CATHY DAVIDSON

REMARKABLY, CATHY N. DAVIDSON occupies two distinguished faculty chairs at Duke University, but reputation never stands in her way when it comes to taking controversial positions. Over the last decade she has become one of the most impassioned advocates of the electronic media—which, she argues, have the potential to transform our ways of thinking more radically than any invention since the printing press. At a time when many observers mourn the demise of the book, Davidson argues that we need to embrace the possibilities of the Web: an explosive growth of new knowledge, nearly immediate access, and an unprecedented freedom in the shaping of information itself. She urges that this spirit of creativity should extend beyond the screen to the schools, which she sees as backward looking at a time when educators finally have the tools to end a spirit-crushing uniformity. Far from pushing the arts and humanities into obsolescence, the new technologies could provide the means for all of us to participate in the making of culture.

Not everyone agrees, however, with Davidson about the new media. In a review for the online journal *Slate*, Annie Paul Murphy accuses her of capitulating to the hype about the wonders of the Web:

> [Davidson] is easily moved to rapture and to dismay, propelled by an enthusiasm for anything new and digital and by an almost allergic aversion to any practices or artifacts from the pre-Internet era. Nor does she have much use for people born before 1980. The inhabitants and the knowledge of the past are merely obstacles to be trampled in the headlong rush toward an interactive, connected, collaborative future. This future, as Davidson imagines it, is one in which games replace books, online collaboration replaces individual effort, and "crowdsourced" verdicts replace expertise.

Other critics of the Web, if not of Davidson herself, argue that it has undermined our ability to read carefully by teaching us to "skim" instead of pausing to reflect. Whatever readers might ultimately decide about these criticisms, Davidson has had the integrity to put her ideas into practice. From 1998 to 2006 she served as Vice

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Quotation from Annie Paul Murphy is taken from "Who's Afraid of Digital Natives?" *Slate*, August 22, 2011. Biographical information is from http://www.cathydavidson.com/about/ and http://www.cathydavidson.com/wp-content/uploads/2011/07/VITA-full-July-26-2012.pdf.

Provost for Interdisciplinary Studies at Duke University and helped to create ISIS, Duke's highly successful program in Information Science and Information Studies. While a vice provost at Duke she created quite a stir when her university, in partnership with Apple, Inc., distributed free iPods to all incoming students. In spite of the scandal, or perhaps because of it, President Obama nominated Davidson to a six-year term on the National Council on the Humanities. The following selection comes from Davidson's book *Now You See It: How Technology and Brain Science Will Transform Schools and Business for the 21st Century* (2011).

Project Classroom Makeover

The *Newsweek* cover story proclaimed, "iPod, Therefore I Am."

On MTV News, it was "Dude, I just got a free iPod!"

Peter Jennings smirked at the ABC-TV news audience, "Shakespeare on the iPod? Calculus on the iPod!"

The online academic publication *Inside Higher Ed* worried for our reputation. How would Duke University "deal with the perception that one of the country's finest institutions—with selective admissions, a robust enrollment, and a plush endowment—would stoop to a publicity ploy"?

And *The Duke Chronicle* was apoplectic: "The University seems intent on transforming the iPod into an academic device, when the simple fact of the matter is that iPods are made to listen to music. It is an unnecessarily expensive toy that does not become an academic tool simply because it is thrown into a classroom."[1]

What had these pundits so riled up? In 2003, we at Duke were approached by Apple about becoming one of six "Apple Digital Campuses." Each campus would choose a technology that Apple was then developing and would propose a campus wide use for it. It would be a partnership of business and education, exploratory in all ways. One university selected Apple PowerBooks loaded with iLife digital audio and video production software. Another chose e-portfolios, online workspaces where students could develop multimedia projects together and then archive them. Another selected audio software for creating audio archives and other infrastructure. What landed us in hot water was that, at Duke, instead of any of these, we chose a flashy new music-listening gadget that young people loved but that baffled most adults: iPods.

In 2003, the iPod did not have a single known educational app, nor did it seem to fall into that staid, stolid, overpriced, and top-down category known as IT, or instructional technology. Gigantic billboards had sprung up everywhere showing young people dancing, their silhouettes wild against brilliant bright

backgrounds. What could possibly be educational about iPods? No one was thinking about their learning potential because they were so clearly about young users, not about IT administrators. That's why they intrigued us.

Our thinking was that educators had to begin taking seriously the fact that incoming students were born after the information age was in full swing. They were the last entering class who, as a group, would remember the before and after of the Internet. If they were born roughly in 1985 or so, they would have been entering grade school around the time that Tim Berners-Lee was inventing the protocols for the World Wide Web. These kids had grown up searching for information online. They had grown up socializing online, too, playing games with their friends online and, of course, sharing music files online. Categories and distinctions that an earlier generation of students would have observed in school and at home, between knowledge making and play, came bundled in a new way for this first generation of kids who, in their informal learning, were blurring that boundary. Their schools hadn't changed much, but at home, online, they were already information searchers. They had learned by googling. What if instead of telling them what they should know, we asked them? What if we continued the lesson of the Internet itself and let them lead us into a new, exploratory way of learning in order to see if this self-directed way might mean something when it came to education? What if we assumed that their experiences online had already patterned their brains to a different kind of intellectual experimentation—and what if we let them show us where the pedagogical results of such an experiment might lead?

From the way most schools operated in 2003—from preschool to graduate schools—you wouldn't have had much of an idea that the Internet had ever been invented. It was as if young people were still going to the library to look in the *Encyclopedia Britannica* for knowledge, under the watchful eye of the friendly local librarian. Schools of education were still training teachers without regard for the opportunities and potential of a generation of kids who, from preschool on, had been transfixed by digital media.

The opportunity seemed to be staring us in the face. At home, five-year olds were playing Pokémon every chance they could, exchanging the cards at preschool with their pals, and then designing tools online to customize their characters and even writing elementary code to streamline their game play. They were memorizing hundreds of character names and roles and mastering a nine-year-old reading level just to play, but teacher training on every level was still text-based. It was as if schools were based on a kind of "hunt-and-peck" literacy, whereas kids were learning through searching, surfing, and browsing the Web. They were playing games in 3-D multimedia, learning to read and write not through schoolbooks but as they played games online and then traded their Pokémon cards with their friends.

When Duke announced that we would be giving a free iPod to every member of the entering first-year class, there were no conditions. We simply asked students to dream up learning applications for this cool little white device with the adorable earbuds, and we invited them to pitch their ideas to the faculty. If one of their profs decided to use iPods in a course, the prof, too, would receive a

free Duke-branded iPod and so would all the students in the class (whether they were first-years or not). We would not control the result. This was an educational experiment without a syllabus. No lesson plan. No assessment matrix rigged to show that our investment had been a wise one.... After all, as we knew from the science of attention, to direct attention in one way precluded all the other ways. So we asked our basic questions in as broad and open-ended a way possible: *Are there interesting learning applications for this device that is taking over young America as a source of entertainment?* And then the most revolutionary question of all: *What do you students have to tell us about learning in a digital age?*

If it were a reality show, you might call it Project Classroom Makeover. It was a little wild, a little wicked, exactly what you have to do to create a calculated exercise in disruption, distraction, and difference: a lesson in institutional unlearning, in breaking our own patterns and trying to understand more of the intellectual habits of a new generation of students and providing a unique space where those new talents might flourish. Instead of teaching, we hoped to learn. We wanted to tap into a wellspring of knowledge young people brought to college from their own informal learning outside of school. We didn't know what would happen, but we had faith that the students would come up with something interesting. Or not. We couldn't deny that failure was also a possibility.

At the time, I was vice provost for interdisciplinary studies at Duke, a position equivalent to what in industry would be the R & D (research and development) person, and I was among those responsible for cooking up the iPod experiment and figuring out how it could work in the most interesting ways.[2] We wanted to stir up some of the assumptions in traditional higher education. We didn't count on causing the uproar that we did. We assumed some of our fellow educators would raise an eyebrow, but we didn't imagine an educational innovation would land us on the cover of *Newsweek*. Usually, if education is on the cover, it's another grim national report on how we are falling behind in the global brain race. Come to think of it, that *is* what the *Newsweek* cover story was about! Like Socrates before us, Duke was leading youth astray, tugging them down the slippery slope to perdition by thin, white vinyl iPod cords.

We were inverting the traditional roles of teacher and learner, the fundamental principle in education: hierarchy based on credentials. The authority principle, based on top-down expertise, is the foundation of formal education, from kindergarten playgroups to advanced graduate courses. At least since the GI Bill that followed World War II, and the rapid expansion at that time of the public university system, a college degree has been the entry card to middle-class, white-collar achievement. Not graduating from high school and lacking a college degree has constituted failure, and education has constructed its objectives backward from that (negative) goal, in some cities all the way down to competition for the right private nursery school.

What this means for young people who come to an elite private university is that they have taken one of a number of specific routes to get there. One way is to test to get into the best preschools so you can go to the best private grammar schools so you can be admitted to the most elite boarding schools so you can be

competitive at the Ivies or an elite school outside the Ivies like Stanford or Duke. Another way is through public schools, a lifetime of determined and focused study, getting A's and even A+ grades in every class, always taking the most difficult courses, earning perfect scores on tests, and doing lots of extracurricular work, too. These students have been focused toward educational achievement their entire lives.[3] We wondered what these astonishing young overachievers would do if given the chance not to follow the rules but to make them.

In the world of technology, *crowdsourcing* means inviting a group to collaborate on a solution to a problem, but that term didn't yet exist in 2003 when we conducted the iPod experiment. It was coined by Jeff Howe of *Wired* magazine in 2006 to refer to the widespread Internet practice of posting an open call requesting help in completing some task, ranging from writing code (that's how the open source code that powers the Mozilla browser was written) to creating a winning logo (such as the "Birdie" design of Twitter, which cost a total of six bucks).[4] Crowdsourcing is "outsourcing" to the "crowd," and it works best when you observe three nonhierarchical principles. First, the fundamental principle of all crowdsourcing is that difference and diversity—not expertise and uniformity—solves problems. Second, if you predict the result in any way, if you try to force a solution, you limit the participation and therefore the likelihood of success. And third, the community most served by the solution should be chiefly involved in the process of finding it.

In the iPod experiment, we were crowdsourcing educational innovation for a digital age to our incoming students. We were walking the walk. Crowdsourced thinking is very different from credentialing, or relying on top-down expertise. If anything, crowdsourcing is suspicious of expertise, because the more expert we are, the more likely we are to be limited in what we even conceive to be the problem, let alone the answer. While formal education typically teaches hierarchies of what's worth paying attention to, crowdsourcing works differently, in that it assumes that no one of us individually is smarter than all of us collectively. No matter how expert we are, no matter how brilliant, we can improve, we can learn, by sharing insights and working together collectively.

Once the pieces were in place, we decided to take our educational experiment one step further. By giving the iPods to the first-year students, we ended up with a lot of angry sophomores, juniors, and seniors. They'd paid hefty private-university tuitions too! So we relented and said *any* student could have a free iPod—just so long as she convinced a prof to require one for a course and came up with a learning app in that course.

Does that sound sneaky? Far be it from me to say that we *planned* this, but once the upperclassmen coveted the iPods, once they'd begun to protest enviously and vehemently, those iPods suddenly tripled and quadrupled in perceived value: Everyone wanted one.

If "Shakespeare on the iPod" is the smirking setup, here's the punch line: Within one year, we had distributed more free iPods to students in forty-eight separate "iPod courses" than we had given without strings to the 1,650 entering first-year students.

That was vindicating enough, but it wasn't all. The real treasure trove was to be found in the students' innovations. Working together, and often alongside their profs, they came up with far more learning apps for their iPods than anyone—even at Apple—had dreamed possible. No one has ever accused Steve Jobs of not being cagey, and Apple's Digital Campus strategy was an R & D winner. The company's flagship technology now had an active lab of students creating new apps for it. There was also plenty of publicity for the iPod as a potential learning tool—the teenagers of America should all thank us for making it easier to pitch the purchase to their parents. In the first year of the iPod experiment, Duke students came up with dozens of stunning new ways to learn. Most predictable were uses whereby students downloaded audio archives relevant to their courses—Nobel Prize acceptance speeches by physicists and poets, the McCarthy hearings, famous trials, congressional debates, or readings by T. S. Eliot or Toni Morrison, or Thomas Edison's famous recitation of "Mary Had a Little Lamb"—one of the first sound recordings ever made. Almost instantly students figured out that they could also record lectures on their iPods and listen at their leisure. Classes from Spanish 101 to Introduction to Jazz to organic chemistry could be taped and listened to anywhere. You didn't have to go to the library or the language lab to study. You could listen to assignments on the bus, at the gym, while out on a run—and everyone did. Because everyone had the device, sound suddenly had a new educational role in our text- and visuals-dominated classroom culture.

Some version of this convenient form of listening was possible with that radical eighties technology, the Sony Walkman. But the Walkman connected to radio and to tapes, not to the World Wide Web, with its infinite amount of information ready for downloading.

Interconnection was the part the students grasped before any of us did. Students who had grown up connected digitally gravitated to ways that the iPod could be used for *collective* learning. They turned the iPods into social media and networked their learning in ways we did not anticipate. In the School of the Environment, with the encouragement of Professor Marie Lynn Miranda, one class interviewed families in a North Carolina community concerned with lead paint in their homes and schools. Each student would upload the day's interviews to a course Web site, and any other student could download and comment on the interviews. At the end of the course, they combined their interviews, edited them digitally, and created an audio documentary that aired on local and regional radio stations and all over the Web.[5]

Some med students realized that there was an audio library of all the possible heart arrhythmias, but no way to access it in a real-time health exam. They came up with a way to put a stethoscope in one ear, using very simple signal-tracking technology to match what they were hearing in the patient's chest to the cataloged conditions. The implications of this original use were obvious, and soon students studying to be doctors and nurses were "operationalizing" such techniques for the diagnostic use of doctors in rural North Carolina and Africa. Dr. Martha Adams, a senior administrator at the Duke School of Medicine, grasped how revolutionary it was to be able to make state-of-the-art medical

research available to those far outside major research centers, and to also make it possible for doctors elsewhere to report on health problems and patterns they were observing in their own communities, thus advancing medical research in both directions. Soon she was working with the National Institutes of Health and leading a national outreach iPod initiative. Once again, attention was being focused in multiple directions at once, not just on outcomes but on process and on interaction, the mirroring happening (as it must, definitionally) in both directions.

In the music department, composing students uploaded compositions to their iPods so their fellow students could listen and critique. Music performance students inserted their voices or their instruments into duets or choruses or orchestras. You could listen to how you sounded as first chair in the flute section of a famous philharmonic orchestra. Students in Duke's engineering department had a field day mangling and dissecting their iPods to study (hack, some would say) everything from Apple's ultrasecret computer code to the physical properties of the famous white plastic exterior of the original iPods.

And they began exploring apps, developing applications that could be added to the iPod's repertoire of abilities without Apple having to give away its proprietary code. In other words, the iPod could still remain an iPod with its own distinctive characteristics, but it could change and morph as new features were added and new capabilities emerged, including some developed by users. To me, this was a conceptual breakthrough: that a commercial product might also be susceptible to consumer customization, a way of extending the infinitely changeable open-source properties of the Internet itself to a product with a far more fixed, finite identity. It was a hybrid of old and new thinking. If that isn't a metaphor for attention in the digital age, I don't know what is.

By the end of our first experimental year, Duke was part of a new movement to transform the iPod from a listening device into an interactive broadcasting device. We were proud to host the world's first-ever academic "podcasting" conference early in 2005. I recently found one of our announcements for the conference and was amused to see those quotation marks around *podcasting*. No one was quite sure even what to call this new phenomenon, in which you could record a lecture, upload it to a Web site, and then anyone anywhere in the world could download it. Shakespeare on an iPod? Absolutely. And that lecture on Shakespeare delivered in the Allen Building at Duke could later be listened to by a student riding a bus in Bangkok or Brasilia. That may not seem revolutionary now. It is hard to remember way back then, in the distant past of the Internet, before iPhones and netbooks, before MySpace and Facebook, and a full two years before YouTube was invented with its motto to "Broadcast Yourself."

The first podcasting conference drew standing-room-only attendance. It was sponsored by one of the first programs I'd spearheaded at Duke, something (another hybrid) called Information Science + Information Studies, or ISIS for short—artists and computer scientists, social scientists and engineers, and everyone in between in a new configuration. Lots of news media crowded into the auditorium at the Center for Interdisciplinary Engineering, Medicine, and Applied Science to witness the event. In a short span, the message had changed

from "How could anyone possibly think this device could be used for learning?" to "This device facilitates sophisticated academic research and has the potential to make that learning instantly available to anyone in the world—for free."

The conceptual breakthrough of podcasting was access. It was expensive buying all those iPods, but the result was a breakthrough in education far beyond Duke, one whose purpose was to make a world of information cheaper to access than it ever had been before. With very little outlay, you had the potential of transmitting anything you heard, anywhere: You could download anything you heard worldwide. Not prerecorded programs made by professionals but content created and uploaded by anyone, ready for downloading—and for remixing and uploading again. When we launched the iPod experiment, no one expected that someday there would be an iTunes U (formed in 2007) with over 350,000 lectures and other educational audio and video files compiled by universities, libraries, and museums all around the world and available for download.

Duke took a lot of heat for being a "rich, privileged institution" that could afford this frivolity, but a revolution in the democratization of knowledge is not frivolous, especially considering that, once customized, an individual mobile device is actually an inexpensive computer. Several years after the Duke experiment, in the fall of 2008, Culbreth Middle School, a public school in nearby Chapel Hill, North Carolina, created its own iPod program for an experimental group of staff and students. They chose the iPod instead of a more traditional laptop because of "the mobility of the device in one's pocket with instant access to information and apps."[6] In January 2010, seventh graders were encouraged to explore the different ways their iPods could be used to keep them informed in the wake of the disastrous earthquake that brought destruction to Haiti. They used iPods to gather measurements of earthquake magnitude and related information, including demographic data, humanitarian assistance updates, local Haitian news podcasts, and historical information on Haitian culture and politics. The device also performed Creole-language translation. Students were even able to maintain up-to-date communication with a local graduate student who was in Haiti at the time and was badly injured in the earthquake. They used their iPods to educate themselves about a terrible disaster far away and produced their own podcasts from the information they gleaned. The experiment left little doubt that in the event of an emergency closer to home, students would be able to contribute their new knowledge to disaster-relief and fund-raising efforts locally.

The iPod experiment was not an investment in technology. It was an investment in a new form of attention, one that didn't require the student to always face forward, learn from on high, memorize what was already a given, or accept knowledge as something predetermined and passively absorbed. It was also an investment in student-led curiosity, whose object was not a hunk of white plastic, but the very nature of interactivity, crowdsourcing, customizing, and inspired inquiry-driven problem solving. At our most ambitious, we hoped to change the one-directional model of attention that has formed the twentieth-century classroom.[7]

THIS iPOD EXPERIMENT WAS A start at finding a new learning paradigm of formal education for the digital era. As we have [learned], an infant's neural pathways are being sheared and shaped along with his values and his behavior in constant interaction with the people around him who exert influence over his life. The iPod experiment was an acknowledgment that the brain is, above all, interactive, that it selects, repeats, and mirrors, always, constantly, in complex interactions with the world. The experiment was also an acknowledgment that the chief mode of informal learning for a new generation of students had been changed by the World Wide Web. It was an attempt to put the new science of attention together with the new digital technology that both demanded and, in some ways, helped produce it.

I'm not going to argue that the *interactive* task of surfing is better or worse than the reception model that dominated mass education in the twentieth century. "Better" and "worse" don't make a lot of sense to me. But there's a difference and, as we have seen, difference is what we pay attention to. Said another way, we concentrate in a different way when we are making the connections, when we are clicking and browsing, than when we are watching (as in a TV show or movie) or listening or even reading a book. Indisputably, the imagination is engaged in making connections in all of those forms, as it is in anything we experience. It is engaged in a different way when we ourselves are making the connections, when we're browsing from one to another link that interests us and draws our attention. We don't need a "better or worse" because we have both, and both are potentially rich and fascinating cognitive activities. But the relative newness of the surfing/searching experience drove our interest in the potential of the iPod experiment; in 2003, educators already knew how to mine traditional media, but we had not yet figured out how to harness the new forms of attention students who had grown up surfing the Web were mastering. The Web does not prescribe a clear, linear pathway through the content. There is no one way to move along a straight-and-narrow road from beginning to end.

The formal education most of us experienced—and which we now often think of when we picture a classroom—is based on giving premium value to expertise, specialization, and hierarchy. It prepared us for success in the twentieth century, when those things mattered above all. Yet what form of education is required in the information age, when what matters has grown very different? What form of education is required in a world of social networking, crowdsourcing, customizing, and user-generated content; a world of searching and browsing, where the largest-ever encyclopedia is created not by experts but by volunteers around the world—as is the world's second most popular Web browser (Mozilla's Firefox), the world's most massive online multiplayer game (World of Warcraft, with over 11 million subscribers a month), and all the social networking and communication sites, from MySpace and Facebook to Twitter?

Another way of asking the question is: How do we make over the twentieth-century classroom to take advantage of all the remarkable digital benefits of the twenty-first century?

The iPod experiment was a start, but to get a sense of just how big a task we face, it's useful to have a sense of how schools came to be the way they are, shaped by the values of a very different world.

Do you remember the classic story by Washington Irving, "The Legend of Sleepy Hollow"? It was written in 1820 and features a parody of the pompous schoolmaster in the form of Ichabod Crane, a homely, gawky, and self-satisfied pedant who is confident in his role as a dispenser of knowledge. He knows what does and does not constitute knowledge worth having and is equally sure that students must be drilled in that knowledge and tested to make sure they measure up. If you blindfolded Ichabod Crane, spun him around, and set him down in a twenty-first-century classroom, he would be baffled by electricity, dumbfounded by moving images, confused by the computers and cell phones, but he'd know exactly where to stand, and he'd know exactly where he stood.

It's shocking to think of how much the world has changed since the horse-and-buggy days of Sleepy Hollow and how little has changed within the traditional classroom in America. On March 10, 2010, the National Governors Association and the Council of Chief State School Officers even called for "sweeping new school standards that could lead to students across the country using the same math and English textbooks and taking the same tests, replacing a patchwork of state and local systems in an attempt to raise student achievement nationwide."[8] Ichabod Crane lives!

What in the world is going on? In the past in America, times of enormous innovation in the rest of society, including in technology and in industry, have also been times of tremendous innovation in education. What has happened to us? Rather than thinking of ways we can be preparing our students for their future, we seem determined to prepare them for our past.

Literally. The current passion for national standards is reminiscent of the conversations on education at our country's beginnings, back in 1787, the year the U.S. Constitution was adopted. Technology was changing the world then, too. At the time of the signing of the Constitution, the new invention of steam-powered presses, coupled with the invention of machine-made ink and paper, made for mass printing of cheap books and newspapers, putting print into the hands of middle-class readers for the first time in human history. The new institution of the circulating library made books available even to the working poor. Books proliferated; newspapers sprang up everywhere. And that's when a cry for standards and public education was born in America, in response to a new democratic government that needed informed citizens and new technologies of print that made books and newspapers widely available.

Thomas Jefferson himself advocated that America had to launch a "crusade against ignorance" if the nation was to survive as an independent representative democracy.[9] By 1791, when the Bill of Rights was added to the U.S. Constitution, seven states were making provisions for public education. There was not yet anything like an "educational system" in the United States, though. Education was attended to unevenly by local, regional, state, and private institutions, some secular, some sectarian, an inheritance that continues to this day in

the form of state-controlled educational policy, local and regional school boards, and other decentralized means of oversight.

Horace Mann, whose name can be found over the entrance of many public schools in America, was the first great champion of national educational reform. The son of a farmer of limited means, Mann clawed his way to an education, earning money by braiding straw to pay the local tuitions for the elementary schools he attended for only six weeks at a time, leaving the rest of his time free to help with family farming operations. He enrolled at Brown University at age twenty, graduated in three years as valedictorian of the class of 1819, and dedicated himself to the creation of the "common schools," which after around 1840 became the predecessor of a free, publicly supported education system.

The common schools were scheduled around the agriculture year so farm kids could attend too. The schools were open to both boys and girls, regardless of class, although several states explicitly forbade the attendance of nonwhite children. The schools were locally controlled, with the kind of local politics governing curriculum and textbook assignments then that we see now in the state-by-state regulation of education, even after our "national educational policy" has been adopted.

Mandatory, compulsory public schooling developed over the course of the last half of the nineteenth century and got its full wind at the turn into the twentieth century as part of America's process of industrialization. Public education was seen as the most efficient way to train potential workers for labor in the newly urbanized factories. Teaching them control, socializing them for the mechanized, routinized labor of the factory was all part of the educational imperative of the day. Whether meant to calm the supposedly unruly immigrant populace coming to American shores or to urbanize farmers freshly arriving in the city, education was designed to train unskilled workers to new tasks that required a special, dedicated form of attention. School was thought to be the right training ground for discipline and uniformity. Kids started attending school at the same age, passed through a carefully graduated system, and were tested systematically on a standardized curriculum, with subjects that were taught in time blocks throughout the day. In ways large and small, the process mimicked the forms of specialized labor on the assembly line, as well as the divisions of labor (from the CEO down to the manual laborers) in the factory itself.

Many features now common in twenty-first-century public education began as an accommodation to the new industrial model of the world ushered in during the last part of the nineteenth century. With machines that needed to run on schedule and an assembly line that required human precision and efficiency, schools began to place a great emphasis on time and timeliness. Curriculum, too, was directed toward focusing on a task, including the mastery of a specified syllabus of required learning. "Efficiency" was the byword of the day, in the world of work and in the world of school. Learning to pay attention as directed—through rote memorization and mastery of facts—was important, and schools even developed forms of rapid-fire question-and-answer, such as the spelling bee or the math bee. This was a new skill, different from the elite models of question-and-answer based on the Socratic method; the agrarian model of problem solving, in which

one is responsible for spotting a problem and solving it (whether a wilted corn tassel or an injured horse); and the apprenticeship model of the guild wherein one learned a craft by imitating the skills of a master. An assembly line is far more regular and regulated. One person's tardiness, no matter how good the excuse, can destroy everyone else's productivity on the line. Mandatory and compulsory schooling for children was seen as a way of teaching basic knowledge—including the basic knowledge of tasks, obedience, hierarchy, and schedules. The school bell became a symbol of public education in the industrial era.[10]

So did specialization. With the advent of the assembly line, work became segmented. A worker didn't perform a whole job but one discrete task and then passed the job on to the next person and the next and so forth down the assembly line. The ideal of labor efficiency displaced the ideal of artisanship, with increased attention paid to the speed and accuracy of one kind of contribution to a larger industrial process. Focused attention to a task became the ideal form of attention, so different from, for example, the farmer on his horse scanning his land for anything that might look out of place or simply in need of care.

By 1900, state and regional schools were becoming the norm, replacing locally managed ones, and by 1918, every state had passed laws mandating children to attend elementary school or more. A concession was made to Catholics in that they could create a separate, parochial school system that would also meet these state regulations, another legacy that comes down to the present in the form of "faith-based schools."

During the first six decades of the twentieth century, as America ascended to the position of a world power, the rhetoric of education followed suit, with an increasing emphasis on producing leaders. While the nineteenth-century common schools had focused on elementary education, the twentieth-century focus was increasingly on the institution of high school, including improving graduation rates. In 1900, approximately 15 percent of the U.S. population received a high school diploma, a number that increased to around 50 percent by 1950.

After World War II, there was a rapid expansion of both high schools and higher education, invigorated after 1957 when the Russians surprised the world by launching *Sputnik,* the first man-made object ever to orbit the earth. As America competed against Russian science in the Cold War, policy makers placed more and more emphasis on educational attainment. Many economists argue that America's economic growth through the 1960s was fueled by this educational expansion.

Robert Schwartz, dean of the Harvard Graduate School of Education, notes that since the last quarter of the twentieth century, the pattern of educational expansion that has characterized the United States from the Revolutionary War forward has changed.[11] Since 1975, American educational attainment has leveled off or even dropped while there has been a dramatic increase in the number of jobs requiring exploratory, creative problem solving typically encouraged by postsecondary education. We are seeing the first signs that our education system is slipping in comparison to our needs.

The current high school graduation rate is roughly the same as it was in 1975, approximately 75 percent. Our graduation rate from four-year colleges is

28 percent, also roughly the same as it was thirty-five years ago. That this has even remained consistent in the face of all that has changed in the last thirty-five years is remarkable enough, a credit to both the drive and quality of American students and the patchwork, piecemeal reforms we've used to hold the system together. Yet while we've been holding steady, other countries have made rapid gains. Whereas in the 1960s we ranked first in the proportion of adults with high school degrees, we now rank thirteenth on the list of the thirty countries surveyed by the Organisation for Economic Co-operation and Development (OECD), an organization that coordinates statistics from market-based democracies to promote growth. By contrast, South Korea has moved from twenty-seventh place on that list to our old number one spot.

Most troubling is what happened from 1995 to 2005. During this one decade, the United States dropped from second to fifteenth place in college completion rates among OECD nations. For the wealthiest and most powerful nation on earth to rank fifteenth is nothing short of a national disgrace. This is especially the case, given that our system of education *presumes* college preparation is the ideal, even in environments where most kids are not going on to college. By that standard, we are failing.

It's not that we cared about education before 1975 but don't today. Our heart is not the problem. Look at the numbers. The Swiss are the only people on earth who spend more per child on public education than Americans. According to OECD, we spend over $11,000 per year per child on public education. That's more than double the rate of South Korea. Education spending accounts for more than 7 percent of our GDP.[12] However, the OECD statistics show that our graduation rates now are roughly on a par with those of Turkey and Mexico, not nations to which we like to compare ourselves by other indicators of our power or success.[13]

It is little wonder that educators and parents are constantly reacting to the comparative, global numbers with ever more strident calls for standards. The problem, however, is the confusion of "high standards" with "standardization." Our national educational policy depends on standardized tests, but it is not at all clear that preparing students to achieve high test scores is equivalent to setting a high standard for what and how kids should know and learn.

The real issue isn't that our schools are too challenging. It's the opposite. Among the top quartile of high school students, the most frequent complaint and cause of disaffection from schooling is boredom and lack of rigor. That also happens to be true among the lowest group, for whom low expectations lead to low motivation.[14] Kids aren't failing because school is too hard but because it doesn't interest them. It doesn't capture their attention.

Relevance has been proved to be a crucial factor for keeping students in high school, especially mid- and lower-level students. Tie what kids learn in school to what they can use in their homes, their families, and their neighborhood—and vice versa—and not surprisingly, that relevance kicks their likelihood of staying in school up a few notches. Because in the United States (but not in many countries with higher college attendance), going to college requires money for tuition, our emphasis on college as the grail of secondary

education only rubs in its inaccessibility (its irrelevance) to lower-income kids—a fact that contributes to high school dropouts. Finally, for all groups, and especially for students in the lowest-achieving group, relationships with teachers and counselors who believe in them and support them (often against peer, familial, or cultural pressure) is a determining factor in remaining in school. These key factors for educational success—rigor, relevance, and relationships—have been dubbed the new three *Rs*, with student-teacher ratio being particularly important. Small class size has been proved to be one of the single most significant factors in kids' staying in and succeeding in school. Twenty seems to be the magic number.[15] Even on a neurological level, brain researchers have shown that kids improve with directed, special attention to their own skills and interests, the opposite of our move toward standardization.[16]

The biggest problem we face now is the increasing mismatch between traditional curricular standards of content-based instruction and the new forms of thinking required by our digital, distributed workplace. At any level—blue collar or white collar—those jobs requiring "routine thinking skills" are increasingly performed by machine or outsourced to nations with a lower standard of living than the United States. Yet virtually all of contemporary American education is still based on the outmoded model of college prep that prepares students for middle management and factory jobs that, because of global rearrangements in labor markets, in large part no longer exist.

We've all seen industrial jobs for manual laborers dwindle in the United States and other First World economies, either taken over by machines or outsourced abroad to workers who are unprotected by unions or fair labor laws. The same is now the case for routinized white-collar office jobs. In exploitative "digital sweatshops" all around the world, workers at minimal wages can do everything from preparing your tax return to playing your online strategy games for you, so your avatar can be staging raids while you are on the trading floor or in your executive office on Wall Street.

To be prepared for jobs that have a real future in the digital economy, one needs an emphasis on creative thinking, at all levels. By this I mean the kind of thinking that cannot be computerized and automated. This creative thinking requires attention to surprise, anomaly, difference, and disruption, and an ability to switch focus, depending on what individual, unpredictable problems might arise. Perhaps surprisingly, these noncomputational jobs, impervious to automation, occur at all levels across the blue-collar and white-collar spectrum. Many of these jobs require highly specialized and dexterous problem-solving abilities or interpersonal skills—but do not require a college degree.

We were criticized for the iPod experiment. Many treated it as if it were an extravagance, superfluous to real learning and real education. But the iPod experiment exemplifies a form of inquiry-based problem solving wherein solutions are not known in advance and cannot be more successfully outsourced to either a computer or to a Third World laborer who performs repetitive tasks over and over in horrific conditions at minimal wages. The new global economics of work (whatever one thinks about it politically) is not likely to change, and so we must. And that change begins with schooling. Learning to think in

multiple ways, with multiple partners, with a dexterity that cannot be computerized or outsourced, is no longer a luxury but a necessity. Given the altered shape of global labor, the seemingly daring iPod experiment turns out actually to be, in the long run, a highly pragmatic educational model.

Part of our failure rate in contemporary education can be blamed on the one-size-fits-all model of standards that evolved over the course of the twentieth century; as we narrow the spectrum of skills that we test in schools, more and more kids who have skills outside that spectrum will be labeled as failures. As what counts as learning is increasingly standardized and limited, increasing numbers of students learn in ways that are not measured by those standards. This is the lesson of attention blindness yet again: If you measure narrowly, you see results just as narrowly. In other words, the more standardized our assessment, the more kids fail. Their failure is then diagnosed as a learning disability or a disorder. But they are failing when assessed by a standard that has almost nothing to do with how they learn online or—more important—what skills they need in a digital age.

The mismatch is just wrong. It's as if we're still turning out assembly-line kids on an assembly-line model in an infinitely more varied and variable customizing, remixed, mashable, user-generated, crowdsourced world. As long as we define their success by a unified set of standards, we will continue to miss their gifts, we will not challenge their skills, and, in the end, we will lose them from our schools just as, implicitly, we have lost interest in them.

We need far more inquiry-based opportunities for our kids. It doesn't have to be as expensive or as radical as the iPod experiment. The world is full of problems to solve that cost little except imagination, relevant learning, and careful guidance by a teacher with the wisdom to *not control* every outcome or to think that the best way to measure is by keeping each kid on the same page of the same book at the same time.

I recently visited a middle school where one girl with green- and blue-striped hair, creatively and eccentrically dyed, sat against the wall, remote from the other kids, as drawn into herself as she could possibly be without disappearing, looking for all the world like the kid who will never hear anything. When I, a stranger, came into the classroom, some of the other kids fussed over my unexpected appearance there, and my *difference*: One girl admired my purple leather jacket, another asked if I was an artist, because I was wearing a black turtleneck and skinny black pants. One boy asked about the image of an electric fan on my long, illustrated scarf from South Africa, and a waggish little boy hummed, with perfect pitch, "Who's That Lady?" when he saw me in his classroom. When I asked how in the world a twelve-year-old knew the Isley Brothers, he said snappily, "The Swiffer commercial." There was a lot of buzz in the class about the visitor, in other words. The green-haired girl in the corner slowly shifted her gaze in my direction, gave the smallest upward movement at the corner of her lips before returning to her frown and letting her eyes move back to outer space again, away from the strange visitor, determinedly *not there.*

I thought of a blog post I'd read earlier that week by the prolific business writer Seth Godin, creator of the popular user-generated community Web site Squidoo. Godin's post was called "What You Can Learn from a Lousy Teacher," and his list of what you can learn from the teacher you cannot please included: "Grades are an illusion, your passion and insight are reality; your work is worth more than mere congruence to an answer key; persistence in the face of a skeptical authority figure is a powerful ability; fitting in is a short-term strategy, standing out pays off in the long run; and if you care enough about work to be criticized, you've learned enough for today."[17] This remote young woman against the wall didn't look defeated by school. There was something *resolute* in her. I could sense that she had, somehow, taken in intuitively the kinds of lessons Godin was preaching, even if it would take her another decade to fully realize what, in her body language, she was already showing she'd absorbed.

She stayed that way, barely making eye contact with the teacher or any other students, until drawings begun during the previous class were handed around to be worked on again. The transformation I witnessed then was so rapid and thorough that I thought of what Pygmalion must have seen the first time his statue came to life. She went from being still, glassy-eyed, self-contained, and entirely not-present to a concentrated, focused, dedicated bundle of intensity. She still didn't interact with the other kids, but all eyes were on her as she began her day's work on a highly detailed line drawing she was executing. Unlike the bustle at the other tables in the room, there was a silence around her, with the kids practically tiptoeing into the circle of her aura to watch, not speaking to her or to one another, then moving away. I was dying to see her drawing but even more interested in the compact energy she'd created around herself and the other kids, generated from the passion of her drawing. Rather than interrupt that magic, I moved away.

Later in the day, I saw her waiting for her ride home, in the homeroom period at the end of the day, and again the sullen remoteness of I-am-not-here returned After all the kids had gone, I asked her teacher to tell me about her. She'd been diagnosed as profoundly learning disabled, with attention deficit disorder. Her parents sent her to this magnet arts school after she had failed elsewhere. At home, the only thing she seemed to enjoy doing was doodling, but her elementary school had laid off its art teachers, sacrificed to educational cutbacks and the fact that, in our standardized forms of testing, there is no EOG (end-of-grade exam) for art. Art is therefore an add-on that many public schools cannot afford. It was only at the new school that her skills as an artist were recognized. She quickly went from the class failure to the class artist. She mastered the editing tools on the class computer and transferred her imagination and creativity there, too, much to the admiration of her classmates.

I think again about what learning disabilities signify for kids today. In the *Diagnostic and Statistical Manual of Mental Disorders* (the infamous DSM), attention deficit disorder is characterized by distractibility, frequent switching from one activity to another, boredom with a task after just a brief time trying to execute it, and difficulty organizing and completing a task or in focusing on a task in which one is not interested. That last phrase is key. ADD almost never applies to *all* activities, only those in which the child is not interested. This isn't a disability (a fixed biological or cognitive condition) but a disposition (susceptible to

change depending on the environment). Keep the kids interested and ADD goes away.

The girl with the green hair has special skills that show up nowhere on her compulsory EOG state tests, on which she continues to score poorly. "Your work is worth more than mere congruence to an answer key." This girl's talents don't count on those tests, and yet she has a special and valued ability that cannot be replaced by a computer program. The problem is that her fate is to a large extent controlled by her performance on the EOG tests, and unless the adults in her life—teachers and parents—are resolute in shepherding her along a path where her talents are valued, they may ultimately wind up undeveloped.

I identified with this girl. When I was in school, my talents had been math and writing, and there was a teacher, Miss Schmidt, who saw those gifts, despite my abysmal test scores, despite the fact that we had to memorize the preamble to the Constitution and the Gettysburg Address to graduate from eighth grade and I just couldn't. I tried and failed over and over many times, staying after school, trying to say it out loud and failing again. Miss Schmidt was feeling certain that I wasn't really trying but just being "obstinate." Then, during one of our painful after-class sessions, she had a hunch. She offered me the opportunity to write an essay instead, one essay about each brief text I was failing to memorize. I stayed up all night working on this and returned the next day with my project. My scrawl filled every page in a small spiral binder—*two hundred* pages.

I remember her eyes widening as she took this smudgy, worn binder from my hand. She looked through it in disbelief and bewilderment as she turned over pages and pages of my barely readable handwriting. There were even footnotes. "You still don't have them memorized, do you?" Miss Schmidt asked. I shook my head. After a moment, she got out the special state certification and, beside my name, put the check mark I needed to graduate from middle school. I'd passed.

Sometimes you learn from the good teachers too. It's not easy to be a good teacher all the time. The girl with the green hair was lucky to find one who honored her talent. Before I left his classroom, I told him, if he thought it appropriate, to let the girl know that the visitor, that professor from Duke University, had noticed her beautiful artwork and admired it. I told him, if he thought it appropriate, to let the girl know that, when the visitor was her age, her hair was purple.

As Matthew b. Crawford argues in *Shop Class as Soulcraft*, his eloquent study of the importance of making and fixing things, our national standards for secondary schools miss kids like this young lady. Our schools are geared, implicitly and explicitly, to be college preparatory. They are weighted toward a twentieth-century, white-collar, middle-management economy.[18] Our standardized education not only bores kids but prepares them for jobs that no longer exist as they once did. Attention blindness again. Our one-size-fits-all educational model focuses steadily and intently on the past.

The space age was America's educational glory moment, when we occupied the number one spot. At that moment, there was a splendid flowering of many

kinds of educational theory, including progressive theories, free schools, Montessori schools, science and technology schools, new math, old math, and on and on. It was thought that we were facing a brave new world of science for, after all, incomprehensibly, men had walked on the moon. Education took that fervor to its heart, blossoming, experimenting with innovations as bold and expansive as the solar system itself.

Now, in a digital age, we can communicate and learn in ways not even imagined by Neil Armstrong and Buzz Aldrin walking for the first time on the face of the moon: "One small step for man, one giant leap for mankind." Yet our educational vision has shrunk to the tiny bubble of a multiple-choice exam. Our dreams of new standards of knowledge have shrunk to the right or wrong answer, chosen not among infinitely variable possibilities but among A, B, C, D, and, perhaps, none of the above.

I hate this kind of education. I'm prejudiced, I admit it. So don't ask me. Ask any adult. Ask yourself. What was the most formative experience of your life in school? I suspect your answer isn't "I scored in the 94th percentile on my fifth-grade end-of-grade compulsory exam." Whenever I ask this question, invariably I hear a story of a great teacher who had faith, who inspired and challenged someone to do more than she ever thought was possible before.

Ichabod Crane may nod approval at our current national educational policy. It may seem familiar to him and right. For those of us who remember what inspired us, what commanded our attention, there was always something experimental and daring, there was always something more.

Some of the best teaching I ever witnessed did not happen courtesy of the Internet. It was many years ago, in rural Alberta, Canada. Inez Davidson, the mother of my first husband, Ted, began her teaching career at eighteen, teaching in a one-room schoolhouse in Pincher Creek, a coal-mining town in the Canadian Rockies. She rode half-wild horses to school each morning, alone in the dark and the cold through grizzly country, "putting miles on them," as she would say, before they could be sold to local ranchers as well-trained working horses. Inez was maybe five feet tall, but no one messed with her, ever.

Ted's father was a rancher in the town of Mountain View when he married Inez. Mountain View is as pretty as its name, a gorgeous ranching community in the foothills of the Rockies. The Davidson homestead looked out upon Chief Mountain, the sacred mountain of the Blackfoot and Blood Indian tribes. The area was made up mostly of Native peoples and Mormons or adamant ex-Mormons like the Davidsons, plus elk, moose, black bear, grizzlies, mountain lions, and so forth. Two hundred people in two hundred square miles. The area was poor, too. Rural electrification only came to Alberta in the late 1950s. Even in the 1970s and 1980s, when I was there, the kitchen had a stove that also burned wood (for when the electricity went out), and the entire house had only two additional propane heaters. This was *Canada*, in the foothills of the Rocky Mountains. In winter, it was sometimes 20 or 40 degrees below zero. The hallways and bathrooms and bedrooms were unheated. There was an outhouse for when the plumbing was overtaxed. It was a lot for a gal from Chicago to take in.

My mother-in-law taught in the three-room schoolhouse in Mountain View. For many years, there were more former residents of Mountain View with PhDs, MDs, or law degrees than from any other town in Alberta besides the two major cities in the province, Edmonton and Calgary. By the time I came on the scene, graduate students earning their degrees in education departments in the province were coming to Mountain View to find out what was happening there, that such a backwater was sending students not only to college but well beyond.

Mrs. Davidson, as she was called, was a main reason for this educational success story. How did she do it? First, she got in a lot of trouble, every year, with the school superintendent because she refused, ever, to teach to a test. She covered what the province demanded of third, fourth, and fifth graders and far more, but she always did it her way, as a challenge, a game, an interactive and communal learning activity. She made learning fun—and she was tough.

She was very skeptical of the concept of learning disabilities. She taught long after the normal retirement age and began to see kids coming to school who were more hyperactive than she'd seen in her earlier career and was convinced that part of the reason was environmental and part behavioral. She was concerned about both food additives and contaminants in the air and drinking water even in cattle country, where the water supply was tainted by runoff from oil and smelting plants far away. She was also shocked at how parents were driving kids to school instead of having them walk or ride horses in; these were forms of physical exercise she believed were important to kids' health, well-being, and concentration in the classroom. She loathed it when she saw kids medicated as a remedy for their learning disabilities, and was much more interested in all the subtle and obvious ways kids learned—and learned differently.

She insisted that everyone had a unique way of learning and believed that to be true of the smartest students as well as the academically weakest. She took pride in finding challenges that inspired kids who had clear cognitive restrictions or physical ones, and defied anyone to bring her a kid she couldn't teach. Rodney, a close friend to all the Davidson boys, was a brilliant athlete but very poor in school. Reading was hard and math unbearable. He couldn't conceptualize arithmetic on any level and used his fingers to count even the simplest arithmetic. Other teachers wrote him off as "slow." Mrs. Davidson bought him an abacus and had him research all the sophisticated things the ancient Egyptians could calculate on one. She then taught him to use the different parts of each of his ten fingers as if they were beads on an abacus. He could put his hands under the table and, without anyone seeing, do "rapid calculation" instantly. He did so as a kid, acing math tests, and he did so as an adult, gaining a reputation for uncanny speed and accuracy in the brawny, take-no-prisoners arena of the cattle auctions. Rodney was no one's fool.

Two of Inez Davidson's best teaching tricks involved games. One was that, on every Friday, she would divide up the kids, the fifth graders on one side of the room, the little kids—third and fourth graders—on the other. Whatever they had learned that week would be the subject of the Friday contests. The first part

of the day would be spent with the previous week's winners figuring out what kind of competition they would make. They would devise the rules and explain them to the other group. The competition would then require one group testing the other on the answers to various problems in all the different areas they had studied that week.

Mrs. Davidson would serve as the referee. The little kids worked hard to beat the older kids, who of course had their honor to defend, and each team tried to ask harder and harder questions to stump the other. Once Mrs. Davidson felt that the week's work had been covered, she would declare a winning team. The winning group could head out to the playground fifteen minutes early while the losers sat there an *interminable* fifteen minutes—nine hundred seconds!—getting a head start on next week's contest. Some weeks, though, they had so much fun scheming on the hard questions they'd ask the following week that Mrs. Davidson would have to point to the clock to remind them that study hall was over and that it was time to go outside to the schoolyard to play with their friends.

Sometimes they had an hour of these competitions on Friday, sometimes two hours. The other teachers grumbled that Mrs. Davidson's kids got away with murder. Ted, who had his mother as a teacher for all three years because there wasn't anyone else in Mountain View, ended up winning a full scholarship to the University of Chicago, where he tested out of virtually all of his first- and second-year college courses. Not bad for a kid from a cow town in the Canadian Rockies.

Mrs. Davidson taught her kids to dream. Every year, there would be some new, ambitious project with a theme that would unfold over the course of the year. One year, the project was for each child to find a pen pal in another town called Mountain View somewhere in the world. There was only one map in the school, so a first step was to take an enormous piece of newsprint, cover the map, and spend days and days tracing out all the countries on their own map. Then, each child went to the library, which held far fewer books for the entire school than my study holds today, and they each started reading about all the countries in the world, looking for other Mountain Views. They would then mark their particular Mountain View on the hand-drawn map tacked up in the schoolroom. They had to think of ways to communicate with kids in these other Mountain Views. Since this was a Mormon area, there were families who had been on missions to other parts of the world, so that was the obvious way to make contacts, but this was a contest, and ingenuity was rewarded.

One kid remembered that Hang Sang, the elderly Chinese man who ran the local general store, the only store in town, had come over to Canada to work on the railroad, as had so many Chinese immigrants. Taciturn, with a thick accent, Mr. Sang was amused and delighted when one child suddenly wanted help writing a letter—in Chinese. The kid had somehow found out about a town called Mountain View in China. That was the child who won the contest, and long after the contest was over, he spent time with Mr. Sang, talking to him in the back of his store.

But of course they all won. The globe became smaller through the connections they made, and their town became larger. They learned geography and

anthropology and foreign languages too. The project lasted not just one full year but many years, and some kids visited those other Mountain Views when they grew up. To this day, I don't drive through a town named Mountain View (there are a lot of them in the world, actually) without wondering if one of Mrs. Davidson's kids sent a letter there and, through the connection made, was inspired to go on, later, to become a professor or a doctor or a veterinarian.

None of what happened in Mrs. Davidson's classroom in Mountain View, Alberta, Canada, depended upon an iPod. None of it required the Internet. But the Internet requires this kind of interactive, motivated, inspired, and curious form of learning. The key here is that Mrs. Davidson's classroom was not really divided up into "subjects" so much as it was into problems, puzzles, brain teasers, challenges, games, word problems, and intellectual obstacle courses, many of which require kids working together toward a solution. What counts is the little kids showing, with pride, that they are every bit as smart as the big kids and the big kids showing, with pride, that they are king, and all of them understanding (although they'd fight you rather than admit it) that they need one another to learn and to dream.

Like the iPod experiment, what this classroom story shows is that kids want to learn and can propel themselves to all kinds of learning as long as there is a payoff, not in what is won or achieved in statistical terms, but what is won and achieved inside, in the sense of self-confidence and competence. Learning, in this sense, is skill and will, an earned conviction that, faced with a challenge ahead, this past achievement will get one through. You can count on your ability to learn, and nowhere is that more important than when what you've learned in the past no longer suffices for the future. That is the glistening paradox of great education: It is not about answering test questions. It is about knowing that, when tested by the most grueling challenges ahead, you have the capacity to learn what is required to succeed.

It is in this sense that unlearning is a skill as vital as learning. It is a skill you have to acquire, too. Unlearning requires that you take an inventory of your changed situation, that you take an inventory of your current repertoire of skills, and that you have the confidence to see your shortcomings and repair them. Without confidence in your ability to learn something new, it is almost impossible to see what you have to change in order to succeed against a new challenge. Lacking confidence in your ability to change, it's much easier to blame the changed situation—typically, new technologies—and then dig in your heels, raising a bulwark against the new. Confidence in your ability to learn *is* confidence in your ability to unlearn, to switch assumptions or methods or partnerships in order to do better. This is true not only for you, as an individual, but for whole institutions.

That's what those kids in a tiny town in rural Alberta learned as fourth and fifth graders pitted against the sixth graders (and vice versa). Mrs. Davidson had to fight the school superintendent every year. Her kids all knew that, too. They knew that she'd put herself on the line for their learning; she'd stand up to anybody, including the superintendent, on their behalf. She dared him, year after year, to fire her. In a different era, he might have, but every year, there'd be

the ritual dressing down in his office. I was never in the room with them, but I have a feeling that it wasn't Mrs. Davidson who left feeling chastised.

Put those kids in a lecture hall, give them a standardized curriculum with standardized forms of measuring achievement and ability, and they learn a different lesson. They might well master what they are supposed to learn, but that's not education. When you think of learning as something external to yourself, learning becomes a levy—*an assessment, not an asset.* The assessment no longer matters after the schooling stops. The asset is a resource one draws on for a lifetime.

How can the lessons of this woman's extraordinary classroom be put to use? The model of learning in Mrs. Davidson's classes is probably as old as human history. It is the game. As in a game, there are parameters, what you need to know in order to succeed within the game's rules and requirements, subject matter, or methods. There is a specific target or goal, and you compete with others and against others to win. The real winner, always, is you, not because you earned the trophy but because you learned the inestimable skill of responding to a challenge.

NOTES

1. These are all quoted and the experiment is discussed in James Todd, "The iPod Idea: Wired for Scholarship," *Duke Magazine* 91, no. 5, Sept.–Oct. 2005.
2. The iPod experiment would never have happened without approval and funding of this forward-looking initiative, for which credit goes to my colleagues Tracy Futhey, Vice President for Information Technology, and Provost Peter Lange.
3. On values formation and the blind spots it leaves, see Barbara Herrnstein Smith, *Contingencies of Value: Alternate Perspectives for Critical Theory* (Cambridge, MA: Harvard University Press, 1988).
4. Jeff Howe, *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business* (New York: Crown, 2008).
5. Professor Marie Lynn Miranda is a pioneer in using new technologies to help shape community activism on environmental policy. Her Web site is: http://fds.duke.edu/db/Nicholas/esp/faculty/mmiranda (accessed May 6, 2010).
6. Maria Magher, "iPod Gets Top Marks: Culbreth Middle School Is the First in the State to Require Device," *Chapel Hill News*, Mar. 14, 2010.
7. I have written about this at length with my HASTAC cofounder, David Theo Goldberg, in a research report that was first put up on the Web for comment from anyone who wished to offer it, then published in a research report based on colloquia we held all over the country, *The Future of Learning Institutions in a Digital Age* (Cambridge, MA: MIT Press, 2009). The expanded book form of this project is Cathy N. Davidson and David Theo Goldberg, *The Future of Thinking: Learning Institutions in a Digital Age* (Cambridge, MA: MIT Press, 2010).
8. "States Push for Nationalized Educational Standard," *US. and World News*, CBS Interactive, Mar. 10, 2010.

9. The classic studies of American education include Lawrence Cremin, *American Education: The National Experience* (New York: HarperCollins, 1980); Carl Kaestle, *Pillars of the Republic: Common Schools and American Society, 1780–1860* (New York: Hill & Wang, 1983); and Michael Katz, *Reconstructing American Education* (Cambridge, MA: Harvard University Press, 1987).
10. See Alvin Toffler and Heidi Toffler, *Revolutionary Wealth: How It Will Be Created and How It Will Change Our Lives* (New York: Knopf, 2006): 357–62.
11. Robert Schwartz "The American High School in Context," paper delivered to Sino-U.S. Seminar on Diversity in High School, Mar. 23, 2009. This is the single most concise survey and set of statistics I have found anywhere, and one remarkably free of the polemics and politics (left or right) that confuse many of the statistics. This debt to him is not just for this wise assessment and sorting of the numbers but for his distinguished career of contribution to national educational policy since the Carter administration.
12. These are official figures from the Organisation for Economic Co-operation and Development (OECD), an international organization of thirty countries "committed to democracy and the market economy."
13. Ibid.
14. Special thanks to tweeter Michael Josefowicz, a retired printer who tweets as ToughLoveforX, for this clarifying distinction between *standards* and *standardization*. Schwartz's essay discusses the surveys of why students drop out of school.
15. On class size and academic performance, see foundational work in, for example, Glen E. Robinson and James H. Wittebols, *Class Size Research: A Related Cluster Analysis for Decision-Making*. (Arlington, VA: Education Research Service, 1986); Jeremy D. Finn, *Class Size and Students at Risk: What Is Known? What is Next?* (Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement, National Institute on the Education of At-Risk Students, 1998); and Gene V. Glass, Leonard S. Cahen, Mary L. Smith, and Nikola N. Filby, *School Class Size: Research and Policy* (Beverly Hills, CA: Sage, 1982).
16. See William R. Dagged and Paul David Nussbaum, "How Brain Research Relates to Rigor, Relevance and Relationships." See also Peter S. Eriksson, Ekaterina Perfilieva, Thomas Bjork-Eriksson, Ann-Marie Alborn, Claes Nordborg, Daniel A. Peterson, and Fred H. Gage, "Neurogenesis in the Adult Human Hippocampus," *Nature Medicine* 4 (1998): 1313–17. There is a prolific body of research and policy statements on the "new three Rs"–including other xRs, such as responsibility, representing, relating, and so forth. See, for example, Clifford Adelman, *Principal Indicators of Student Academic Histories in Postsecondary Education*, 1972–2000 (Washington, DC: US Department of Education, Institute of Education Sciences, 2004); and Anthony P. Carnevale and Donna M. Desrochers, *Connecting Education Standards and Employment: Course-Taking Patterns of Young Workers* (Washington, DC: Achieve Inc., 2002).
17. Seth Godin, "What You Can Learn from a Lousy Teacher," http://sethgodin.typepad.com/seths_blog/2010/03/what-you-can-learn-from-a-lousy-teacher.html (accessed Mar. 20, 2010).
18. Matthew B. Crawford, *Shop Class as Soulcraft: An Inquiry into the Value of Work* (New York: Penguin, 2009).

QUESTIONS FOR MAKING CONNECTIONS WITHIN THE READING

1. Do you recognize yourself in Davidson's portrayal of the "first generation of kids" to grow up with the Internet? Do you regard yourself and other people your age as *information seekers*? Have the schools that you attended prior to college ignored the potential of the Internet, as Davidson suggests? If most students are adept at finding information via the Web, does it make sense for schools and universities to focus on skills they already have? Have you found that in terms of *quality*, however you wish to define it, the information furnished by the Web can hold its own with other sources, such as books and lectures? Have you found Facebook and Twitter to be effective forms of knowledge delivery?
2. Davidson argues that crowdsourcing has advantages over authority as an organizing principle for education. What forms of social interaction does crowdsourcing involve, and what are its potential strengths as well as its potential liabilities? What forms of interaction are implied by the authority principle? In what ways might the growth of standardized testing reflect the basic values of a system premised on authority? In what ways do crowdsourcing and collaboration offer alternatives to the standardization that Davidson inveighs against? Could crowdsourcing, and the Web in general, inadvertently produce standardization of another kind?
3. It is possible to argue that Davidson sees the new technology—like the free iPods gifted to the students at Duke—as a means to an end rather than an end in itself. What end(s) does she want students to pursue? What, in other words, are her political or cultural objectives? Based on the selection, would you say that Davidson wants to nudge us toward a more egalitarian way of life? What assumptions does she appear to make about ordinary people? Does she see creativity as exceptional? How about intelligence? Does she view failure as socially produced—that is, as forced upon learners by the educational system itself?

QUESTIONS FOR WRITING

1. In the widely read essay "Is Google Making Us Stupid," Nicholas Carr blames the Web for shortening our attention spans and training us to race through online information without stopping to reflect carefully on its meaning or its implications. "Once," Carr writes, "I was a scuba diver in the sea of words. Now I zip along the surface like a guy on a Jet Ski." Does the Web indeed promote "shallowness" in our use of information, and how might Davidson respond to the charge that it is making us less thoughtful? Are the activities she describes, such as inventing new apps, conducive to reflection? How does the experience of surfing the Web differ from reading

a novel? How does it differ from watching TV? Is interpreting a novel or poem a more active process than surfing the Web?

2. What is Davidson's philosophy of education? What does she believe should be its most important goals, and which aspects of contemporary schooling does she regard as detrimental? How has Davidson's experience of "difference" influenced her attitudes toward learning, and how were those attitudes shaped by the example of her mother-in-law, Inez Davidson? How might Davidson respond to Annie Paul Murphy's charge that her program for reform disregards past cultural achievements: "the inhabitants and the knowledge of the past are merely obstacles to be trampled in the headlong rush toward an interactive, connected, collaborative future"? What is the value of the past in Davidson's philosophy?

QUESTIONS FOR MAKING CONNECTIONS BETWEEN READINGS

1. In what ways might the new technology celebrated by Davidson pose a challenge to the ideology of "smartness" that Ho describes? How might the Internet help undermine a prestige-based hierarchy that *smartness* reinforces? If everyone has access to high status knowledge and can use it in creative ways, what impacts might such a change have on higher education—and on social life in general? Conversely, how might Ho's research complicate Davidson's egalitarian plans because, as Ho suggests, hierarchy is deeply entrenched in higher education? If Davidson were teaching at a less prestigious university than Duke, would her iPod program have generated the same degree of controversy? Does her optimism inadvertently reflect her own privileged situation within an elite institution?
2. The Internet-savvy "kids" whom Davidson lauds and wants professors to learn from are roughly the same people Twenge describes in "An Army of One: Me." Will Davidson's call for a nonhierarchical and student-centered education succeed if the students have been socialized into narcissism, as Twenge alleges? Does the Web actually promote the uncritical self-absorption of "generation me," or might it represent an antidote? Do the social media make people more social, or do they actually encourage psychological isolation? Does the Internet itself promote the idea that everyone will be exceptional if they just develop self-esteem? How might Davidson respond to Twenge's argument?