Chapter 9: A Voice in the Wilderness–the Difficult Task for Authentic Engagement

It is not conceivable that our culture will forget that it needs children. But it is halfway to forgetting that children need childhood. Those who insist on remembering shall perform a noble service.

–Neil Postman

Facts do not cease to exist just because they are ignored.

–Aldous Huxley

Not Found in App Stores

“Mr. Brock?”
I looked up from where I was refocusing a microscope to see both Paige and Emma with their hands raised. I flashed them an index finger to indicate ‘just a moment’ and finished fixing the slide I was working.

I turned to Grace and Irina. “There. Someone had bumped the stage. The pointer’s back on the right cell again.”

“Thank you, Mr. Brock,” replied Grace as Irina leaned in to observe the corrected slide.

I walked over to my waiting students, noticing that everyone else seemed to be moving smoothly back and forth across the room as they completed the assignment, and stood next to the lab bench.

“Yes?” I queried.

“Mr. Brock, I don’t see how you can figure out which interphase cell comes at the beginning and which one goes at the end.” Emma told me. “Number six or number three?”

“Well, what happens during interphase?” I asked her.

“It’s when normal cell life happens.” She replied.

“And what else?” I asked. She furrowed her brow, and I continued. “What are we studying right now?”

“Mitosis.” Paige answered instead of Emma.

“And what critical process has to take place during the interphase stage of a cell’s life for mitosis to happen?” I asked.

Two sets of furrowed brows greeted me this time. So I pointed at the board where I had diagramed replication earlier in the class.

“Oh, the DNA gets copied.” Paige replied, Emma nodding in agreement.

“So what do you think that might do to the size of the nucleus?” I queried.

“Make it bigger.” They both answered together.

I sensed motion and realized that much of the class had wandered over to join the conversation.

“But how does knowing that help?” Mellie questioned from behind me.

“What’s different about the two slides?” I asked, pointing at the microscope in front of us and then at the other one across the room. “What do your observations tell you?”

Paige took a quick look in the eyepiece and then down at her drawings and notes. “I think six here is bigger.” She answered.

I looked at Emma. “Do you agree?”
She took a quick peek, and responded, “Yes.”
I deliberately looked her in the eye, then, and said, “So if you were ordering all of these slides as if you were making one of those flip-book ‘movies’ you made back in grade school, which slide would come at the start of a ‘movie’ about the cell life-cycle?”

Both girls got a look of sudden understanding on their faces, but Emma audibly gasped. “THIS ONE!” She cried out.

“Very good. Now you have the start of your ‘movie’ and its ending.” I told her. “You just have to put the rest of them in order.”

“But Mr. Brock, that’s impossible!” complained Grace, who was now standing next to me.

“Yeah, Mr. Brock!” chimed in Irina.

“No. It’s not.” I responded firmly. “What it does require is that for each of the stages of mitosis where you have two slides in the same phase, you have to think about how the appearance of the chromosomes would be changing over the course of that phase.”

“But that means you’re asking us to think, Mr. Brock!” Irina moaned.

“Yes, and you all know my response to that.” I added.

“‘There isn’t an app for that.’” Grace parroted, glaring at me ever so slightly.

“Yup! There isn’t.” I said. “And that’s why you’re here.”

### The Myth of Multitasking

Thinking is in danger. It is under assault from today’s technology, and those of us in education are on the front lines. Distracted students and hovering parents, smaller vocabularies and declining reading skills, an inability to concentrate and a loss of empathy…the list of negative impacts the now ubiquitous presence of digital devices in our lives has produced could—and has!—filled books. Furthermore, as a classroom teacher who is both a neuroscientist and a “digital immigrant,” I have witnessed the transition and its impact on my students’ cognitive abilities firsthand.

Yet, before I get ignored for promoting some Neo-Luddite agenda and my younger readers dismiss me with the mean-spirited meme “Okay, Boomer,” I need to preface my remaining thoughts in this chapter by pointing out that I am not anti-technology. After all, I am publishing this project on a blog, and for the past two decades, I have designed and maintained three websites at my former school. My father and I enjoy texting back and forth while watching sporting events “together” in our respective cities, and I actually prefer streaming my favorite PBS show, NOVA, to watching it on TV.

But like any form of technology, the Internet of Everything (as it is coming to be) has negative as well as positive consequences for our lives, and we must be willing to confront the potential harmful effects of today’s digital world with clear and open minds if we wish to live safe and healthy lives. Cars, after all, have speed limits for a reason, and as renowned neurologist Adam Gazzaley and psychologist Larry Rosen have demonstrated through nearly a decade now of research, the “speeding” danger of the Internet of Everything is that it “degrades our perceptions, influences our language, hinders effective decision making, and derails our ability to capture and recall detailed memories of life events”—all critical and consequential aspects of thinking. What’s more, their research has gone on to show that “the negative impact is even greater for those of us with undeveloped or impaired cognitive control, such as children, teens, and older adults.” Therefore, those of us in education have an even greater imperative to
deal with any detrimental side-effects of digital technology, and I am here to argue that one of them is a hinderance in our students’ capacity to think.

And my reason for doing so once again has to do with the genetically pre-determined hard-wiring of that organ inside our heads. The human brain evolved so that it “naturally focuses on concepts sequentially, one at a time.” What that means in practical terms is that every single time a person shifts their focus from one thing to another, they have literally stopped thinking about the first thing. Thus, for example, if you are presently trying to text or e-mail while also trying to read this paragraph, your brain first employs neurons to shift to reading screen #1. Then it next employs the neurons that encode the rules for reading screen-type #1. That is followed by the neurons that disengage from screen-type #1 neurons to shift to reading screen #2, and finally, your brain employs those neurons that encode the rules for reading screen-type #2. This four-stage process in your brain is always linear, always in this order, and your brain does it every single time you switch attention.

Thus, while the typical student today believes he, she, or they can juggle 6-7 different forms of media at the same time, the reality is that he, she, or they are preventing his, her, or their brain from thinking in an attentive manner about any of these media. The notion of multi-tasking is a myth; the brain can only single tasking is a myth; the brain can only single

### thinking processes, it also costs the brain enormous amounts of energy to engage in all that attention switching, and “that’s why a person who is interrupted takes 50 percent longer to accomplish a task and makes 50 percent more errors” while doing so. It is also why when given the task to learn something while a screen was present, “students could not focus for more than three to five minutes even when they were told to study something very important.” The simple truth is that any over-use of digital technologies lowers an individual’s efficiency and productivity, decreases the ability to problem-solve, and interferes with the capacity to learn.

And anyone who doesn’t think our children are over-using digital technologies isn’t paying attention. They look at their smartphones alone on at least 27 times per day on average, with some looking at them more than 150 times, and 92% of ages 10-18 are on-line as well every day for an average of 9 hours (in addition to any time spent on-line on school work!). Eighty percent of teens report picking up their phones within 15 minutes of waking, and a staggering 24% of them say they keep them within arm’s length 24 hours a day, answering texts and tweets even at night. In addition, 95% report multi-tasking at least a third of their day, including texting on average 100 times or more, and if these statistics do not convince you that our children are over-using their digital technologies, then know this: each minute—yes, minute—there are on average 284,722 Snapchats, 1,736,111 Instagram photos, and 300 hours’ worth of YouTube videos downloaded—and who knows what the stats for TikTok will be once researchers start collecting that data!

In the meantime, the consequences for education are clear: that is a lot of thinking being hindered, and as we will see next, those of us in today’s classroom have seen the spillover. But from the “35,000 foot perspective,” the view is equally clear: unless all of us who are
stakeholders in education start rethinking the role the new digital age should play in our children’s lives, we risk a world where the quality of the thinking won’t match the difficulty of the challenges confronting it—and even Oz’s Scarecrow can tell you what’s wrong with that.

What It Takes to Succeed

Standing in front my class, I prepared to say number five on what I’ve been told was their list of “top ten things you never want to hear from Mr. Brock.”

“People,” I announced grimly. “We have a problem.”

Expressions of concern flashed across faces, and there was a collectively swallowing. “These are your homework from last class.” I said, holding up a pile of papers in my right hand. “And they are not good.”

“In fact,” I declared, starting to pace. “So many of you didn’t even come close to passing that after a while, I just stopped grading. There was no point to it. It was so clear that you all had no idea how to answer what I thought were two simple questions that I knew I would only be punishing you if I kept correcting your papers.”

Concern turned to worry, and Allegra’s hand shot up. “Mr. Brock, what did we do that was so bad?” She asked anxiously. “I mean, I thought the assignment was pretty simple, too. How could we have all done so badly?”

There were several nervous murmurs of agreement. “Good question.” I replied as I halted my pacing to address the entire class. “Either none of you have figured out yet what kind of work is expected of you in this course, or else none of you seems to know how to use a textbook. Since it was not just a few of you who failed but practically every one of you in both classes, I’m going to assume for now that it’s because you just don’t know how to read the book.”

Puzzled frowns now joined worried looks. “Therefore,” I declared firmly. “Instead of doing what we were originally going to do at the start of class today—which was to begin the next lab on how cells regulate their environment—we’re going to spend time learning how to use a textbook to complete a homework assignment.”

A few of my very best students struggled not to roll their eyes, and there were the beginnings of some protestations. But I silenced them all with a slight glower. “I agree, Cassie.” I said, looking directly at one of my almost eye-rollers. “I would have thought that by ninth grade that you’d know how to use a textbook correctly, too. But I’ve got a stack of evidence that suggests otherwise. So please take a moment to get out your textbooks and open them to the pages of the assignment.” I said firmly.

They complied as I pulled the projector screen down and brought up the images of the text on my computer. I waited patiently, then, until everyone had her book out and I was certain that I had eighteen pairs of eyes on me.

“Okay,” I asked. “Whenever you have any assignment where you have to answer questions from a chapter in the book, what is the very first thing you want to do?”

Various hands went up, and I waited a five-count before calling on Naina. “You make sure you know what the questions are asking in order to know what you’re looking for?” She stated, cautiously.

“Good. You’re seeking a body of information and you want to give your search some focus.” I answered.
I studied the room, and now the look on their faces was even more bewildered than ever. I could almost hear them thinking: *what has gotten into Mr. Brock? We’ve known this stuff since the fourth grade!*

I asked what was next and called on another student.

“You write down the answers as you read along?” Christine said slowly, clearly uncertain as to why she was having to say something so obvious.

“Which is exactly what I’m guessing most of you did.” I replied. “Right?” They all nodded. “Wrong. That’s exactly what you don’t do.” I told them.

The collective look of shock was quite dramatic, as if I had chopped down one of the fundamental pillars of their worldview.

“Why not?” I asked the class.

They sat and thought for a long time before a few hesitant hands began to go up. I saw that one of them was Christine’s again, and I wanted to reward her brave willingness to risk another answer; so I called on her a second time.

“Because we might miss something important?” She said uncertainly.

I nodded at her and gave her a big smile. “Very good. If all you do is write down an answer as you read along, you can miss critical information.”

I turned to point at the projected page on the screen.

“What was your first question on last night’s assignment?” I asked. “Kelly?”

“To compare and contrast the parts of plant and animal cells.” She replied.

“And what is on page 128?” I asked rhetorically.

She studied the screen for a moment, glanced down at the open book on her desk and blushed. Then she looked at me in open embarrassment.

“A diagram of an animal cell.” She responded quietly.

“And on page 129?” I continued. “Anyone?”

“A plant cell!” came the chorus of groans.

“In fact,” I stated. “Both diagrams take up over 80% of the space on these two pages. What’s that probably tell you?”

Cassie raised her hand again, and I called on her.

“That the information in them is important.” She droned, clearly miffed at herself.

“Oh, huh.” I nodded. “And the moral of this story is? Allegra?”

“To remember to go back and look at the diagrams as well as read what’s written.” She responded glumly.

I gave one of those head shakes that is both a ‘yes’ and a ‘no’ and pointed intently toward the screen with an outstretched arm.

“Yes, but it’s not just diagrams.” I told them. “It’s pictures, graphs, and even the text itself. The point is that whenever you’re using the book or any resource for an assignment, you always want to use the questions to focus your attention as you read. But you also always want to retrace your steps a second time to make sure you didn’t miss anything.”

I paused to let that sink in and then held out the pile of their failed homework again.

“That’s what it is going to take to succeed in this class.” I declared. “And that’s what’s missing from these. You didn’t go back and double check that you had found all the information you actually needed to complete the assignment.”

I pointed at the diagrams to underscore what I was saying once more and then studied their faces for understanding.

“Do you all now see what you should have done?” I asked.
Many nodded and several said “yes,” but in addition to the new understanding, I also saw a lot of frustration in their eyes—this was extra work!—and I pondered momentarily about how to address that apprehension.

“Look, I’m not angry, people.” I shared sincerely. “I don’t blame you for what happened with this assignment because you clearly weren’t prepared to do it correctly and that’s my job. It’s why we took the time today to learn how to read a textbook better, and it’s why you’re going to redo this assignment tonight. I want you to be able to succeed in this class, and it’s my responsibility to show you how even when I think someone else ought to have done so already.”

That brought a few smiles of relief, but I shook my head; I wasn’t finished.

“However,” I stressed. “The reason I let you see how disappointed I was today was because I want you to understand the seriousness of what happened. Only you are ultimately accountable for how successful you are in this class, and the same is true of everything you do in life. It’s my job to help you get ready, but once I know that you know how to do something successfully, you will be the ones who decide how well you want to accomplish it. I’m simply responsible at that point for determining how good a job you actually did.”

Again, I paused to let them absorb what I’d said and then continued.

“Remember,” I said. “I grade nearly everything you do in here because the universe ultimately ‘grades’ everything you do out there. And I want you to do a better job than the people before you have been doing.”

Their Missing Voice

There is a time honored truism in teaching that you have to meet your students where they’re at to get them where you want them to go, and for many years, I think most of us in education—myself included—have met them where we felt we could assume they would be given our own educational experiences and upbringings. However, in today’s world, the technological revolution of the past twenty years has changed all that, and I would argue that we can’t make this assumption anymore at all. I can still recall almost viscerally how frustrated and discouraged I felt reading that failed homework assignment now fifteen years ago and how hard the entire year was with that class. Yet, unfortunately, one group has simply been followed by another who seemed even more under-prepared to do the work required of them, and I have recently actually had to start deliberately pointing out the diagrams when presenting that particular assignment—and I still have students fail a seemingly basic comparison task. It has been enough to compel me seriously as someone who practices scientific observation to wonder if perhaps my students really are getting dumber with each passing year.

Of course, such thoughts are not uncommon as individuals begin to experience the generational differences that come with aging, and I am too much of a historian and philosopher not to recognize that every older generation since there have been such things has regularly dismissed the younger as the inevitable end of civilization. However, that historian in me also knows that sometimes the elders have been right, and perhaps “something has gone way wrong” this time. After all, there is ample data that students everywhere “are showing steep declines in their performance, behavior, and values” due to the impact of technology, and in fact:

This [impact] has been studied extensively, with researchers linking nearly every type of in-class technology—including email, texting, laptop, social media and more—to decreased classroom performance regardless of how that performance is measured.
(grades, work productivity, etc.), and across all grade levels ranging from elementary school to college.¹⁶

Hence, maybe the children in our classes genuinely are getting dumber.

Yet a decline in standardized test scores and a decrease in intellectual preparedness for school work (including even preschoolers¹⁷) do not in and of themselves imply a diminishment in student intelligence, and as I have wrestled with the frustrations of this issue, I have come across a paradox in my work that points to what I think is really happening. In examining recent final projects of my 9th grade biology students—a project which is a month long culminating investigation into soil ecology to assess their mastery of everything they’ve learned all year¹⁸—I have found that while my students have been arriving in my doorway less prepared to do the expected work, the overall quality of their projects by year’s end has actually been going up! Somehow, they are arriving “dumber” and yet leaving “smarter.” How can that possibly be?

It is indeed a paradox, and in finally seeing it, I have come to realize that my more recent students have been coming to school “dumber” but not in the sense of more stupid. Instead, they have started arriving in the original sense of that word: mute or voiceless.¹⁹ They don’t know how to “speak” as they once did, and it is this silence that is the most significant reason for why the current situation in education “is nothing short of a crisis.”²⁰ Because until we can get kids to “speak” in the first place, any attempt to discuss what gets “said” is utterly pointless.

One cause for this silence, of course, is the disregard and devaluation we have already discussed in Chapters 7 & 8, and this abandonment has only grown worse as the remorseless new economy of the information age has destabilized conventional life cycles to the point where we are all “struggling to maintain meaningful connection with each other.”²² Hence, as our children’s marginalized status has only increased “is it any wonder that students, having received such messages from a dozen sources, stay silent in the classroom rather than risk another dismissal or rebuke.”²³

However, in addition to this marginalization, I think there is a deeper, more profound answer to what has changed to make the ones in my classes more voiceless, and that is technology’s relentless attack on their inner life. In our always-on world, we not only “seem to have lost the ability to single task…we appear to have lost the ability to simply be alone with our thoughts.”²⁴ Yet solitude is critical to the development of the self that is essential to the learning process because, as we have already seen, all authentic learning and knowledge can only happen in the genuine relationship between the self and the “Other.” Therefore, anything that introduces barriers to the authenticity of that relationship introduces barriers to these capacities, and thus, the more the technology of the smartphone and the computer screen introduce actual barriers to the intimate interaction that creates a real relationship, the more our modern technological world hinders the educational process and silences the mind’s capacity to “speak.”²⁵

Furthermore, since “not every issue has an answer that can be googled…this lack of internal and external solitude can have negative long-term repercussions.”²⁶ To know something, you have to be able to stand still long enough to enter into community with it and to listen to what it has to say to you; you have to “allow the subject to occupy the center of [your] attention”²⁷ in the way two friends do with each other when sharing an intimate experience. But because this “requires a level of solitude and reflection that makes [today’s youth] feel uncomfortable”²⁸—and we cannot understate that discomfort—the external pressures of a digital age leave them nowhere to stand still at all anymore (let alone long enough to realize that they have lost the balance of their inner life that allows for standing still in the first place!).
Thus, unless we change this situation (at least in our schools), our children will continue to grow “dumber” until they are no longer simply “voiceless;” they risk becoming genuinely stupid.

Uncomfortable Conversations

A knocking sound made me look up from where I was grading to see Laura and Suzanna standing at my classroom’s door, looking uncomfortable.

“Yes, ladies?” I said. “What can I do for you?”

Laura responded. “Mr. Brock? Do you have second to talk?”

“Certainly.” I nodded, setting my pen down.

“Could we please shut the door, Mr. Brock?” Suzanna asked. “It’s not something we’d like other people overhearing.”

That raised an internal “eyebrow.” But I simply replied, “All right.”

I stood up from where I had been sitting so that I could be on the same level as the two girls, and Suzanna closed the door. When she turned back, all three of us were facing each other near the front of the room.

“What seems to be the problem?” I asked.

They exchanged a furtive look, and then Laura spoke.

“It’s Karen, Mr. Brock.” She said, while Suzanna nodded vigorously, repeating. “Yes, Karen.”

There was abrupt silence as if that was all there was to the matter. So I gave them both my best “AND…?” look.

“It’s the project, Mr. Brock,” Suzanna finally continued. “Our presentation on bacteria is due tomorrow, and she still hasn’t worked on any of her slides.”

Laura nodded. “We split the questions up so that each of us was responsible for our portion of the project, and Suzanna and I have already finished our slides and uploaded them. That’s how we know Karen hasn’t done anything. She hasn’t even opened the shared doc.”

I processed this for a moment before responding.

“The documentaries on your pathogens are not due until tomorrow.” I told them. “Perhaps Karen needed to finish something else and needed to wait until today to complete her share of your project. Balancing workload is something you know we’ve spoken about in class all year. Maybe this is one of those times for Karen. Have you asked her?”

Both girls shook their heads firmly.

“No, Mr. Brock,” replied Laura. “You don’t understand. We all agreed to have our own slides done by today so that we could double-check each other’s work tonight before turning it in tomorrow morning.”

I repeated myself, emphasizing my words. “Have you asked her? Have you spoken with her about your concerns?”

Again, more head shaking.

“We’ve tried, Mr. Brock!” They replied, nearly in unison. “She isn’t answering her email,” said Suzanna. “And she won’t respond to texts,” added Laura. “She’s even ignoring the class group-chat.”

I took a moment to process this latest bit of additional data and then responded.

“Have you tried actually talking to her?” I said, stating the obvious. Turning to Laura, I added, “The two of you were sitting next to each other in the Nook during lunch today. I saw you as I was walking to the office. And I know you share some of your classes. Since she was
obviously not responding to any of your other attempts at communication, did you take the time
to actually speak with her about your concerns?”

From the expressions on both their faces, I might as well have just asked them to place
their hands in a jar of spiders. But they tried to deflect their obvious discomfort with an excuse.
“She’s already gone home for the day.” Suzanna shared. “Her mom picked her up early
for an orthodontist appointment.”

“Yes, it’s too late for us to talk with her today.” Laura added.
I knew I was showing my age, but I thought, how else are they going to learn?
“You can text Karen, right? You have her number?” I asked.
They both nodded.
“Then pick up your phone and call her.” I said sternly.

What had been mere anxiety morphed into unspeakable fear as a flood of words spilled
out of both girls.

“Mr. BROCK!...Oh my god, I could never do that...NO ONE calls people, Mr.
Brock!...My own mother knows better than to try and reach me that way...She’d never answer
us...Don’t you understand how things are, today?...”

I held up my hand to stop the torrent.

“Ladies, you came to me for advice, and I’ve given it to you.” I said. “The rest is up to
you.”

“But Mr. Brock, what if she doesn’t get her share of the work done and it hurts our
grade?” complained Suzanna.

I shook my head.

“Welcome to adulthood, people.” I stated. “In the grown-up world, you will spend much
of your life needing to work in small groups, and effective communication is going to be a key
skill to your success in those situations.”

Both girls were too polite to express their exasperation to at me directly, but I had taught
too long not to see inside their heads. So I tried a slightly different tack.

“Look, uncomfortable conversations are precisely that, uncomfortable.” I said. “I get it.
I don’t enjoy them either. But to fix real problems—such as yours—they have to happen.”

I paused to see that that thought had sunk in before continuing.

“Therefore, the two of you have a choice.” I said. “You can struggle to work through
your discomfort and learn how to deal with uncomfortable conversations now, while all that’s at
stake is a school project. Or you can wait until you’re my age, when it could be a marriage or a
job on the line.”

I took the moment to look each of them directly in the eye.

“Your call.” I told them.

Their Silenced Voices

The research is quite clear: the demands and structures of our digital age are dismantling
the foundations of human relationships of all kinds, and it is not without reason that the titles of
most of the citations in this chapter include “Alone Together,” “The Big Disconnect,” and “The
Distracted Mind.” As psychologist and educational consultant, Robert Evans, sums it up: “this
brave new [world’s] impact on the part of people’s lives that depend on relationships... has been
malignant,”31 and I will argue that perhaps nowhere has this been more true than in the field of
education where the acts of relationship are fundamental to the teaching and learning process and
successful communication is essential to the entire endeavor. As we see with my students, they are not only becoming intellectually “voiceless,” they are on the verge of becoming literally voiceless.

Again, though, before the technophiles of this world dismiss me as antiquated irrelevance and my younger readers turn away because “the old guy just doesn’t get it,” I need to state that I am not denying the positive connectivity that the Internet of Everything has provided. It has saved lives, both literally and metaphorically, and especially for young people still struggling with their sense of identity, technology can provide a community and safe space for them which may simply not exist where they happen to reside.\textsuperscript{32} Again, as I said earlier, digital technology is no different than any other: there are pros and cons, and we have to be willing to look openly at both in order to manage its consequences for our health and well-being.

And one of those cons is how the world of screens is negatively impacting how so many of us interact with one another today. As we have repeatedly revisited, this is not the environment in which our brains evolved, and simply put, the “brain comes hardwired for human relationship because that is the most essential connection for survival.”\textsuperscript{33} Yet, “there is no app for emotional intimacy, no digital shortcut to the deep rich knowing of another human being,”\textsuperscript{34} and the research is clear that our “text driven world of rapid response”\textsuperscript{35} fails to promote the development of the necessary empathy, emotional intelligence, patience, and intimacy found in mature adult relationships.\textsuperscript{36} In fact, our text culture silences to the point where today’s children and youth consider it unacceptable to make a phone call or ask a direct question of another person, thereby “[preventing] kids (and adults) from building crucial skills that come from having tough conversations face-to-face, where facial reactions provide nonverbal communication tools typically unavailable through a screen.”\textsuperscript{37}

What makes matters potentially even worse, though, is that, as we discussed in Chapter 3, the brain gets good at what it practices, rewiring itself to match the environment in which it finds itself. Therefore, our children living in this digital age are altering their neural maps for less empathy, weaker language and speech centers, and poorer socialization skills.\textsuperscript{38} Add in the fact that there is strong evidence for the possibility that our always-on world is activating the brain’s addiction centers as social media users “chase the high” from all those dopamine hits.\textsuperscript{39} and it does not surprise those of us who work daily with children to see sizeable groups of them, sitting together in absolute silence for long periods of time, just staring at their screens.

Moreover, all this silencing has consequences that reach far beyond the realm of simply dealing with the uncomfortable conversations that are integral to education. It is driving children at ever younger ages to seek advice from peers and anonymous online media communities, exposing them to “answers” to life’s questions that were once the purview of the parents and other significant adults in their lives (e.g. many tweens and teens now routinely learn about so-called sexual intimacy through online pornography\textsuperscript{40}). Even worse, many adults are “disappearing themselves [into their own technology] and offering that behavior as a model for their children.”\textsuperscript{41} Thus, absent more authentic communication in their lives, the Internet of Everything is causing potential safety nets and teachable moments to disappear, leaving our children often isolated and unprotected from “our [current] cultural infatuation with treating each other in such profoundly degrading, humiliating, and soul crushing ways.”\textsuperscript{42} Social media expert, Ana Homayoun, summarizes the situation quite well when she writes:

\textit{It’s perfectly normal for tweens and teens to make mistakes as part of the developmental process. It becomes infinitely more problematic when they make those mistakes anonymously on apps and are exposed to things they might be unprepared for socially,}
emotionally, or otherwise. Without guidance and support, issues can snowball and have increasingly dire consequences.\textsuperscript{43}

What this entire state of affairs means for those of us in education is that we have children of all ages arriving at our schools who are exhausted from trying to multi-task all the time (losing the equivalent of 50 complete nights worth of sleep each year according to the CDC\textsuperscript{44}), unable to stand still with their own thoughts, terrified of meaningful communication, and all too frequently raising themselves (at least partially) on the Internet of Everything. Is it any wonder there has been a 20-fold increase in anxiety disorders over the past 30 years?\textsuperscript{45}

Chronic stress levels in adolescents—particularly young women—are now resembling those “that we used to see only in adults,”\textsuperscript{46} and between this heightened anxiety and stress, I strongly suspect that the amount of cortisol in the brains of a significant number of our “digital natives” is closing in on the lower edge of the levels once found exclusively in those suffering from PTSD.\textsuperscript{47}

An entire generation with potentially 24/7 nearly PTSD brains.... And we expect them to come into our classrooms and learn.

Too Many Screens

As my AP class filtered into the room, I smiled and greeted them.

“You came back!” I said excitedly.
Amber just smiled, but Emma and Lauryn gave me quizzical looks.

“You were expecting us not to, Mr. Brock?” Emma asked, clearly bemused.

“Yeah, Mr. Brock, why wouldn’t we come back?” Hailey said, joining the group.

“Because when I have to give the ‘Welcome to Hell’ speech that very first Day Zero,” I told them truthfully. “Not everyone has come back for the actual first official day of class.”

“You’re kidding, Mr. Brock!” declared Lauryn.

“Nope.” I shook my head. “It’s only happened once in the twenty years since I started giving that speech, but it has happened.”

“Well, we’re made of stronger stuff.” Emma responded, finishing unpacking for class.

“Yeah!” Adele added, setting her backpack down and joining the conversation. “We’re ready for it, Mr. Brock. ‘Biology Bootcamp’ you said the other day? Bring it on!”

I smiled in reply and had to fight not to give a shake of my head. \textit{They never really believe you,} I told myself. \textit{Not until they actually experience it for themselves.}

The rest of my students finished unpacking, and I took a quick glance around the room for attendance. It was a mixed group of juniors and seniors this year, and they had sorted themselves out in their seating just about the way I would have expected. \textit{Always interesting to see their friend groupings,} I thought.

After pressing the link that said everyone was here, I walked back to the front of the room, picking up a book along the way, and stood very deliberately at the center of their attention.

“Before we get started today,” I said. “I need to share some information with all of you so that as students, you can make some informed decisions about how you tackle this class.” I held up the book. “And so you know that I am not just making this stuff up,” I told them. “Here is one of the many sources of the research, and you are welcome to borrow it and read for yourself any time you choose.”
Katherine politely interrupted. “Like you’re going to lie to us, Mr. Brock.” She teased, shaking her head with a grin in disbelief.

“Never the less,” I replied. “A good scientist knows their sources.” I set the book down and continued. “First, because I need to get you all ready for science at the next level where lecture is still the main teaching method, unlike ninth grade, there will be lectures in this course.” I told them. “I try to keep them to a minimum, and I record them and post them online so that you can go back and revisit them. But it means you will need to take notes in this class, and that is item one from the research: you learn better when you take notes by hand than you do when using a laptop. You are still free to use your laptops for note taking in this class if you wish; just know that doing so will make it harder for your brain to learn the material.”

I paused to let that sink in, and there were some nods and intrigued looks.

Then I made a dramatic show of reaching into my left pocket, hauling out my smartphone, and holding it high.

“Second,” I stated. “This is the enemy of your brain. “We will actually learn the science of why when we study the nervous system and talk more about your hippocampus later in the year, but for now, I am letting you know that simply having this device on your person decreases your working memory by the equivalent of a full letter grade. So if you are striving to operate on a given day with an A-level brain, this device guarantees you are limited to a B-level ability if it is anywhere near your person.”

I paused again, letting that sink in, and this time, there were expressions of open discomfort on their faces.

“In fact, that is true for every screen you have open.” I told them. “So if you are taking notes on your laptop or doing your homework on your computer and you have this device on your person, that A-level brain just became a C-level brain.”

Discomfort had turned to anxiety on a couple of faces, and Maddy raised her hand.

“Mr. Brock, why didn’t you tell all of us this at the start of ninth grade?” She asked.

I stopped talking, turned, and just gave her my “Seriously? There ARE dumb questions” look.

“Oh. Right.” She responded, a little self-consciously. “I forgot. Terrified.”

“Mm, hm.” I reminded her. “It’s usually not until late November at the earliest before you all start thinking that maybe this Mr. Brock guy isn’t so bad after all.”

Those who had had me before all chuckled at the memory, and Maddy grinned.

“Anyway,” I continued. “Again, I am not going to tell you what you should or should not do with your digital devices. I just think as students you need to make whatever choice you make in an informed fashion.”

I lowered the phone in my hand.

“And because I believe that all of you deserve my A-level brain,” I announced. “I’m now going to go put this back in my briefcase in the science prep room, and then we’ll get started.”

I headed quickly out the door and down the hall the short distance to where my desk resided, making sure as I dropped off the phone that it was muted so that it would not interfere with any of my colleagues working, and then, I headed back to the room—where as I approached the door, I found my entire class putting away their devices in their backpacks.

I won’t lie: it was a sight that made me both proud and hopeful.
The statistics on digital technology’s impact on education can be both overwhelming and depressing. Research has shown that as a student’s multi-tasking and social media consumption go up, there is a direct relationship with how much his, her, or their GPA goes down. Seventy-five percent of school-aged individuals report feeling panic when they cannot immediately locate their smartphones, even when made aware that the absence of this device would actually decrease the amount of time it takes to complete their homework, giving them more free time. Furthermore, though shown that their texting during classes had caused college students to perform 30% worse on their assessments, this knowledge did not alter their behavior in any way.48

Moreover, statistics such as these only a scratch at the surface. The very tool that distracts our students is now the dominate tool for managing and completing their homework, and as Homayoun has observed, this always-on access to grades and the nearly universal sharing of test scores and other accomplishments has led to a comparison culture of “never enough,” where “students now alter their expectations to focus on how they are doing relative to others” and are no longer “concentrating on their own learning process” and how much personal growth they are accomplishing.49 No longer is academic success identified with achieving personal purpose or potential. Instead, it has become—as the kids say—“all about the ‘likes’,” leaving our students each day worrying more and more about the rather banal and narcissistic values of celebrity and fame than they do about their schooling and what it could mean for who they become as adults.50

Yet, as difficult as it may be to hear all these impacts technology is having on teaching and learning—a situation M.I.T. professor Sherry Turkle has suggested is causing what were once considered pathologies to become normalized51—I want to argue that the greatest risk our digital age brings to education is the loss of perhaps thinking’s most important function: creativity. To be creative first requires being bored, and our always-on, immediate-response, FOMO-addicted world “leaves little time for reflection, deep thinking, or even just simply sitting back and letting our random thoughts drive us to places we might not have [otherwise] gone.”52 But even more significant, in a world where no one gets lost anymore, we have chosen to upload our memory to the Cloud, and that is even more problematic than not making space for boredom because our brain’s capacity for creativity is directly proportional to the amount of information in its long-term memory (LTM).

The reason for this is that at its core, creativity is the novel combination of ideas, and “the more existing ideas you have in your head, the more varied and richer will be your novel combinations of them.”53 But that would seem to suggest—as my skeptical technophiles are no doubt already starting to scream—that since the Internet is a nearly infinite source of ideas, technology should actually be the greatest source for creativity the world has ever known. However, the part of the brain where ideas get brought into our awareness is the hippocampus, and the hippocampus is—you guessed it!—genetically hard-wired by its evolutionary history to look in one location and only one location for its source of ideas: LTM. The hippocampus simply cannot mingle ideas from an external source the way it does ideas from LTM, and therefore, if an idea is not in LTM, the hippocampus cannot use it for purposes of creative thinking. Yet that means that “the emptier our long-term memories, the harder we find it to think. [Hence,] anyone who stops learning facts for himself because he can Google them later is literally making himself stupid.”54 Or to put it another way, in a world of increasingly complex
problems, digital technology has not only made it harder for us to stand still to confront them, it is destroying our actual capacity to tackle them in the first place. As Turkle poetically summarizes the situation, “among all its bounties, here the Internet has given us a new way not to think.”

Coda

So where as educators does all of this leave us? Our digital world is not going away, and indeed, I would like to emphasize at this juncture that much of the work and research of the people I have cited so heavily in this chapter is about how to adapt to what Gazzaley & Rosen have called in their book’s subtitle our “ancient brains in a high-tech world.” The efforts of these psychologists, neurologists, and educators focus as much on how to address the challenges of the digital age as they do on identifying the challenges themselves, and I strongly encourage anyone who teaches to make the time to read their full work.

However, I have deliberately focused on technology’s potential perils to an authentically engaged education because, as I think Turkle again says so elegantly:

*we need to get into new and more disciplined habits where we examine the assumption that we are getting something important from these new technologies. We must ask whether a technology expands our capacities and possibilities or exploits our vulnerabilities…. Technology offered us sugared soda water, and we embraced it. We took over a hundred years to decide it was no good for us at all. But by the time we declared it toxic, [we had an epidemic of obesity and type 2 diabetes on our hands].*

The simple truth is that it is one thing for our adult minds to grapple with the identified hazards of the digital world; it is another for the undeveloped minds of our children. Like Turkle, I believe that we have “already completed a forbidden experiment, using ourselves as subjects with no controls,” and I genuinely do fear that we may have already lost an entire generation to B-level brains (or worse!), struggling in an age of A+ problems.

My prayer is that we do not make it two. We do not have a hundred years this time to discover that we’ve created digital “soda.”

Notes

8. Gazzaley and Rosen, *The Distracted Mind*, p. 111; their original emphasis.

13. Evans, *Family Matters*, p. 4; my emphasis.


17. Where students are showing up without the “traits of persistent learners and original thinkers eager to engage;” Steiner-Adair, *The Big Disconnect*, p. 105.


19. In fact, as a historical note, the famous Medieval philosopher and theologian, Thomas Aquinas, was nick-named “the dumb Ox” for his large size and habit of remaining quiet.

20. *Crisis at the Core*, p. i.


29. In fact, “our devices are ever more closely coupled to our sense of our bodies and minds” (Turkle, p. 167) to the degree that a third of people even check their phones while using the bathroom and 9% even do so during sex (Gazzaley & Rosen, pp. 11 & 108). As Catherine Steiner-Adair summarizes it well, “our digital devices have finally come to define us” (p. 4).

30. As with my parent conference vignette in Chapter 7, this one is also deliberately a composite of the many similar conversations I have had over the past 10 years, with fictitious names to protect privacy.


35. Turkle, *Alone Together*, p. 172


44. Ana Homayoun, *Social Media Wellness*, p. 165
47. There has been some recent push-back from the research community that the studies of
digital technology’s impact have been strictly observational and have not met the rigor of
controlled experiments (see Lydia Denworth, “The Kids are All Right” in *Scientific
American*, Nov. 2019, pp. 44-49). However, I agree with David Katz, director of the
Yale-Griffin Prevention Research Center at Yale School of Public Health, when he points
out that “the idea that you can’t learn something from observation is glaringly false.
Think about telling kids not to run with scissors. We don’t have randomized controlled
trials of kids running with scissors, do we? We just know from observation that it’s
50. Ana Homayoun, *Social Media Wellness*, p. 79.
53. Ian Leslie, *Curious: The Desire to Know and Why Your Future Depends on It* (New