How Memory, Focus and Good Teaching Can Work Together to Help Kids Learn

Everyone has a pet theory on how to improve education: better professional development for teachers, more money, better curriculum, testing for accountability, teacher incentives, technology, streamlined bureaucracy. Policymakers have been trying these solutions for years with mixed results. But those who study the brain have their own ideas for improving how kids learn: focus on teaching kids how to learn.

“The more you teach students how to learn, the less time you have to spend teaching curriculum because they can [understand] it on their own,” said William Klemm, senior professor of neuroscience at Texas A&M University. “I think the real problem is that students have not learned how to be competent learners,” he said. “They haven’t learned this because we haven’t taught them.” Neuroscientists still have a lot to learn about how the human brain learns, remembers and reacts to environments, but there are certain things Klemm said are fairly well documented and not always applied in schools.

TECHNOLOGY AND DISTRACTION

There’s no denying the Internet is an amazing resource for fast access to diverse perspectives and rich opportunities to extend learning. “That’s a good thing because the more you think about something from multiple perspectives, the better you are at understanding it,” Klemm said. But the Internet is also full of false information, and students aren’t always taught how to tell the difference.

For students, it’s easy to get distracted, pulled off track by the many interesting pop-ups, links or videos embedded in any Web post. When this happens, kids multitask, a concept neuroscientists have shown doesn’t really exist. When a person thinks she is doing two things at once, she is really switching rapidly back and forth between individual tasks, eroding the attention and quality of each task in the process.

“The problem with multitasking is it interferes with forming memories,” Klemm said. And while it has become trendy to say kids don’t need to know basic information because they can look it up on the Internet, Klemm is adamant that students cannot build more complex knowledge without information in their working memory. “We live in a generation where students are doing more and more of this, so they’re messing up their ability to memorize,” Klemm said.

Klemm believes the Internet makes students lazy. “When students rely on the Internet for knowledge, they are programming themselves to look for information on the Internet and not in their heads,” he said. When asked to recall the information they just looked up, they don’t remember it as well. Instead, they remember how to find the same information again on the Internet.
Without memorizing some information, it’s harder for the brain to acquire new knowledge and skills. It takes longer for the brain to process new information, and students are less likely and slower to ask informed and perceptive questions. “The more you know, the more you can make conclusions, even be creative,” Klemm said. “All of these things have to be done by thinking, and thinking has to be done from what’s in your working memory.”

Distractions of all sorts — whether it’s Friday’s football game or the phone in a student’s hand — are bad for learning, Klemm said. Teaching students to focus will be a crucial part of preparing them to build on the knowledge they’ve gained.

**PROTECTED LEARNING TIMES**

It’s often assumed that if a kid is paying attention while the teacher is talking, he or she is learning. But there are two additional times when the brain must be protected from distractions that are just as important: the period before and the period after the learning takes place.

When a student has an experience of learning, he holds that new information in his short-term memory while the brain consolidates it and prepares it for long-term storage. The problem is, short-term or working memory can’t hold very much information. Often students become distracted immediately after learning something, and that new sensory input crowds out the lesson before it can be used for thinking and building new knowledge. “Long-term memory requires physical and chemical changes in the brain,” Klemm said. Specifically, it requires protein kinase by the brain. If that process is blocked, with a distraction, for example, it prevents the brain from forming a long-term memory of what the student learned.

Neuroscientists are still researching what happens when a memory is recalled, say, for a test. Experimentally, it has been proven that when a student calls up a memory from long-term storage, it is temporarily placed in the short-term memory. At that point, there is an opportunity to enrich that memory before it gets reconsolidated. “They’ll remember an improved version of the original,” Klemm said.

**TAKEAWAYS**

There are several straightforward ways educators can start creating learning environments that support what neuroscience has found about how the brain learns best. While many of these concepts aren’t new, they come up again and again in research and bear repeating.

**Stress is bad for learning.** When students are worried about tests or something in their private lives, they are distracted from what’s going on in the classroom. Chronic stress is even worse. The steroids released when a person is under chronic stress kill neurons, particularly those located in the hippocampus, an important part of the brain for storing long-term memories. “Anything you can do to reduce a child’s stress will make it easier to be a better learner,” Klemm said.
Classroom decorations can be distracting. Researchers at Carnegie-Mellon recently found that overly decorated classrooms were a distraction to students. While no one is suggesting school walls should be completely bare of color, too much can be bad for learning.

Test for a reason. “Testing is a good thing if it’s non-punitive,” Klemm said. “It requires students to recall what they know and process what they don’t know. But high-stakes testing, although probably at some level necessary for official accountability, can be overdone to the point where it makes school unpleasant for the teacher and the kids.”

Spend more time teaching learning skills. Klemm recommends memory tricks like mnemonic devices, and visualizing ideas as complex images, to help students expand their working memory. “If they knew these things, they wouldn’t have to work so hard and school might even become fun,” Klemm said. “Once students start reflecting and become more self-aware, they have the opportunity to become better students.”

“Working memory gets overloaded,” Kleem said. “Most people can only hold four independent ideas in working memory.” But if images are used to represent a constellation of ideas, people can remember much more. Words are hard to remember, but images stick with people. “It’s like a zip file,” Klemm said. “This is a way to get your working memory to carry more.”

Teaching kids about how their brains and memory work can also be a way to help them discover intrinsic motivation to complete tasks. And when educators are attentive to some of the environmental factors that produce good (or less good) learning, they can structure the conditions for kids to thrive academically.