What's The Big Idea?

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The RAIM Process in ACTion

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

This overview describes how teachers can develop assessment plans that effectively measure student learning. These plans use the Conceptual Flow (see WTBI?, lead article series: Conceptual Flow Does it All, 2004-2005) and the Record of Assessment in Instructional Materials (RAIM) process. A more complete description of RAIM will be found in the soon-to-be released book, Assessment-Centered Teaching: A Reflective Practice, Corwin 2008.)

Assessment-Centered Teaching

Ask teachers to describe their teaching practice and most focus on the following: activities they do with their students; content – often related to state standards — they want their students to learn; and instructional materials or other resources. Assessments are usually absent because assessments are mainly an afterthought to instruction (Popham, W. J. (2005). Rarely is assessment raised as a critical element of planning for instruction and the basis for instructional decisions.

Contrast the typical teacher above with our vision of the Assessment-Centered Teacher who always mention assessment as an integral part of their teaching practice. They cannot think about instruction without considering using assessment tools and strategies to gather information about what students know. These assessments also help teachers refine instructions to better serve their students.

Assessment-Centered Teaching (ACT) combines best instructional and assessment practices. Teachers need to fully integrate their knowledge of teaching and assessment in order to implement effective instructional plans and decisions.

Just as teachers rely upon their knowledge of content, teaching strategies and instructional materials, they must also rely on quality assessment practices to plan and design sound methods of gathering information about student understanding.

Using the Conceptual Flow and RAIM process, teachers can transform their assessment practices. Prior to teaching a unit, the RAIM process helps teachers develop an assessment plan aligned with learning goals in their Conceptual Flow. Teachers identify which assessments in their instructional materials correspond with their assessment plan and analyze the quality of the assessments, deciding which needs to be kept as is, revised, deleted or developed. The completed RAIM provides a road map for measuring student progress over time.

Although a teacher can develop a RAIM individually, the process is greatly enhanced with other teachers and a facilitator. Teachers can learn so much from each other when they discuss the purpose of assessments and anticipated student responses.

The RAIM Process in ACTion

The RAIM process begins with a completed Conceptual Flow which identifies specific content and then maps the order of instruction. Learning goals are based on the concepts outlined on the Conceptual Flow. Completing the RAIM includes:

1. Pre-think appropriate assessment points in the Conceptual Flow.
2. Match assessments to each point identified.
3. Select and arrange assessment tasks (pre-assessments, juncture assessments and post-assessments) in an overall assessment plan which guides teachers as they monitor students' progress.
4. Develop expected student responses for selected assessment tasks.

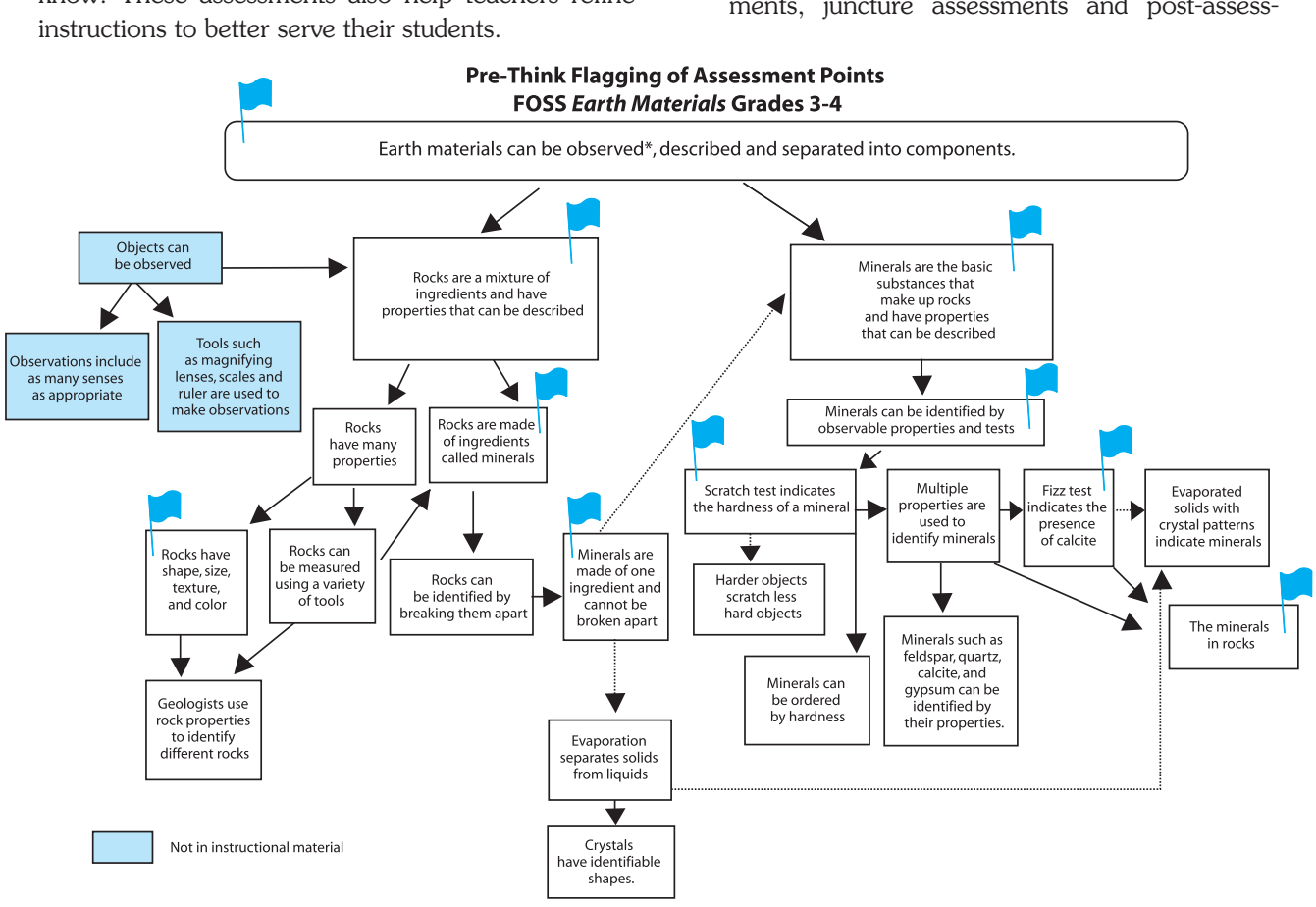

Fig. 1

Pre-think Appropriate Assessment Points in the Conceptual Flow

Teachers use a pre-think to identify assessment points in their Conceptual Flow. They analyze the content chunks and consider how to embed both formative and summative assessments in relation to those chunks.

Teachers first ask: What do I expect a student to produce/understand on a post or summative assessment of this unit of instruction? Then, working backward to earlier lessons in the unit, teachers ask: What knowledge should my students acquire as they work toward the learning goals of the unit? Finally, they consider: What prior knowledge do my students need to access the concepts in the unit?

During the pre-think, Assessment-Centered Teachers use sticky notes to flag where assessments should be located in their Conceptual Flow. Flags visually indicate points when the teacher needs to know what the students know (including possible alternative conceptions) before continuing instruction (see Fig. 1).

Match Assessments to Each Point Identified

Next, teachers begin matching their pre-think assessment points to actual assessments found in their instructional materials.

There are three possible scenarios for any given assessment point: 1) the assessment point may be supported by an assessment in the materials, 2) the assessment point may not be supported which means teachers need to develop the assessment, or 3) the instructional materials include assessments for concepts that the teachers did not identify in their pre-think. Teachers then need to decide if these assessments should be used. Prompts in the ACT Portfolio help address each situation.

Select and Arrange Assessment Tasks in an Assessment Plan

Once all of the possible assessments for the unit have been identified, teachers select those assessments which will best monitor students' pathways toward the learning goal.

In an ideal world, teachers would use all student work as an assessment of student progress; in the real

RAIM PROCESS, CONTINUED ON PAGE 2

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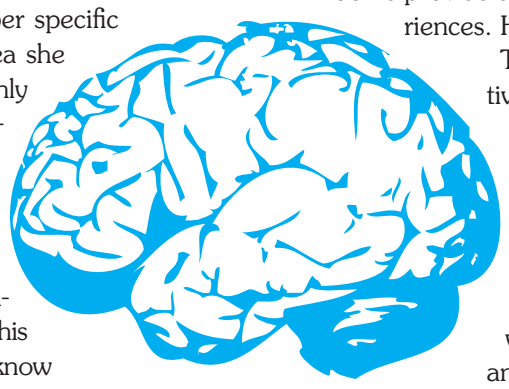
DIRECTOR'S COLUMN

Creating Memories

BY KATHY DIRANNA

The brain is a powerful organ. When connections work, we are able to do creative and wondrous things but when connections fail, we are reduced to communicating in bits and pieces.

But even those pieces provide an insight into the endurance of memory that's built on life's experiences. I know that first hand because my mother has Alzheimer's disease, and we live each day looking for connections. She can't remember specific words — but she knows the idea she is trying to convey and stubbornly uses "replacement" words to describe her thoughts.



I share this very personal story because watching her has made me even more vigilant about making learning experiences meaningful for students. This experience reinforces what we know from *How People Learn* (Bransford, et al., 1999) of the importance of building conceptual frameworks so students can become "experts" in their field of study. It also challenges us to reflect on how well our learning environment optimizes learning.

How People Learn: Bridging Research and Practice (Donovan et al. Eds, 1999) describes how four environments impact learning: learner-centered, knowledge-centered, assessment-centered and community.

Take a look at how these environments shape learning. Which does your classroom resemble? How could you enhance your present environment to be more effective, stimulating?

The first environment incorporates knowledge, skills and attitudes that learners bring into the classroom. Learner-centered teachers present students with "just manageable difficulties" — that is, challenging enough to maintain engagement, but not so difficult as to lead to discouragement (p. 20). In order to do this, teachers must have an understanding of where their students are in their understanding of a concept and where they need them to be in understanding that concept.

Knowledge-centered classrooms are based on teachers knowing what is taught (subject matter), why it is taught (understanding) and what competence or mastery looks like. Learning with understanding is more difficult than memorizing and takes more time, but it's more effective to help students make connections and build conceptual frameworks. These classrooms provide depths of study with multiple experiences. Hands-on must be minds-on.

Teachers and students use formative assessments to monitor progress in an assessment-centered environment (see lead story). These assessments are learner-friendly and provide opportunities for students to revise and improve their thinking. Teachers use students' work to identify student progress and gain insight on how to revise instruction to meet students' needs.

Learning is influenced by the context in which it takes place. A community-centered approach requires the development of norms for classroom and school. "Teachers must design learning experiences that promote intellectual camaraderie and attitudes toward learning that build a sense of community…" (p 22). Cooperation in problem solving and argumentation among students in such communities enhance cognitive development. In addition, these communities model the ways scientists work.

In this era of researched-based education, let's use the research from *How People Learn*. The next time you reflect on your classroom, look past the physical setup. Imagine what a visitor would observe in terms of it being a learner-,knowledge- and assessment-centered classroom. Ask yourself: how intellectually rich is my environment for every student? Where are areas for improvement?

More importantly, how is your environment shaping learning memories that will last a lifetime?

RAIM PROCESS, CONTINUED FROM PAGE 1

world, however, teachers need to design an assessment plan which provides appropriate and feasible data to monitor and adjust their instruction. Here, teachers use the learning goals and the flow of concepts to select the most critical assessment points for deep analysis of student work (see Fig. 2).

Develop Expected Student Responses (ESRs)

With an assessment plan in place, teachers generate Expected Student Responses (ESRs) which demonstrate high, medium or low levels of understanding. Teachers write optimal student responses and create descriptors for middle and low-levels of understanding.

Even if scoring guides or rubrics are available in the instructional materials, it's extremely beneficial for teachers to develop ESRs. Teachers can compare their ESRs with the published scoring guides and make revisions accordingly.

Teachers Insights

Sharing their Assessment-Center Teaching experience, here's what teachers had to say about the RAIM process:

- One high school teacher discovered why many students missed almost all items on a pre-assessment — it did not reveal prior student knowledge because it contained difficult vocabulary words. When the teacher revised his assessment plan through the RAIM process, he created a new pre-assessment which was less vocabulary weighted and more accessible. The changes helped him learn what students knew about the subject and their familiarity with the vocabulary; it also provided him with more useful information for instructional planning.
- A middle school teacher realized she was gathering a great deal of assessment data but was not gathering sufficient information on important concepts. She decided to create assessment items for a specific concept that would be proportional to the concept's importance in her Conceptual Flow.

	Pre- Assessment	Juncture 1	Juncture 2	Juncture 3	Post- Assessment
Concepts from Conceptual Flow	Rocks and minerals have properties by which they can be described and differentiated. Quality observations are both quantitative and qualitative.	Rocks have shape, size, texture, and color AND are made of ingredients called minerals.	Properties of hardness can be used to classify minerals.	Calcite can be detected with vinegar.	Rocks and minerals have properties by which they can be described and differentiated.
	Narrative Item	**Mock Rock**	**Scratch Test**	**Calcite Quest Investigation**	**Narrative Item**
Assessment Tasks	Using observations and test results, students determine if rock or mineral.	Use student journal entry on mock rock observations.	Scratch test to identify hardness.	Fizz test to identify minerals.	Using observations and test results, students determine if rock or mineral.

Fig. 2

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K–12 ALLIANCE CONTACTS:

Kathy DiRanna—*Statewide Director*
(714) 438-3806 **kdirann@wested.org**
or your local Regional Director

GENERAL QUESTIONS:
Doris Waters—*Administrative Program Manager*
(714) 438-3802 **dwaters@wested.org**

REGIONAL DIRECTORS AND SERVICE AREAS:
Cindy Anderson **(760) 458-1619** **canders@wested.org**

David Harris **(619) 418-4292** **dharris@earthlink.net**
Vista Unified School District

Diane Carnahan **(209) 468-9164** **dcarnah@wested.org**
North and South Bay (Lake, Marin, Mendocino, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma)
North Central Valley (Alameda, Amador, Calaveras, Contra Costa, San Joaquin, Stanislaus, Tuolumne

Karen Cerwin **(909) 337-9131** **kcerwin@wested.org**
RIMS (Inyo, Mono, Riverside, San Bernardino)

Rita Starnes **(559) 332-2123** **rstarne@wested.org**
Central California (Fresno, Kern, Kings, Madera, Mariposa, Merced, San Luis Obispo, Santa Barbara, Tulare, Ventura)

Jo Topps **(562) 597-8523** **jtopps@wested.org**
Greater Los Angeles (Los Angeles and Northern Orange)

Kathryn Schulz **(619) 725-7325** **kschulz1@mail.sandi.net**
San Diego City Schools

Jody Skidmore Sherriff (916) 774-6540 **jskidmo@wested.org**
Greater Sacramento Area (Alpine, Colusa, El Dorado, Nevada, Placer, Sacramento, Sierra, Sutter, Yolo, Yuba)
Far North (Butte, Del Norte, Glenn, Humboldt, Lassen, Modoc, Plumas, Shasta, Siskiyou, Tehama, Trinity)

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FOR FURTHER INFORMATION, CONTACT:
What's The Big Idea?/K-12 Alliance
2720 South Harbor Boulevard, #A
Santa Ana, CA 92704-5822
(714) 438-3802 or 3803 (telephone)
(714) 438-3808 (fax)

Editor: Brenda Rees
Layout: Wolfe Design Marketing

LEADERSHIP

Cadre Confessions

BY RUTH DESILVA, PAUL KILLIAN AND ROD ZIOLKOWSKI

For the last 15 years, we have worked together as a K-12 Alliance Cadre, training elementary school teachers in pedagogy, literacy strategies and science content during summer science institutes.

You may be curious why we have stayed together for so long, how we have changed, and what we have learned along the way. Here's our story:

Paul was the first to join the K-12 Alliance when it was known as CSIN, at the program's inception more than 20 years ago. Ruth joined a few years later and has held the full range of positions from teacher leader to staff developer; she's currently our literacy guru. A high school science teacher, Rod joined 15 years ago to help teach science content.

Part of the reason we have been a team for so long is that we really enjoy working together. From our earliest days together, we have had fun. Over the years, we have developed a deep appreciation for each others' strengths as our cadre roles became more defined.

SCRUBBED UP— Cadre members Rod Ziolkowski (from left), Paul Killian, Ruth DeSilva and Karen Cerwin celebrate a long-lasting relationship which rivals medical school training.

Individually, we have markedly different interests, personalities and styles.

For example, Paul is a part-time third grade teacher and district science curriculum specialist for the ABC Unified School District. He knows first hand what elementary school students and teachers need and keeps our focus on those we serve.

On the other hand, Ruth reminds us about the learning process. She is the voice that says "Slow down, give students time to process, reflect and communicate." Rod loves science, breaking Big Ideas into key pieces and then building them conceptually.

As different as we may be, we are united about our goal — to support educators.

During the school year, we mostly work alone in our classrooms and it's easy to drift along. But when we come together in the summer, we remind ourselves what we value — educating others and ourselves about the world around us.

Our concept and lesson plans are the "stories" we tell at our sessions. "Once we know the parameters of the story," explains Paul, "we let Rod, the scientist, plan the basic storyline. Then Ruth and I tweak it to fit the needs of our audience."

Through the years, we have never told the same story twice, even though we have repeated certain sets of standards. "Our classroom experiences and the K-12 Alliance have encouraged us to look through a different set of glasses every time," says Paul.

Overall, we have gained so much from the teachers who attend our sessions. It's very rewarding to see teachers who originally felt unprepared to teach science, develop into talented leaders and powerful teachers.

CADRE CONFESSIONS, CONTINUED ON PAGE 4

TEACHING & LEARNING

Friendly Talk

BY KIM LUTTGEN

Formative assessments are essential to effective science instruction yet instructional materials don't always provide them. To fill the gaps, teachers resort to open-ended questions of the "Tell Me Everything You Know" variety. This often results in "I know nothing" or a time-intensive brain-dump that tells the teacher nothing about what the student thinks about the particular concept.

In San Diego this summer, we worked on creating assessments that would quickly give teachers insight into their students' thinking.

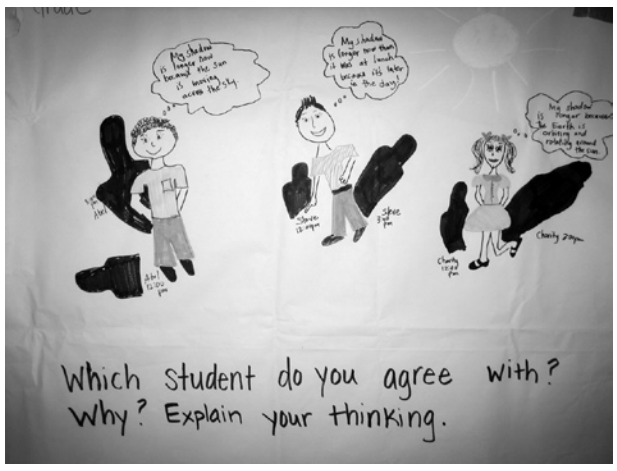

Fig. 1

To keep it simple, we focused on "friendly talk" probes similar to those in *Uncovering Student Ideas in Science* ((Keeley, P., Eberle, F., & Farrin, L., 2005). Each probe has a picture indicating the context and characters with talk (or thought) bubbles expressing different ideas about the concept; students select the character they most agree with and explain why. A successful probe is targeted to a specific learning goal and is based on research into common misconceptions.

Before beginning probe development, we asked participants to complete a probe in order to help them understand the types of thinking probes can evoke. They discovered probes can: provoke students to think about what they already know, to generalize, to make connections between ideas, and to ask themselves questions about their own thinking. Several teachers also uncovered their own misconceptions during these discussions.

Fig. 2

To begin, groups of teachers selected a California Science Standard (e.g., plants are the primary source of matter and energy entering most food chains; and the position of the sun changes during the course of the day) and used Curriculum Topic Study to help them clarify the idea they wanted to target. Then, they did a little research (again using Curriculum Topic Study) to identify common ideas that students bring to the table.

For example, students think plants get their food from the soil, the sun or fertilizers like Miracle Gro. In terms of understanding the position of the sun, stu-

FRIENDLY TALK, CONTINUED ON PAGE 4

COLLABORATION

AIMing For The Best Materials

BY KEVIN ERICKSON

How many times have you heard a teacher grumble, "Who picked these materials?"

Selecting instructional materials is typically an after-school, evening or weekend task for volunteer teacher committees. The sheer volume of materials is overwhelming and in many districts, the "real time" (paid professional time) is often absent.

One teacher suggested that if a home purchase followed the same process as materials adoption, a family of eight would send two members — who are very tired — to walk through a number of houses in one day, and then select the best one based entirely on a sales pitch. After the home is bought, other family members would be left to remodel the structure to make it work. Oh, and you can't buy another home for seven years!

Coachella Valley Unified School District, lead by K-12 Alliance staff developers, is changing this all-too-frequent scenario. The science adoption process is changing the way Coachella teachers think about choosing materials. Teachers know a purchase isn't just about money; it's also largely responsible for student understanding.

DOING HOMEWORK — Representing Coachella K-6 schools, staff developers reviewed materials during the summer program.

Even though California requires approved materials to meet certain criteria, there are no guarantees these instructional materials work to develop student understanding.

Last spring, K-12 Alliance staff developers suggested to the district they use the AIM process (developed by WestEd/K-12 Alliance and BSCS) to paper screen all state approved instructional materials and pilot those with merit.

Staff developers offered to monitor the process from generating district criteria through adoption of new materials.

Working with district and school representatives, staff developers created local criteria and rubrics in four areas: 1) student work, 2) assessment, 3) content connections, and 4) work teachers do.

This summer, 40 teachers, representing all Coachella Valleys USD K-6 schools, spent a total of 1,500 man-power hours collecting evidence on six publishers. They read, evaluated content connections, and looked for a balance of activities and instructional strategies that would engage all learners.

Teachers were charged with citing evidence, using the rubrics, providing justification for the scores they assigned and deliberating to reach consensus. At the end of the deliberation, three publishers were given the green light to move into the pilot phase.

AIMING FOR THE BEST, CONTINUED ON PAGE 4

How Are We Measuring Up?

With the focus on test scores these days, it's easy to get caught up in bragging rights if you did well on the California Standards Test (CST), or are you pulling out your hair if you did poorly.

But let's take another approach to measuring student learning: looking at multiple measures which indicate growth. The good news is we have the "right stuff!" Results on classroom assessment, local benchmarks and the state test correlate positively to our professional development efforts.

California Mathematics and Science Partnership (CaMSP) grants have been the impetus for this good news. These are research partnership grants that investigate how various professional development practices impact and improve student achievement. CaMSP will look at data from all projects, compare different professional development programs and determine "best practices."

So the question is: "How are we — the K-12 Alliance — measuring up?"

Working with district and school leaders and institutes of higher education (IHE) faculty for the past three years, the K-12 Alliance has collaboratively designed and implemented quality professional development programs. These programs target improving teacher content knowledge and pedagogical practice in the service of improving student understanding and achievement.

The Data Are in

The K-12 Alliance program is currently involved in 13 MSPs from all Cohorts (1-4). Some projects target a specific grade level (e.g., Palm Springs fifth grade math), others target grade spans (e.g., Tulare grades 4-8 science), and some have math and science components (e.g., Montebello and Vista). Four different evaluators have been gathering data on these projects.

	2005	2006	2007
4th grade Physical Science	37.9%	40.3%	51.0%
5th grade Physical Science	38.2%	39.5%	49.4%
4th grade Life Science	40.5%	40.5%	47.5%
5th grade Life Science	37.4%	42.1%	48.9%
4th grade Earth Science	33.9%	27.5%	40.0%
5th grade Earth Science	37.9%	42.0%	46.5%

Fig. 1

The exciting consensus is that professional development is making a difference in the way teachers are approaching student learning. Our evaluators report gains in teacher confidence, the use of the 5-E learning cycle and appropriate questioning strategies. Evaluators also report significant changes in teacher content knowledge as seen by pre-post tests which are compared with control teachers taking the same assessment.

Student growth is measured by pre-post tests on units which incorporate content that teachers learned in the institutes. Large gains in science content knowledge were noted in grades 4-6. Many of these teachers do not have science backgrounds; the content institutes provided them with conceptual frameworks while the Teaching Learning Collaboratives (TLCs) helped them design effective lesson to build student understanding.

In study groups where teachers looked at student work, teachers noticed improvement in their students' ability to conceptualize and communicate their science understanding. Middle school teachers reported increased student competency in the investigation and experimentation realm (e.g., charting, graphing, and writing summary statements).

Just as important as numbers and data, teachers have expressed their appreciation for becoming better teachers. "My participation as a lead teacher and now as a facilitator has had a positive influence on my teaching ability," said Laura Voshall, a fourth grade teacher in Tulare who has seen an increase in her students' scores on the CST.

"Using the conceptual flow model first in science and then in other academic areas has had a positive impact on my student's learning. My students are predominately second language learners and have made significant gains on standardized testing. I believe this is a direct result of my participation in summer institutes and TLCs. I continue to become a better educator because of this collaborative experience."

Cause for Applause

Overall, districts are celebrating increase scores on fifth grade CST.

For example: after just one year of participation, Marysville proficient scores went from only 5 percent of the students to 23 percent. Below basic and far below basic decreased from 60 percent to 32 percent! Take note: almost every fourth and fifth grade teacher is involved in the MSP project.

Similar results were obtained for schools in Tulare that had increases from 3 percent to 26 percent proficient and a corresponding decrease in the below basic and far below basic categories.

Coachella reviewed its scores by looking at different science strands at fourth and fifth grades. These percentages reflect the average percent of correct answers in each of the strands. Over three years, improvement has been made in all three disciplines (see Fig. 1).

K-12 Alliance participants often credited the K-12 Alliance as the catalyst that changed their teaching. They continually comment on how much work it is to teach for learning but overall, it's worth it in the end.

Now, we have the data to show it!

From multiple measures of teacher practice and student understanding, we know that the quality we demand causes the results we want. When asked "How are we measuring up?" we can proudly answer, "We are measuring up quite well!"

RAIM PROCESS, CONTINUED FROM PAGE 2

- An elementary teacher became aware of the influence of item format, readability and graphics on students' understanding of a task. Through the RAIM process, she learned how to select or revise assessment items so her students could read, comprehend graphics, and understand "friendly" formatting. She recognized the importance of tasks which provide trustworthy information about students' thinking.

In conclusion, the Conceptual Flow and RAIM are essential advance-planning tools that Assessment-Centered Teachers use before teaching a unit. When teachers are ready to implement their units, they need to reflect on the coherence of their learning goals, assessment and instructional plans. For these teachers, assessment is no longer absent nor an afterthought to planning but instead, a full partner in designing high quality instruction for their students.

In the next issue of *What's the Big Idea?*, we'll examine how to develop scoring guides and analyze patterns in student work to inform instruction.

References:
Popham, W. J. (2005). Classroom Assessment: What Teachers Need To Know (4th Edition). Boston: Allyn and Bacon.

FRIENDLY TALK, CONTINUED FROM PAGE 3

dents often think their shadows elongates during the day, because it is later in the day. Teachers also had to remember what students say when they describe their thinking about the concept.

The next step was to draw a picture which would set the context and place the characters. (For groups without an artist, this was the most difficult part!) One teacher suggested collecting pictures of phenomena instead of drawings.

Finally, participants brainstormed ways to address misconceptions they now expect their students might hold. Teachers worked together in grade-level groups and were able to develop an effective probe in an hour (see Fig. 1 and 2, page 3).

During the sessions, participants recognized this process would work well for site-based professional development. In a small amount of time, it allowed teachers to increase their own pedagogical content knowledge, walk away with a formative assessment they can use in their classroom and, for some, address their own content misconceptions.

Kim Luttgen was a middle school teacher on special assignment for San Diego Unified School District and is now working on her master's in Applied Geosciences at San Francisco State.

CADRE CONFESSIONS, CONTINUED FROM PAGE 3

We have had the opportunity to work together elsewhere, but we keep coming back to the K-12 Alliance because we have always felt respected, trusted, valued and honored. It's a privilege to do something you love for an organization you believe and a cause bigger than yourself.

All three authors are from ABC Unified School District. Ruth DeSilva is a third grade teacher at Carver Academy School. Paul Killian teaches third grade at Leal Elementary School half time and serves as the district science resource teacher half time. Rod Ziolkowski teaches physics and film making at Whitney High School.

AIMING FOR THE BEST, CONTINUED FROM PAGE 3

"The paper screening process was very objective and unbiased, which I think many of the teachers appreciated," said one teacher. "The teachers involved also really welcomed the chance to have a voice in this part of the adoption process."

Beginning in October, 27 teachers volunteered to be part of the rigorous pilot that will lead to a selection in February of 2008. The final selection will be an effective instructional program which will have been selected and understood by teachers from every site.

We believe this evidenced-based process will be an enormous resource for teachers, leaders and students.

Our teachers have already learned through professional discussion with colleagues about conceptual connections, assessment, student-to-student discourse, hands-on vs. minds-on activities, guided and supported reading instruction, and scaffolding for EL students.

Our teacher-leaders and district office will have data to build professional development which will support implementation of new materials.

Most importantly, our students will benefit from a selection process because it places their understanding first and foremost.

In short, the materials adoption process becomes a "We" for everyone.

Kevin Erickson is a teacher on special assignment and project director of the MSP project.