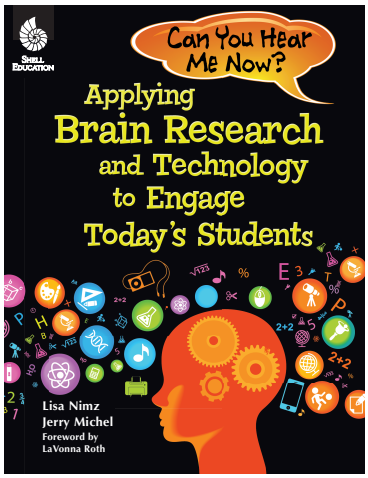
SHELL EDUCATION

Sample Pages from

Can You Hear Me Now?: Applying Brain Research and Technology to Engage Today's Students



The following sample pages are included in this download:

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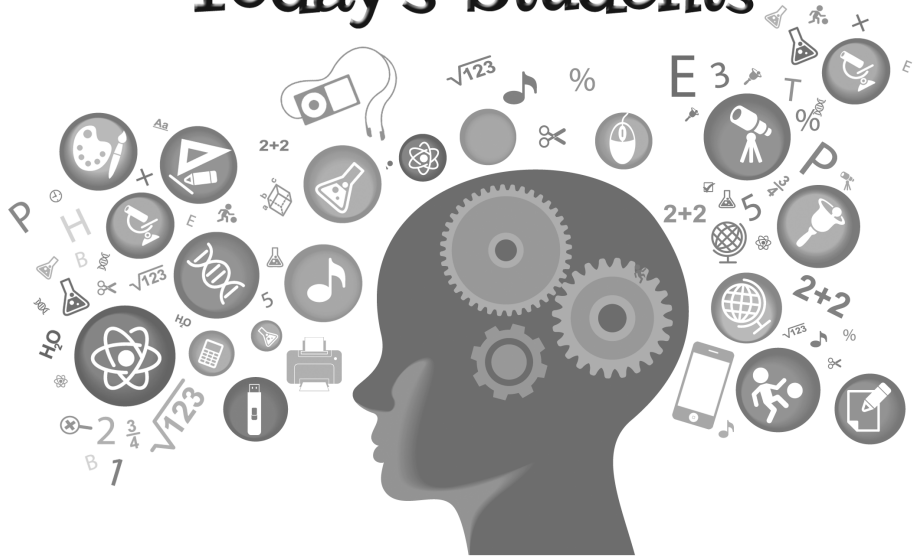
- Sample chapter selection

Can You Hear Me Now?

Applying Brain Research and Technology to Engage Today's Students



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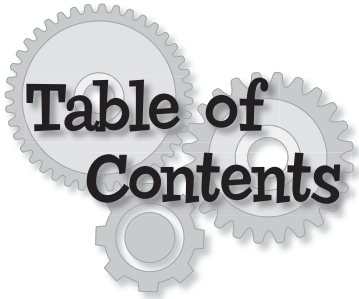

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students' performance and engagement is the highest. When students learn, they do not simply learn the content, they also learn whether or not to like or appreciate what they are learning.

As we work our way through the 21st century, educators must add a new topic to their list of beloved subjects—neuroscience. At the end of this century's first decade, there were more than 30,000 books in print that were related to the brain (Goldberg 2010). Even more importantly, this fascination must be shared with students and colleagues with the same enthusiasm as the vocabulary-loving English teacher, the "mad scientist" chemistry teacher, the number puzzle aficionado mathematics teacher, and the kindergarten teacher who finds a new favorite story to share every day.

Neuroscience Moves Out of the Laboratory

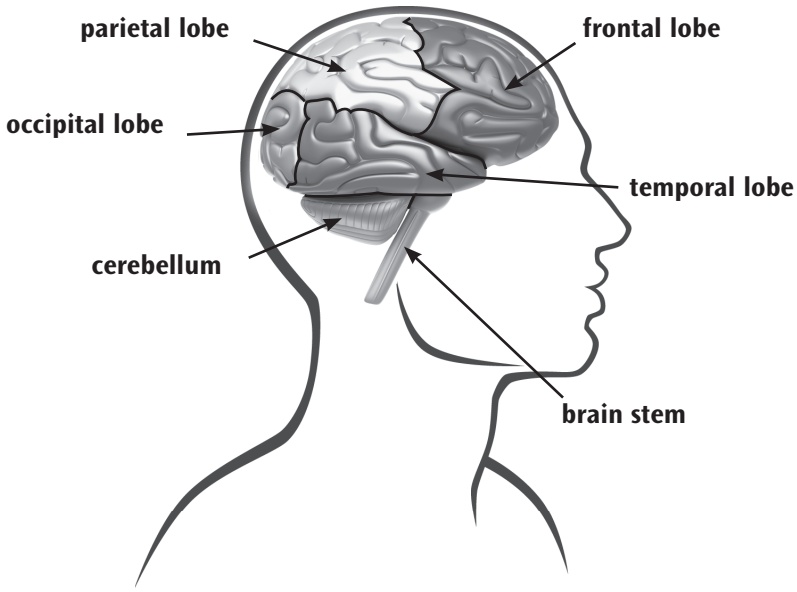
Neuroscience is not just for the laboratory anymore. What does a competent educator need to know about the primary engine behind learning in the human brain? How do educators find reliable, intelligible sources of information about how the brain works? How do they translate all the scientifically based research they encounter into classroom practice?

It turns out that teaching is like brain surgery—a deliberate wiring or rewiring of the brain. The brain is complex, multilayered, interconnected, and immensely powerful. It follows to reason that, if educators are to develop their students' intellect, their instruction and curriculum must likewise be complex, multilayered, interconnected, and immensely powerful. To take advantage of the processing power of the 100 billion neurons and 100 trillion connections (Zimmer 2010) in our students' (and our own) brains, it behooves us to develop a working understanding of how our minds access, process, remember, recall, and apply information.

Each part, or lobe, of the brain is responsible for specialized functions. The occipital lobe processes visual information. The temporal lobe processes auditory information, including speech, and stores long-term memories. Sensory integration is handled by

the parietal lobe. And the frontal lobe is responsible for the crowning achievements of judgement, problem solving, and planning. Figure 1.1 shows the different areas of the brain.

Fig. 1.1. Parts of the brain



Imagine what it would be like if our instruction could make use of each of these areas to create a more robust understanding of important concepts. Certainly, if you can feel it, experience it, see it, touch it, and hear it, you are more likely to understand and remember and recall it at a later date. Take a moment to reconsider Weinberger's metaphor of the Internet being organized like a web made by drunken spiders (2007). That might be just what our neural network looks like when it lights up and starts recognizing and making sense of facts, figures, and new ideas. Learning and understanding deeply depend on the learner's will to repeatedly focus on the content. This is what builds foundations and develops increasingly efficient neural networks; it always has and always will. Whether a settler is building a sod house on the prairie or an architect is building an undulating skyscraper in a bustling downtown area, there are common foundational

elements that must be understood and employed to make each structure stable and habitable.

In later chapters, we will explore the role practice plays in developing expertise in any given area. Being that success in school depends largely on expertise in reading, writing, and developing number sense, educators must first look at how learners make sense of new information and integrate it into the pattern-seeking networks and structures tucked in the folds of their brains.

Appropriately titled, Learning Sciences is emerging as a program of study at more than thirty major universities and research centers around the world, including Northwestern, McGill, Stanford, Tufts, and the University of Sydney. This exciting field combines multiple disciplines (often including cognitive science, computer science, educational psychology, and anthropology) and seeks to uncover what makes for the most effective learning environments. By focusing on real-world settings and taking a multifaceted exploration of how we learn, researchers and students in this field are building exciting bridges between research and practice. Tracey Tokuhama-Espinosa (2011) includes an exhaustive list of these institutions in her book *Mind, Brain, and Education Science: A Comprehensive Guide to the New Brain-Based Teaching*.

Educators can do the same thing in their classrooms and schools by actively engaging themselves in the science of learning, both with and without technology. The following possibilities can be considered: forming a book study group to discuss *Proust and the Squid: The Story and Science of the Reading Brain* (Wolf 2007), getting a subscription to *Scientific American: Mind*, following cognitive psychologist Daniel Willingham's Facebook page, or starting a social bookmarking group to collect and share interesting articles, websites, YouTube™ videos, and more with friends and colleagues. The important thing is simply to share findings, challenge ideas, and look for ways to continually improve how students learn and perform in the classroom.

Shaping Our Future: Outside Forces and How They Influence Education

It used to be that building a computer lab was all that a school or district needed to prepare students for the future. You can almost hear the whisper coming from the computers' cooling fans, "build it, and they will learn." Teachers and administrators struggled with how to integrate technology meaningfully into the curriculum. Should a separate teacher handle technology, because there was not time to squeeze one more thing into the curriculum? In elementary schools, should a computer lab class be added to the art, music, and physical education rotation, so teachers can have more time to meet and plan with grade-level teams?

Slowly but surely, in school board meetings, newspaper columns, and online forums, school communities are grappling with what it means to teach students in the 21st century. To test your own ideas about 21st century skills, imagine that these ideas have been put on trial and you are on the jury. When the prosecuting attorney asks what knowledge you have of 21st century skills, what will your answers be? You might say critical thinking is one of the concepts near the top of your list, although there are those who would disagree. One such example shares a sentiment often echoed by those who follow the movement for greater focus on 21st century skills: "With so much new knowledge being created, content no longer matters; that ways of knowing information are now much more important than information itself" (Rotherham and Willingham 2009, 16). Students believe it when they say, "Why do I have to memorize this? I can always Google it on my smart phone if I need the answer."

Taking advantage of technology to find information rather than learning and recalling facts may be a persuasive argument. That is until your ophthalmologist says, "Huh. Now that's funny. The laser really should not leave a mark like that on your cornea. Hold still a minute. Let me Google that. Oh, don't blink now!"

There are many situations and professions in which one must know the content so well it seems second nature. Such knowledge is crucial to basic competency—let alone expertise. These notions that place ways of knowing information above the information itself will make the 21st century skills movement "a weak intervention for the very students—low-income students and students of color—who need powerful schools as a matter of social equity" (Rotherham and Willingham 2009, 16).

The media and other public voices are constantly questioning the current state of our children's education. It does not take much digging to find expressions of concern that our school systems are hopelessly mired in the past. Pundits and policymakers alike sound clarion calls to draw attention to which partnership, foundation, coalition, or task force needs (or will provide) funding and how their vision will lead to the solutions for our children's future (for examples, see Foundation for Excellence in Education 2010; Johnson, Adams, and Haywood 2011).

Educators cannot avoid addressing the outside forces that are marshaling their arguments for change in the content of the curriculum, the manner in which we instruct, or the tools we share with students. By focusing on a series of critical questions, educators can avoid being led astray from their primary mission—providing a sound education for all their students. Questions such as the following enable educators to move forward with change that benefits teaching and learning:

- How do we know this particular innovation, tool, or resource is important?
- How do we explain why it is important to students, colleagues, and the community?
- How do we convince and teach others that it is important?
- How do we help others implement the change?

In the end, what matters most is how these questions are asked and addressed in each classroom. As educators move forward with new technological tools that are more meaningfully integrated into the curriculum, they must be thoughtful and

patient in equal measure. As any teacher will tell you, there is an inverse relationship between our confidence in any tool and how many times it crashes when put to use. It is days like those when we are ready to open the pod bay door and shove HAL right out, plummeting him back to Earth.

Time is a finite and overtaxed resource in any school, especially when it comes to providing classroom teachers with the resources and opportunities to deepen their understanding of how and why we all learn. Between determining how to address grade-level standards, making sense of the data collected from student assessments, designing differentiated learning activities, and preparing sub-plans, the times to process and share scientific research on learning and cognitive development might seem few and far between. Working with tools and media that seem to change between lesson planning and delivery in the classroom can make even the most confident teachers feel wobbly and uncertain.

Challenges in education are always present. Finding and refining the best ways to help young minds grow is hard work. Now, rather than making sure new copies of a classroom novel are the same edition so the pagination on our handouts from the ditto machine do not have to change, we make backup plans for when our interactive whiteboard ignores our attempts to interact with it.

The full potential of education is expressed through the interaction between our experiences and our openness to new ideas and understandings. The argument will never be whether or not to use the new media, technology, and information now at our disposal, but how to use it to better develop understanding and intellect, in both literacy and numeracy. While it is clear that technology (at least until the next operating system is released) is here to stay, educators must continue to remember that their brains have been here all along.

Thinking and Teaching in 2.0: Point/Counterpoint

Consider the difference between a trend and something that is trendy. Headlines, online and in print, often make texting, social networking, and other new media alternately frivolous window dressing to our students' lives or dangerous distractions that will lead to lower standards for literacy and numeracy development. Sit with a colleague and, in point/counterpoint style, use the two stems below to explore your views on 21st century learning tools in school. After your first round, switch sides and make your new arguments based on the opposing stem.

- Technology and new media open these doors to learning...
- Technology and new media create these barriers to learning...

As a result of this conversation or activity, work with colleagues to identify how our perspectives on technology influence our ability to integrate technology into instruction in meaningful ways.