Alternate Assessments for English Language Learners

Using drawings and interviews to measure student learning

By Anne (Amy) Cox-Petersen and Joanne K. Olson

English Language Learners (ELL) are capable of high levels of conceptual understanding related to science. However, traditional means of assessment do not typically reflect their understanding of science content. We found through classroom observation and analysis of student products that while ELL students have difficulty writing in English, they can speak about science with a level of sophistication not reflected on written assignments. This mismatch between assessment practices and student understanding is what motivated us as teacher researchers to assess fourth- and fifth-grade understanding of marine environments through drawings.

Study Background

We cotaught science and mathematics to a multiage class of third-, fourth-, and fifth-grade elementary students, 60% of which identified themselves as Latino/a (from El Salvador, Guatemala, Nicaragua, and Mexico) and limited English proficiency. The Latino/a students had limited English proficiency.

We sought to (a) gain information about our students, their lives, and their culture; (b) integrate students' culture and experiences into formal science instruction; and (c) provide experiences for students to help them connect science content with personal experiences. We had given many traditional paper-and-pencil tests and found that many students failed the test. When we talked with our students, we realized that they knew much more than was measured through a textbook-created test or even our own teacher-created test, so we chose to assess their learning through drawings.

Student drawings have been advocated as a means to assess conceptual understanding in science (Hein and Price 1994). Based on the maxim that "a picture is worth a thousand words," drawings often reveal more than written responses. Because drawings do not require mastery of the English language, they likely have fewer barriers than other written assessments for ELL students.

Drawings Over Time

One of the strengths of using student drawings as an assessment tool is that teachers can compare and contrast understanding over time. We assessed students' understanding of the ocean over a period of eight months. We decided to use the ocean as a theme during the entire school year because we're about 17 km (10 miles) from the beach. We used state standards to guide our teaching of the ocean within physical science, life science, and Earth science standards.

Drawings about the ocean were coupled with specific science experiences during interactive, inquiry-based instruction. Experiences included two field trips to the beach, a field trip to an aquarium, development and maintenance of a saltwater aquarium in our classroom, and opportunities to communicate with marine biologists at a local university.

These experiences, in addition to classroom instruction, prepared students to complete drawings four times throughout the school year:

September, November, March, and June. On each occasion, we gave students plain white paper with the same verbal prompt: "Draw a picture of what is in the ocean, using as much detail as possible." We allowed approximately 45 minutes for each drawing session.

Assessing the Drawings

Scoring drawings can be challenging. Therefore, we decided to give each drawing four different scores, and both of us scored each drawing individually. The first score reflected the total number of unique animals present in the drawing. The second score included the total number of unique plants. The third score included the total number of unique nonliving features, such as seamounts, volcanoes, trenches, and ocean ridges. A fourth score reflected the level of sophistication of the drawing, using a rubric ranging from 0–5. Our use of the term *sophistication* refers to the accuracy of the placement of living organisms and how well the drawing reflected an understanding of major marine science concepts. We used the following rubric to determine sophistication scores:

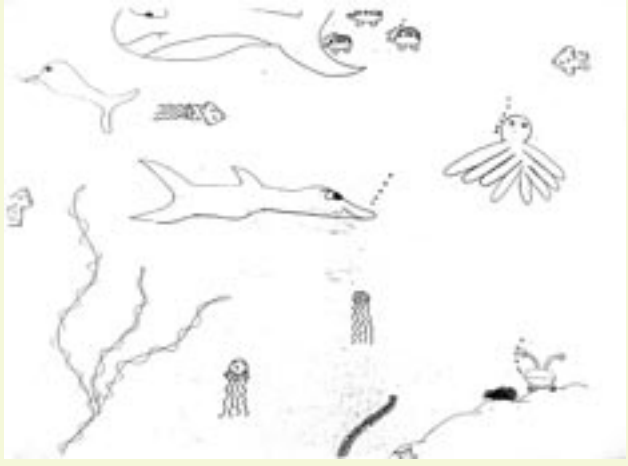
0 = No drawing or a drawing of one organism and the water surface
1 = Two or more animals, water surface
2 = Plants or the ocean floor, two or more animals
3 = Swimming and stationary animals, plants, and ocean floor
4 = Ocean floor with features, swimming and stationary animals, plants, most are accurately placed
5 = Extensive ocean floor features with appropriate organisms, many animals and plants, accurate placement, shows some relationships between organisms (e.g., a baleen whale eating krill)

The four different scores allowed both of us to look at the depth and breadth of understanding related to plants, animals, ocean features, and the interaction of organisms within their marine environment. Overall, students showed improvement in their scores over time, with the mean sophistication score increasing from 1.72 in September to 3.68 in June. The number of unique animals drawn increased from 4.37 in September to 9.45 in June. Plants were typically nonexistent in the September drawings, with a mean of 0.60 plants drawn by students. This increased to a mean of 1.19 in June. Nonliving features showed similar gains, with a mean of 0.65 in September and 2.32 in June.

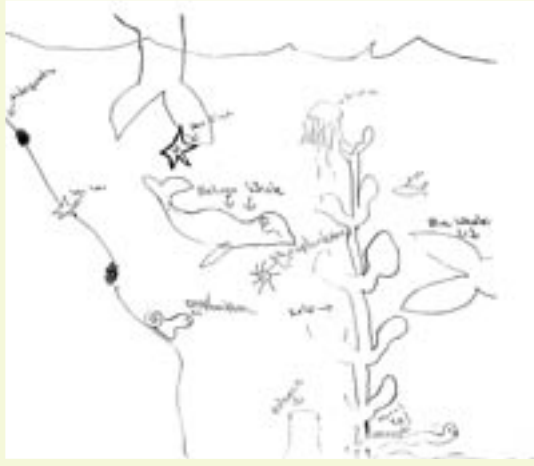
We recommend that teachers provide a rubric in advance of any

Figure 1.

A comparison of student drawings from November and June.



November



June

assignments or allow students to help create the rubric. If students help define the rubric, teachers may want to post specific science standards that relate to it and have students assist in translating learning expectations into a rubric. This will take some time, but encouraging student participation allows them to take ownership in the learning and assessment process.

"Draw Talk" Interviews

Using drawings in conjunction with a short interview called "draw talk" allowed students to further express ideas using English. Students conducted their draw talk with other students first before discussing their drawings with us, the teachers. Sharing with peers allowed them to "try out" their explanations in English, which provided a safer and more supportive atmosphere for assessment later.

Following the drawings and draw talk, we asked students to write about their drawings in their journals. This was an effective exercise because students had accrued background knowledge and vocabulary before expressing their ideas in English. Some students integrated Spanish words within their journals but replaced many of their Spanish words with English words over time. The journals were not graded but used to determine their interests in particular areas of marine science and to see that they were expressing their ideas on a daily basis. The English Language Learners in our class usually needed substantial time to write and revise their ideas. When they knew they had enough time to write and revise multiple drafts of their work, they completed the task and did quite well. Traditional assessment situations rarely provided the extensive time ELL students needed, and these students struggled as a result.

Science Learning for All

While ELL students need to develop English literacy to succeed academically, assessing conceptual understanding in science using only traditional assessments can misrepresent students' understanding. Using drawings and other alternative forms of assessment is consistent with the *National Science Education Standards* (NRC 1996), which encourages teachers to "use multiple methods and systematically gather data about student understanding and ability" (p. 37). Further, "each mode of assessment serves particular purposes and particular students. Each has particular strengths and weaknesses and is used to gather different kinds of information about student understanding and ability" (p. 38). As schools become more ethnically and linguistically diverse, science teachers and science teacher educators need to determine ways to teach and assess science more effectively.

Anne (Amy) Cox-Petersen **(acox@fullerton.edu)** ***is an associate professor at Cal State Fullerton. Joanne K. Olson is an associate professor at Iowa State University. They completed this study at Foshay Learning Center in Los Angeles.***

References

Hein, G.E., and S. Price. 1994. *Active assessment for active science*. Portsmouth, NH: Heinemann.

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.

Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

Content Standards

Grades K–4

Standard A: Science as Inquiry

- The abilities necessary to do scientific inquiry
- Understandings about science inquiry

Teaching Standards

Standard B:

Teachers of science guide and facilitate learning.

Standard C:

Teachers of science engage in ongoing assessment of their teaching and of student learning.