Chapter 1. Creating a Formative Assessment System

“I don’t know how you’re going to learn this, but it’s on the test,” said the professor of a graduate class on neuroanatomy that Doug was taking.

The teacher's words articulated one perspective about education: Students should study and learn the content assigned to them. Her statement suggested that the teacher's job is to provide information and the students' job is to learn it, whatever way they can. When his teacher implied that the responsibility for learning rested solely on the students, Doug's confidence plummeted. Having looked at intricate pictures of the human brain, Doug was already questioning how he was going to learn this information. Now his teacher was telling him that she, too, didn't know how he (or any other student in the class) would learn it.

Understand that Doug was highly motivated to learn this content, and understand that his teacher was armed with the latest technology and instructional methods. The teacher was caring and passionate about her subject area, and, further, she had clearly communicated her high expectations at the outset of the course and summarized information weekly. Were these measures enough to ensure that Doug, and the other members of the class, reached high levels of understanding? Simply put, no. Even though high-quality instruction, innovative technology, motivation, high expectations, and passion are important in the teaching and learning process, they are not sufficient to ensure that learning occurs.

What was missing from this scenario—and from the entire class experience—was a formative assessment system. The teacher needed to establish learning goals, check for understanding, provide feedback, and then align future instruction with the students' performance. She needed an instructional framework that allowed her to feed-forward, not just provide feedback.

A Formative Assessment System

Feedback, when used as part of a formative assessment system, is a powerful way to improve student achievement. Feedback by itself, though, is less useful. As John Hattie and Helen Timperley note, "Feedback has no effect in a vacuum; to be powerful in its effect, there must be a learning context to which feedback is addressed" (2007, p. 82).

Hattie and Timperley propose a formative assessment system that has three components: feed-up, feedback, and feed-forward (see Figure 1.1). Feed-up ensures that students understand the purpose of the assignment, task, or lesson, including how they will be assessed. Feedback provides students with information about their successes and needs. Feed-forward guides student learning based on performance data. All three are required if students are to learn at high levels. Each of these three components has a guiding question for teachers and students:

- Where am I going? (feed-up)
- How am I doing? (feedback)
- Where am I going next? (feed-forward)

Imagine Doug's teacher establishing the purpose for one of her classes, perhaps something like this: To use cytoarchitecture to identify locations in the cerebral cortex. She might then check for understanding, maybe through an audience response system, and provide individuals and the class with feedback. For example, she might ask, "Do the various regions of the brain contain the same number of cellular levels?" This dichotomous question has an answer (yes), and students would receive feedback about whether they had answered the question correctly. Based on the number of correct and incorrect responses, the teacher could decide what to feed-forward. The performance data from the class might suggest that the teacher needs to provide additional information and instruction to the whole class. Alternatively, the data might suggest that the teacher needs to ask specific students to elaborate on their answers so that she can determine the source of their misunderstanding. Then again, the data might suggest that the class has a good grasp on this content and is ready to move on.
Feedback Alone Is Not Enough

We have argued that formative assessment is a system with three inter-related components and that no one component alone is sufficient to ensure student learning. We want to take that one step further and focus on the ways in which feedback by itself is problematic. We have already noted that feedback should not be used in a vacuum. In part, this is because feedback is external to the learner; it is "external regulation," meaning that a student is responding because of something happening to him or her from the outside,
rather than responding intrinsically or internally (Ryan & Deci, 2000). Although students may occasionally use external feedback in their internal regulations, it takes more than feedback to ensure that internal regulation occurs.

External regulation is not the only reason that isolated feedback is ineffective. Another reason is that it transfers responsibility for further learning and performance improvement back to the learner. Consider the ubiquitous research paper. Students typically work on these projects for an extended length of time, maybe even getting peer editing and feedback. Finally, the due date arrives, and the teacher takes the stack of papers home to grade. Some days later, the papers are returned with feedback. What do students do with this feedback? Anyone who’s been in school knows that students either recycle the paper or, if required, make the noted changes and resubmit the paper for another round of review. The teacher has likely spent a great deal of time writing comments, but this time seems wasted when students throw away their work or simply correct the mistakes the teacher identified for them. They haven’t really learned from their mistakes.

The problem bears repeating. Feedback reassigns responsibility back to the learner. Think of a recent project on which you have received feedback. After you received the feedback, did you realize that it was, once again, up to you to figure out the next steps? Were you frustrated with this experience? Did you say to yourself, “Now I have to create another one, only to be judged again? Why can’t she just tell me what she wants?” If this has happened to you, you’ve experienced the abrupt shift of responsibility that we’re talking about. This is not to say that we don’t want students to assume increasing responsibility; we do. It’s just that increasing responsibility should be planned, based on student confidence and competence. We don’t want students to suddenly be responsible for the first time when they make mistakes. Rather, a sophisticated formative assessment system built on a solid instructional framework should be in place from the beginning.

The Gradual Release of Responsibility Framework

A formative assessment system is only as good as the instructional framework on which it rests. No formative assessment system can compensate for poor instruction. Neither does simply having an instructional framework ensure that students will learn; both a framework and a system are required. The instructional framework we recommend is based on a gradual release of responsibility from teachers to students (Fisher & Frey, 2008a; Pearson & Gallagher, 1983) and includes five distinct components (see Figure 1.2).

**Figure 1.2. Gradual Release of Responsibility**


Establishing Purpose

Every lesson must have an established purpose. This purpose can be in the form of a goal or objective, provided that the students know what that goal or objective is. The established purpose can have different components, such as content versus language (which will be more fully addressed in Chapter 2). Establishing purpose is important for many reasons, including alerting students to important information and keeping the teacher from getting off topic by discussing tangential information. In a formative assessment system, the purpose drives both feedback and feed-forward. Most people agree that it’s not fair to assess or test students on things that haven’t
been taught. Sometimes students don't get the purpose of the lesson, and, in those cases, it's not fair to assess students on things that haven't been clearly established as important.

Consider these two examples. In one classroom, the teacher has students working on projects, but they don't know why or what is expected of them. There is no learning goal or purpose. In this class, the feedback students receive may be meaningless. In another classroom, the teacher has students working on projects with a clearly communicated purpose: to understand how sonar is used to determine water depths. When the teacher checks for understanding, the feedback is aligned with this purpose and the teacher can provide additional instruction to students who make errors, feeding forward until they understand the content.

**Teacher Modeling**

School is more than a pile of discrete facts that students have to memorize; it's about thinking, questioning, and reflecting. As apprentices, students need examples of the kinds of thinking that experts do in order to begin to approximate those habits of mind. Thinking is a complex cognitive process that is largely invisible. To make it visible, teachers model through a think-aloud in which they "open up their minds" and let students see how they go about solving the various problems of school, from quadratic equations to decoding a word. As Gerald Duffy points out, "The only way to model thinking is to talk about how to do it. That is, we provide a verbal description of the thinking one does or, more accurately, an approximation of the thinking involved" (2003, p. 11).

In a formative assessment system, teacher modeling serves to highlight the processes that students should use to complete tasks and assignments. It's less about the specific content and more about the ways in which experts in different disciplines go about their work. As we will explore in greater detail, formative assessment systems require attention to more than the correct response. Feedback and feed-forward also focus on the processes that students use as learners and thinkers, as well as their self-regulation and self-monitoring. Teacher modeling, through think-alouds, can provide students with examples of "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000, p. 14) such that students are responding to the feedback and future instruction they receive about learning.

**Guided Instruction**

In each lesson, the teacher must guide students toward increased understanding. This happens through the systematic use of questions, prompts, and cues. In this phase, questions are used to check for understanding. When a student's response indicates a misconception or an error, the teacher prompts the student. Prompts are cognitive or metacognitive and focus on getting the learner to think. If prompts fail to resolve the misconception or error, the teacher provides a cue. Cues shift the learner's attention to a resource that may help. As we will see in greater detail in Chapter 5, guided instruction is difficult to do in a whole-class format and works better in addressing the needs individual students present as they learn.

In a formative assessment system, guided instruction is an opportune time to provide students with feedback while also providing additional instruction. In this way, guided instruction plays a pivotal role in a formative assessment system as teachers feed-forward instruction based on real-time student responses. Consider the following exchange between a teacher and a small group of students having difficulty with the concept of writing mathematical sentences as inequalities.

**Teacher:** Tell me more about your answer. Read to me what you've written.

**Alexis:** The sentence says "Twenty minus the product of four and a number x is less than four." [20 - 4x < 4]

**Teacher:** Yes, it does. So what did your group write on the chart paper?

**Brandon:** Right here. [points]

**Teacher:** Can you read that to me? Not from the projector but from your chart paper?

**Justin:** We wrote twenty minus four plus x is less than four. [20 - 4 + x < 4]

**Teacher:** Did that sound the same as when Alexis read it?

**All:** Yeah?

**Teacher:** Think about the word *product*.

**Alexis:** That's to multiply.

**Justin:** But we didn't multiply.
Brandon: Where do we multiply?

Alexis: Maybe right here? [points to the minus sign]

Teacher: Be careful. You might want to read it again.

Alexis: Twenty minus the product of four and a number x is less than four. Oh, wait, first we have to write 20 and then minus.

Justin: Then it says product, so we have to multiply. But you can't have multiply next to minus.

Teacher: [Cups her hands around the words "the product of four and a number x."]

Brandon: Wait. Look. It's 4x, not minus four plus x.

Alexis: Oh, it's 20 - 4x < 4. That's right, huh?

Justin: It is, now read it again. It's just like the sentence up there. [points to projected problem set]

This brief exchange allows the teacher to prompt and cue such that students experience success and complete the task. Will they need additional instruction? Probably. That's what formative assessment systems are all about: reducing discrepancies between current understandings and a desired goal (Hattie, 2009). Feedback alone would probably not have resulted in new understanding.

Productive Group Work

Though students stand to learn a lot from and with their teachers, they are unlikely to consolidate that understanding unless they also work alongside peers in creating and producing something. Importantly, creating is now considered the highest-order thinking task in the Bloom's taxonomy revised for the 21st century (see Figure 1.3). Creating something requires that students use their prior knowledge in new ways and that they rally resources to complete the task. As Matthew Crawford argues in Shop Class as Soulcraft (2009), thinking should not be separated from doing. It is the doing that solidifies understanding. Of course, educators have known this for a long time, but group work got a bad reputation because we have all experienced bad examples of this good idea. How many times have we been assigned to a group, just to do all of the work and watch others share the credit for it? That's not the productive group work we're talking about, nor is it the cooperative learning that David Johnson and Roger Johnson (1999) envisioned. The key to productive group work is individual accountability. Each member of the group must produce something based on the group's interaction. It is when students work alongside their peers that they interact, using academic language and argumentation skills.
Figure 1.3. Bloom’s Taxonomy in the 21st Century


Figure 1.4 contains an example of a product from a productive group work task in a government class. The example is one of the products from the group; each student produced his or her own notes. In this case, students were reading a text about the importance of writing letters to elected officials. Each student took notes about the reading in the upper left quadrant of the conversation roundtable. Then, as each member of the group discussed the reading, the other members took notes in a corresponding quadrant. When the group completed its reading and discussion, each person wrote a single-sentence summary in the middle of the paper.
In a formative assessment system, the work students create during a productive group session serves as excellent fodder for checking understanding. The instructor reviews these work products against the lesson’s purpose to determine which students need additional instruction (as will be described in the subsequent chapters of this book). For example, even a quick review of Eric’s conversation roundtable suggests that he understands this content and that the group had a very interesting conversation while creating notes. Following this review, the teacher modeled his own search for his elected officials, examined the officials’ perspectives on specific issues, and then chose a topic on which to write a letter to an elected official.

**Independent Tasks**

The goal of education is to produce lifelong learners who can independently access and use information. Thus, each lesson must include opportunities for students to apply what they have learned on their own. Both in-class and out-of-class independent tasks provide students with opportunities to apply what they have learned.

The key to effective independent work lies in timing. Independent work should be used when students have demonstrated some level of success with content in the presence of their teacher and peers. Here’s what doesn’t work: homework assigned just after students have been introduced to content. If, for example, students were just introduced to methods for calculating the slope of a line or adding fractions, it is probably best not to assign homework on that content on the same day—because that homework is premature in this instructional cycle. It’s not that homework is bad or evil; it’s just that it must come when students are ready. In a formative assessment system, independent work allows for practice and application. It can also serve as a review for determining if students have grasped the prerequisite content or if additional instruction is necessary.

The components of a gradual release of responsibility model do not have to occur in a specific order to be effective. Take, for example, a lesson in which the teacher starts with students independently writing a journal entry in response to the question “How are we connected to our environment?” When the timer rings, the teacher has students work in triads to create a visual representation of their collective ideas. As part of this productive group work, each member of the group writes in a different color so the teacher can track each student’s contributions. As the groups work, the teacher meets with small groups for guided instruction, asking questions and then prompting and cueing their responses. After meeting with several groups, the teacher identifies an area of need and gains students’ attention. In this think-aloud, the teacher models his or her understanding of the word *connected* and the various ways that things can be connected, both physically and metaphorically. The teacher then establishes the purpose of the lesson and invites students to return to their groups and complete their charts, taking into account the additional information provided.

Again, the order of components is not important. What is important is that the teacher has an instructional framework that allows him or her to identify instructional needs, provide students with feedback, and plan appropriate instruction.

**Looking Back, Looking Forward**

We’ve introduced a system for formative assessment that provides teachers with a way to take action on student performance data. This system includes feed-up, feedback, and feed-forward, such that students understand a lesson’s purpose and goal, are given information about their successes and needs, and experience high-quality instruction that closes the gap between what they know and can do and what is expected of them.
We do know that there is more information collected about students than ever before and that most of it is not used to make instructional decisions—probably because teachers spend too much time on student feedback and not enough time on feed-up and feed-forward. As we have noted, an exclusive focus on feedback is ineffective because it transfers the responsibility back to students exactly when they are struggling. Instead, we need an instructional framework that allows us to use performance data to make future instructional decisions. Our instructional framework, based on the gradual release of responsibility, provides an intentional way for teachers to increase student responsibility at appropriate times and reassume responsibility as needed.

In the next chapter, we turn our attention to the first part of the system—feed-up. We will explore the ways in which a lesson's purpose can be established and why a clearly communicated purpose is important. We will also investigate the role that motivation plays in student learning as well as how goal-setting can ensure that students become intrinsically motivated and exhibit internal regulation of their learning.