

The Reading-

When best practices in reading intervention didn't reach all struggling readers at one high school, technology provided the successful ingredient.

Struggling students participated in a lab class that developed cognitive skills and improved brain functions that support reading.

As students' reading skills improved, so did their connection to their teachers and the school.

How do you build connections with students who do not feel they are part of the school community? Penn-Trafford High School in Harrison City, PA, always seemed to have a number of students who felt no connection to the school or their classmates. They skipped class or didn't participate when they did attend. They were prime candidates to drop out. They also shared another common factor: they were poor readers.

For years, the school had implemented a variety of interventions to confront adolescent illiteracy. Teachers provided direct instruction in reading, writing, and vocabulary skills. They used high-interest literature. The school implemented print and computer-based reading programs and conducted professional development.

Some students, however, continued to struggle. They experienced not only academic challenges but also low self-esteem, behavior problems, and feelings of hopelessness. They thought that reading was too hard, that school was a waste of time, and that teachers didn't care enough to really help them. Teachers, on the other hand, sometimes thought that those students weren't trying hard enough to help themselves or that they didn't care to learn. As a result, there was a widening gap between

students and teachers in the classroom—that is, until the school changed the way it approached instruction by shifting the focus from reading skills to the reading-ready brain.

Focusing on the Brain

Helping middle level and high school students reach their academic potential takes more than good teachers and good curriculum. A student's brain must be ready to learn.

Over the last 30 years, neuroscience research has led to a better understanding of the processes involved in effective reading and learning. The concept of brain plasticity, for example, refers to the brain's ability to change at any age throughout life. This principle is particularly important at the secondary level because it means that even if a student made it all the way to middle or high school without learning to read or with poor reading skills, his or her brain can change.

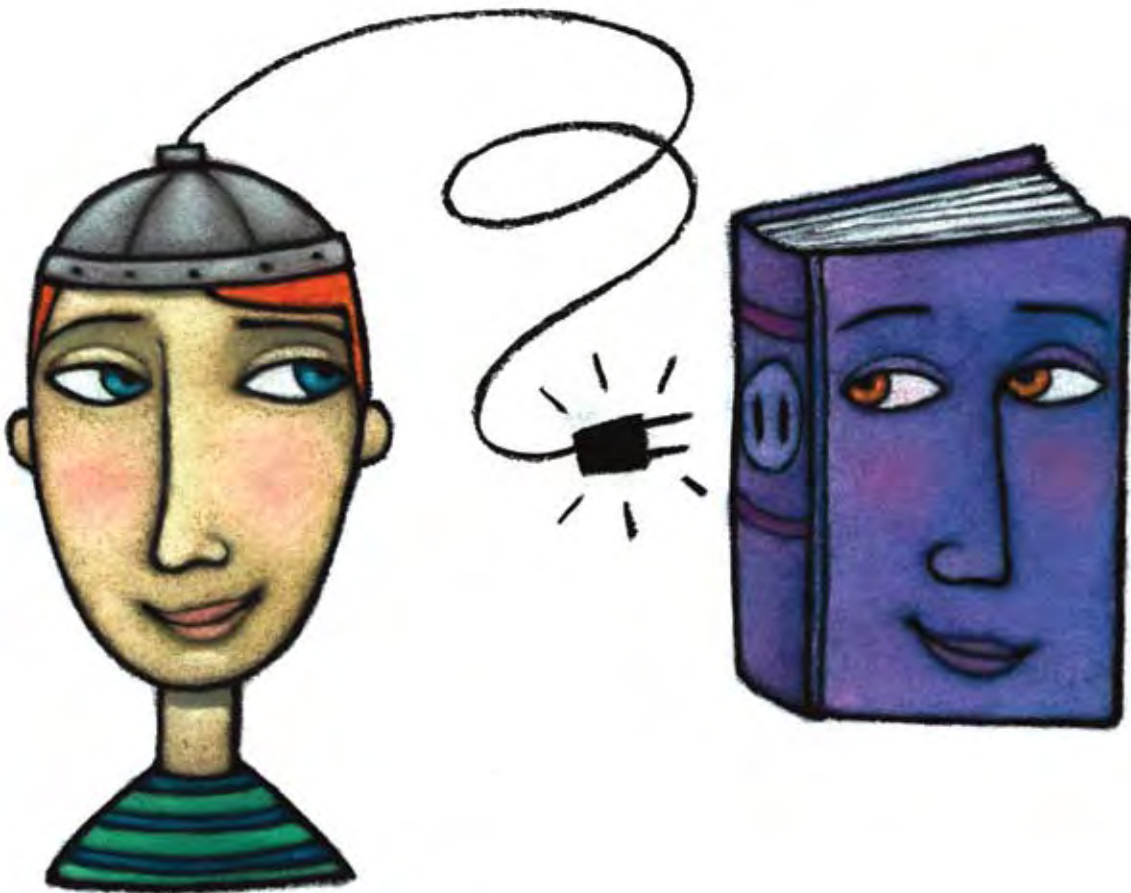
In fact, part of every educator's charge is to help every student develop a better, stronger brain. Thanks to neuroscience research, educators know that how children take in, store, and process information can be improved.

Looking at the array of gadgets that students bring to school everyday, educators also know that increasing numbers of students live their lives in a world of technology. Why

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Ready Brain



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Nine Steps to a Successful Technology Implementation

Be supportive. As principal, you set the example. Openly support the technology to gain the support of teachers, staff members, parents, and students. Provide the training that teachers need to successfully implement the program.

Be consistent. Use the technology as it was designed. Implement a regular schedule and stick to it.

Be forward looking. Ask teachers and lab coaches to tell students and parents what positive changes will occur when students work with the technology.

Be equitable. Assign the technology to diverse student populations. Avoid attaching a stigma to the technology—or the students who work on it—by having it used only by the lowest-performing students.

Be visible. Visit the classroom or the computer lab. Watch what students and teachers do with the technology.

Be positive. Praise the work and progress of the students and the teachers in classrooms, the computer lab, the office, and even the hallway.

Be knowledgeable. Understand the technology so that you can address questions or concerns from parents, teachers, and district staff and school board members.

Be prepared. Think of all the things that could go wrong with the implementation and what you need to do to make things right.

Be informed. In addition to monitoring students' academic performance, track attendance and discipline. Look at how technology affects the whole student.

then do schools continue to try to improve students' reading skills only through traditional instruction and interventions or pair new technologies with the same old instructional approaches? If those tried-and-true approaches did not work for students last year and the year before that, why would they work now just because they appear on a computer screen?

Back in the 1990s, the Penn-Trafford School District had begun to look into brain-based learning and had dabbled with a few programs here and there. The need to better help students address the underlying causes for reading failure led administrators to explore brain-based learning further as they searched for a solution.

With a Link-to-Learn grant from the Pennsylvania Department of Education, the high school implemented the Fast ForWord reading intervention software from Scientific Learning. The software is based on more than 30 years of neuroscience and cognitive research and uses computer-delivered exercises to build the cognitive skills that are required to read and learn effectively. A month later, the district's use of the reading intervention software expanded to include the middle schools and elementary schools as well.

Students at the high school were identified to work on the software on the basis of their test scores, grades, and teacher or parent recommendations. The goal in implementing this technology was to accelerate students' learning by boosting the brain's fitness to process incoming information more effectively and efficiently. Because class periods are 41 minutes, most students work on the software in the computer lab 30 minutes a day.

Changing the Brain

Adding technology to reading instruction brought significant benefits to both students and teachers. A key benefit is that technology can do some things that teachers cannot do or do not have time to do.



Take speech sounds, for example. Research demonstrates that language processing, especially phonology, is the primary cause of reading and spelling problems. To learn the rules of language and associate sounds with letters, students need to distinguish speech sounds correctly. The process is not easy for some students because speech sounds can differ by as little as 10 milliseconds.

Sometimes when a student's brain decodes speech sounds, it miscategorizes them, which can result in the misperception of a word. In a typical classroom where more than 80% of classroom instruction is presented through talking, problems with processing spoken language can lead to difficulties in a variety of areas, such as following directions. In written material, problems are evidenced by slow, labored decoding.

Technology, however, can stretch and emphasize speech sounds, progressing to natural speech sounds as a student advances. The ability to acoustically modify speech helps students recognize word sounds—first in isolated syllables, then in groups of sounds, then in words, and finally in sentences. Technology also makes it easy to individualize instruction and monitor each student's progress, no matter how many students there are. Further, a computer-based program does not become impatient if a student needs to practice or review something over and over again.

Technology also gives teachers the ability to trigger changes in the brain—and engage students—in ways that are nearly impossible to do with traditional instruction. For example, four key components of Penn-Trafford's reading intervention software work together to create the changes in brain function required to achieve literacy:

- Frequency and intensity: neuroscience research demonstrates that completing a set of learning tasks in a frequent, intense time frame accelerates learning
- Adaptivity: exercises that adapt with each keystroke to individual skill levels

and responses keep students continuously challenged but not frustrated

- Simultaneous development: exercises that develop major cognitive and reading skills simultaneously produce lasting improvements in learning
- Timely motivation: tiered rewards maximize motivation from start to finish.

Using those neuroscience principles, teachers can develop the processing efficiency of students' brains, which is essential for reading success. Neuroscience research shows that reading is a demanding activity, calling for many specific events to take place simultaneously in the brain. Thus, teachers use the reading intervention software to help students build four key cognitive skills sets that, when developed together, improve learning and reading:

- Memory: the ability to store information and ideas; essential for word recognition, comprehending complex sentences, and remembering instructions
- Attention: the ability to focus on information and tasks and ignore distractions
- Processing rate: the rate at which a student is able to accurately perceive and manipulate information; the rate at which a student can distinguish speech sounds and identify letter and word forms to create meaning
- Sequencing: placing the detail of information in its accustomed order (e.g. days of the week, the alphabet); the ability to determine the order of letters within words or words within sentences.

Student Successes

Stronger skills result in a wide range of improved essential language and reading abilities, such as phonological awareness, phonemic awareness, fluency, vocabulary, comprehension,

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decoding, syntax, and grammar. This is evident in individual student success stories.

One 10th grader, in particular, is one of the most striking cases of improvement. According to teacher Maureen Harris, this young man became her star student after working on the software, making reading ability gains of two and a half years in just one semester.

"He is actually above grade level now," said Harris. "I believe he started this class because he thought it looked easier than what he was doing, but then he really began to see the success he was having in and out of the Fast ForWord classroom." Added the student, "Keep it going because it really does help people. I can pay attention a lot longer now without getting distracted."

A chemistry teacher related a different story about a young woman whom teachers and administrators had a very hard time reaching, which was one of the reasons she joined the lab. One day, the teacher saw this student hiding a book under her desk. She was reading the book from her Fast ForWord classroom. The fact that this student, who had a history of being disengaged, was absorbed in a book was just incredible. Happy that she was reading and engaged, the chemistry teacher let her finish her reading that day.

In addition to becoming more engaged and attentive, students have started to form a connection to school and to each other. In fact, the first group of high school students who worked on the reading intervention software decided to call themselves "Fast ForWord Extremists." They even set out to make T-shirts to wear to school.

Seeing the progress this group was making, the lab teacher began reading books aloud to students after they completed their 30-minute software protocol. Soon the students—who had never before read a novel—began asking to borrow the books so that they could finish the story. Within a few weeks, the teacher called the district office and asked to order more books.

In addition, after reading a book on World War II and the Holocaust, the students banded together and wrote letters to the principal to request permission to take a field trip to the United States Holocaust Memorial Museum in Washington, DC. Twenty-two students visited the museum last spring.

Thanks to how well this neuroscience and technology approach has stimulated changes in behavior and attitudes, other students are asking their teachers and the principal how they can get into the class to work with the software. We also get calls and e-mails from parents who are eager to have their children work with the software and from those who are grateful for the interventions. Last year, one parent wrote about her son, "His grades this last nine weeks were really good. I feel he is more confident, plus he told me he thinks he is more alert, and he told my husband he can remember better when he reads. I can't believe the progress!"

Results

Student performance has improved as a result of the brain-based learning and technology implementation. On the districtwide assessment, students gained an average of 1.1 years in reading skill levels in 30 days. In addition, the district has experienced increases in attendance; decreases in behavior problems; and increases in confidence, particularly in the high school where some students were dropping out because they saw themselves as hopelessly behind. More difficult to measure are some of the intangible benefits of synthesizing neuroscience, technology, and instruction: bridging the gap between students and teachers and helping struggling readers gain the confidence, the focus, and the skills to become successful readers and graduate.

By unifying proven curricula with computer-based brain fitness exercises, the district has helped students improve the underlying cognitive skills required for effective reading and learning. Students have enhanced their

working, short-term, and long-term memory. They have improved their attention and focus; have increased the rate at which they are able to process incoming information; and have improved their recognition of the order of sounds, letters, and concepts.

Penn-Trafford School District's emphasis on technology and brain-based learning has strengthened the connections in students' brains to improve their capacity to learn now and in the future. The teachers and staff members have also strengthened students' connections to one another, to their teachers, and to the school. **PL**

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