The Atlantic

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Why Kids Won't Quit Technology

By Alexandra Ossola

Smartphones, iPads, TVs, computers, videogames. Technology is omnipresent, especially for young students. They just can't get enough; one 2013 study found that college students check their digital devices for non-class purposes 11 times per day on average, and 80 percent of them admitted that the technology was distracting them from class. This has some educators and scientists concerned: Are students distracted because their brains are hard-wired for it after a lifetime of screens? Is there a cultural or behavioral element to the fixation that has infiltrated the classroom?

As scientists work to answer these questions, educators are finding ways to adapt to students' changes —whatever their cause—and use the technology to their advantage, especially in courses focused on science, technology, engineering, and math (STEM).

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When scientists talk about how technology affects the brain, it's one particular network that they focus on most often. It's called executive function—the series of mental processes at the root of people's working memory, which involves tasks like remembering instructions, and abilities such as multitasking or paying attention. While the most rapid brain development occurs before the age of

five, people don't hit their peak executive-function until their late 20s.

A number of studies have shown the connection between stimuli and executive function. One of the most famous was conducted in 2011 and is commonly known as the "Spongebob study." The research revealed that four-year-olds experience impaired executive function after watching the cartoon for just 10 minutes. In a separate 2011 study, researchers found that teens who are addicted to the Internet have abnormal neural pathways, which are tied to executive function.

While scientists have not yet looked at how this stress affects executive function in the long term, there's reason to think it might. This has to do with our understanding of neuroplasticity, or how an individual's brain changes over time depending on how that person uses it. During adolescence, each person's brain weeds out the pathways that it uses less often in a process called neural pruning, said Gary Small, a psychiatry professor and director of the University of California, Los Angeles, Longevity Center at the Semel Institute for Neuroscience and Human Behavior. "It's hard to imagine that the way you're using your brain at a young age isn't going to affect the pruning process," he added. In other words, if you spent your youth in front of screens, it would make sense that your adult brain would be hard-wired to process information at a frenzied pace.

But Daniel Willingham, psychology professor at the University of Virginia in Charlottesville, says it's still too early to draw conclusions about any long-term effects. "I don't think there's really good evidence that there is any fundamental change to cognition as a consequence of technology," he said. "Anyone who says anything about the long-term effects is going to be guessing." Conclusions found by researchers like the authors of the Spongebob study only factor in short-term impacts on executive function, Willingham said. "The thing about that study is that the measures were taken right after the kids watched the videos, so a better interpretation is that Spongebob makes you tired," he added. If technology had changed kids' brains, we would be seeing more impacts of the inattention in places other than in classroom behavior, Willingham said. "You'd predict a significant dive in standardized test scores over the time frame you're guessing kids have been heavy users of digital technology," he said. The data just doesn't reflect that so, the jury is still out when it comes to technology's long-term effects on the brain.

Still, in the short term, kids are having trouble paying attention in school. Eyes flit to screens and fingers gravitate toward keyboards before, during, and after lessons. "It's a big problem if the only way teachers can get students' attention is through song and dance," Willingham said.

Educators are incorporating iPads and computers into STEM curricula because they present options for different skills and ways of learning. "Sometimes [iPad and computer] games can help students' visual-spatial perception and processing speed, and that can be an advantage," Small said. For example, he mentioned one study that found that surgeons that play videogames more often make fewer errors in the operating room. Another study used a computer game called NeuroRacer that actually increased adult subjects' ability to multitask.

But to give students these educational benefits, teachers must find ways to work the technology into their lessons without giving students' leeway for distraction. That's much more difficult than before, Willingham says, because of students' expectations, not their brains. "When you think about digital technology—and videogames, social media—there's something they have in common: Something interesting happens with very little effort from me," Willingham said. "And there's always something else to choose from. This leads kids to think that being a little bored is not normal." He referred to a 2012 study from the Pew Research Center in which 87 percent of teachers surveyed think that technology is creating "an easily distracted generation with short attention spans." Willingham is concerned because "kids can pay attention but they just don't want to. They have the expectation that everything should always be interesting."

Small and Willingham, like others in this field, disagree about how technology is affecting students' brains in the long term. But they do agree on what action to take now: a cultural shift away from screens. Willingham doesn't think technology is changing how kids learn, but he and his wife have continued to limit how much access their children have to technology. "Our thinking was opportunity costs—we wanted our kids to be doing other things," he said. "But that's not out of a belief that you're frying their brains, because there's not much data to show that that's really true."

Small agrees with Willingham's tactic; students have near constant access to technology, but that doesn't mean we should stop evaluating the role it plays in or out of the classroom. "Educators should be paying very careful attention to how kids are using technology," Small said. "Because we don't know what the long-term effect is, we're going on impressions [about what works]. But we need to get more data to inform educators and policy makers in order to best take advantage of wonderful new technologies."

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http://www.theatlantic.com/education/archive/2014/12/why-kids-wont-quit-technology/383575/

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