

## How Does Multitasking Change the Way Kids Learn?

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***Using tech tools that students are familiar with and already enjoy using is attractive to educators, but getting students focused on the project at hand might be more difficult because of it.***

Living rooms, dens, kitchens, even bedrooms: Investigators followed students into the spaces where homework gets done. Pens poised over their “study observation forms,” the observers watched intently as the students—in middle school, high school, and college, 263 in all—opened their books and turned on their computers.

For a quarter of an hour, the investigators from the lab of Larry Rosen, a psychology professor at California State University-Dominguez Hills, marked down once a minute what the students were doing as they studied. A checklist on the form included: reading a book, writing on paper, typing on the computer—and also using email, looking at Facebook, engaging in instant messaging, texting, talking on the phone, watching television, listening to music, surfing the web. Sitting unobtrusively at the back of the room, the observers counted the number of windows open on the students’ screens and noted whether the students were wearing ear-buds.

Although the students had been told at the outset that they should “study something important, including homework, an upcoming examination or project, or reading a book for a course,” it wasn’t long before their attention drifted: Students’ “on-task behavior” started declining around the two-minute mark as they began responding to arriving texts or checking their Facebook feeds. By the time the 15 minutes were up, they had spent only about 65 percent of the observation period actually doing their schoolwork.

“We were amazed at how frequently they multitasked, even though they knew someone was watching,” Rosen says. “It really seems that they could not go for 15 minutes without engaging their devices,” adding, “It was kind of scary, actually.”

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Concern about young people’s use of technology is nothing new, of course. But [Rosen’s study](#), published in the May issue of *Computers in Human Behavior*, is part of a growing body of research focused on a very particular use of technology: media multitasking *while learning*. Attending to multiple streams of information and entertainment while studying, doing homework, or even sitting in class has become common behavior among young people—so common that many of them rarely write a paper or complete a problem set any other way.

But evidence from psychology, cognitive science, and neuroscience suggests that when students multitask while doing schoolwork, their learning is far spottier and shallower than if the work had their full attention. They understand and remember less, and they have greater difficulty transferring their learning to new contexts. So detrimental is this practice that some researchers are proposing that a new prerequisite for academic and even professional success—the new [marshmallow test](#) of self-discipline—is the ability to resist a blinking inbox or a buzzing phone.

The media multitasking habit starts early. In “[Generation M<sup>2</sup>: Media in the Lives of 8- to 18-Year-Olds](#),” a survey conducted by the Kaiser Family Foundation and published in 2010, almost a third of those surveyed said that when they were doing homework, “most of the time” they were also watching TV, texting, listening to music, or using some other medium. The lead author of the study was Victoria Rideout, then a vice president at Kaiser and now an independent research and policy consultant. Although the study looked at all aspects of kids’ media use, Rideout told me she was particularly troubled by its findings regarding media multitasking while doing schoolwork.

“This is a concern we should have distinct from worrying about how much kids are online or how much kids are media multitasking overall. It’s multitasking while learning that has the biggest potential downside,” she says. “I don’t care if a kid wants to tweet while she’s watching *American Idol*, or have music on while he plays a video game. But when students are doing serious work with their minds, they have to have focus.”

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For older students, the media multitasking habit extends into the classroom. While most middle and high school students don’t have the opportunity to text, email, and surf the Internet during class, studies show the practice is nearly universal among students in college and professional school. [One large survey found](#) that 80 percent of college students admit to texting during class; 15 percent say they send 11 or more texts in a single class period.

During the first meeting of his courses, Rosen makes a practice of calling on a student who is busy with his phone. “I ask him, ‘What was on the slide I just showed to the class?’ The student always pulls a blank,” Rosen reports. “Young people have a wildly inflated idea of how many things they can attend to at once, and this demonstration helps drive the point home: If you’re paying attention to your phone, you’re not paying attention to what’s going on in class.” Other professors have taken a more surreptitious approach, installing electronic spyware or planting human observers to record whether students are taking notes on their laptops or using them for other, unauthorized purposes.

Such steps may seem excessive, even paranoid: After all, isn’t technology increasingly becoming an intentional part of classroom activities and homework assignments? Educators are using social media sites like Facebook and Twitter as well as social sites created just for schools, such as Edmodo, to communicate with students, take class polls, assign homework, and have students collaborate on projects. But researchers are concerned about the use of laptops, tablets, cell phones, and other technology for purposes quite apart from schoolwork. Now that these devices have been admitted into classrooms and study spaces, it has proven difficult to police the line between their approved and illicit use by students.

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In [the study involving spyware](#), for example, two professors of business administration at the University of Vermont found that “students engage in substantial multitasking behavior with their laptops and have non course-related

software applications open and active about 42 percent of the time.” The professors, [James Kraushaar](#) and [David Novak](#), obtained students’ permission before installing the monitoring software on their computers—so, as in Rosen’s study, the students were engaging in flagrant multitasking even though they knew their actions were being recorded.

[Another study](#), carried out at St. John’s University in New York, used human observers stationed at the back of the classroom to record the technological activities of law students. The spies reported that 58 percent of second- and third-year law students who had laptops in class were using them for “non-class purposes” more than half the time. (First-year students were far more likely to use their computers for taking notes, although an observer did note one first-year student texting just 17 minutes into her very first class—the beginning of her law school career.)

## CAN THE BRAIN MULTITASK?

Texting, emailing, and posting on Facebook and other social media sites are by far the most common digital activities students undertake while learning, according to Rosen. That’s a problem, because these operations are actually quite mentally complex, and they draw on the same mental resources—using language, parsing meaning—demanded by schoolwork.

[David Meyer](#), a psychology professor at the University of Michigan who’s studied the effects of divided attention or learning, takes a firm line on the brain’s ability to multitask: “Under most conditions, the brain simply cannot do two complex tasks at the same time. It can happen only when the two tasks are both very simple and when they don’t compete with each other for the same mental resources. An example would be folding laundry and listening to the weather report on the radio. That’s fine. But listening to a lecture while texting, or doing homework and being on Facebook—each of these tasks is very demanding, and each of them uses the same area of the brain, the prefrontal cortex.”

Young people think they can perform two challenging tasks at once, Meyer acknowledges, but “they are deluded,” he declares. It’s difficult for anyone to properly evaluate how well his or her own mental processes are operating, he points out, because most of these processes are unconscious. And, Meyer adds, “there’s nothing magical about the brains of so-called ‘digital natives’ that keeps them from suffering the inefficiencies of multitasking. They may like to do it, they may even be addicted to it, but there’s no getting around the fact that it’s far better to focus on one task from start to finish.”

Researchers have documented a cascade of negative outcomes that occurs when students multitask while doing schoolwork. First, the assignment takes longer to complete, because of the time spent on distracting activities and because, upon returning to the assignment, the student has to re-familiarize himself with the material.

Second, the mental fatigue caused by repeatedly dropping and picking up a mental thread leads to more mistakes. The cognitive cost of such task-switching is especially high when students alternate between tasks that call for different sets of expressive “rules”—the formal, precise language required for an English essay, for example, and the casual, friendly tone of an email to a friend.

Third, students’ subsequent memory of what they’re working on will be impaired if their attention is divided. Although we often assume that our memories fail at the moment we can’t recall a fact or concept, the failure may actually have occurred earlier, at the time we originally saved, or encoded, the memory. The moment of encoding is what matters most for retention, and dozens of laboratory studies have demonstrated that [when our attention is divided during encoding](#), we remember that piece of information less well—or not at all. As the unlucky student spotlighted by Rosen can attest, we can’t remember something that never really entered our consciousness in the first place. And a study last month showed that [students who multitask on laptops in class distract not just themselves but also their peers](#) who see what they’re doing.

Fourth, some research has suggested that when we’re distracted, our brains actually process and store information in different, less useful ways. In [a 2006 study](#) in the *Proceedings of the National Academy of Sciences*, [Russell Poldrack](#) of the University of Texas-Austin and two colleagues asked participants to engage in a learning activity on a computer while also carrying out a second task, counting musical tones that sounded while they worked. Study subjects who did both tasks at once appeared to learn just as well as subjects who did the first task

by itself. But upon further probing, the former group proved much less adept at extending and extrapolating their new knowledge to novel contexts—a key capacity that psychologists call transfer.

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Brain scans taken during Poldrack’s experiment revealed that different regions of the brain were active under the two conditions, indicating that the brain engages in a different form of memory when forced to pay attention to two streams of information at once. The results suggest, the scientists wrote, that “even if distraction does not decrease the overall level of learning, it can result in the acquisition of knowledge that can be applied less flexibly in new situations.”

Finally, researchers are beginning to demonstrate that media multitasking while learning is negatively associated with students’ grades. In Rosen’s study, students who used Facebook during the 15-minute observation period had lower grade-point averages than those who didn’t go on the site. And two recent studies by [Reynol Junco](#), a faculty associate at Harvard’s [Berkman Center for Internet & Society](#), found that texting and using Facebook—in class and while doing

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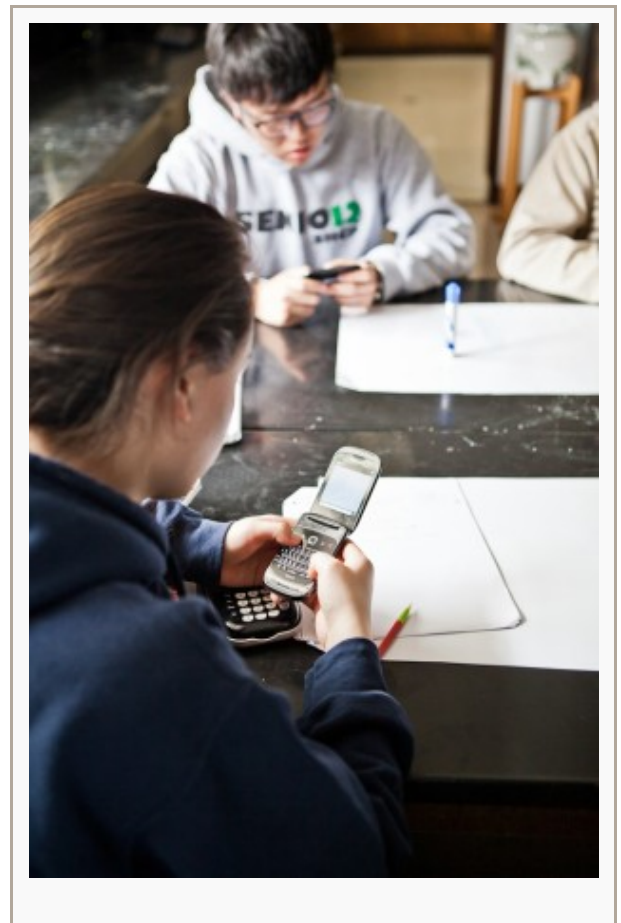
homework—were negatively correlated with college students’ GPAs. “Engaging in Facebook use or texting while trying to complete schoolwork may tax students’ capacity for cognitive processing and preclude deeper learning,” write Junco and a coauthor. (Of course, it’s also plausible that the texting and Facebooking students are those with less willpower or motivation, and thus likely to have lower GPAs even aside from their use of technology.)

## HELPING KIDS PRIORITIZE

Meyer, of the University of Michigan, worries that the problem goes beyond poor grades. “There’s a definite possibility that we are raising a generation that is learning more shallowly than young people in the past,” he says. “The depth of their processing of information is considerably less, because of all the distractions available to them as they learn.”

Given that these distractions aren’t going away, academic and even professional achievement may depend on the ability to ignore digital temptations while learning—a feat akin to the famous marshmallow test. In a series of experiments conducted more than 40 years ago, psychologist [Walter Mischel](#) tempted young children with a marshmallow, telling them they could have two of the treats if they put off eating one right away. Follow-up studies performed years later found that the kids who were better able to delay gratification not only achieved higher grades and test scores but were also more likely to succeed in school and their careers.

Two years ago, Rosen and his colleagues conducted an information-age version of the marshmallow test. College students who participated in the study were asked to watch a 30-minute videotaped lecture, during which some were sent eight text messages while others were sent four or zero text messages. Those who were interrupted more often scored worse on a test of the lecture’s content; more interestingly, those who responded to the experimenters’ texts right away scored significantly worse than those participants who waited to reply until the lecture was over.



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This ability to resist the lure of technology can be consciously cultivated, Rosen maintains. [He advises students to take “tech breaks”](#) to satisfy their cravings for electronic communication: After they’ve labored on their schoolwork uninterrupted for 15 minutes, they can allow themselves two minutes to text, check websites, and post to their hearts’ content. Then the devices get turned off for another 15 minutes of academics.

Over time, Rosen says, students are able extend their working time to 20, 30, even 45 minutes, as long as they know that an opportunity to get online awaits. “Young people’s technology use is really about quelling anxiety,” he contends. “They don’t want to miss out. They don’t want to be the last person to hear some news, or the ninth person to ‘like’ someone’s post.” Device-checking is a compulsive behavior that must be managed, he says, if young people are to learn and perform at their best.

Rideout, director of the Kaiser study on kids and media use, sees an upside for parents in the new focus on multitasking while learning. “The good thing about this phenomenon is that it’s a relatively discrete behavior that parents actually can do something about,” she says. “It would be hard to enforce a total ban on media multitasking but parents can draw a line when it comes to homework and studying—telling their kids, ‘This is a time when you will concentrate on just one thing.’”

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Parents shouldn’t feel like ogres when they do so, she adds. “It’s important to remember that while a lot of kids do media multitask while doing homework, a lot of them don’t. One out of five kids in our study said they ‘never’ engage in other media while doing homework, and another one in five said they do so only ‘a little bit.’ This is not some universal norm that students and parents can’t buck. This is not an unreasonable thing to ask of your kid.”

So here’s the takeaway for parents of Generation M: Stop fretting about how much they’re on Facebook. Don’t harass them about how much they play video games. The digital native boosters are right that this is the social and emotional world in which young people live. Just make sure when they’re doing schoolwork, the cell phones are silent, the video screens are dark, and that every last window is closed but one.

*This story was produced by MindShift in conjunction with [The Hechinger Report](#), a nonprofit, nonpartisan education-news outlet based at Teachers College, Columbia University and [Slate](#).*

