


the *Science* *of* Learning



Performance data can reveal

what *who* isn't learning and
what isn't being learned but not
why
students are struggling or
how to
address their needs.

My colleagues who serve as principals often struggle to both lead a powerful, whole-school vision for high-quality instruction and help individual students for whom success at learning and school remains elusive. The larger the school, the more quickly they determine that fulfilling both tasks simultaneously is impossible.

Our conversations begin with broad ideas and concepts about addressing learning diversity but quickly move to stories about the students who keep them up at night. Typical is one principal's concern about Jeff, a bright 10th grader who is generally a strong student, although he's had some difficulties since middle school. In particular, he receives poor grades on writing assignments, especially on essays and research papers. His state writing test barely scored a two. Jeff does well on most other tests and evaluations, and his teachers think highly of him, but his papers, reports, and essays are returned to him with the same messages: "highly disorganized," "needs more clarification," and "incomplete." The continued negative feedback on writing assignments frustrates Jeff and he feels humiliated about it. "I don't get it," he said when asked about what is going on. "I rewrote that essay twice, and it still comes back with marks all over it." His dad wonders if Jeff even has a chance at being successful in college.

Principals who are determined to help their teachers inspire all students to bold accomplishments while identifying the right strategies for their most complex and struggling learners need to have a relentless focus on making *learning* the core business of school. This isn't the same as emphasizing assessment data, standards, and instruction. Rather, it means focusing on the foundation upon which all those initiatives rest: an understanding of *how* people learn.

Findings from neuroscience and cognitive and behavioral science and their implications for learning can help principals equip their faculty members with strategies and tactics that make personalized and successful learning plans a reality. Equally important, their schools will unearth the unique strengths and affinities of uniquely wired minds. Not only will more students become successful learners but also schools will nurture many more diverse and creative minds.

How Learning Happens

Schools can't make more than modest gains in student achievement without making greater expertise on how learning happens a core competency of educational practice. The National Expert Panel on Increasing the Application of Knowledge About Child and Adolescent Development and Learning in Educator Preparation Programs—chaired by James Comer and Linda Darling-Hammond and convened by the National Council for Accreditation of Teacher Education—will issue a plan of action in 2010 calling for attention to child and adolescent development and learning in preparation programs. Practicing educators have had limited opportunities to acquire this knowledge, if they had any opportunities at all.

The primary focus for professional preparation and development—usually supported by No Child Left Behind and philanthropic dollars—has been on deepening content knowledge without balancing that focus by deepening learner knowledge. Concurrently, there has been an explosion of findings about neuroscience and its relation to learning. This new knowledge has filtered to only a fraction of U.S. classrooms despite the emergence of several organizations that are dedicated to this field. Many of those organizations focus on synthesizing the latest research

RESOURCES

The following organizations are involved in synthesizing research from science and education into a framework for understanding the brain and learning and translating those implications into strategies for classroom application.

All Kinds of Minds
www.allkindsofminds.org

CAST (Center for Applied Special Technology)
www.cast.org

How Students Learn Mathematics, History and Science.
M. S. Donovan & J. B. Bransford [Ed.]. 2001. Washington, DC: National Academies Press.

International Mind, Brain and Education Society
www.imbes.org

The Neuro-Education Initiative at Johns Hopkins University
School of Education
www.hopkinsmedicine.org/brainscience/resources/neuro_education_initiative

on learning and learning variation into a framework that can be used by educators to better understand the learning and academic performances of students—particularly those who appear to struggle.

All Kinds of Minds, one such organization, provides programs and resources for educators that are based on a synthesis of research led by Mel Levine. Neuroscience, developmental knowledge, and cognitive science research findings are placed in a neurodevelopment framework that organizes these insights into eight constructs that influence learning. Educators learn this framework and how to use it to determine students' learning strengths and weaknesses as a way to understand the phenomenology of their classrooms. At its core, this framework provides a way to understand individual students' behavior, work products, and responses to instructional tasks as they relate to how each student learns—or doesn't.

Medina (2008) asserted that being able to "read" a student's mind is a powerful tool in the hands of teachers:

This is the ability to understand the interior motivations of someone else and the ability to construct a predictable theory of how their mind works based on that knowledge. This gives teachers critical access to their students' interior educational life. (p. 67)

Medina (2008) argued that having such understanding is the single most important ingredient for becoming effective facilitators of information and could be the most important predictor of who will become a good teacher, particularly among those who teach many kinds of minds.

As a first step to developing such understanding among their staff members, principals can incorporate study about learning variation in a long-term professional development plan. Content from organizations that focus on the relationship between neuroscience and learning in professional learning communities is helpful for self-guided online professional development or for presentations at all-staff conferences.

The Most Vulnerable

As teachers acquire knowledge about learning variation, how minds are wired to learn, and the neurodevelopmental requirements for specific subject matter mastery, they can begin to focus on the needs of their most vulnerable and perplexing students. In his keynote presentation at the third annual What Works Conference, Nelson (2008) relayed the following story: At the start of the school year, a principal from a school in Washington State asked her faculty members if they could identify any students they thought might fail. Each teacher named two or three. After taking all the names and compiling them into a composite picture, the principal reconvened the staff and said, "Now that we've doomed these students to failure, what should we do about it?" From then on, that group of students—and their progress—became the focus of weekly staff meetings.

Although Nelson (2008) used the story to describe how the school used improving science and math performance as the instructional focus, the research showed that the focus on the cohort of students resulted in gains on state tests for *all* students. When the staff made visible the students who were at risk of failing and used instructional innovation and intervention to reach them, all the students in the school benefited. Principals can replicate this success by asking their teams or academic departments to identify the students who are most at risk and then making the entire school faculty accountable for those students' success. Instructional management plans can help educators match instruction to how students are wired to learn.

Hidden Strengths

Finn (2008) noted that "people are good at different things—and plenty of human traits matter besides academics." Further, he warned, "Don't read too much into test

scores.... They're risky when it comes to judging individuals." Citing episodes with his own children, he concluded that "test scores concealed more than they showed" (p. 36). The obsession to meet benchmarks can obscure even more valuable information about students.

Often, educators rush to find out what's wrong when they see students who are not progressing at the expected grade level. The search for what is going wrong can't obscure the more important search for what's going right. In adulthood, what really counts is the depth and diversity of a person's strengths. Schools haven't served students well if they progress through each grade level to graduation while harboring undiscovered or neglected mental assets.

Equally important is helping all students identify and express their affinities and passions, which can be key in making decontextualized academic content relevant to the

lives of students. When she was the headmistress of Purnell School in New Jersey, Jennifer Fox developed an affinities program (www.strengthsmovement.com) for high school girls that can be a core component of any middle level or high school program. The program is based on the belief that building on students' strengths is the best way to help them create meaningful lives.

Ingredients for Success

Knowing how people learn enables educators to identify the mental processes that students use to master important lessons, tasks, and assessments. When teachers understand this, they can do two things: They can inform students of which brain functions they will be using in a lecture, an experiment, a group project, a written analysis, or a math problem or to prepare for a high-stakes test. They can also

Essential Components of a Neurodevelopment Profile

All Kinds of Minds has identified the following eight constructs—groupings of related brain functions—to help educators, students, and parents understand how unique profiles affect learning and performance.

Attention. The network of controls over brain performance, such as mental energy, the ability to process incoming information, and the ability to regulate output.

Temporal-sequential ordering. The processing, storage, and production of materials that is linear or exists in a meaningful serial order. Whether it's being able to recite the alphabet or push a response button on *Jeopardy*, being able to understand the time and sequence pieces of information is a key component of learning.

Spatial ordering. The ability to process and produce information and material that is visual and exists in a spatial way, such as visual patterns, symbols, school materials, and work spaces.

Memory. The storage and recall of information over a brief span, for extended periods, or while using or manipulating information or multiple task components.

Language. This function involves elaborate interactions among the various parts of the brain that control such abilities as pronouncing words, understanding different sounds, comprehending written symbols, and producing discourse.

Neuromotor functions. The brain's ability to coordinate the movement of large muscle, hand, and finger functions is key to many areas of learning, including writing and keyboarding.

Social cognition. The thinking that facilitates interpersonal interactions, particularly the ability to succeed in relationships with peers, parents, and teachers. This is one of the most overlooked components of learning.

Higher-order cognition. Interrelated processes that accomplish complex thinking and address sophisticated mental challenges.



identify and teach strategies that will support students who have weak wiring for the demands of a given task.

An added value from programs that develop learning expertise in educators is that they will also develop a shared vocabulary to use when describing student learning challenges. Teachers can replace—or complement—such labels as “attention deficit/hyperactivity disorder” with detailed descriptions of the students’ attention challenges and strengths. Progress reports and conferences about students can use language that avoids the judgmental tone that often creeps into discussions of students’ work.

Conclusion

Over time, developing teachers’ capacity to deeply understand the learning variation in their classrooms will replace the tyranny of testing with the love of learning as the focus of classroom practice. The beginning step of using this new research with just one student picked by every teacher—and jointly taking responsibility for seeing this cohort succeed—

will help teachers become confident that they have the skills to teach the most-complex learners. When minds are no longer misunderstood and interventions address students’ “weak wiring,” teachers, students, and parents replace old habits of frustration and defeat with a hopeful and optimistic sense that students can be successful and discover their strengths. **PL**

REFERENCES

- Finn, C. E., Jr. (2008, February 27). Lessons learned. *Education Week*, pp. 28, 36.
- Medina, J. (2008). *Brain rules: 12 principles for surviving and thriving at work, home and school*. Seattle, WA: Pear Press.
- Nelson, G. (2008, November). *Innovations in improving the STEM teaching pipeline*. Keynote presentation at the third annual What Works Conference of the National Comprehensive Center for Teacher Quality, Washington, DC.

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