Shop Before You Adopt — Better Strategies For Selecting Science Instructional Materials

(Author’s note: This is the second article about selecting instructional materials. In our last issue, we presented Analyzing Instructional Materials – AIM—developed by the K-12 Alliance/WestEd in partnership with the BSCS Center for Professional Development, as a viable professional development strategy for reviewing and selecting instructional materials. AIM delivers a process that assists users with pre-screening, paper screening and piloting instructional materials. Through an evidenced-based decision making criteria, it analyzes that evidence collection and locally designed rubrics — AIM users can confidentially select instructional materials that make sense in their context.

In this article, we briefly compare the AIM process to the Curriculum and Instruction Steering Committee – CISC — Science Adoption Toolkit and make the case for both a paper screen and pilot before purchasing.)

Stop! Only read this article if you are:

• responsible for facilitating your school, department or district instructional materials adoption committee,
• a member of your school, department or district instructional materials adoption committee, and/or
• a teacher who will use the materials selected by your school, department or district instructional materials adoption committee.

With 11 different science programs available to California schools during the 2007 adoption cycle, all of us involved in K-8 science education will need a way to navigate through the myriad of available choices. Not only must we select the most appropriate science instructional materials but also the most appropriate selection process.


Closer to home, two other processes can be most useful. The first is the K-12 Alliance/WestEd’s AIM process (see December 2006 What’s The Big Idea?); the second is the Curriculum and Instruction Steering Committee’s (CISC) Science Adoption Toolkit. Here is an overview of both.

Analyzing Instructional Materials (AIM)

AIM is a professional development strategy in which teachers collaboratively gather evidence of locally identified criteria. They analyze that evidence using rubrics which include: science content, work students do, assessment and work teachers do.

Through the paper screen process, the most promising materials are selected for the pilot. Pilot evidence is then analyzed with two rubrics: student understanding and teacher implementation (see Figure 1, right). AIM recommends piloting of instructional materials AFTER the paper screen process and BEFORE selection.

AIM is a professional development strategy that goes beyond the normal “checklist” review done by separate committees or individuals working in isolation. AIM engages all teachers who are to use the instructional materials in meaningful conversations that help develop a common understanding of the instructional materials. In addition, educators learn how to think critically about instructional materials and address implementation issues (e.g., time, resources, professional development).

One recent AIM user describes how the data collection process caused the selection team to look at instructional materials in a new way. “We kept going back to the concept development sequence, how does it flow together? It really made us think does this connect and focus more on the whole unit rather than the isolated components and I think that is what we looked at before, just things in isolation.” (Chapter 4, page 100, JBS Dissertation)
The World – As We Hope It Will Be

BY KATHY DIRANNA

As I was enjoying my last day of "vacation," leisurely reading The Los Angeles Times, I came across a column in the Current section entitled: Through Rose-colored Microscopes. It seems that every year since 1966, an online organization named Edge, has e-mailed a question to scientists and thinkers about the state of the world. This year's question was, "What are you optimistic about?"

The answers were intriguing. An evolutionary biologist Richard Dawkins was optimistic, saying "that the physicists of our species will complete Albert Einstein's dream and discover the final theory of everything before superior creatures, evolved on another world, make contact and tell us the answer."

Max Tegmark, a physicist at MIT, commented on human beings smallness in a cosmic sense. Even though it makes him feel rather insignificant, he states, "I've turned more optimistic about our cosmic significance. I've come to believe that that advanced, evolved life is very rare, yet has huge growth potential making our place in space and time remarkably significant."

James O'Donnell, a classicist and cultural historian at Georgetown University makes the point that history repeats itself with the same stupidities, the same vengeances, but that dumbness never lasts. "That the physicists of our species will complete Albert Einstein's dream and discover the final theory of everything before superior creatures, evolved on another world, make contact and tell us the answer."

These wise humans give me hope.

We need to continue to explore to find the theory of everything. We need to know that we are not insignificant. We need to know that dumb choice and policies never last and that we need evidence-based education.

If this isn't a call for quality science education in our systems, I don't know what it is. Therefore, I'm optimistic that with new instructional materials, we can set the course of science that is inquiry and evidenced based. I'm optimistic that current policies that deny students access to science while they wither in hours of literacy-only programs will fold.

Yes, I'm optimistic that we have a place in the universe that can be positive. And most of all, I'm optimistic that with talented teachers, dedicated to facilitating their student's understanding and achievement and to recognizing that every student is our future, we can discover the theory of everything.

Happy New Year to us all.

SHOPPING STRATEGIES, CONTINUED FROM PAGE 1

Comparison

Figure 2 is a brief comparison of the major features of the AIM Process and the Science Adoption Toolkit. Both assist users with: establishing the district's vision, identifying major components and/or criteria, use of data collection tools, rubrics, scoring sheets, and suggestions for piloting. Facilitation guides are also available for both processes. Both processes can support each other.

While each process has its own strategies, aim and the science adoption toolkit can help support each other. For example, Stage 1 of the Science Adoption Tool kit helps to clearly identify the needs of the district through data analysis. The AIM rubrics provide clarity for evaluating the evidence. In addition, the development of a conceptual flow in AIM helps the selection committee grasp the totality of the instructional materials rather than isolated components.
M? A leader? I suppose we all tend to ask ourselves that question. But think about what Julian St. Weissgass Mathematics Professor at UC Santa Barbara and director of Equity in Mathematics Education Leadership (EMELD) says: “Leadership is taking responsibility for something you care about.”

Hmm... why, then, yes! I guess I am a leader — along with all my peers in K-12 Alliance. And what a team we are! People first, innovation always.

It’s hard to believe that 20 years have gone by since I met my 24 other colleagues. We were the first group of teachers to work together! We were all learning together and creating with our leader Kathy DiRanna.

As one of the teachers in the classroom, we were naturally concerned about our “charge.” How were we going to invent more time to accomplish our great dream of professional development? But somehow we did. The answer came easy: we did what we did because of the people — a nurturing and supportive team.

And me? My trip from classroom teacher, to staff developer, to Regional Director was also filled with adventure, comedy and mystery all rolled up together. The decision to become a Regional Director meant a great change. I had to consider giving up tenure, asking for a leave, foreseeing the future. You know, the simple things in life!

We were very nervous at our first Regional Director meeting when Kathy DiRanna shared some of the possible views to the future. We could only see a few months ahead and funding was unsure. It felt a little impossible, still, I felt inwardly confident. I remembered the most Gumball Rally, about a race across the United States in cars with no designated route. An image popped into my head.

As one driver zooms along the highway, he reaches up, tips off the rear view mirror and throws it out the window. “What did you do that for?” I exclaim the passenger Driver. “When you are planning to win the race, it doesn’t matter what is behind you, it’s important to be prepared for what’s ahead.”

So true! The K-12 Alliance has always looked ahead, preparing positively to meet the challenges of the road. This organization continues to be a great learning trip with competent and wonderful people. That is why I am proud to be part of the team. I am with motivated people who want to work, to change and to be the best. Finally, I’d like to share two favorite quotes that keep things in perspective for me.

Author Margaret Wheatley refers to motivation theory in her book Leadership and the New Science. “Our attention is shifting from the enticement of external rewards to the intrinsic motivators that spring from the work itself,” she explains.

Another favorite quote is from author Susan DiPillar. “This is where the mind begins,” she says. “This is where the mind begins.”

Pigs Can Fly… And Talk And Build Houses And Shop At The Mall…

BY SUSAN GOMEZ-ZWIEP AND WILLIAM STRAITS

Could Charlotte really write in her web? Does Snoopy really think he’s flying a plane atop his doghouse? And just how famished is the Hungry Little Caterpillar?

Concerned that the anthropomorphism found in most animal stories may mislead young learners, the A.A.H.S. (American Association for the Advancement of Science) ordered some guidelines for educators, noting that by the end of the second grade, students should know that stories sometimes give plants and animals attributes they really do not have (A.A.H.S., p. 102).

But all is not lost for science teachers, even though these young students will continue to read books about worms attending school and pigs building houses. You see, anthropomorphic texts can provide great opportunities for meaningful scientific learning, while developing students’ understanding of different kinds of texts.

Analyzing Anthropomorphisms — A SE Lesson Plan

To start, gather up non-fiction and fiction books related to a particular animal for each group of students. You may want multiple sets so all groups can discuss the same animal or sets related to different animals for each group.

1. (Engage)

Begin with a class discussion by reading aloud amazing features of animals — some factual, some fiction. After each is read, ask students if they believe the attribute to be true or false.

For example: “Reindeer keep warm by eating a type of antifreeze.” (True — the moss they eat contains a chemical that keep their body fluids warm. The moss itself offers no nutritional value.)

Students will begin to think about the incredible things they have heard or read about animals and will learn how to tell which ones are true. Disagreements and minor debates are all part of the discussion and, in fact, the overall process.

During a pre-assessment period, students select or are assigned an animal. Working in teams of 3 or 4, students will record everything they know about their animal on individual sticky notes. These sticky notes are placed on chart paper to create a map showing how their ideas are connected to demonstrate current thinking.

Students can also write their maps directly on chart paper, but sticky notes allow students to move ideas around as their ideas change during the group’s discussion.

2. (Explore)

The next step is to distribute the collection of books to each student team. Students then create a chart listing characteristics of their animal from the various texts. These characteristics can then be placed in a graphic that separates characteristics that describe humans (square) from characteristics that describe the animal (oval). The characteristics common to both are placed on the chart where the circle and square overlap.

LUNCHTIME AT THE BRIDGE — Don Fry’s fifth graders from Ella Intermediate School in Olivehurst MJUSD check out the surroundings. Don is a Science Staff Developer for “Science Success for All” and “The Bridge Project.”

“The Bridge Project” was designed to cross county lines to link students and educators in schools in the Yuba River Watershed. The project also established a network of schools, students and educators in Nevada and Yuba Counties that use the Global Learning and Observations to Benefit the Environment (GLOBE) Program to regularly gather and share watershed data.

ACADEMIC PARTNERS — Students from Alice Intermediate School in Yuba County work together with their peers at Seven Hills Middle School in Nevada County.

Students from both schools rendezvoused at the beginning of the academic year at science center, and plan to keep in touch throughout the school year.

In addition to learning about hydrology, students are doing their own research — they are measuring oxygen content and other water quality factors, using GPS devices to pinpoint spots where water samples were collected.

Since the beginning of the academic year, students have been taking water samples from the Yuba River near their own schools. Since these locations are about
A Need and a Plan for Piloting

A major difference is that the AIM process, as a professional development strategy, includes a pilot AFTER the paper screen and BRIEF list screening. In this way, AIM goes beyond the selection of materials to the implementation of materials.

AIM suggests that analyzing instructional materials is somewhat like an interview process in which the paper screen results in the best candidates that meet the given criteria. However, the selection cannot be completed unless the materials are subjected to the real world of the classroom. In other words, the materials have to be taken for a "test drive."

Contrary to current pilot practices — when teachers develop an affinity or hatred for the materials they are given to pilot — the AIM pilot is done AFTER the paper screen. The committee has already agreed on what makes quality materials. The pilot is done only on the top-ranked materials from the paper screen. And the AIM pilot is still evidence based; opinion is not a criteria!

Pilot teachers, representing a broad cross section of teachers, use comparable sections of the materials in their classroom and gather evidence in terms of student understanding and teacher implementation. For example, using AIM tools, the pilot teachers gather student work in a pre-assessment (what do students know before they begin a unit?), from several learning experiences (e.g., investigation, activity, reading, assessment), and finally from a post-assessment.

Teachers bring their student work to committee meetings and use rubrics score the work. They also gather data from students shedding light on which of the materials helped them learn most effectively. This unique tool helps teachers understand how the materials work from a student point of view.

Additionally, teachers use AIM tools and rubrics to determine how well the materials support teachers in the use of the materials. Are there support items such as background information, assistance with student misconceptions, pointers to setting up labs, assessment rubrics, quality ancillary materials? Teacher support is scored as comprehensive, average or minimal based on the criteria. Scores from the pilot are added to scores from the paper screen (see Figure 4, below) and a final decision is reached.

Because AIM causes teachers to thoroughly analyze materials in the paper screen and in the pilot, the district now has a group of teachers who are very familiar with the instructional materials. Through discussion of the data, the materials review and pilot teachers help identify implications for future professional development for quality implementation of the materials.

Go Slow to Go Fast

What ever process you ultimately select, take your time in reviewing the instructional materials — it’s not a process to be rushed.

Designing Professional Development for Teachers of Science and Mathematics (Loucks-Horsley, et al., 2003) suggests that a collaborative, clearly articulated procedure that addresses all aspects of the selection process is essential to quality selection. Having experienced the AIM professional development strategy, teachers say they will never look at learning, teaching or the role of instructional materials in the same way again.

For additional information about the AIM process, contact your local K-12 Alliance Regional Director or your main office. For additional information about the Science Adoption Toolkit, contact your county science coordinator.

### The AIM Process: Combining the Paper Screen and Pilot Scores

![Figure 4](image)

### Pigs Can Fly... CONTINUED FROM PAGE 3

(3) Explain

Once students have had a chance to discuss their readings and sorted characteristics, they will re-evaluate their map. They can rearrange their concepts, add new ones, review concepts, and modify the links between them. Sticky notes can again be useful to help track student thinking. As students re-evaluate their concept map, any new concepts or links can be shown with a different color of pen or sticky notes.

Once the concept maps have been discussed, direct the students to the "human" side of the chart and explain that giving human-like characteristics to their animals is called anthropomorphism. Students can then brainstorm possible reasons why anthropomorphisms are used in some fictional texts.

(5) Extend

Students can now create their own fictional story and non-fictional accounts of another animal.

50 miles apart, their findings can vary noticeably.

The data collected by the students is shared over the Internet on the GLOBE website (www.globe.gov). Students publish their research projects using GLOBE data and protocols while collaborating with scientists and other GLOBE students across the country and worldwide. (4) Evaluate (post-assessment)

Once the concept map has been revised, the students will communicate their understanding of their animal to the class. This can be done through a "wanted poster." The main portion of the poster should depict and accurately describe the animal they discussed, integrating information from their concept map. However, the lower portion of the poster should be saved for an "also known as" section where students can place samples of anthropomorphic characteristics they noted from their fictional texts.

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