



Reflections

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Formative Assessment: A Brief Overview

By Harold Pratt

One of the major changes in *Introductory Physical Science (IPS)* 8th Edition was the addition of formative assessment items in the textbook and the *Teachers Guide and Resource Book (TGRB)*. In response to a few questions about the meaning of formative assessment and how to use the new items, we are providing this brief overview of formative assessment and an article (on page 3) on how to use the items in the *TGRB* to improve the reading comprehension of students. (For 8th Edition users, much of this information is available on pages xiv-xvi in the *TGRB*.)

The defining characteristic of formative assessment, and our reason for including it in the 8th Edition, is that it is used to modify or improve instruction. It is also called classroom assessment because it originates in the teaching process and is used immediately by teachers to modify their methods and help students better understand the outcomes of a lesson. Summative assessment, on the other hand, refers to assessments used for determining grades, making decisions about promotion, graduation, or placement of students. There is some confusion about the labels since some educators consider interim tests given between those all-important decision points requiring summative assessment as “formative.” But it is important to remember that the intent or purpose of formative assessment is to inform and guide instruction, not just gather information or provide a grade.

To be effective, formative assessment should be a part of a more comprehensive plan of in-

struction. A helpful booklet from the National Research Council (the developers of the *National Science Education Standards*), *Classroom Assessment and the National Science Education Standards**, describes the following template for designing and integrating formative assessment into regular classroom practice:

What is the goal of the instruction?

Establish clear and specific outcomes for your lessons. The outcomes should be described as performances; i.e., what will the students be able to do (paper and pencil or procedural performances from investigations)

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eTips for Teachers: Using Lab Notebook Quizzes

Have you signed up to receive *Reflections* and *eTips for Science Teachers* by email? If you have, then you already know about teacher Gery Morey’s helpful article on using quizzes to evaluate students’ lab work – helpful when working with a large group of students! It appeared in the September issue of *eTips*.

If you have not yet signed up, it’s easy to do so. Not only will you receive great teaching tips and resources every month, you’ll also help us conserve resources! To sign up, go to <http://www.sci-ips.com/newsletter> and click on the link provided. It takes just a few seconds to get the extra help you deserve in the classroom. And don’t forget to check out Morey’s lab notebook quiz article, and other previously published work, on that same page (<http://www.sci-ips.com/newsletter>).

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and communicated to students so that they can tell when they have met them.

What have the students grasped from the lesson?

This is where the formative assessment questions in the 8th Edition, or ones that you create on your own, come in. These are usually short questions that are limited to one idea or skill. They are not graded or scored but, if possible, a show of hands will let you know immediately how many students have answered correctly and are ready to move on.

How will you advance students' learning?

At this point, the assessment has provided information that can help you modify your original lesson plans, if the student responses indicate the need to do so. Some students, if not many at times, will need help. At this point some re-teaching or new teaching is necessary to bring them up to the point where you can move on to the next topic.

The research on the use of formative assessment is very clear. If it is used in a frequent and ongoing way

as describe above, it is extremely effective in improving student achievement. Several researchers have claimed it to be one of the most effective teaching strategies for which we have research data.

If you want to read more about formative assessment strategies, additional information can be found online. ERIC provides a short primer on the teaching method called "The Concept of Formative Assessment" (<http://www.vtaide.com/png/ERIC/Formative-Assessment.htm>), while an overview of both summative and formative assessment can be found in a recent article from Heritage University (<http://www.mmrvsjr.com/assessment.htm>). A landmark article, published by Phi Delta Kappan and written by Paul Black and Dylan William, also gives research-based findings about the quality and use of formative assessment in the classroom (<http://www.pdkintl.org/kappan/kbla9810.htm>).

*To read or purchase Classroom Assessment and the National Science Education Standard, visit www.nap.edu/catalog.php?record_id=9847.

News and Notes...

Looking Forward to NSTA in Denver

Make sure to visit us at the NSTA Regional Conference in Denver, Nov. 8-10! Our booth number is 1116.

Another Success for SCI Workshops

The SCI summer programs at the Colorado School of Mines in Golden, Colorado, and in Massachusetts were enormously successful! More than 50 teachers participated in our workshops for *IPS* and *FM&E*, as well our workshop on the evaluation and writing of good science test questions. Several commented how much they enjoyed the teaching insights provided by the author-instructors, as well as by fellow participants. Teacher experience levels varied from "I'll have a real teaching job for the first time this fall!" to "I've been teaching *IPS* and *FM&E* for many years." Some had previously attended one of our workshops and, in some cases, this was their second or third workshop!

As the year gets started, we have already re-

ceived calls from teachers wishing they had attended the summer program. Don't let this happen to you - start planning now to attend a workshop next summer!

Earn Rewards for You and Your School!

One of the most successful marketing strategies for our textbooks is "word-of-mouth" advertising by our customers. Now you or your school can profit by publicizing our programs! SCI now offers incentives for "spreading the word."

If you know of a school that does not currently use *Introductory Physical Science (IPS)* or *Force, Motion, and Energy (FM&E)*, talk to them about our programs! Then email us your colleague's adoption and contact information and we will add it to our database. If the school then purchases a class quantity of our textbooks within three years of when you spoke with them, you will receive a reward certificate good for any one of the following: A \$100 credit for you or your school toward the purchase of any of the products we sell – textbooks, soft-

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Improve Reading Comprehension with Formative Assessment in 8th Edition IPS

By Harold Pratt

Reading for comprehension has always been a challenge for many students, especially in science where so many of the ideas and vocabulary are new. The formative assessment questions in the 8th Edition of *Introductory Physical Science (IPS) Teacher's Guide and Resource Book (TGRB)* were designed to help improve students' understanding of the content in the reading sections and develop some reading skill and practices that will assist them in all content areas.

Most of the reading sections in *IPS* have a logical development in the way they build the case for an overarching or big idea. Each paragraph usually depends on the preceding paragraphs and adds a new element as the big idea builds over several paragraphs in the reading section. Because of this developmental and accumulative nature of the reading, you can assist students in their reading comprehension if you monitor their understanding of each paragraph or small group of paragraphs as they read the passages. For this reason, the formative assessment questions in the *TGRB* are almost all assigned to a particular paragraph or section. Each question can be used most effectively if you and the class are reading the section together.

After one of your students has read a paragraph or section out loud for the class, ask the question related to that section orally and determine how many students can answer it correctly, indicating that they understand that paragraph or section. This can be done in a number of ways. Ask them to write their answers and then trade papers while you discuss the answer. Partners would assess the level of understanding of their answers and discuss them based on what you have indicated in your lesson. As an alternative, without trading papers, students can indicate whether they think they are correct by a show of hands. Some teachers pass out index cards and ask the students to respond on the card. Collecting the cards and flipping through them will give you a good sense of how many students have the understanding they need.

Your goal here is two-fold. First, you want to get a quick determination of who and how many students understand the section they have just read. Your second

objective is to help students develop their own self-assessment abilities.

Now a decision is needed. Can you move on to reading the next paragraph or do you stop and take time for additional discussion or explanation? Maybe allowing students to ask a question or two will be sufficient. Ask one or two of the students who comprehend the content to explain their thinking. Sometimes they can communicate to other students in ways that you can't. Modeling what is sometimes called a "think aloud" may also be useful. A think aloud is an opportunity for you to demonstrate how an experienced reader reads and reflects on a passage in order to make meaning out of it. You literally think out loud with your students as you read a section.

At the end of most reading sections, there are additional formative assessment questions that relate to the entire passage or "big idea." They will help you know how well your class comprehends the complete section in a similar manner. After awhile students should be able to tell how well they understand the reading on their own, using these formative assessment questions.

Based on our knowledge of formative assessment, the research behind it, and our use of similar strategies with students and teachers with earlier editions of *IPS*, we are confident that using the questions will help your students better comprehend the important ideas in the book. Please let us know your experience with the provided questions, as well as your success with your own formative assessment questions.

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ware, or video, a \$100 credit for you toward the tuition cost of one of our summer workshops, or a \$50 cash payment to you!

The choice is yours, so start spreading the word and earning your rewards! The number of reward certificates you can receive is limited only by the number of "non-user" schools that you talk to and that subsequently purchase a class quantity of one of our textbooks.

(Certificates awarded for an initial purchase only, not for subsequent purchases.)