Assessment, Choice, and the Learning Brain

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***Editor's Note:*** *This is an excerpt from the article "Assessment and the Learning Brain: What the Research Says," which appeared in* Independent School Magazine *(Winter 2014) by* [*Mariale Hardiman*](http://education.jhu.edu/faculty/SOE_Faculty/mariale-hardiman) *and Glenn Whitman.*

If you really want to see how innovative a school is, inquire about its thinking and practices regarding assessment. For the students, does the mere thought of assessment trigger stress? Do the teachers rely heavily on high-stakes, multiple-choice, Bell Curve-generating tests? Or do the students seem relaxed and engaged as teachers experiment with new forms of assessment designed to support deep and lasting learning?

The growing field of educational neuroscience, converging developmental psychology, cognitive science, and education, can help teachers and school leaders rethink how they approach assessments. While some of its initial findings merely support what educators have intuitively believed, it is also challenging many assumptions and providing new insight into best educational practices, especially regarding assessment.

What we do know is that a plethora of assessment-related research has shed light not just on the importance of students' mindsets, but also on the importance of continual feedback and how active retrieval of information, in carefully spaced intervals, can produce long-lasting learning. Research also shows that providing students with choice enhances attention and engagement -- and confirms that the arts can help deepen long-term memory consolidation (Hardiman).

Specifically, the following research is helping to change our understanding of the correlation between teaching and learning -- and altering our approaches to student assessment.

**Mindsets: Performance vs. Mastery Goals**

Research on the connection between motivation and learning has focused on two types of mindsets that students develop, based on the kind of experiences (including assessments) we present them with in school. Students tend to develop either **performance-related goals** or **mastery goals** (Ames & Archer).

Performance-related goals are those linked to more traditional types of assessments. Students become motivated by the grades they achieve, their rankings compared to other students, and extrinsic rewards such as honor rolls or school awards. In contrast, students who develop mastery goals are motivated by the actual learning experiences. Their rewards arise from the challenges of acquiring and applying new knowledge and skills.

While students may possess a combination of both types of goals, those motivated primarily by performance goals tend to lose motivation and confidence when faced with difficult academic challenges or when set back by failures. In contrast, students who are motivated by mastery goals are more likely to persevere in the face of such challenges. Difficult tasks or setbacks do not diminish their motivation or self-esteem (Pintrich; Grant & Dweck). Students with mastery goals mindsets are more likely to choose more difficult but rewarding ways to demonstrate learning.

**Feedback on Performance**

Another focal point of research is the timeliness and method of providing feedback to students. Timely feedback has been shown to deepen one's memory for the material assessed (Pashler, Cepeda, Wixted, & Rohrer). Moreover, in a study comparing immediate versus delayed feedback, the mere anticipation of timely feedback produced better performance. Students who knew that they would get immediate feedback performed better on a task than those who were told that feedback would be delayed (Kettle & Häubl). Finally, studies suggest that marking answers right or wrong (as in multiple choice tests) has little effect on learning. However, providing the correct response only after a student has spent time "struggling" to find the correct answer significantly increases retention of the material (Fazio, Huesler, Johnson, & Marsh).

Researchers have also discovered that the spacing of assessments and feedback produces more effective learning. If students revisit content over carefully spaced intervals, they retain information longer than if presented with information once and then only assessed immediately after initial (short-term) mastery (Kornell, Castel, Eich, & Bjork).

These findings, among others, show us the reciprocal relationship between assessment and learning. Providing timely and effective feedback can improve students' mastery of the content and produce more efficient -- and satisfying -- learning experiences.

**Active Retrieval of Information**

A growing body of research suggests that actively retrieving information produces significant long-term benefits for learning compared to passive studying (Karpicke & Roediger). While any assessment requires some type of active retrieval, having students reconstruct what they know through alternative assessments leads to deeper understanding and consolidates learning in more powerful ways than traditional testing (Karpicke & Blunt).

Active retrieval is also crucial as students prepare for assessments. Too often, when we ask students to reflect on their study strategies, they say they simply reread class notes. Training students to build regular self-testing into their study strategies will help them embed material into their long-term memory (Kornell & Son).

**From Theory to Practice**

Moving neuroscientific research on assessment into classroom practice faces two barriers. First, despite the fact that the work of educators targets the organ of learning, the brain, most teachers and school leaders have little understanding of the architecture of the brain and how it receives, filters, and applies information. Second, work that falls under the various versions of "brain-based" is too often believed to be of greatest benefit to struggling learners, those who historically might be called "learning challenged." Such thinking is short-sighted and fails to recognize the importance of research in educational neuroscience for *all* students.

But what teachers assess should be what teachers want students to know, not just for an upcoming test, but also for the long term. And how we assess students has important implications for whether they will retain content or procedural knowledge for the short or long term. Far too often, as neuropsychology professor Tracey Tokuhama-Espinosa pointed out in 2010, "While students manage to keep enough dates, facts, and formulas in their head to pass the test, this knowledge never made it to long-term declarative memory, it was never truly learned at all (only memorized in the short term)." Research in educational neuroscience, therefore, should not only inform the types of assessments teachers give students, but also help shape the strategies students use to prepare for assessments, or to work through projects.

How can all this research impact assessment at your school? Every year, we need to assess every student in multiple, developmentally appropriate ways. That was the impetus for "[Assessment Tic-Tac-Toe](http://www.edutopia.org/pdfs/blogs/edutopia-whitman-assessment-tictactoe.pdf)." *(****Note:*** *link downloads a 60 KB pdf.)* This is what differentiated assessment means. Some assessments will play to a student's strength while others will pose significant challenges; some assessments will, wonderfully, do both.

**Notes:**

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