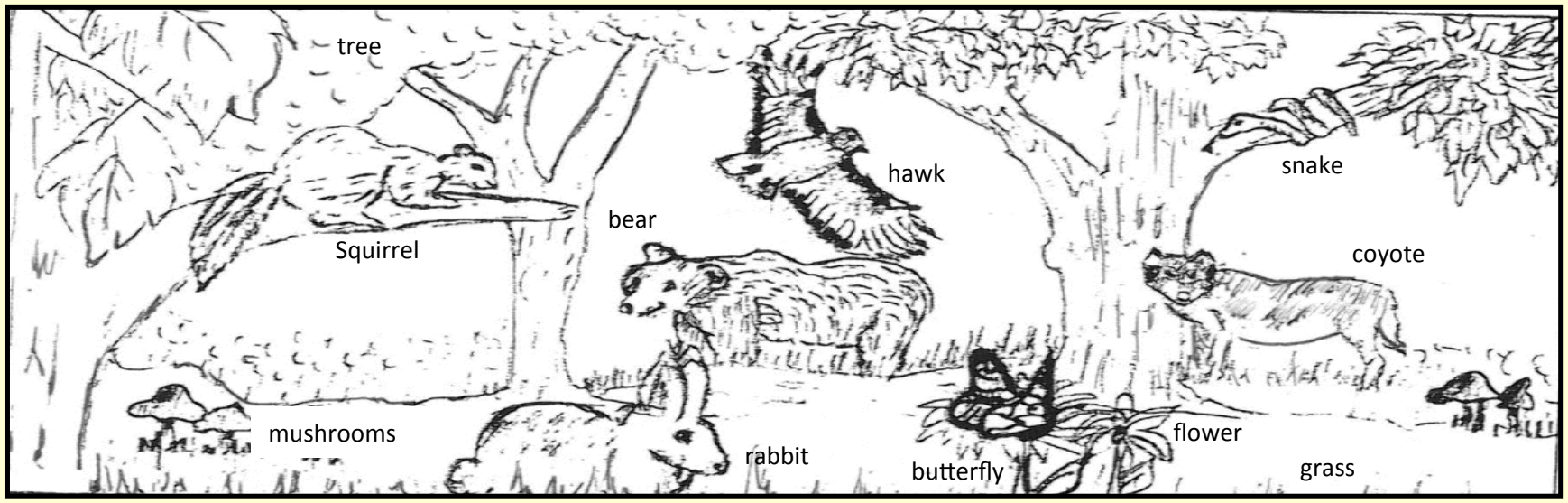
Making Adaptations

- Because he had 3 ELL students in his class he gave them this assignment in lieu of the other question:

  "Review the picture below and label each of the organisms."

Is this task measuring the same information?
Is it at the same level of complexity?

Making Adaptations: One Successful Strategy



Use this picture to help answer questions.

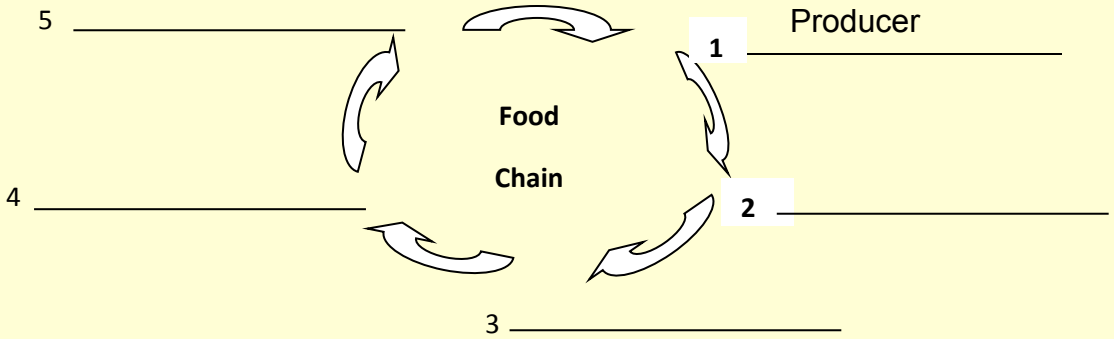
Making Adaptations: One Successful Strategy

(1) Select one organism, and match it to the food chain category. What is the function of each category?:

The *mushroom*	is a	**decomposer**	that *feeds off dead organisms*
(organism)		*(category)*	*(function)*
The	is an	**omnivore**	that
(organism)		*(category)*	*(function)*
The	is a	**carnivore**	that
(organism)		*(category)*	*(function)*
The	is a	**producer**	that
(organism)		*(category)*	*(function)*
The	is an	**herbivore**	that
(organism)		*(category)*	*(function)*

Making Adaptations: One Successful Strategy

(2) Put each category of the food chain in sequential order.



CATEGORIES:

Carnivore

Decomposer

Herbivore

Omnivore

Producer

Making Adaptations: One Successful Strategy

(3) Using information from (1) and (2), what happens when one of the categories is eliminated or destroyed?

Explain in the space below using words or pictures.

(Example adapted from task developed by teachers in the Concurrent Assessment Development project funded by NSF, and Kopriva and Sexton, 2011)

More Strategies

Polygon Patterns	G7 Math
Puzzle	G4 Math
Roots and Shoots	Elementary Science
Density	Middle School Science
Power Plant	Middle School Science
Ramp Experiment	Middle School Science

More Strategies: Summary

2. Polygon Patterns

- The strategy here uses the method of 'storytelling', or building the problem context within which the targeted question(s) will emerge.
- A method used here to focus the student on the problem is including a question during the building of the problem context. It is not to be confused with the targeted question(s), as this type of question is typically not about the target or focal learning objective(s).
- The target objectives are to
  - produce the correct answer to the problem of 25 polygons

    AND (regardless of how the student arrived at this answer)
  - demonstrate the algebraic algorithm exemplified in the 25 polygon question.
- This task uses accessible response environment methods where ELLs respond to the target objectives separately, including a space to demonstrate challenging reasoning. These response methods only work in tandem with accessible build up of the problem context.

More Strategies: Summary

3. Density
   - This strategy relies largely on the method of providing a problem context that has been carefully designed to include extraneous data related to misconceptions as well as relevant data about objects and about the liquid within which these objects will be placed.
   - Such a problem context sets up a method of a non-text response space that successfully allows students to demonstrate their full or partial mastery of the target objective without using any language.
   - If such a problem method had not been used, the assessment of the objective would have had to include a question asking students to justify through text why objects float or sink.
4. Puzzle
   - This task primarily relies on uses 3 response methods to track the sophistication of students' spatial skills development with almost no language. The first asks students to do the action, the second requires students to demonstrate internal skills WITHOUT external action, the third is a meta-cognitive check which evaluates executive processing.

More Strategies: Summary

5. Power Plant

- This task illustrates the response strategy of using causal chains, including complex chains, to demonstrate sophisticated reasoning skills. The two examples use the methods of
  - sentence frames, with word order specification (not always necessary)
  - accessible stimuli to populate the frames, including
    - pictures,
    - symbols
    - supported text
  - arrows to demonstrate causality without language
- The problem context of the task uses the method of identifying relevant elements of the targeted objective in the prior build-up. In this way they are available for reference in the response spaces.

More Strategies: Summary

6. Roots and Shoots
   - The focal strategy here is a carefully illustrated response space designed to elicit 3 sets of answers. The combination of these responses provides confirmatory data to determine thorough understanding of the targeted objective, the relationship of gravity and light to the direction of roots and shoots growth. Only one or two answers would not be sufficient.
   - The methods used are
     - A visual only response space capable of clearly communicating the focal variables of the target objective without unnecessary confusion.
     - Visual response elements to populate the response space.
7. Ramp Experiment
   - Often drawings or demonstrations show students' grasp of concepts and skills. This method is used here in the response environment where the objective is to show their understanding of the experimental method.
   - The problem build up uses the method of demonstration and storytelling to communicate the context for students.

Some Guidelines

- It is essential to probe the content teacher and discover together what the actual target content objectives are for a lesson. These form the basis of what should be measured in the assessments.

- Remember, this is about CONTENT assessment. While integrating language and content during instruction is often effective, it is important to separate the assessment of language from the assessment of content.

- Make sure to match the cognitive complexity of the adaptations to the learning objectives and any questions posed to native speakers.

- Use a variety of methods and strategies. Base the strategies on the lesson objectives—different ones naturally suggest different approaches to assessing in most cases.

Some Guidelines

- Many successful adaptation strategies use a thoughtful construction of a problem before they elicit targeted information. This may involve a ‘telling of a story’, demonstration, or using other devices as long as they don’t cue the responses. The purpose of the problems are to engage the students in the topic, and to present many of the relevant components of the targeted assessment before the actual questions. Such an approach sometimes argues for a somewhat ‘themed’ approach to assessment where multiple independent questions might come from a common environment.

- Repetition is key. Use similar visuals, symbols, language or demonstrations throughout a task or themes of questions. While this may not be the best way of writing, it is effective for assessments.

Some Guidelines

- ELLs are not opposed to language in questions or problems as well as it is supported, relevant, and well-placed. In fact, the ONPAR tasks demonstrate that language in the actual target questions or requests for information is actually PREFERRED, as language brings a level of precision to the targeted demands.

- ELLs also often prefer to explain themselves using open-ended spaces, rather than respond to multiple choice. This is only helpful, though, if teachers allow non-standard ways of communicating, and are willing to take time to evaluate the responses. With practice, it has been shown that monolingual English educators (with no L1 help) can evaluate responses of ELLs at almost the same rate as they do for native speakers.

Some Guidelines

- Adaptation strategies often use methods used in instruction, especially instruction that uses multiple modalities to communicate. Use of similar strategies for both supports and strengthens the learning, and makes communication during assessment easier and more accessible.

- Use multiple informal and formal assessment opportunities in the classroom. This includes performances, observations, self-reflection opportunities (communicated however students can), and open response spaces (designed to encourage communication using text, diagrams, pictures, code-switching, alone or in combination).

- Open up assessment beyond multiple choice, true-false, simple sorting, or fill in the blank methods