Beyond The Final Grade
Using Assessment Evidence To Guide Instruction And Provide Feedback To Students

Editor’s note: This is fifth in a series of articles about Assessment-Centered Teaching (ACT), a product of the Center for the Assessment and Evaluation of Student Learning (CAESL) funded by the National Science Foundation. CAESL is a collaborative partner of WestEd, the University of California Berkeley’s Lawrence Hall of Science and Graduate School of Education, the University of California, Los Angeles’s National Center for Research and Evaluation and Student Standards (CRESST); and Stanford University.

Here we provide an overview of how information gained from careful analysis of student assessment may be used to guide instruction and provide feedback to students. A more complete description of this process can be found in “Assessment-Centered Teaching: A Reflective Practice” (Corwin, 2008).

Wouldn’t our work as teachers be wonderful, if after assessing students, we ventured beyond the final grade in the grade book and actually used the information we gained through careful analysis of assessment data to design meaningful instruction for all learners in our classrooms?

To some this might sound like a fanciful scenario given the demands of “covering” standards, running to catch up with pacing guides and preparing our students for state testing in the spring. Yet for others, who have dared to accept the challenge of assessment-centered teaching, it is a reality.

Assessment-centered teachers have given themselves permission to slow down and use student assessment data to guide instruction and to provide feedback to students.

As we continue our journey through the Assessment-Instruction Cycle (Fig. 1), we find teachers at an important crossroads in their effort to improve their instruction and assessment practices. Teachers have completed their analysis of the student work (see WTRP, March 2008) by identifying patterns and trends in student learning. They now can use this information in formative ways to reconsider learning goals, re-evaluate their teaching and their instructional materials, and/or revise their assessments and scoring guides.

The ACT Portfolio Assessment-Centered Teaching: A Reflective Practice, 2008) provides three steps for reflection on the information teachers have gathered:

1. Identify general patterns and possible interventions
2. Identify specific revisions in instruction
3. Plan feedback to students

Identify General Patterns and Possible Interventions

The first set of ACT Portfolio prompts ask teachers to focus on general patterns of student learning problems or alternative conceptions as well as consider interventions that could be made to address these learning needs.

What interventions could you use to follow up in your instruction? What changes or augmentations to instruction would be helpful for your students? Consider the integrity of the Conceptual Flow, sequences for learning, and the variety and purpose of activities. Cite evidence from student work to guide your decisions.

For example, academy teachers using the “Plate Tectonics: The Way the Earth Works” unit analyzed student work from the pre-assessment which revealed some students’ naïve notions about earth science concepts.

Many student ideas were on target: identifying the layers of the earth, attributing movement of magma to connection currents, knowing that mountains are formed by plates coming together, and knowing that the sea floor is spreading.

Some student ideas, however, were erroneous—weather is caused by changes in the Earth’s core, valleys are caused by tectonic plates moving against volcanic eruptions are caused by forces in the earth’s core, and the core of the earth is as hot as the sun.

This information about student thinking assisted the teachers to guide their instructions on specific sub concepts, which helped students revise their initial alternative conceptions about plate tectonics.

Identify Specific Revisions in Instruction

The second set of prompts encourages teachers to focus on specific aspects of instruction that might need revision by considering the following:

- The Conceptual Flow: Are “mini-concepts” needed to build a bridge between major concepts?
  - Learning sequences for a particular concept. Do the activities address student understanding? How does the order of the activities build student understanding? Should other activities be incorporated to challenge student thinking? How do the questions promote deep student thinking?
  - Selection of activities: Do all students have access and the opportunity to engage at their level of understanding? How do the activities help students confront and revise their alternative conceptions? Revision of instruction might include best practices such as:
    - Using a “backward design” for lesson planning to identify key concepts for student understanding.
    - Engaging students in active learning to reveal and build on their prior understanding of a concept.
    - Designing questions (and expected student responses) to probe student understanding more deeply.
    - Using targeted, open-ended questions to encourage student discourse and the discussion of ideas.
    - Providing additional experiences when necessary to challenge student conceptions.

Use of these strategies incorporates an understanding of the interconnected nature of instruction and assessment.

For example, questioning strategies encourage reflection, which helps students learn and, in turn, help teachers assess student understanding. During a whole class discussion, questions such as “What makes you think this? Explain what you mean by… What is your evidence for…?” can expose specific reasons behind students’ struggles with new ideas. In small group work, probing questions can help students clarify and extend or redirect their thinking.

Once student thinking is revealed, assessment-centered teachers use various techniques to continue to probe the student’s line of reasoning and help the student construct understandings that are more scientifically sound.

Some structures for building new understandings include: discourse circles, think-pair-share discussions, whiteboards to record group thinking, and poster presentations.

Teachers can also design alternative student investigations in which students generate and interpret new evidence as a way to build a more complete and accurate understanding of the concept. Applying a concept to solving a problem in a new setting can be another effective way to challenge student thinking.

For example, students struggling to accept the idea that gases have mass may need evidence that mass can be measured. One teacher explored this topic using several modalities—such as digital and Internet resources and informational text—to help students access alternate ways of representing the concept.

Fig. 1

Plan Assessment and Instruction: Select or Design Appropriate Assessments (Conceptual Flow)
The Data Dilemma

BY KATHY DIARRANA

I’ve spring... and time again to look at data. No, not RBIs or ERAs. It’s testing time and schools are thinking about AVPs and APIs, as well as children with stomachaches, lost instructional time and how to make students do well on tests. How did we get to a point where meaningless data masquerades as accountability? Imagine how different our practices might be if we looked at other data to inform our decisions.

The Bayer Corporation — a science and research-based company with major businesses in health care, nutrition and innovative materials — helped underwrite the Making Science Make Sense Initiative which advances science literacy across the country through hands-on inquiry-based science learning, employee volunteerism and public education.

Bayer conducts the annual Bayer Facts of Science Education survey (www.BayerUS.com/mms) to gauge the state of science literacy and science education in the U.S.

Some highlights from their recent surveys:

• Seventy percent of principals said, if given the choice, they would put more funding into science than English or math programs.
• Of all subjects, students say science is the subject they are most curious about — science (42 percent), social studies (33 percent), math (13 percent), English (7 percent).
• Only 33 percent of executives thought schools have scientific minds. When asked to select which of the two contrasting skills employers value more in new hires, both new employees and managers chose being able to:
  • solve unforeseen problems on the job
  • adapt to changes in the work environment
• America’s workforce needs people with scientific habits of mind. When asked which one of the two contrasting skills employers value more in new hires, both new employees and managers chose being able to:
  • solve unforeseen problems on the job
  • adapt to changes in the work environment
• Make no mistake; data is important, but it is only as good as its source. Maybe we should be looking at an education RBI known as CWU (Children Who Understand)!

What data are you using to make important decisions about your students’ science education?

BEYOND THE FINAL GRADE, CONTINUED FROM PAGE 1

students were then able to manipulate gases in ways, along with guidance for him — as well as the student — about how to progress to the next level. A sound assessment plan enables teachers to give students guidance in advance by establishing clear expectations for performance. These expectations, in turn, provide the basis for quality feedback.

“Defining and clarifying instructional goals before class became routine,” says one teacher. “Sharing expectations with my students seemed to motivate them because they knew what I expected.”

The ACT Portfolio process of using assessment data to inform instruction promoted positive changes in teachers’ instruction and assessment practices. Academy teachers shifted from an orientation focused on curriculum delivery and measurement of summative performance toward an appreciation of teaching for understanding and using assessment information to gauge student progress throughout instruction.

Look for continued conversations about teaching and learning in next school year’s What’s the Big Idea?

BEYOND THE FINAL GRADE, CONTINUED FROM PAGE 1

Another academy teacher developed a rubric to help his students demonstrate their knowledge of science.

Science should be core

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What’s the Big Idea?/K-12 Alliance

2720 South Harbor Boulevard, #A

WHAT’S THE BIG IDEA?

Director’s Column

Fig. 2 — Connie’s Scoring Guide

<table>
<thead>
<tr>
<th>Level</th>
<th>What the Student Already Knows</th>
<th>Expected Student Response</th>
<th>What the Student Needs to Learn</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE</td>
<td>Rock Expert</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Student knows that the property of hardness can be used to classify minerals and that a harder mineral always scratches a softer mineral.</td>
<td>Student agrees that rubbing two materials together is a legitimate test for hardness. States that a harder mineral will always scratch a softer mineral.</td>
<td>Student needs to understand that because the white mineral is scratched, the gray mineral must be harder than the white mineral.</td>
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<tr>
<td></td>
<td>Rock Novice</td>
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<tr>
<td></td>
<td>Student knows that the property of hardness can be used to classify minerals.</td>
<td>Student agrees that rubbing two materials together is a legitimate test for hardness. States that a harder mineral will always scratch a softer mineral.</td>
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<tr>
<td></td>
<td>Rock Observer</td>
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<td></td>
<td>Student knows that when two rocks are rubbed together, one will scratch the other, but can’t identify hardness as a cause for the scratch.</td>
<td>Student agrees that rubbing two materials together is a legitimate test for hardness. States that a harder mineral will always scratch a softer mineral.</td>
<td>Student needs to understand that because the white mineral is scratched, the gray mineral must be harder than the white mineral.</td>
</tr>
<tr>
<td></td>
<td>Conventional Feature</td>
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<td></td>
<td>Student writes that one rock scratched the other because it was bigger. Student thinks size of the rock determines its hardness.</td>
<td>Student gives some information about the minerals or the hardness that does not pertain to the task or includes an alternative conception (e.g., size is a hardness).</td>
<td>Student needs to observe that rocks can cause scratches on one another and that size is not a factor in the hardness of a rock.</td>
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</tbody>
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FOR FURTHER INFORMATION, CONTACT: What’s the Big Idea/K-12 Alliance 2720 South Harbor Boulevard, #A Santa Ana, CA 92704-5532 (714) 438-3802 or 3803 (telephone) (714) 438-3808 (fax)

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Getting Better At Doing Our Best

BY DAVID PUMMILL

Technology Embedded In The TLCs

BY KAREN CERWIN

Why Working Together...Works!

BY SUSAN GOMEZ-ZWIEP AND TERRY SHANAHAN
The past seven years have been very productive for the San Diego Unified School District where science leaders have been growing and flourishing at school sites. Even with a loss of grant monies, innovative thinking has resulted in more teachers participating in the K-12 Alliance training programs.

In 2001, USP and MSP Grants provided numerous professional development opportunities to teachers who gained a deeper understanding of conceptual science, inquiry-based science, hands-on science, reading and writing science, and assessing science by looking at student work.

The K-12 Alliance was instrumental in guiding SDUSD through the process; the Alliance, along with SDUSD Science Leaders, the Science Department and districts, collaboratively wrote a Professional Development program that encouraged teachers to hone and refine their classroom skills. Now with grant monies ending, creative thinking was necessary to continue these programs. Newly appointed SDUSD Science Curriculum Leader, John Spiegel recognized the need call upon the natural talent around him to create a program where everyone would benefit.

In September of 2007, John presented The Science Support Network Teachers program to Science Resource Teachers, the district and area assistant superintendents. Superintendents and principals were asked to submit names of teachers who demonstrated a science passion, leadership skills and the willingness to commit to joining a new group of Science Leaders.

These target teachers would continue the K-12 Alliance association, enabling established Science Leaders to carry on with their most important work.

Since grant funds were practically gone, the big questions were how to pay for these training sessions. Here is where collaboration came into play.

Site administration, the science department and the district would financially support these Science Leaders, principals submitting teacher names agreed to fund visiting teacher coverage, meeting time and site planning time, and the science department supported registration fees, travel and accommodations for teachers to attend a training session this past January.

The result was an overwhelming. In the end, 40 teachers of the Science Support Network made the trip to Costa Mesa and worked with teachers from 20 districts across California. These teachers learned about facilitating science lesson studies, developing site action plans, determining the needs of their site through the use of the Concern Based Adoption Model (CBAM), providing professional development specific for their school site, and looking at the components of a quality science program at their school.

It was a new beginning!

Science Support Network teachers are now gearing up to attend the K-12 Alliance training this June, where the focus will be on writing professional development plans to bring to their schools in the 2008-09 school year.

All in all, the innovative Science Support Network program continues to provide opportunities for Science Lead Teachers to deeper and broaden their science education abilities.

And the network is growing. SDUSD is now organizing a Cohort 2 with additional schools and teachers joining the Science Support Network.

When times are hard, it takes forward thinking to not throw up our hands and give up, the Science Support Network is an example of how creativity, necessity and cooperation can carry us all through any roadblock we can encounter.

Kathryn Schulz is a member of the San Diego Science Department and a K-12 Alliance Regional Director.

Nurturing Science Leadership
BY KATHRYN SCHULZ

Talking Celery
With The Cadre

Consider the lovely stalk of celery. Some people chop it up for turkey stuffing, others mix it in their tuna salad, and some plop peanut butter and raisins on stalks for ants on a log.

But science teachers have other uses for this well-structured plant: they put it in food coloring so students can observe up-close how plants transport water.

Recently, a fifth grade TLC team used the class experiment. Students were mesmerized as they watched the red dye moving up from the water through the plant and up toward the leaves. This demonstration confirmed everything the teaching team read about plants, namely that plants use xylem, a porous tissue, to transport water from roots to leaves.

The team challenged the students to explore what would happen if a fresh celery stalk was placed “upside down” (leaves in the colored water). To everyone’s surprise, including the teaching team, the dye still moved—this time from top to bottom. Hey! What gives?

Does xylem take water up and down (and not just up as the books indicate)? or is something else going on?

We asked our cadre member, David Polcyn, Biology Department Chair at Cal State San Bernardino, to elaborate on the nature of xylem and water transportation. His reply:

“This is a good question. The xylem is actually composed of dead cells, so it doesn’t really control the direction of flow at all. It works like a straw, because water moves toward the end that is doing the extracting or sucking.

Normally that direction is only from roots to leaves, because the leaves are experiencing evaporation (exapotranspiration), thus water is “sucked up” from the roots toward the leaves.

But a cut celery stalk no longer really has a functional “top and bottom,” so fluid should move either in either direction, depending on which end is in the water and which end is experiencing evaporation.”

So next time you are casually crunching on celery sticks at a get-together, you can impress guests about the nature of xylem tissue, dead cells and straw. You’ll be the hit of the party!

ANNOUNCING: Our New Book!

A Reflective Process For Integrating Assessment And Instruction!

Valuable for practitioners who wish to improve their teaching and their students’ learning, and for researchers concerned with putting ideas of formative assessment into teaching practice.

—Richard J. Shavelson, Margaret Jack Professor of Education Stanford University

Drawing from conceptual principles and empirical findings that establish the crucial role of ongoing formative assessment, the authors describe a professional development framework and program that prepares teachers to adjust their teaching to student thinking in the moment and to refine assessments to better reveal students’ understandings through-out instruction.

—Avan J. Hellen, Director, Hellen Research Associates

Stating people know and written by: Kathy DiRanna, Jo Toppo, Karen Cerwin, and Diane Carnahan from the K-12 Alliance/WestEd; Craig Strang and Lynn Barakos from the Lawrence Hall of Science; Ellen Osmundson from UCLA and Maryl Gearhart from UC Berkeley.

Corwin Press
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Suitable for all grade levels, this resource describes how reflective practitioners can use the ACT portfolio to reflect on, modify, and improve their curriculum and instruction. The forms included on the CD-ROM guide teachers through the process.