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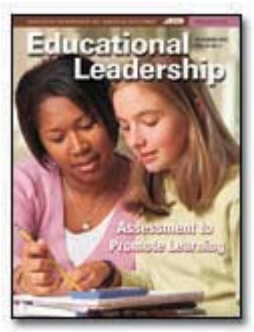
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Linking Formative Assessment to Scaffolding

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Learning theory supports four effective strategies common to both formative assessment and scaffolding.



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Some people roll their eyes when ivory tower academics talk theory. But a good theory can be immensely practical. Learning theory provides coherence and big-picture understandings, especially when we're trying to change our teaching practices. Learning theory also helps us decide what to do when we can't rely on past experience. Moreover, it provides a basis for fitting together separate research-based strategies into a pedagogical approach that really works.

Take *formative assessment* and *instructional scaffolding*, for example. When you consider the terms in light of sociocultural learning theory and Vygotsky's (1978) zone of proximal development, they're essentially the same thing. Occurring in the midst of instruction, formative assessment is a dynamic process in which supportive adults or classmates help learners move from what they already know to what they are able to do next, using their zone of proximal development.

Moving Learning Forward

Present-day learning theories and research findings have profound implications for teaching practice because they tell us how intelligence develops. Contemporary learning theories—including constructivism, cognitive theory, and sociocultural theory—share several core principles. Most important are two ideas: that we construct knowledge, and that learning and development are culturally embedded, socially supported processes.

Children develop their abilities to think and reason in the same way that they learn language, gestures, interpersonal behaviors, manners, and tastes—through their social interactions with family and community. According to Vygotsky's (1978) cultural theory of development, any aspect of a child's cognitive development occurs twice: first on the social plane in interaction with others, and then on the psychological or internal plane. Whatever language and logical structures children use in their thinking, they first learned through social interactions.

Vygotsky's zone of proximal development model explains how this development occurs. The zone of proximal development is the space between

> the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (1978, p. 86)

Learning in the zone of proximal development is a joint activity in which the adult simultaneously keeps an eye on the goal of fully proficient performance and on what the learner, with assistance, is currently able to do. In the case of language development, the process is natural and almost invisible as parents encourage and support their children's increasingly competent efforts. Reciprocal teaching (Palincsar & Brown, 1984), which targets reading comprehension, is an example of a formal strategy used to help students develop their language skills.

Terms in Sync

Scaffolding and formative assessment are strategies that teachers use to move learning forward in the zone of proximal development. Scaffolding refers to supports that teachers provide to the learner during problem solving—in the form of reminders, hints, and encouragement—to ensure successful completion of a task. An important feature of scaffolding, especially in authentic, apprenticeship contexts, is keeping the task whole—"controlling those elements that are beyond the learner's capacity" (Wood, Bruner, & Ross, 1976, p. 90).

For example, when a child is first learning to sew or set the table, adults may step in and help with the trickiest or most difficult part—threading the needle or taking the breakable glasses down from the top shelf—but nevertheless, the child completes the real task. In classrooms, teachers help students with their research before sending them to the library on their own. When a student is stuck because he or she can't find information on a given topic, the teacher may suggest a new search term or help the student narrow the topic, but in the end, the student completes the research process on his or her own. Gradually, as competence increases, the teacher cedes more control to the learner. To be successful, the learner must also come to understand and take ownership of the goal.

Formative assessment uses insights about a learner's current understanding to alter the course of instruction and thus support the development of greater competence. From a sociocultural perspective, formative assessment—like scaffolding—is a collaborative process and involves negotiation of meaning between teacher and learner about expectations and how best to improve performance.

When D. Royce Sadler wrote his seminal paper on formative assessment in 1989, he was trying to show why students so often failed to improve, even when teachers provided accurate feedback. He argued that it was insufficient simply to point out right and wrong answers to students. For assessment to be "formative," a student must

- Come to hold a concept of quality roughly similar to that of the teacher.
- Be able to compare the current level of performance with the standard.
- Be able to take action to close the gap.

According to Sadler, the teacher could help the student internalize quality criteria by translating them "from latent to manifest and back to latent again" until these criteria become "so obviously taken for granted that they need no longer be stated explicitly." Sadler wanted to develop evaluative expertise in students so they could become proficient at monitoring their own learning. Like scaffolding, this kind of classroom interaction can foster intrinsic motivation as well as cognitive and metacognitive learning.

The Link Between Assessment and Research

The following four strategies illustrate the strong connection between formative assessment and research on learning. We must keep in mind, however, that educators will not achieve the benefits of formative assessment for learning simply by implementing a string of promising techniques or by using them mechanistically. Research-inspired strategies are not likely to be effective until they are part of a larger cultural shift in which teachers and students jointly take up learning as a worthy endeavor (Shepard, 2000).

Eliciting Prior Knowledge

Students build new understandings—about anything from mathematics to video games—by making sense of new experiences in light of what they already know. In this context, Tharp and Gallimore (1988) offered the metaphor of weaving: We understand new information only when it has been "woven into our *system* of meanings and understandings" (p. 109). Using sociocultural theory, Tharp and Gallimore developed the concepts of responsive teaching and instructional conversations to describe how teachers can assist learning by eliciting students' relevant knowledge.

Teachers should not think of prior-knowledge assessment as a discrete pre-test to use from time to time. Rather, it should be common classroom practice. We should routinely ask ourselves what we already know that will help us solve a problem or learn from a new unit of study. For example, with Ogle's (1986) K-W-L technique, teachers ask students to post on a chart what they already *know* (K) and, through discussion, establish what they *want* (W) to learn. At the end of the activity, students discuss and summarize what they have *learned* (L). Knowledge-activation routines like this help develop students' metacognitive abilities while providing relevant knowledge connections for specific units of study.

Similarly, Moll, Amanti, Neff, and Gonzalez (1992) collaborated with teachers to identify student "funds of knowledge" as another way to draw connections between student learning experiences in and out of school. For example, a teacher who made a home visit observed a child selling Mexican candy to a neighbor and developed a unit using candy as a theme. Students studied the ingredients used to make candy and discovered the differences between the artificial flavors and coloring used in U.S. candies and the vegetable dyes and real fruit used in Mexican ones.

Routinely eliciting and building on prior knowledge can become part of the larger cultural shift required to establish a learning classroom. In a recent study of new formative assessment practices, Black and Wiliam (2004) provided an example of the power of new norms:

> One class, subsequently taught by a teacher not emphasizing assessment for learning, surprised the teacher by complaining, "Look, we've told you we don't understand this. Why are you going on to the next topic?" (p. 35)

Providing Effective Feedback

We think of feedback as essential for learning. Surprisingly, in a comprehensive review of feedback, Kluger and DeNisi (1996) found that one-third of the studies showed negative effects—feedback about performance actually harmed learning outcomes. According to Kluger and DeNisi, positive learning outcomes were more likely when feedback focused on features of the task—such as how the student could improve in relation to the standards—and emphasized learning goals instead of lavishing nonspecific praise or making normative comparisons. In motivational literature, *learning goals* refer to learning for the sake of mastering a skill and becoming competent—intrinsic motivation. In contrast, *performance goals* refer to performing a task to please someone else or to get good grades—external motivation. In classrooms, the kind of task-specific feedback that helps learning might be, "Great, you told us about the most important thing that happened in the story," or "Try to give more detail about why the puppet looked scary."

Although sustained, one-on-one interactions are not feasible in the regular classroom, detailed studies of one-on-one tutoring can show us how effective feedback works. For example, Lepper, Drake, and O'Donnell-Johnson (1997) observed that expert tutors are highly selective in how they use feedback. They typically ignore errors that are inconsequential to the solution process, such as spelling errors in an early draft. They forestall errors by offering hints when they perceive that a student is likely to repeat a previous error (for example, when a student reads a word problem aloud with a misplaced emphasis, revealing his or her misunderstanding of the problem). These decisions help maintain student motivation and self-confidence during the feedback process. Consistent with the idea of working in the zone of proximal development and Sadler's point about formative assessment—that students must be able to take action to close the gap between their current and expected performance—feedback is most effective when it helps move the student forward.

In a study that could provide a feasible model for professional development, Elawar and Corno (1985) worked with mathematics teachers to help them learn how to provide more focused feedback to students. Their feedback training emphasized these guiding questions: What is the key error? What is the probable reason the student made this error? How can I guide the student to avoid the error in the future? As a result of this more focused feedback, student achievement dramatically improved compared with several control classes. In addition, students developed more positive attitudes about mathematics.

Teaching for Transfer of Knowledge

A goal of learning is for students to be able to extend their knowledge and apply it in new situations. However, both research findings and practical experience tell us that school learning is often compartmentalized and inert. In contrast, making connections and constructing meaning are integral to teaching for both transfer and robust understanding. Developing this kind of learning requires attention to metacognition. Classroom practices should include a broader discussion of how students can use specific strategies—not just within the narrow perimeters of a given lesson or set of content—and how they can use insights from previous lessons to generate new knowledge. Students might discuss such questions as "What do we already know about fractions that can help us understand decimals?" or "How is learning about ratios and proportions the same as—and different from—learning about fractions?"

One of the many unfortunate influences of popularized behaviorism on education is its narrow conception of learning objectives and test fairness. For behaviorists, a fair test must correspond exactly to what teachers have taught. However, as the teaching-to-the-test literature has shown, repeated practice with familiar formats reduces the likelihood that students will be able to use their knowledge when they encounter problems posed in even slightly different ways (Shepard, 1997). Teachers shouldn't ask students to answer questions on a summative exam that are fundamentally different from the kinds of questions the students experienced during instruction, but they should foster a classroom culture that challenges students to make connections and apply what they have learned to a broad range of problems. For example, as soon as students show me they've "got it," a new question always follows my congratulatory smile: "Now, have you thought about it *this* way?" When this wider range of questioning is the rule in the classroom, it becomes appropriate to expect extensions, applications, reformulations, and connections on summative examinations.

Teaching Students How to Self-Assess

Student self-assessment is not about saving teachers from the work of grading papers. When used in a way that develops student thinking, it can be a deeply principled practice that serves both metacognitive and motivational purposes. In addition to acquiring specific knowledge and skills, becoming competent in a field of study means learning and internalizing the standards by which others will judge our performance. Posting rubrics so that students can see the features of a good essay helps make criteria accessible, but the real metacognitive work takes place as students begin to learn the meaning of rubric components by trying to interpret them and apply them to their own work. High school students learn what it means to support an argument in a history paper in the same way a 3rd grader learns how to write a good summary of a story—first by receiving formative feedback about essential elements and then by being able to self-critique and check for those elements in their own work.

Self-critique increases students' responsibility for their own learning and can make the relationship between teacher and student more collaborative. In case studies of self-evaluation practices in sites in England and Australia (Klenowski,

1995), students reported that they came to a clearer understanding of the assessment criteria and became more reflective in their judgments because they knew they would have to discuss how they met the criteria. Students also became more interested in teacher comments and feedback than in grades.

A study by White and Frederickson (2000) illustrates the power of self-assessment. In the context of an inquiry-based science curriculum, students learned to evaluate their own and one another's research by applying specific criteria, such as the degree to which the student's work revealed knowledge of the science and a grasp of the processes of inquiry; was systematic; was carefully reasoned; and used the tools of science. Their judgments had a correlation of 0.58 with teacher ratings, whereas the judgments of control students, who saw the criteria only at the end of the curriculum, had a correlation of only 0.23 with teacher ratings. Compared with students in control classrooms, students who learned to self-assess showed greater gains on an inquiry test, earned higher scores on their research projects, and earned higher scores on the conceptual model test. Impressively, the advantages of learning to use the assessment criteria were greatest for previously low-achieving students, raising their performance to the level of high-achieving students in the control classrooms. White and Frederickson's students became successful in science through scaffolding that emphasized the process of self-assessment.

A Learning Culture

Perrenoud (1991) argued that some students will work hard and thrive on formative assessment, whereas others are "imprisoned in the identity of a bad pupil and an opponent" (p. 92). To counteract this, Perrenoud emphasized that teachers who want to practice formative assessment must "reconstruct the teaching contract" (p. 92). Our aim should be to establish classroom practices that encourage peer assessment, regard errors as opportunities for learning, and promote shared thinking. This implies a profound cultural transformation: classrooms in which both students and teachers focus on learning rather than on grades.

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