**Research Says / Good Feedback Is Targeted, Specific, Timely**

Bryan Goodwin and Kirsten Miller

Many parents have observed the irony that a child who shows little perseverance when practicing piano or doing homework will joyfully commit countless hours to mastering Guitar Hero or other video games. In fact, by the time the average U.S. adolescent turns 21, he or she will have spent *10,000 hours* playing video games (Prensky, 2001)—which is, as it turns out, about the same amount of time necessary to fully master a sport, musical instrument, or area of professional expertise (Ericsson, Krampe, & Tesch-Romer, 1993).

According to Prensky (2007), the addictiveness of video games can be partly attributed to the constant stream of feedback they provide. At each level of the game, players learn what works and what doesn't, and they can immediately use that knowledge to advance to more challenging levels. And researchers have found that the same dynamic applies in education: One of the most powerful keys to unlocking student motivation and perseverance is feedback.

**A Powerful Effect on Learning**

In a recent update of Marzano, Pickering, and Pollock's 2001 meta-analysis, McREL researchers found an effect size for feedback of 0.76, which translates roughly into a 28 percentile point difference in average achievement (Beesley & Apthorp, 2010; Dean, Pitler, Hubbell, & Stone, 2012). John Hattie (2009) found a similar effect size of 0.73 for feedback in his synthesis of 800 meta-analyses of education research studies; in fact, feedback ranked among the highest of hundreds of education practices he studied.

But not all feedback is good feedback. Despite the generally beneficial effects of feedback, one-third of studies on feedback examined in two seminal meta-analyses actually found *negative* effects on learning (Shute, 2008). Research points to three keys to using student feedback to improve student achievement and avoid these negative effects.

**Link Feedback to Learning Objectives**

The first rule of feedback reflects the straightforward observation that feedback doesn't do much good if students are not receptive to it. Researchers have long noted what many teachers have seen for themselves—when students buy into their learning objectives, they display more positive attitudes toward learning, more effort and perseverance, and greater engagement in their schooling (Pintrich & Schunk, 2002).

Further, some research suggests that when feedback is delivered as formative guidance rather than summative evaluation, it can help students develop a *learning orientation*, in which they view improving their own competence as the goal of learning, as opposed to a *performance* o*rientation*, in which they view being evaluated well by others (or getting a good grade) as the goal of learning (Shute, 2008).

**Make Guidance Specific**

When the two of us were beginning writers, we shared a pet peeve—editors who would scrawl in the margin next to a piece of prose the three ambiguous letters *awk* (short for *awkward*). As novices, we had no idea what was wrong with the offending phrase or how to fix it. Rather than helping us improve our writing, the vague feedback just left us grumbling as we padded our sentences with extra words to appease what seemed to be an editor's arbitrary sensibilities. In short, our writing got worse, not better.

Vague feedback can have similar negative effects on students, resulting in uncertainty, decreased motivation, and even diminished learning. Case in point: A study of 6th graders found that providing students with feedback in the form of written comments resulted in significantly higher achievement than providing the nonspecific feedback of numeric scores (Wiliam, 2011). Most intriguing, though, the same study found that adding numeric scores to written comments negated the benefits of the comments, presumably because "students who got the high scores didn't need to read the comments and students who got low scores didn't want to" (Wiliam, 2011, p. 109). As it turns out, the best feedback isn't a score or grade; it's clear, specific guidance on how to improve.

**Give Feedback at the Right Time**

Research presents a paradox regarding the timeliness of feedback. Obviously, students don't learn much from feedback provided weeks after completion of a long-since-forgotten unit or assignment. For most education purposes, immediate feedback seems preferable, especially when students are learning difficult concepts or procedural skills (such as long division) in which they run the risk of developing misconceptions or faulty approaches. However, feedback that's *too* immediate may cause students to rely on teachers for answers rather than persevering and figuring out problems on their own (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991).

The optimal timing of feedback seems to depend on the nature of the learning task. When students are acquiring new, complex knowledge or skills, real-time checks for understanding and tips can prevent them from developing misconceptions or incorrect practices. But when they are extending and applying knowledge (for example, writing an essay or solving a complex theorem), delaying feedback somewhat can enable them to self-correct, develop perseverance, and take responsibility for their own learning objectives.

**Making Classrooms More Like Video Games**

The environment in many classrooms, where feedback is often delayed and provides vague guidance only loosely tied to learning objectives, contrasts sharply with that of video games, where a player learns within moments that he or she has played the wrong note on Guitar Hero or taken a wrong turn in the Zelda labyrinth. It's hard to imagine children being glued to these games if, instead of receiving ongoing, real-time feedback, they got their results weeks later in the mail.

Teachers often complain about disengaged students who have been spoiled by the instant gratification of modern technology. Let's face it—video games will likely always have more entertainment value than a biology class. But borrowing some of the principles of these games—in particular, the relevance, specificity, and timeliness of the feedback they provide—could go a long way toward powering up classroom environments, making them more engaging and rewarding for students.

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[Bryan Goodwin](mailto:goodwin@mcrel.org) is vice president of communications, McREL, Denver, Colorado. He is the author of [*Simply Better: Doing What Matters Most to Change the Odds for Student*](http://www.ascd.org/publications/books/111038.aspx)*Success* (ASCD, 2011). [Kirsten Miller](mailto:kmiller@mcrel.org) is a lead consultant at McREL.

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