
What Is Formative Assessment?

Chapter Overview

- Where are you going, and how are you going to get there?
- What is formative assessment?
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WHERE ARE YOU GOING, AND HOW ARE YOU GOING TO GET THERE?

Imagine that you're going on a road trip. You started from Los Angeles in the early morning with the general idea of driving north to arrive in San Francisco by the afternoon or early evening. You've arranged to stay at your friends' house. You've been there before, so you have a general idea of where you're headed and what the house looks like, but you're not exactly sure in which neighborhood they live, and you don't have a street or house number for them either. Come to think of it, you're on Interstate 5 but haven't been paying much attention to where you've been, so you're not even sure how far away you are from where you started or where you're going.

Absurd as this scenario may sound, it's analogous to students' experiences in traditional science classrooms. Students know that they're in a

science class, and they probably know their teachers are teaching a unit about some general concept with a title like “The Cell,” “Force and Motion,” or “The Ideal Gas Law.” It’s most likely, however, that these students don’t have a clue as to what they’re supposed to be learning, and they may also be challenged to let you know what they’ve done in class the past few days. It’s not that much different from setting out in a car without knowing exactly where you’re going and without a clear route for how you’re going to get there.

In the road trip example, it’s possible that you might find your way to your friends’ house, but it’s also likely that you would get lost and frustrated and end up spending the night in Sacramento after having made a wrong turn somewhere. It’s the same way with students in a traditional classroom; some of them will end up learning what’s expected of them, but others might end up walking away knowing something completely different from what you had intended.

A more realistic plan for a road trip would be to begin with the address of your destination. Then, after looking at a map, you would look at where you were starting from and make a plan for getting there. For instance, you might plan to leave Los Angeles at about 9:00 in the morning, taking US-101 to Interstate 5 heading north. You might plan a series of stops along the way to eat and stretch your legs. You would also plot out the series of directions you’d need to navigate in order to get from Interstate 5 into San Francisco and ultimately to your friends’ house. You would thus have a clear idea of where you’re going, where you are starting from, and how you’re going to get there.

The process of formative assessment—the kind of assessment that takes place while learning is in progress—follows a similar procedure in providing a road map for student learning. Science teaching through formative assessment starts with setting a clear learning goal, making that learning goal explicit to your students, finding out what students know now, and then plotting an instructional course for students to reach the learning goal. Sometimes this process is also called classroom assessment or everyday assessment, but the basic point is the same: formative assessment is carried out by teachers in their own classrooms and is intended to help students reach learning goals.

This book is designed to help science teachers carry out formative assessment in their own classrooms—that is, setting a learning goal, finding out what students have learned so far, and making plans to help students meet that goal. It is built on an extensive research base developed over the course of the last 10–15 years that has established not only the impact formative assessment can have on student learning but also the relative effectiveness of different formative assessment strategies. The book will provide simple and clear explanations for what you can do to implement formative assessment in your classroom and will accompany these explanations with concrete examples from multiple grade levels and content areas.

WHAT IS FORMATIVE ASSESSMENT?

It's easy to think about assessment as something that's separate from everyday teaching. You finish teaching a unit, and students take a test to show what they learned. The state department of education interrupts your class for three days to see how well students in your school and district are progressing toward proficiency on the state standards. Juniors take the SAT for their college applications, and seniors take AP tests to get college credit.

These examples all have one thing in common: they are considered to be summative assessment or assessment that's intended to take place when instruction is finished to establish what students have learned. These assessments often have high stakes attached to them because they determine, for example, the kind of college to which a student can apply, the grade a student will get in a course, or the rating given to a school. Summative assessments serve an important purpose in finding out what students know—for example, finding out if students in a given class or school are meeting state standards. However, the high stakes attached to these tests have given the word *assessment* a bad name.

The problem with using only summative assessment in your classroom is that if you wait to assess your students when teaching is over, it's already too late. Returning to the road trip analogy, a summative assessment of your progress would simply state that you had arrived in Sacramento instead of San Francisco. It would have been much more helpful to know when you had made a wrong turn along the way so that you could have turned around and gotten back on the right road.

Fortunately, there's more than one kind of assessment. Assessment that takes place while learning is still in progress gives you information about what students know so that you can reteach a concept students have not understood, talk to individual students who may be off course, and better adapt your teaching so that all of your students can learn. *Formative* assessment is a kind of assessment that helps you modify teaching and learning while learning is in progress and can be thought of as assessment *for* learning and not *of* learning. It is called formative because it informs teaching and learning. It may sound a lot like a description of effective everyday teaching, and there's a reason for that; good teachers pay very close attention to what their students understand and constantly adjust instruction to help students learn.

Formative assessment follows the same procedure that you would use in driving from your home in Los Angeles to San Francisco. It consists of three steps that can be phrased as questions:

Where are you going?

Where are you now?

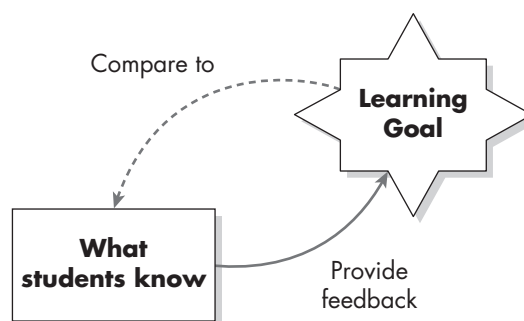
How are you going to get there?

These three questions comprise a process that is often called the formative assessment loop or the feedback loop; that is, the process of setting a learning goal, comparing that goal to what students currently know, and then giving students feedback to help them reach learning goals (National Research Council, 2001). Once you've set the learning goal, you can use a variety of formative assessment strategies like those presented in this book to find out what students know so that you can compare it to the goal. Then, if students have not met the goal, you can provide feedback in the form of questions, examples, or activities that will help them meet that goal. The formative assessment loop thus helps you to double-check that students have learned what you want them to know and allows you to make a contingency plan in the form of feedback that will help them to learn. This process is illustrated in Figure 1.1.

The first step involves deciding what students are going to learn during a lesson, a unit, or an entire course. Then, the teacher should tell students about those learning goals. The kind of learning goals that work with formative assessment go beyond simple lists of the different concepts students will learn. Goals that work well with formative assessment may come in the form of a question that will frame an instructional unit (e.g., What is an acid?) or can be criteria for what makes a good argument or a clear explanation. The goals can be stated explicitly or can be presented to students concretely in the form of exemplars that illustrate high-quality student work. Either way, it's important for students to know where they're going so that they can assess their own progress as they learn.

The second step involves finding out what students currently know as it relates to the learning goal. To do this, you need to have a way to get students to tell you what they actually understand, as opposed to rehashing what they think you want to hear, by asking open-ended questions, reading through student work, and listening to small-group conversations. It's important at this point to let students know they won't be graded on what they tell you because if you do, the students will focus on telling you what they think you want to hear rather than sharing their complex and often

Figure 1.1 The Formative Assessment Loop

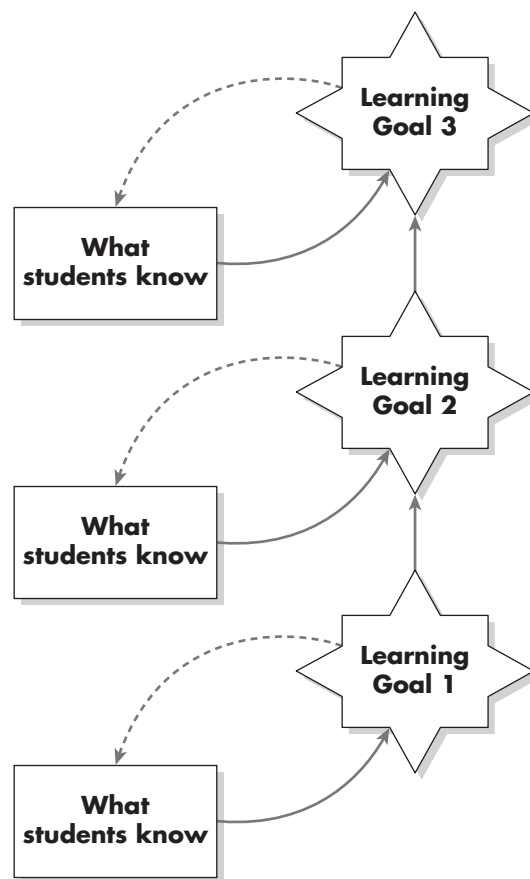


inaccurate ideas. Once you know what students think, you can compare what you found out with the learning goal and thereby identify what it is that students still need to learn.

The third step, and perhaps most important, is acting on this gap between what students know and what they need to learn. To help students reach learning goals, you need to give them some kind of feedback that points out inconsistencies in their thinking, connects what they know to more advanced concepts, or in some other way gives them information that will help them to improve their work. Feedback comes in a variety of forms: responding to students' questions, re-teaching important concepts that students have not understood, writing comments on their work, or encouraging them to set out steps for themselves to reach learning goals.

Over time, formative assessment loops can be connected together as you set increasingly challenging goals and help students to reach them through formative assessment. Each loop builds on the last, helping you to determine if students have truly met learning goals, so you can decide if students need more instruction to meet the present learning goal or are ready to move on to the next goal (Figure 1.2).

Figure 1.2 Multiple Formative Assessment Loops



EFFECTIVENESS OF FORMATIVE ASSESSMENT

Sometimes, it seems as if educational researchers are looking for the *silver bullet* teaching method that will truly help all students to learn. There is probably no one approach that will ever be effective for all students, but research on formative assessment indicates that it has a larger impact on student learning than most other teaching interventions (Black & Wiliam 1998). In fact, in a review of more than 250 studies, Black and Wiliam (1998) found that low-achieving students had the greatest learning gains in studies of formative assessment. Black (1998) summarized the findings of the 1998 review into four features:

- Formative assessment will require new teaching practices and thus calls for significant changes in classroom practice.
- Students must be actively involved in their learning.
- For assessment to function in a formative manner, results have to be used to modify teaching and learning.
- Assessment has the potential to affect not only student learning but also motivation, self-esteem, and participation in self-assessment.

The finding that formative assessment is especially effective in helping lower-achieving students reach learning goals has important implications for increasing equity in education. Rather than sorting students into *haves* and *have-nots*, formative assessment can increase access to high-quality science education for *all* students (National Research Council, 2001; White & Frederiksen, 1998). Formative assessment helps you to set challenging learning goals and then provides the mechanism for helping your students get there. By paying very close attention to all students in your classroom and giving feedback to individuals aimed at helping them to reach learning goals, you can actively work to level the playing field for lower-achieving students, English language learners, and special education students in your own classroom.

After Black and Wiliam called the attention of the education community to the important role that formative assessment can play in helping students to learn, researchers have explored how teachers can enact formative assessment in their own classrooms. The rest of this book will adapt these research findings into concrete approaches to developing and enacting your own formative assessments in your classroom.

OVERVIEW OF THE BOOK

This book is organized into two main sections. The first section will describe in detail each of the three steps in the feedback loop of formative assessment.

Chapter 2 starts by describing the first step in the feedback cycle—setting learning goals. It includes planning sheets that will help teachers to