# 1

# HOW PERSONAL DIGITAL LEARNING WILL MAKE US SMART

If you saw three teens in the back of a classroom playing games, watching videos, and checking text messages, you would likely assume that little learning was going on. If you were in a classroom at most schools, you would be right. But there is another possibility. These students may be at one of a growing number of schools that are incorporating technology in exciting and productive ways. In fact, you could have observed the same three students in a coffee shop rather than a

classroom and they may be deeply engaged in learning activities unlike any you have ever experienced. They may be part of a learning revolution that, with a little help from us, will be coming soon to a community (or a computer) near you.

Twenty years of prompting, investing, threatening, and reforming have largely failed to dramatically improve education in the United States. There may be pockets of excellence, but results from U.S. schools are flatlined. While unions and school boards argue about contract minutes, the rest of the developed world passed us by in achievement and high school graduation and college completion rates. The United States ranks near the bottom of developed countries in math, with nearly one-quarter of students unable to solve the easiest problems.[1] More than 40 percent of students in Korea, Taiwan, and Singapore score at the advanced level in math and only 6 percent do in the United States.[2] The nation's 2009 report card indicated "that 38 percent of seniors demonstrated proficiency in reading and 26 percent reached that level in math. In addition, reading scores remain lower than they were in 1992. And the report found essentially no progress in closing achievement gaps that separate white students from black and Hispanic peers."[3]

The causes of our lagging performance are complicated but in short our schools are obsolete. They cannot accomplish what we need them to accomplish. Mass production style, our schools batch process each age group—some get it, others fail and repeat or drop out. We expect a lot out of teachers during the short school year but give them few tools to accomplish their complicated tasks. But there is a big opportunity right in front of us—to create schools that are engaging, are personalized, and work better for everyone. To better understand this opportunity let's take a closer look at that high school classroom described at the beginning of the chapter.

## YES, THIS IS LEARNING

There's Maria, the girl checking text messages. Only these are not messages from friends or updates on a celebrity court appearance; they are responses from a local politician to her requests for interviews on immigration. As part of Maria's course on civics, she is deputy editor of a website attempting to illuminate the immigration debate. Maria has already interviewed a number of politicians and activists on both sides of the issue and has produced articles and opinion pieces judged by online peers and advisors. All of Maria's contributions are filed in an electronic portfolio. She is passionate about her work as an editor but she isn't quite as passionate about statistics. Later that day, she will go to her ninety-minute math lab, which combines self-paced online learning with occasional individualized online tutoring if she gets stuck. Even though she isn't excited about statistics and finds it difficult, this approach is working for her and she feels successful, unlike her experience in precalculus class last year in a traditional school environment, when she just couldn't learn at the same pace as the top students.

Eric is in front of a laptop, playing a game, but is this Angry Birds or World of Warcraft? No, it's an algebra game and as he views his score Eric sees that he's got more work to do on quadratics. His smart recommendation engine has already suggested a new math game that may provide a better learning mode for Eric—the system determined that his persistence improves under competitive situations with public recognition of his point status. Before trying out the new game, Eric takes a moment to check a discussion stream he is engaged in with his virtual learning team comparing two opposing views of tax policy. He notes that one of his teammates has cited a

fact about the tax rates under Bill Clinton that he thinks may be wrong and when he checks his online source, he finds his instincts were right. He types a response with a correction.

Eric has completed enough units of study to complete lower division (what used to be the ninth and tenth grades). His culminating project and successful public demonstration will mark a midyear transition to upper division, when he will begin earning college credit and begin working on a career concentration including an internship.

Finally, we meet Isabel who is listening to her iPod and smiling. It isn't Kanye West or Lady Gaga who is making her smile, it is a lecture on Beethoven from McGill University that she had downloaded from iTunes U. Isabel is enrolled in the upper division of a virtual high school, she plays in a youth symphony, and music is her life. The lecture is only part of the background work she is doing in preparation for a project on music composition. Because Isabel does most of her learning at home, some folks are concerned about her lack of social interaction—in addition to her friends from the orchestra and soccer, she has a dozen mentors, is on five learning teams and four project teams, and regularly interacts with three academic advisors.

This isn't 2020 sci-fi. These portraits represent how millions of students could be learning with tools that are currently available to schools. Right now a small percentage of students in the United States are having these educational experiences. This is an emerging reality, a learning revolution under way, riding on the heels of the digital revolution, and rather than making us dumber, it has the power to help more students achieve academically and leave school prepared for work and further learning. It will extend learning to hundreds of millions of students. Personal digital learning can significantly boost traditional results. How this is happening and can happen are

addressed in these pages. But before we return to the power of personal digital learning, let's look for a moment at the world that students will be learning and working in—an economy that is based increasingly on having good ideas.

## IDEA ECONOMY

There are two growth economies in the United States—the idea economy and the service economy. Professional and technical jobs—the ideas jobs—are the ones that tend to be plugged into the global economy and that will continue to grow in number. At the other end of the pay scale are the services and help-ing professions including landscaper, waiter, cook, and health care aide. These jobs earn less than the median income—often minimum wage—and do not require a college degree; they are also expanding. The jobs that used to exist between these two sectors—the middle-class ones that created two-car-garage suburban America—are disappearing. MIT economist David Autor studied the disappearing act and concluded, "The struc-ture of job opportunities in the United States has sharply polar-ized over the past two decades, with expanding job opportunities in both high-skill, high-wage occupations and low-skill, low-wage occupations, coupled with contracting opportunities in middle-wage, middle-skill white-collar and blue-collar jobs."[4]

The polarization of the economy is a big problem. As educa-tors we can't fix the economy but what we can do is dedicate ourselves to making sure that as many students as possible are prepared to engage productively in the kinds of professional and technical jobs that that will help our economy and our stu-dents thrive. Learning is the entry ticket to the idea economy. "Most jobs that will have good prospects in the future will be complicated," says Louis Gerstner, former CEO of IBM. "They

will involve being able to juggle data, symbols, computer programs in some way or the other."[5] But are our schools preparing students for this kind of work? I would say no. Let's look more closely at the features of the idea economy, at how ideas turn into industries, and compare them to the education we are currently providing.

## JUST-IN-TIME LEARNING

The idea economy is iterative; it thrives on failure and feedback. By iterative I mean that ideas are tried and refined and tried again. It thrives on trial and error, risk and invention. Just listen to Marissa Mayer, Google's VP of Search: "We make mistakes every time, every day thousands of things go wrong with Google and its products that we know we can fix. But if you launch things and iterate really quickly, people forget about those mistakes and they have a lot of respect for how quickly you rolled the product out and made it better."[6]

Marissa's Google Search is both a product and driver of the idea economy. Search is a new form of idea economy learning: it is inquiry-based, iterative, and instantaneous. Search organizes the world's data to answer your questions: the better your question, the better the response. It is hard to imagine life before Internet searching—I don't know how we raised children, conducted business, or investigated illness without it. Google Search has turned us all into researchers, a shift whose importance we don't want to underestimate. Gisele Huff, executive director of the Jaquelin Hume Foundation, says, "The age of the expert is dead."[7] She points out that a doctor has hundreds of people and hundreds of ailments to worry about; you have one thing to worry about. If the doctor thinks you have adenoid cystic carcinoma, chances are you'll use a search

engine to learn as much as you can about it. Search makes the world's knowledge accessible; now learning is just a matter of motivation and focus.

The just-in-time learning that Google enables is a far cry from the just-in-case learning our schools are now offering. Luckily, this economy—in which a compelling idea can become an industry—is beginning to also have an impact on education. Just look at Toby Rowland.

Late on Good Friday 2010 in London, Toby Rowland, CEO of start-up Mangahigh, was pleased at the number of high-level mathematics games played by students from all over the world—over twelve thousand on day one—with many from the United Kingdom where it was a national holiday. A self-described "geek" who loved school, Rowland worked at Walt Disney before launching King.com, the largest skills gaming company in the world. Toby realized that gaming was really luring kids into skills-based learning, whether they knew they were headed that way or not. Rowland recalls, "These people are improving their skills through casual games. If you made a different type of casual game, people could develop better skills that are much more valuable to them."[8]

Toby had a big idea: the same strategies that produce persistent game-play behavior could be used to teach students mathematics. Toby recruited top math experts and game designers and launched Mangahigh. By April 2010, Toby had seventy thousand young people around the world playing eight math games online. Toby's idea was enabled by the capacity and experience necessary to execute it. Mangahigh joins a handful of young companies that will transform learning from textbooks and tests to engaging and adaptive experiences.

Microsoft was created with the idea that computers could make us more productive. Google was created with the idea

that search could be better. Walmart was created with the idea that retail could be more efficient. eBay was created with the idea that the web could be a marketplace. K[12], a $500 million e-learning giant, was created with the idea that schools could be conducted online. Each of these ideas attracted investment, created jobs, and launched an industry segment.

Having great ideas has long been a feature of the U.S. economy, a product of, among other things, a culture of independent thinking, financial markets, a venture-capital sector adept at taking ideas to scale, and a strong and diversified higher education system. But that could change if we don't nurture it. As Nayan Chanda, editor of YaleGlobal Online, wrote in an Indian publication, "The U.S. seems sadly unprepared to take advantage of the revolution it has spawned. The country's worn-out infrastructure, failing education system and lack of political consensus have prevented it from riding a new wave to prosperity."[9] When the bubble burst, the recession took more than wealth. "Americans are glum, dispirited and angry," Fareed Zakaria explained in *Time Magazine.* "The middle class, in particular, feels under assault. In a *Newsweek* poll in September, 63 percent of Americans said they did not think they would be able to maintain their current standard of living. Perhaps most troubling, Americans are strikingly fatalistic about their prospects. The can-do country is convinced that it can't."[10]

## "CAN-DO" EDUCATION

I, for one, am very optimistic. Education has a profound role to play in how this country thinks about the future and the level of preparation its young people have for shaping it. We can innovate; I see it happening every week. Education reform got a big boost with the Obama administration's stimulus grant

programs. But this book isn't about reform, it's about reinvention. If you extend a few trends and connect a few dots, you can imagine a system of public education with dramatically better results for the kids that need them most. We can shift from batch processing to personal digital learning but to do so means encouraging the entrepreneurs in our schools, embracing a new generation of learning tools, and inviting new providers to address unmet needs.

According to Gary Schoeniger, an entrepreneurship educator who writes for the Kauffman Foundation, "Entrepreneurs are fueled by their ideology and determined to make a difference. Armed with little more than a laptop and cell phone, fueled by their ideology, caffeine and a few credit cards, they set out against the status quo, breaking rules and blazing trails—redefining the world as they go." Ideally, this is the kind of energy we want to bring to our schools and have our students bring to their education and their work, but as Schoeniger also observes, "The organizational mindset that we have so carefully cultivated—the mindset that fosters obedience, order and efficiency—may blind us to opportunity and hinder our ability to succeed in this new entrepreneurial economic environment."[11]

## PREDICTIONS

*In five years . . .*

**The Common Core State Standards and Race to the Top assessments will frame this decade of U.S education the way NCLB did the 2000s.**

However, in *Customized Schooling,* Rick Hess and Olivia Meeks argue that it has been so hard for entrepreneurs to break into the school district–controlled system that "[t]he result is

perverse, trapping educators and students in a ghetto where powerful new tools and services are curiosities rather than routine parts of the school day."[12]

The can-do education we need is starting to appear in a few spots from within but mostly from outside. The traditional system is being bypassed and redesigned by a learning revolution fueled by educational entrepreneurs who are creating new schools and new ways of learning, with personal digital learning at the core.

## THE LEARNING REVOLUTION

Here is what this revolution looks like: customized learning is replacing a one-way slog through a print curriculum. Engaging media is motivating students to work harder and longer. Mobile technology is extending and expanding learning opportunities, especially for low-income students. Customization, motivation, and equalization will boost achievement, narrow gaps, and prepare more students for the idea economy. In these new educational environments, instead of annual feedback three months after the test, students can receive instant performance feedback and motivational reward mechanisms. District-run schools are being replaced by or are partnering with purpose-built learning networks: charter school chains such as KIPP (Knowledge Is Power Program) and franchise-like school developers with a common information platform, such as the New Tech Network.

What's driving this development? A confluence of forces over the last decade has begun to loosen the rigid hold that traditional approaches and structures have held on U.S. education; they include maturing information technology, the rise of informal learning opportunities, and a significant increase

## TEN SHIFTS THAT CHANGE EVERYTHING

1. *Responsibility.* Families are taking back responsibility for learning, and choices in learning are exploding.
2. *Expectations.* These are shaping education in two ways. First, as the Common Core State Standards Initiative reveals, there is political consensus that all students should be eligible and prepared for higher education. Second, a generation that has grown up with the "my way" mindset expects more customization than a lecture hall can offer.
3. *Aspirations.* Rather than aspiring to having students achieve mastery that can be measured by standardized tests, schools need to focus on higher-order skills, such as the ability to create, perform, and persist under dynamic circumstances.
4. *Content.* Although there is value in curated content, textbook adoption is becoming an expensive relic. Education needs to look to everything from free online content to sophisticated learning programs with smart recommendation engines that suggest content based on learning level, interest, and best learning modality.
5. *Pedagogy.* Teacher-centered, lecture-based classrooms are giving way to student-centered, interactive, applied, and project-based learning. Master schedules will give way to interesting blends of customized learning experiences and projects that encourage integration and application. Just-in-time learning will become more common, slowly replacing the current model of just-in-case learning.
6. *Assessment.* The most important shift of the coming decade may be the instant feedback of assessment. As student learning shifts to a predominantly digital form, there will be a flood of keystroke data from games,

simulations, virtual environments, end-of-unit quizzes, and adaptive assessments that will provide instant feedback to students and teachers.

7. *Grouping.* The model in which students of the same age slog through a print curriculum at the same rate is slowly giving way to individual progress models in which students learn at their own rate. Individual progress models—common in alternative education, online learning, and credit recovery—will become most prominent in high schools, community colleges, and certificate programs.

8. *Location.* Learning will take place anytime, anywhere. Students in high schools and colleges will increasingly assemble a transcript from multiple providers. Their formal certification may be place-based but their education will be unbounded.

9. *Culture.* Online, blended, and community-connected learning develops a mixed-age culture—old teaching young, young teaching old, and peer tutoring.

10. *Relationships.* Social networks will augment and then replace the classroom as the dominant organizing unit of learning. Although many students will matriculate at their own rate, they will do most of their learning as part of a virtual community.

in education philanthropy. Recently, the fiscal crisis made it impossible to continue usual operations. Together these forces are driving ten shifts in how education is and will be conducted.

In *Rethinking Education in the Age of Technology,* Collins and Halverson situated these shifts in a century of U.S. public education. The list above and the following table, adapted from their work, summarizes the shift from the one-room schoolhouse of the agrarian age to the giant suburban schools of the industrial age to the personal digital learning of the idea economy.

## Agricultural to Industrial to Idea Economy Education[13]

| Factor | From | To | To |
|---|---|---|---|
| **Responsibility** | Parents | State | Individuals and parents |
| **Expectations** | Social reproduction | Success for all | Individual choice |
| **Aspirations** | Practical skills | Discipline knowledge | Learning how to learn |
| **Content** | Books | Textbooks | Learning objects |
| **Pedagogy** | Apprenticeship | Didacticism | Interaction |
| **Assessment** | Observation | Testing | Embedded assessment |
| **Grouping** | Mixed-age | Age cohorts | Individual progress |
| **Location** | Home | School | Anywhere |
| **Culture** | Adult culture | Peer culture | Mixed-age culture |
| **Relationships** | Personal bonds | Authority figures | Social networks |

## CHARTER SCHOOLS

The coincidental birth in 1991 of the business-sponsored New American Schools Development Corporation, an effort to identify effective schoolwide restructuring models and charter school legislation beginning in Minnesota, ushered in a generation of almost ten thousand new schools. Many were developed in networks around an intentional school design and began sharing support services with similar schools around the country.

Typically authorized under a performance contract with a state, school district, or university to operate as an independent, public charter schools typically receive less funding than traditional schools and no funding for facilities. About a fifth of the more than five thousand charter schools in the United States are part of a managed network. More than three dozen high-performing charter school management organizations are revealing how responsive schools can be to students, teachers, and communities. Most networks aren't very innovative; they are just better managed than traditional schools—they hire talented people and help them execute at a high level every day. Execution across the managed networks is aided by perpetual rather than political leadership—the (mostly nonprofit) boards are appointed to support an organizational mission rather than elected to serve a political agenda, as is often the case on public school boards.

Consider some of the school networks that think hard about preparing kids for their future and not our past. Expeditionary Learning, which draws on Outward Bound principles, is based, in part, on "the having of wonderful ideas."[14] It is precisely this notion of rewarded curiosity that is essential for a leader in the idea economy. Charter school networks such as High Tech High in San Diego, Envision Schools in San Francisco, and Denver School of Science and Technology bring learning to life with deep explorations and public demonstrations.

Evidence of what the Hewlett Foundation calls deeper learning can be seen in student work at these schools—papers written, books published, videos produced, artwork created—and even more compelling is the sparkle of confidence in students' eyes when asked to describe work they know is of professional quality.

Some independent charter schools struggle academically, should not have been authorized in the first place, and should be

closed. Remember the iterative process that brought us Google Search? As charter schools try, fail, learn from each other, and succeed, they are bringing important lessons about efficient and responsive management to education. A few are showing us exciting things about how students can learn differently, the importance of feedback loops, a culture of achievement, and the benefits (and shortcomings) of performance contracting— all things that are paving the way for a new future of learning.

Charter schools, and charter management organizations in particular, were among the most important developments of the last decade. However, they only serve about 3 percent of U.S. students and still require a lot of charity to operate and grow. It's time to take the lessons learned and the effective models developed over the last decade and supercharge them with technology.

## THE TECHNOLOGY

If you need to learn how to calculate the slope of a line, a quick Internet search will yield a Wikipedia explanation, a Khan Academy tutorial, a couple of learning games, several peer-to-peer learning sites, and lots of YouTube videos. The notion of a textbook as just one way to learn is suddenly very antiquated.

New digital tools are also fueling the current learning revolution. Computer learning games, discussed in more depth in Chapter Four, that are based on the neuropsychology of learning and motivation have the potential to engage students in ways we had never thought possible. We are likely to learn far more than we know in the coming decade about finding the "hook" that will improve persistence through difficult work. We are experimenting with how to finely access student learning and student learning styles based on keystroke data that

are tracked and analyzed from computer learning programs. In fact, we are on the verge of creating and putting to use psychological understandings of student profiles that indicate, for example, when a student prefers competition to collaboration, works harder if public recognition is involved, and is most persistent between 10 PM and 1 AM. As you will see in the following chapters, we are getting a lot smarter about getting smart.

We are living through the historic shift from getting our information from print to digital forms. The technology revolution transformed business and entertainment and will have an equally profound impact on learning. Now that anyone can learn nearly anything nearly anywhere for free or cheap, all bets are off. The learning race, not the arms race, will define the future. This book is about our future, about the power of digital learning to help us finally reach and teach all students, no matter their neurological profile, geographical position, or socioeconomic background. And so, I'd like to conclude here with an inspiring and exciting story that points to the future of learning, a future in which technology can be harnessed to provide exciting opportunities for students in hard-to-reach places.

Ushodaya High occupies the dark and crowded upper floors of a dated retail strip under the shadow of the elevated airport expressway in a forgotten slum south of Hyderabad.

## PREDICTIONS

*In five years . . .*

**Low-cost blended private schools will serve close to two hundred million students in India, China, and Africa. More than half will use low-cost mobile learning technology.**

The expressway speeds passengers from a modern airport to a bustling information technology downtown in south central India. Many students in India don't have access to quality public schools, particularly those in urban slums. Ushodaya students were lucky to find this low-cost private school run by Praveen Kumar, and Praveen was lucky to have been discovered by Neera Nundy. Born in Canada, Neera attended Harvard Business School and decided to move back to India to help bottom-of-the-pyramid entrepreneurs such as Praveen unleash their ideas. Neera and her husband launched Dasra, a grant-funded social enterprise that supports dozens of social entrepreneurs every year. One of the 2009 recipients included Praveen. With Neera's help, Praveen improved teacher pay and support, began keeping financial statements, and is connecting more slum kids with college and career opportunities in the idea economy. In a couple years, Praveen will be able to add online learning using low-cost tablet computers and free curriculum. He'll be able to leverage good teachers and reach a few more of the half-billion Indian young people eager to get smart.

With demand created by the idea economy, the learning revolution is being fueled by expanding access to broadband, cheap mobile devices, and powerful new tools. It is increasingly possible for anyone to learn anything almost anywhere. That allows us (and forces us) to reinvent the delivery of public education. So let's get started.