

FUTURE MINDS

How the digital age is changing
our minds, why this matters,
and what we can do about it

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PART ONE

HOW THE DIGITAL ERA IS CHANGING OUR MINDS

Chapter 1

The Rise of the Screenager

“Computers are useless. They can only give you answers.”

Pablo Picasso

Observe for a minute a teenager in their natural habitat, in front of a screen. Chances are that they’re not speaking but furiously tapping a keyboard. They appear to be in a hurry and, one suspects, they aren’t fully concentrating, waiting, as they undoubtedly are, for some new bit or byte of information to flash across the screen.

Today’s teenagers are better described as “screenagers,” a term popularized by Dan Bloom to describe the act of reading on screen. They’re woken up by an alarm on a cellphone and they check the latest gossip on the same device, often before they get out of bed. They go to school or work in a vehicle that features screen-based information or an entertainment system, and they spend most of their day interacting with one kind of screen or another. In the evening they interact with their friends via screens and may finally sit down to relax with the internet. According to one 2009 study, an average of 2,272 text messages a month are currently sent or received via a US teen’s phone screen; a 2010 report found that text messaging and social networking account for 64 percent of cellphone use among 16–24 year olds in the UK.

Don Tapscott, author of *Growing Up Digital*, claims that a student nowadays will have been exposed to 30,000 hours of digital information by the time they reach their 20s. Similarly, a Kaiser report that surveyed 8–18 year olds about their media consumption habits found that the total amount of leisure time American kids devote to media (most of it screen based and almost all of it digital) is “almost the equivalent of a full time

job.” Conversely, consumption of printed media, including books, is generally in decline.

Given the prevalence of screen culture among teens, what new kinds of attitudes and behaviors will we, as parents and employers, have to contend with?

10 ways screenagers are thinking differently

- 1. Screenagers prefer multitasking, parallel processing, and personalized experiences, read text in a nonlinear fashion, and prefer images over words.
- 2. Memory is something found on a hard drive. If they need information they Google it.
- 3. The ability to create, personalize, and distribute information easily is creating more of a focus on the self.
- 4. Screenagers frequently use digital devices to avoid confrontation and commitment.
- 5. Virtualization is removing the necessity for direct human contact and this is breeding a generation that prefers to deal with a machine than a human.
- 6. The reset generation thinks that if something goes wrong they can always press a button and start again.
- 7. The digital generation demands sensory-laden environments, instant response, and frequent praise and reward.
- 8. Screenagers live in the now and everything is just gr8, although they may be less literate and numerate than their forebears.
- 9. The screenage brain is hyper-alert to multiple streams of information, although attention and understanding can be shallow.
- 10. The screenage brain is agile but is often ignorant of wider context and culture.

They want it and they want it now

Screenagers have a desire for personalized experiences, and a preference for reading text in a nonlinear fashion and for images over words. They also want speed. They expect things to happen quickly and, as a result, have next to no patience. Digital content is usually available almost immediately and this mindset of instant digital gratification is translated to the nondigital world. Waiting 90 seconds for a hamburger is ridiculous to the average screenager. So too are queuing in a bank and physically interacting with someone you don't know.

A study by the Social Issues Research Centre (SIRC), a UK-based thinktank, says that Generation Y—usually defined as those born between 1980 and 1999—want it all and expect to get it. Along with instant gratification, the buzzwords of these digital natives are eclecticism and diversity. This is a sampling generation who expect to do whatever they want, whenever they want. This means buying single music tracks rather than whole albums or swapping jobs at the drop of a pay check. As one member of the SIRC study put it, “Nothing is out of our reach, we can get anything shipped from anywhere in the world in a couple of days.”

People 35 and over use a cellphone to manage their day. For those under 35, and especially screenagers, a cellphone is a proximity device that allows them to reshape time and space. While mobile phones are replacing wallets, watches, and doorbells (“hello, I'm outside, can you let me in?”) they also allow people not to commit, or to save commitment to the very last second. In the digital era it's impossible to be late because you simply reschedule. Commitments are similarly fluid because a better opportunity might always show up, hence everything's done at the last minute. Got somewhere to go? No need for a plan, or a map; just make it up on the run.

Personal communication is changing too. Want to dump your boyfriend? Just alter your profile status on Facebook from

“in a relationship” to “single.” After all, if you’d wanted to speak to him in person you’d have sent him a text (“eLoves me, eLoves me not”). If you need to communicate with someone it is usually unnecessary to see them physically. These are people (to paraphrase Nick Bilton, author of *I Live in the Future and Here’s How It Works*) who do not see any distinction between real-life friendships that involve talking or looking someone in the eye and virtual ones, where communication is through email or text message. Facebook and Twitter as well as virtual communities such as Second Life also feed into the desire to be reassured that one is not alone, so screenagers use this kind of site to check on their own existence and coalesce around an ever-changing universe of friends and online culture.

This constant flow of information does indeed allow us to get a sense of other people’s lives. Small bits of information, mundane and senseless though they may be on their own, eventually build into a kind of narrative. Scientists have called this phenomenon ambient awareness or ambient intimacy. It is similar to how you can pick up another person’s mood by being close to them and decoding the small signals they transmit.

Life in a virtual world has benefits in the real world too. At Stanford University, the Virtual Human Interaction Laboratory (VHIL), run by Assistant Professor Jeremy Bailenson, researches how self-perception affects human behavior. Specifically, the lab studies how online activities influence real life. One of its findings is that there is a significant bleed between virtual experiences and real-life attitudes and behavior, in both directions. For example, if you become increasingly confident in a virtual world, this confidence spills over into the real world.

Nevertheless, we may also be developing a new generation who lack resilience and who believe that when things go wrong, all they have to do is press a button and things will quickly go back to the beginning for another attempt. If so, what will happen when something difficult shows up that they can’t avoid, forward, or delete?

These might not sound like gargantuan changes, but what starts as a behavioral shift tends to flow into attitudinal change, which, in turn, becomes social change. Gen Y will be running the world in 10 or 20 years' time. They are the next wave of employees and if you are not working alongside them already, you will be in the not too distant future. You might also be wanting to know the best way to handle them as a teacher or parent.

Teachers may face a conflict of teaching and learning styles. Older teachers generally teach face to face and proceed in a logical or step-by-step basis. In contrast, younger students tend to jump around from one idea or thought to another and expect sensory-laden environments as a matter of course. They also want instant results and frequent rewards, whereas many teachers regard learning as slower and serious and consider that students should just keep quiet and listen. We are in for some rather stormy weather over the next few decades as the analogue minds of both teachers and parents clash with the attitudes and behaviors of digital minds. As David Levy, the author of *Scrolling Forward*, comments, there could be a "conflict between two different ways of working and two different understandings of how technology should be used to support that work."

In the world of work it's much the same story, although many of these issues have yet to surface in organizations because only recently have screenagers started full-time employment. Change will take longer to filter all the way through to the most senior levels in organizations. In the meantime, expect attracting and retaining talent to become much harder, especially if the economy is healthy. If those in the digital generation feel that they are not developing or progressing rapidly up the corporate ladder, they will simply leave. The idea of serving an apprenticeship within an organization is dead conceptually as well as economically.

CONNECTIVITY ADDICTION

We may be behaving like screenagers already, however. A study from the University of California (Irvine) claims that we last, on average, three minutes at work before something interrupts us. Another study from the UK Institute of Psychiatry claims that constant disruption has a greater effect on IQ than smoking marijuana. No wonder, then, that the all-time bestselling reprint from the *Harvard Business Review*, a management magazine, is an article about time management. But did anyone find the time to actually read it properly?

We have developed a culture of instant digital gratification in which there is always something to do—although, ironically, we never seem to be entirely satisfied with what we end up choosing. Think about the way people jump between songs on an iPod, barely able to listen to a single song, let alone a whole album. No wonder companies such as Motorola use phrases like “micro boredom” as an opportunity for product development.

Horribly, a couple in South Korea recently allowed their small baby daughter to starve to death because they became obsessed with raising an “avatar child” in a virtual world called Prius Online. According to police reports, the pair, both unemployed, left their daughter home alone while they spent 12-hour sessions raising a virtual daughter called Anima from an internet café in a suburb of Seoul.

Internet addiction is not yet a globally recognized medical condition, but it is only a matter of time. Already 5–10 percent of internet users are “dependent,” according to the Computer Addiction Center at Harvard’s McLean Hospital. This is hardly surprising when you stop to consider what is going on. According to a University of California (San Diego) study, we consumed three times more information in

2008 than we did back in 1960. Furthermore, according to Clifford Nass, a professor of communications at Stanford University, there is a growing cohort of people for whom the merest hint of new information, or the faintest whiff that something new is going on somewhere else, is irresistible.

You can see the effect of connectivity cravings first hand when people rush to switch on their cellphones the second their plane lands, as though whatever information is held inside their phone is so important, or life threatening, that it can't wait for five or ten minutes until they are inside the airport terminal. I know. I do it myself.

The thought of leaving home without a cellphone is alarming to most people. So is turning one off at night (many people now don't) or on holiday. Indeed, dropping out of this hyper-connected world, even for a week, seems like an act of electronic eccentricity or digital defiance.

In one US study, only 3 out of 220 US students were able to turn their cellphones off for 72 hours. Another study, conducted by Professor Gayle Porter at Rutgers University, found that 50 percent of BlackBerry users would be "concerned" if they were parted from their digital device and 10 percent would be "devastated."

It's more or less the same story with email. Another piece of research, by Tripadvisor.com, found that 28 percent of respondents checked email at least daily when on a long weekend break and 39 percent said they did so at least once a day when on holiday for a week or more.

A study co-authored by Professor Nada Kakabadse at the University of Nottingham in the UK noted that the day might come when employees will sue employers who insist on 24/7 × 365 connection. Citing the example of the tobacco industry, the researchers noted how the law tends to evolve to "find harm." So if employers are creating a culture of

constant connectedness and immediacy, responsibility for the ensuing societal costs may eventually shift from the individual to the organization. Broken marriage and feral kids? No problem, just sue your employer for the associated long-term expenses.

A banker acquaintance of mine once spent a day in a car park above a beach in Cornwall because it was the only spot in which he could make mobile contact with his office. His firm had a big deal on and his virtual presence was required. "Where would I have been without my BlackBerry?" he said to me later. My response was: "On holiday with your family taking a break from work and benefiting from the reflection that distance provides." He hasn't spoken to me since we had this conversation, although he does send me emails occasionally. I usually pretend that I'm on a beach and haven't received them.

It's happening everywhere. I have a middle-aged female friend (a journalist) who goes to bed with a small electronic device every night. Her husband is fed up and claims it's ruining their sex life. Her response is that she's in meetings all day and needs to take a laptop to bed to catch up with her emails. This is a bit extreme, but I know lots of other people who take their cellphones to bed. How long before they're snuggled up late at night "attending" meetings they missed earlier, having downloaded them onto their iPad or something similar? Talk about having more than two people in a marriage.

Our desire to be constantly connected clearly isn't limited to work. Twitter is a case in point. In theory, Twitter is a fun way to share information and keep in touch, but I'm starting to wonder whether it's possible to be *too* in touch. I have some friends who are "Twits" and if I wanted to I could find out what they're doing almost 24/7. One, at least, will be

“Eating marmite toast” at 7.08 pm and the other will be “In bed now” at 11.04 pm or “looking forward to the weekend” at 11.34 pm. Do I need to know this?

Why is all of this significant? In *A Mind of Its Own*, Cordelia Fine makes the point that the brain’s default setting is to believe, largely because the brain is lazy and this is the easier, or more economical, position. However, when the brain is especially busy, it takes this to extremes and starts to believe things that it would ordinarily question or distrust. I’m sure you know where I’m going with this but in case you are especially busy—or on Twitter—let me spell it out.

Our decision-making abilities are at risk because we are too busy to consider alternatives properly or because our brains trip us up by fast-tracking new information. We become unable to exclude what is irrelevant and retain an objective view on our experience, and we start to suffer from what Fredric Jameson, a US cultural and political theorist, calls “culturally induced schizophrenia.”

If we are very busy there is every chance that our brain will not listen to reason and we will end up supporting things that are dangerous or ideas that seek to do us, or others, harm. Fakery, insincerity, and big fat lies all prosper in a world that is too busy or distracted. Put bluntly, if we are all too busy and self-absorbed to notice or challenge things, then evil will win by default. Or, as Milan Kundera put it: “The struggle of man against power is the struggle of memory against forgetting.”

Crikey. That sounds to me like quite a good reason to unsubscribe from a few email newsletters and turn the cell-phone off once in a while—to become what Hal Crowther terms “blessedly disconnected.” The future of the planet and life as we know it are clearly at stake.

Multitasking mayhem

Screenagers have a predilection for multitasking and parallel processing. An Ofcom report in 2010 found that while 16–24 year olds spend 6.5 hours a day on media and communication, 29 percent of that time they are multitasking, so squeezing in 9.5 hours' worth of activity. You can study, be on Facebook, watch television, and have a mobile phone clamped to your ear, but is anything of substance going into your brain? Academic and author Mark Bauerlein quotes an American student who says: "I can't concentrate on my homework without the TV on. The silence drives me crazy." Compare this with a study at UCLA, which found that multitasking had an adverse effect on learning. "Even if you learn while multitasking," says Russell Poldrack, co-author of the study, "that learning is less flexible and more specialized, so you cannot retrieve the information as easily... When distractions force you to pay less attention to what you are doing, you don't learn as well as if you had paid full attention."

Scientists using functional magnetic resonance imaging (fMRI) have discovered that the constant switching required to multitask effectively is damaging some of our higher-level brain functions, especially those related to memory and learning. We can just about cope with doing two things at once, but we often can't remember what we've done or how or why we did it. Some studies suggest that multitasking increases stress-related hormones like adrenaline and cortisol and this is prematurely ageing us through what's called biochemical friction.

Research by Eyal Ophir and others at Stanford University established that heavy multitasking students not only took longer to respond to tasks than light multitaskers, they made many more mistakes too. On the plus side, heavy multitaskers are among the first to glimpse new information, so they are good at spotting new ideas. The downside is an inability to focus on what they are doing, so they are somewhat flighty and flakey.

There is also what Edward Hallowell, author of *Crazy Busy*, refers to as “a constant low level of panic and guilt.” These thoughts are echoed by a study from the University of California (Irvine), which found that people who are continually distracted by email suffer from higher levels of stress; and by Gary Small at the University of California (Los Angeles), who says that such stress can be linked to lower levels of short-term memory.

No wonder Bill Joy, co-founder of Sun Microsystems, likens the twenty-first-century teen to a village idiot. Speaking at the Aspen Institute’s 2006 Festival, he said: “This all, for me, for high school students, sounds like a gigantic waste of time. If I was competing with the United States, I would love to have the students I’m competing with spending their time on this kind of crap.”

Or, as authors William Strauss and Neil Howe have observed, “The twenty-first century teen, connected and multi-tasked, autonomous yet peer-mindful, marks no great leap forward in human intelligence or global thinking.”

The screenage brain

Comparing the differences between generations is fraught with difficulty, but it is still one of the better ways to foresee the immediate future. Many compare analogue thinkers (Gen X and Boomers) to digital thinkers (Gen Y and Millennials), or digital immigrants to digital natives, terms coined by writer and games designer Marc Prensky. To quote Prensky: “Today’s students have not just changed incrementally from those of the past... a really big discontinuity has taken place. One might even call it a ‘singularity’—an event which changes things so fundamentally that there is absolutely no going back.” This so-called singularity is the arrival and rapid dissemination of digital technology in the last decade of the twentieth century. Gen Y and younger have spent their whole lives surrounded by digitization and connectivity.

How will the digital generation think? What will it be like to grow up with smart, emotionally aware devices? Will the minds of future humans merge with machines to create some kind of posthuman hybrid? A new type of mind is emerging from an osmotic interaction with digital objects and environments. This digital mind is, in the words of Bauerlein, “mentally agile but culturally ignorant.” It is “highly aware of itself and others in its immediate (digital) proximity but is impatient and surprisingly ignorant of the wider world.”

Naomi Baron, a linguist at the American University in Washington DC, claims there is an “intellectual torpor” among today’s students. Corner cutting (to save time) is prevalent and, more worryingly, students are thinking in incoherent snippets. This thought is echoed by Maryanne Wolf, a neuroscientist working at the Center for Reading and Language Research at Tufts University in the US. She claims that students skim, skitter, and are generally pointillistic in their approach to knowledge. When you can Google information, why do you need to form or remember knowledge?

For the last quarter of a millennium there has been a general consensus, certainly in western cultures, that words were important and that certain rules should be strictly observed. But spelling, syntax, and grammar no longer matter to screenagers. They’re after speed and quantity of communication, hyper-alertness, search and seize.

The PC argument (that’s Personal Computer) is that language has always been fluid and therefore we shouldn’t worry too much about how people express themselves. After all, Chaucer couldn’t spell in today’s terms and it’s really the thought that counts. It’s all gr8.

And in the future, our interaction with machines will be predominantly oral and visual. We will ask machines questions and they will answer back. We will listen to literature and watch books. As science journalist James Gleick has observed: “We have learned

a visual language made up of images and movements instead of words and symbols.” But spelling, syntax, and grammar do still matter. So do physical books. They all convey ideas and if you restrict any of them you constrain thinking and discussion.

Worrying about the future of thinking is nothing new. In *The Shallows*, Nicholas Carr points out that in Plato’s *Phaedrus*, Socrates laments the new reliance on the written word. Socrates believed that, while writing might give the superficial appearance of wisdom, this was at the cost of true insight. Equally, in the fifteenth century the humorist Hieronimo Squarciafico thought that Gutenberg and the relative ubiquity of printed books would render men lazy and “less studious.”

Nevertheless, writing and printing did not reduce concentration, they increased it. Writing something down on paper (which in those days was expensive) or slowly reading a book (even more expensive) made you think hard and long. Reading was deep, deliberate, focused, and sustained as a result. Not any more. Technology such as cellphones, search engines, and email does the very opposite. It can create a cerebral whiteout. The writer Geordie Williamson referred to this as “another powerful accelerant in the outsourcing of the human mind.” We may be reading more in terms of sheer volume, but most of this reading (and writing) is in short snippets. It is not the kind of reading or writing that I believe is important.

Compare physical books with their electronic equivalent. Digital books contribute to an accelerated pace where the acquisition of facts is almost devoid of broad understanding, narrative, or context. Physical books, in contrast, allow people to slow down and reflect. Physical books (and face-to-face conversation) shape and direct our thinking in ways that digital information does not.

Not only that, research by the University of Connecticut found that web users are consistently poor at judging whether web-based information is trustworthy or not. The study asked students to look at a spoof web page, <http://zapatopi.net/treeoctopus>, about a

rare tree octopus. 90 percent of students thought the page was a trustworthy and reliable source, despite its mention of conservation organizations such as Greenpeas (saving the world from humans) and People for the Ethical Treatment of Pumpkins.

Another study, this time by web researcher Jacob Nielsen, tested 232 people reading material on screens using eye-tracking tools and found that only six participants read web pages linearly. Everyone else jumped around like caffeinated rabbits, briefly chewing on a bullet point and then careering off to snack on a patch of color or perhaps a typeface change. In a further project, Nielsen found that teens were faster than adults at reading online but their attention spans were much shorter, so anything difficult tended to be skipped.

The key point about digital or screen reading versus reading on paper is that books are part of a system of thinking. Books do not stand alone. They are contextual, both in relation to other books and to their historical setting. Digital books, and screen reading in general, are different because information becomes content, separated from any clarifying context. Any substantial move away from books would therefore represent a shift away from part of our cultural heritage and understanding.

Reading on a screen, especially one surrounded by hyperlinks, is fast and is suited to foraging for facts. In contrast, reading on paper is reflective and is best suited to trying to understand an overall argument or concept. Both forms of reading (both forms of technology) ought to be able to live alongside each other.

We need to get the balance right and restrain the use of certain devices in certain environments. Pencils and books are still important and employers and educators need to think much more clearly before they plug in and log on. In some instances we need to decelerate learning. After all, we've had slow food and slow cities, so why not slow learning and slow thinking?

Are IQ tests making kids stupid?

The number of adults with a university-level education in the UK has increased markedly over the past 40 years. According to OECD research, 29 percent of people aged 25–34 have what the OECD calls a Type A tertiary education (essentially from universities, which have expanded to allow greater access), while for those aged 55–64 this figure is just 16 percent. In short, more people are now going to university—well done dons. But while a numerical expansion of academia means more thinking, this doesn't necessarily translate into better-quality thinking. Moreover, for every study or statistic “proving” that we are getting smarter in a general or overall sense, there seems to be another “proving” the very opposite, especially when one starts to look at very specific areas or traits.

For example, a report from the US National Endowment for the Arts has linked flat or declining national reading scores with a reduction in the number of teens reading books. In 1984 around 30 percent of 17 year olds claimed to read almost every day for pleasure. By 2004 this figure had fallen to around 20 percent and 19 percent also said they never read, up from 9 percent in 1984. In 2006, the Conference Board in Canada found that almost 90 percent of employers thought that “reading comprehension” was “very important.” It seems there is a gap between the behavior of students and the needs of employers.

And here's an interesting conundrum. According to James Flynn, Professor Emeritus at the University of Otago in New Zealand, IQ scores rose steadily throughout the twentieth century. Indeed, there has been a fairly consistent three-point increase every decade since testing was first introduced. Furthermore, this smartening up is accelerating. The annual increase between 1947 and 1972 was 0.31 points but during the 1990s the annual increase was 0.36 points. In between watching *Woody Woodpecker* (1947) and *Harry Potter and the Philosopher's*

Stone (2001) kids got smarter and are now far smarter than their grandparents, who were brought up reading difficult books and writing out long essays by hand.

Yet how, in an age of failing schools, illiteracy, reality television, *Big Brother*, Paris Hilton, and Guitar Hero can we possibly be getting any smarter? There are lots of theories, such as better diet, more leisure time, smaller families, and even video games. But perhaps a better explanation lies in how we view intelligence, and especially how we measure it via the IQ tests themselves.

An IQ test measures general intelligence and various commentators (most notably Stephen Jay Gould and Howard Gardner) have thrown large spanners into how such a test works. IQ tests are a reasonable measure of logical problem-solving ability or abstract reasoning. People are asked to find similarities between different objects, arrange items into logical sequences, or mentally shift geometric shapes. These are tests that involve classification and correlation, and it appears that these abilities have been rising consistently for a very long time. But this has nothing whatsoever to do with video games or anything connected to the internet. This is hardly surprising. In 1900, most people would have been employed in either agriculture or factories and there was limited demand for abstract or conceptual thinkers. Outside of universities, “intelligence” would have been seen as something relating to practical (physical) problem solving. Hence intelligence—as measured by an IQ test—would have been low. But over the last 100 years or so, the requirement for abstract or conceptual thinking has grown substantially. As a result, we have got much better at precisely the kind of non-verbal intelligence that IQ tests measure best.

This can help to explain why IQ scores are increasing while at the same time millions of workers in the UK and the US are functionally illiterate and innumerate. It also sheds light on why screenagers get good IQ test scores while at the same time the

number one gripe from employers is a lack of basic reading, writing, and arithmetic skills.

If you split out test results for literacy and numeracy, you will find that students today are no smarter—and in some cases they are considerably more stupid—than students 50 or 60 years ago. According to one Australian study, a teenage student in 2003 was about a quarter of a grade level below a comparable student in 1964. Or, as Nicholas Carr points out, tests that measure “memorization, vocabulary, general knowledge, and even basic arithmetic have shown little or no improvement.”

In other words, cognitive skills are rising dramatically and this is connected to improved use of logic and hypothesis. Put simply, we are living in a time where moral and ethical questions are more important and where both work and leisure are more intellectually than physically challenging.

This is something the writer Steven Johnson picked up on in his provocative book *Everything Bad Is Good for You*. He has argued that popular culture (everything from episodes of *Law & Order* and *CSI* on television to video games such as Tetris, *Myst*, and *Grand Theft Auto*) is more intellectually demanding and individuals are being forced to work a bit harder mentally to participate. Our external environment is changing and this is having a positive effect on screenagers’ abstract reasoning abilities. Our minds, after all, are wired to adapt.

We do need minds that can react instantly or monitor fast-flowing information. We do need minds that can screen. In this sense, screenagers have an advantage. But we also, crucially, need curious, playful, imaginative, deep minds that can dream up big ideas and express them crisply and succinctly to other people in a compelling manner. And this, dear reader, takes us on to the next chapter—straight back to school and to the generation coming next.