Excerpt from *Their Eyes Glazed Over*

Consumed by technology that they cannot bear to disable or ignore, my students lose awareness of what’s going on around them. They don’t know what they’ve missed – often, they don’t know that they’ve missed anything. They’re still accountable for it, but such mindlessness has become an epidemic: a [study](http://researchnews.osu.edu/archive/distractwalk.htm) from the Ohio State University found that walking while texting has caused a significant rise in injuries. In Chongqing in China, sidewalks contain a special lane for people who can’t be bothered to look up from their phones. And in the German city of Augsburg, there are traffic signals on the ground for people who would otherwise endanger themselves by failing to notice red lights.

Part of the reason people can’t seem to look up from their phones is that we’ve convinced ourselves we’re multitasking, rather than failing to focus (like the way I toggle between various browser tabs and apps even as I write this). A California State University [study](http://www.csudh.edu/psych/Facebook_and_Texting_Made_Me_Do_It-Media-Induced_Task-Switching_While_Studying-Compuers_in_Human_Behavior-2013-Rosen_Carrier_Cheever.pdf) monitored middle-, high-school and college students who had been instructed to research something important for 15 minutes. Two minutes in, students’ focus started to wane as they checked messages, texts and various websites. The average student lasted six minutes before caving to the temptation to engage in social media. Despite being watched, students spent only approximately 65 per cent of the allotted time studying. Given that most students spend far longer than 15 minutes trying to do coursework, it’s easy to see how little gets done, and how checking messages or opening up another browser tab would be increasingly difficult to resist, especially if we tell ourselves it’s related to work or study.

At the end of each semester, my students submit a portfolio that chronicles their work over the past 16 weeks. I ask them to reflect on what they’ve learned, both in terms of tangible skills and about their own tendencies. Students write insightful and honest self-analyses; they confess to all kinds of bad habits they’ve developed in college or perpetuated since high school, such as procrastinating, skipping proofreading or staying up all night playing video games.

Increasingly, students express dismay at their ability to manage time and to stay focused. Though I’m grateful on a daily basis that Facebook and cellphones weren’t around when I was in college, this isn’t a new problem. Students have always found more satisfying ways to spend time than writing essays and studying for tests; even with nothing urgently (or not so urgently) fun to do, they have always waited until the last minute. But now students who aren’t necessarily procrastinators, or who used to be able to focus on assignments, find it harder and harder to fight distraction.

The simple answer is that we’re obsessed, but that term requires unpacking. Even though it might make us anxious – the official term is ‘[TechnoStressed](http://www.technostress.com/tsconversation.htm)’ – we feel we must constantly check our various accounts because we can. Many people are also driven by the fear of missing out (FOMO). Because of how much happens in any given instant, we’re missing *something* when we’re unplugged, and we’re often compelled to log back on to see what’s happened since our last visit, or to confirm that nothing has.

Excerpt from *Fahrenheit 451*, Ray Bradbury

He felt at ease and comfortable. "Why aren’t you in school? I see you every day wandering around."

"Oh , they don't miss me," she said."I'm antisocial, they say. I don’t mix. It's so strange. I'm very social indeed.

It all depends on what you mean by social, doesn't it? Social to me means talk­ing to you about things like this." She rattled some chestnuts that had fallen off the tree in the front yard. "Or talking about how strange the world is. Being with people is nice. But I don't think it's social to get a bunch of people together and then not let them talk, do you? An hour of TV class, an hour of basketball or baseball or running, another hour of transcription history or painting pictures, and more sports, but do you know, we never ask questions, or at least most don't; they just run the answers at you, bing, bing, bing, and us sitting there for four more hours of film-teacher. That's not social to me at all. It's a lot of funnels and a lot of water poured down the spout and out the bottom, and them telling us it's wine when it's not. They run us so ragged by the end of the day we can't do anything but go to bed or head for a Fun Park to bully people around, break windowpanes in the Window Smasher place or wreck cars in the Car Wrecker place with the big steel ball. Or go out in the cars and race on the streets, trying to see how close you can get to lampposts, playing 'chicken' and 'knock hubcaps.' I guess I'm everything they say I am, all right. I haven't any friends. That's supposed to prove I'm abnormal. But everyone I know is either shouting or dancing around like wild or beating up one another. Do you notice how people hurt each other nowadays?”

"You sound so very old."

"Sometimes I'm ancient. I'm afraid of children my own age. They kill each other. Did it always use to be that way? My uncle no. Six of my friends have been shot in the last year alone. Ten of them died in car wrecks. I'm afraid of them and they don't like me because I'm afraid. My uncle says his grandfather remembered when children didn't kill each other. But that was a long time ago when they had things different. They believed in responsibility, my uncle says. Do you know, I'm responsible. I was spanked when I needed it, years ago. And I do all the shop­ping and housecleaning by hand.

“But most of all,” she said, I like to watch people. Sometimes ride the subway all day and look at them and listen to them.I just want to figure out who they are and what they want and where they're going. Sometimes I even go to the Fun Parks and ride in the jet cars when they race on the edge of town at midnight and the police don't care as long as they're insured. As long as everyone has ten thousand insurance everyone's happy. Sometimes I sneak around and listen in subways. Or I listen at soda fountains, and do you know what?"

"What?"

"People don't talk about anything." "Oh, they *must!"*

"No, not anything. They name a lot of cars or clothes or swimming pools mostly and say how swell! But they all say the same things and nobody says anything different from anyone else. And most of the time in the cafes they have the joke-boxes on and the same jokes most of the time, or the musical wall lit and all the colored patterns running up and down, but it's only color and all abstract. And at the museums, have you *ever* been? *All* abstract. That's all there is now. My uncle says it was different once. A long time back sometimes pictures said things or even showed *people. "*

***A Work in Progress: The Teen Brain Harvard Magazine, Sept.-Oct. 2008*** Debra Bradley Ruder

**Y**our teenage daughter gets top marks in school, captains the debate team, and volunteers at a shelter for homeless people. But while driving the family car, she text-messages her best friend and rear-ends another vehicle.

How can teens be so clever, accomplished, and responsible—and reckless at the same time? Easily, according to two physicians at Children’s Hospital Boston and Harvard Medical School (HMS) who have been exploring the unique structure and chemistry of the adolescent brain. “The teenage brain is not just an adult brain with fewer miles on it,” says Frances E. Jensen, a professor of neurology. “It’s a paradoxical time of development. These are people with very sharp brains, but they’re not quite sure what to do with them.”

Research during the past 10 years, powered by technology such as functional magnetic resonance imaging, has revealed that young brains have both fast-growing synapses and sections that remain unconnected. This leaves teens easily influenced by their environment and more prone to impulsive behavior, even without the impact of souped-up hormones and any genetic or family predispositions.

Most teenagers don’t understand their mental hardwiring, so Jensen, whose laboratory research focuses on newborn-brain injury, and David K. Urion, an associate professor of neurology who treats children with cognitive impairments like autism and attention deficit disorder, are giving lectures at secondary schools and other likely places. They hope to inform students, parents, educators, and even fellow scientists about these new data, which have wide-ranging implications for how we teach, punish, and medically treat this age group. As Jensen told some 50 workshop attendees at Boston’s Museum of Science in April, “This is the first generation of teenagers that has access to this information, and they need to understand some of their vulnerabilities.”

Human and animal studies, Jensen and Urion note, have shown that the brain grows and changes continually in young people—and that it is only about 80 percent developed in adolescents. The largest part, the cortex, is divided into lobes that mature from back to front. The last section to connect is the frontal lobe, responsible for cognitive processes such as reasoning, planning, and judgment. Normally this mental merger is not completed until somewhere between ages 25 and 30—much later than these two neurologists were taught in medical school.

There are also gender differences in brain development. As Urion and Jensen explain, the part of our brain that processes information expands during childhood and then begins to thin, peaking in girls at roughly 12 to 14 years old and in boys about two years later. This suggests that girls and boys may be ready to absorb challenging material at different stages, and that schools may be missing opportunities to reach them.

Meanwhile, the neural networks that help brain cells (neurons) communicate through chemical signals are enlarging in teen brains. Learning takes place at the synapses between neurons, as cells excite or inhibit one another and develop more robust synapses with repeated stimulation. This cellular excitement, or “long-term potentiation,” enables children and teenagers to learn languages or musical instruments more easily than adults.

On the flip side, this plasticity also makes adolescent brains more vulnerable to external stressors, as Jensen and Urion point out.

Teen brains, for example, are more susceptible than their adult counterparts to alcohol-induced toxicity. Jensen highlights an experiment in which rat brain cells were exposed to alcohol, which blocks certain synaptic activity. When the alcohol was washed out, the adult cells recovered while the adolescent cells remained “disabled.” And because studies show that marijuana (cannabinoid) use blocks cell signaling in the brain, according to Jensen, “We make the point that what you did on the weekend is still with you during that test on Thursday. You’ve been trying to study with a self-induced learning disability.”

Similarly, even though there is evidence that sleep is important for learning and memory, teenagers are notoriously sleep-deprived. Studying right before bedtime can help cement the information under review, Jensen notes. So can aerobic exercise, says Urion, bemoaning the current lack of physical-education opportunities for many American youths.

Teens are also bombarded by information in this electronic age, and multitasking is as routine as chatting with friends on line. But Jensen highlights a recent study showing how sensory overload can hinder undergraduates’ ability to recall words. “It’s truly a brave new world. Our brains, evolutionarily, have never been subjected to the amount of cognitive input that’s coming at us,” she says. “You can’t close down the world. All you can do is educate kids to help them manage this.” For his part, Urion believes programs aimed at preventing risky adolescent behaviors would be more effective if they offered practical strategies for making in-the-moment decisions, rather than merely lecturing teens about the behaviors themselves. (“I have yet to meet a pregnant teenager who didn’t know biologically how this transpired,” he says.)

By raising awareness of this paradoxical period in brain development, the neurologists hope to help young people cope with their challenges, as well as recognize their considerable strengths.

