1 Becoming Digital

The Road to Digital Citizenship

A SHORT HISTORY OF EDUCATIONAL TECHNOLOGY

Pardon me while I sound like some of the elders in my family who used to tell me they trudged 10 miles, barefoot, uphill, through two feet of snow, dead, just to get to school. But unless you are old enough to belong to AARP (for those outside the United States who might not understand the reference, this equates to retirement age), your current digital lifestyle will seem like something that has always been here—you are just waiting for it to get cheaper, faster, and cooler. In order to put the concept of *digital citizenship* in historical perspective, let's consider the long, slow digital climb to the wonder machines we take for granted today. Then we will consider the concept of community and citizenship as they apply to the digital lifestyle that seems so invisible to us now.

It is no wonder that the public has little historical appreciation for the dark days of computing—our past has disappeared all around us. While antique chairs, cars, and even toasters can be restored to become useful, aesthetic memorabilia, that's not the case with passé digital technology. Old computers with hulking, fuzzy CRT monitors are simply useless, environmentally hazardous, and, above all, uncool. Thus, while some retro technologies survive to serve as historical mile markers in our midst, old computers are tucked out of sight and out of mind—in a landfill near you. The result is that when it comes to living our digital lifestyle, we know only now.

But the reality is that the revolution that has resulted in the sleek, powerful laptop computers that fit neatly in our thin briefcases started out a

few short decades ago as mainframe machines that were so slow, noisy, awkward, heavy, and weak that it took geeky programmers with no illusions of having a social life to love them. When I began in educational technology in the early 1980s, the mainframe computer that was the center of my digital life was the size of two refrigerators and did far less than my iPhone does today. Yet despite their limitations, mainframes started many things that are still with us. E-mail began on mainframes, as did some other forms of social media, like computer conferencing and public discussion groups, still known as listservs. Although access to the Internet was reserved at that time for scientists and the military, many of us still managed to gather electronically by connecting our home computers to mainframes using modems and the phone system at speeds so slow you could hear each letter land on the screen with an audible *thunk.*

FYI

When Slow Was Slow

My first modem transmitted at 150 bps (bits per second). An average broadband connection today transmits at 3 mega bps. Thus in 1980, I transmitted at five one-millionths of the speed that I do today. To translate this into more comprehensible terms, if broadband speed is akin to driving a car at 50 mph, then 150 baud translates into driving .0025 miles per hour. At that rate, it would take your car 400 hours, or a little over 16 days, to go one mile.

What was noticeably absent in those days was software. The world of distributed productivity that we take for granted today, in which literally anyone with the time and inclination can create programs and other resources to share with the greater learning community, did not exist. We used a very small amount of software that had been created largely by programmers and engineers to do programming and engineering kinds of things. And as I like to remind younger readers, in the early days of computing there was nothing to click on. Everything was typed in at a blinking cursor and often inspired cryptic error messages that seemed to say, "Hey, dummy, get an engineering degree, or take a pottery class."

Most of us in education who were not programmers in the early 1980s were attracted to computers not for what they did at the time but for what we knew they would eventually do. The Apple IIe, which was one of the first personal computers to be both useful and lovable, was one of the first machines to show up in classrooms, circa the early 1980s. When Apple IIes arrived, there was very little software available for them. They booted up in the BASIC programming language and sat there, blinking at you, waiting for you to get in touch with the programmer within. One can't help but muse how different the computer revolution would have been had early computers booted up in a word processor or a painting program rather than a programming language.

TRY THIS

UNDERSTANDING YOUR OWN PERSONAL COMPUTER HISTORY

Ask your colleagues, friends, or students to investigate the following stats about their first computer, or for dramatic effect, the first computer owned by their parents: size, weight, RAM, and CPU speed. Teachers should ask students to compare and contrast the information they collect, and create a historical timeline based on what they discover.

Even though there was very little public software for educators, and no Internet to use to swap homemade programs, most of us hung in there because we knew everything would change—it was just a matter of time.

Our wait was rewarded when the program AppleWorks for the Apple IIe was released circa 1984. It combined a spreadsheet, database, and word processing program into one easy-to-use, low-cost integrated software package. This software constellation persists today as Microsoft Office, the most popular software tool set in history. AppleWorks was so useful to so many teachers that administrators bought it in bulk. The result was that suddenly the Apple IIe was not just for tinkerers and geeky hobbyists; it was for everyone. We watched with amazement as the incipient desktop computer market took off, as though millions of potential users had been just waiting on the sidelines, praying that computers would actually be able to do something useful one day. The result was that software began to proliferate, and new machines began to appear that could be used broadly in education, business, and science, as well as in our personal lives. When the IBM PC and Macintosh became generally available during the early to mid-1980s, our digital path seemed set. We had no idea where it would take us, but we were sure we were headed into a future of intellectual and creative overdrive that would rival the Renaissance.

Because I was a teacher when the first desktop computers arrived, the computer revolution was, for my colleagues and myself, an educational technology revolution.

Although educational technology existed as an area of study at universities, it was concerned largely with programming, as well as creating and studying the use of media-based instructional materials. With the arrival of individual desktop computers and useful software, everything changed. Suddenly, consumers had the chance to be creators. Technology that had once belonged only to engineers, developers, corporations, and the military was in the hands of teachers and the general public to create, tinker, play, work—and later as networks were developed—communicate,

and socialize. And because kids were much more comfortable doing many of these things, they gained a new status in the classroom as expert, helper, and in some cases troublemaker by virtue of their willingness to experiment with the new machines in their midst. The pressure was on for classrooms to adjust to new relationships between students and teachers and to recast educational strategies that would put students at the center of their learning experience.

It was during the mid-1980s that the educational world in North America and elsewhere began the slow, often grudging integration of digital technology into the educational experience. As small cadres of enthusiasts experimented with the new technology in classrooms, they often encountered suspicion, cultural inertia, and the lack of a budget line item for something completely new called "hardware and software." However, while many in the mid-1980s were saying educational technology was just a fad, by the mid-1990s no one was. During the 1990s, budgets began to reflect the need for hardware, software, and professional development devoted to understanding and using emerging technology.

A few short years later, we were forced to reconcile ourselves to yet another new, expensive reality: the need to upgrade our technology every few years. Standard operating procedure included bracing ourselves for the next big thing that was just around the corner that we would simply have to have if we were to responsibly prepare students for the real world. While upgrading may seem like the status quo today, it was a brand-new concept in the 1990s. Prior to the digital technology revolution, "the stuff" that organizations purchased had a life cycle of many years. School buses seemed to last forever, as did audiovisual equipment and typewriters. Desks, chairs, and even textbooks and encyclopedias were on a very slow replacement cycle. In contrast, by the late 1990s, computers and software were expected to have a half-life of three years or less. To members of the cell phone generation, who feel compelled to replace their bulky, uncool cell phones every year, three years seems like a lifetime.

TRY THIS

TRACKING YOUR COMPUTER PAST

How many computers have you had in your life? What did you do with your old ones? How many pieces of software have you learned that you no longer use? I have used 24 word processors in my lifetime, but today I basically use just a few. This is also an interesting activity to do focusing on cell phones given that, as of this writing, web lore reports that over 400,000 cell phones are decommissioned every day.

As I write this book 28 short years after entering the educational technology revolution, I look back with disbelief at the light-years we have come. The slow-witted text entry machines of the 1980s have become point and click, lighting-fast tools for artists, scientists, economists, writers, teachers, Mom and Dad, and, most important, kids. And there is no letup in sight. The massive interconnectedness of the web has created a workforce of many millions who are idling close by, ready to jump in to create the next big thing. Those of us who don't actually crank out the code to create the new programs nonetheless have our role to play by manning the blogs, wikis, and other engines of social media to let the rest of the world know what's on the horizon. My apologies to Newton, but we have created a perpetual motion machine.

The Digital Indigenous

We make a lot of the fact that today's kids have no sense of amazement about the steady stream of innovation that has become a way of life. They are, according to Marc Prensky (2001), "digital natives" because they grew up during digital times. As the digital indigenous, they take their environment for granted.

But if they are digital natives, then my friends and I were electromechanical natives when we were growing up during the 1960s. We no more noticed the appliances in our lives than today's kids notice the digital gadgets in theirs. The common denominator between our generations is what Marshall McLuhan (McLuhan & Powers, 1989) referred to as *the figure-ground phenomenon.* Ground is the environment that we don't see yet which massages us totally, providing the unconscious social context for our actions. In contrast, figure is what we notice, the spike that transcends the constant, invisible noise of the environment. I will use *figure-ground* as a lens through which to view the issue of digital citizenship throughout this book.

For us, ground is largely the tEcosystem, the secondary ecosystem that we have created that consists of digital technology, connectivity, and the communication

FYI

Fogies Evolve Quickly

The technological generation gap is forever—and it's shrinking. In a New York Times article titled "The Children of Cyberspace: Old Fogies by Their 20s," author Brad Stone (2010) notes that technological generations are now measured in terms of 10 years: "The ever-accelerating pace of technological change may be minting a series of mini-generation gaps, with each group of children uniquely influenced by the tech tools available in their formative stages of development" (para. 5). From upstart native to old fogy in no time at all.

they facilitate. As with our primary ecosystem, we rarely notice it unless something goes awry with it. In the meantime, it completely controls us while being entirely off our radar.

In contrast, figure is the visible change—the moving ad on the webpage that keeps diverting our attention from what we are trying to read; the sensationalist media story that absorbs us despite our better judgment; and occasionally, the solid, thought-provoking piece of content that makes its way to the surface in the mediasphere. If we notice it, then it is figure. Sometimes, we even notice the technology we routinely take for granted, such as when it breaks, is missing, or presents us with those annoying upgrade glitches. But usually, it forms the ground of our daily existence by being everywhere and invisible at the same time.

While we focus on figure, we must, due to our limited perceptual capacity as human beings, ignore other potential figures, as well as the ground in which they appear. With all due respect to brain plasticity, hyperlinking, and our evolving capacity to multitask, we are still primarily serial-processing human beings when we want to investigate, reflect upon, and make decisions about an issue of importance. While we may think laterally, tangentially, and creatively as we do so, we need focus in order to analyze, draw conclusions, and communicate our findings.

FYI

Multitasking May Be a Myth

According to John Medina (2010), brain researcher and author of Brain Rules, there is substantial proof that we do not retain information nearly as well when we multitask as when we focus on a specific task. Continuous partial attention (Stone, 2009) is just that: partial.

Focus, once one of our most powerful talents in addressing issues of our day, is becoming a dying art. In a world of information overload, depth has been sacrificed for breadth, understanding for knowing. If there is one requirement for being a committed, effective digital citizen, it is the ability to see technology as figure against the greater ground of life and to be able to focus on what we see so that we can understand its impacts on ourselves, our communities, and the environment.

That is why citizenship, an ancient social invention cultivated over millennia, has come to the fore as we begin to pull back from the screen and wonder what kind of people we want our kids to grow up to become. As we consider technology as figure, and see clearly its pervasiveness and power, we realize there is very little we can effectively legislate in a free society that will prevent technology from running amok or us from misusing its power. We will need to keep that from happening ourselves, as individuals and communities, as we make personal and collective decisions about how to use our technology individually and with each other.

Thus, it is part of our job to help students not only use technology but also to question it. Doing so does not come naturally. Our kids, like kids of any generation, will ignore what they grow up with unless we bring it to their attention. Therefore, the first place we start in the cultivation of digital citizenship is helping students to see the technology in their lives—to make technology figure rather than ground. After all, they can't question what they don't see.

In fact, if we as educators and adults are interested in continuing the mentor-mentee relationship that has existed for millennia between the old and the young, then this is a key component of our new job description: to help students see and evaluate the technology in their lives. Any consideration of digital citizenship is useless without this ability. This doesn't require mentors to be more technically competent than their mentees, just more vigilant about placing technology in a broader social context. A mantra to guide us might be:

> Students will study the personal, social, and environmental impacts of every technology and media application they use in school.

We don't want students to know just how to use technology but also when and why. We want them to be not only good workers but also good neighbors, informed voters, and involved citizens. After all, once they graduate, they may be living next door to us, if not physically then certainly digitally. We would do well to ask ourselves just what kind of neighbors we would like them to be.

A SHORT HISTORY OF ISTE STANDARDS

It was amidst the confusion, panic, and excitement of the educational technology revolution that in 1998 the International Society for Technology in Education (ISTE) developed national standards for students for the use of technology in teaching and learning, with teacher standards following in 2000, and administrator standards in 2002. These standards appeared not a moment too soon. Those of us trying to convince a skeptical public of the inevitability of digital technology in education were seen as everything from devoted utopians to big budget fringe fanatics. The ISTE standards were important because finally we could point to a nationally recognized professional group for support, recognition, and the articulation of standards that were specifically developed to address the presence of computers in classrooms.

The development of the ISTE standards were also important for historical reasons. It marked the beginning of one of the first public processes devoted to chronicling a professional understanding of what digital technology meant to education and, by implication, society at large. During the

1990s, the reality was that most of us were feeling our way in a field that was evolving so quickly in so many directions that trends were hard to discern. It wasn't until the diffusion of the Internet by the mid-1990s that the national conversation about how to use digital technology for teaching and learning began in earnest via e-mail, bulletin boards, and listservs. Millions of digital explorers were comparing notes and rethinking education in light of all the new possibilities implicit in the new technology. Simultaneously, they were helping define the digital information and communication technology industry, a vast, new human enterprise that would become part of everybody's professional and personal lives. ISTE's first standards were an attempt to make sense of these developments as they applied to the educational arena.

TRY THIS

EXPLORE THE STANDARDS IN YOUR SCHOOL DISTRICT

Whether you are a teacher, taxpayer, or simply a concerned citizen, you should know how your school views technology. Do the schools in your community have technology standards for faculty, students, or administrators? Are they based on local, state, or ISTE standards? My experience tells me that schools with active educational technology committees that talk about standards and innovative applications of technology on an ongoing basis are often the most imaginative and vibrant. Whenever possible, include community stakeholders on the committee to keep your efforts grounded in the reality of life beyond school.

ISTE standards are also historically important because we will be able to look back at their evolution as a kind of rolling time capsule that reflected how we viewed technology in education at particular points in history. We might expect very little change over time. After all, standards should reflect timeless human concerns that transcend the details of our invention. Yet ISTE updated their standards in 2008. Called "the refreshed standards," they reflect significant changes in our understanding of the evolving digital world. For this reason, the evolution from Version 1 to 2 bears our consideration.

Before discussing the changes, let's present both sets of standards.

2000 ISTE National Educational Technology Standards (NETS) for Teachers (Standards Version 1)

I. **Technology Operations and Concepts.** Teachers demonstrate a sound understanding of technology operations and concepts.

II. **Planning and Designing Learning Environments and Experiences.** Teachers plan and design effective learning environments and experiences supported by technology.

III. **Teaching, Learning, and the Curriculum.** Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.

IV. **Assessment and Evaluation.** Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.

V. **Productivity and Professional Practice.** Teachers use technology to enhance their productivity and professional practice.

VI. **Social, Ethical, Legal, and Human Issues.** Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK–12 schools and apply those principles in practice.

From the 2000 ISTE National Educational Technology Standards for Teachers. Used with permission by ISTE. Available at www.iste.org/Content/NavigationMenu/NETS/ForTeachers/2000Standards/NETS_for_Teachers_2000.htm.

Compare and contrast these with the ISTE NETS refreshed standards (Standards Version 2) that replaced them in 2008:

1. **Facilitate and Inspire Student Learning and Creativity.** Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

2. **Design and Develop Digital-Age Learning Experiences and Assessments.** Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S (NETS Standards for Students).

3. **Model Digital-Age Work and Learning.** Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.

4. **Promote and Model Digital Citizenship and Responsibility.** Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

5. **Engage in Professional Growth and Leadership.** Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

From the refreshed (2008) ISTE National Educational Technology Standards for Teachers. Used with permission by ISTE. Available at www.iste.org/Content/NavigationMenu/NETS/ForTeachers/2008Standards/NETS_for_Teachers_2008.htm.

Each standard set has a distinctly different tone. The first set stresses technology operations and integration. The subtext is that technology is to be used effectively "within the box" to support whatever best practices in education are in use at the time. In contrast, the new standards make clear that technology is changing educational practice in deep ways, and that out-of-the-box thinking has become part of the new paradigm.

FYI

Creativity Is Important for Students Too

Refreshed Standard 1 for students (2007) reads,
"**1. Creativity and Innovation.** *Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:*

- *apply existing knowledge to generate new ideas, products, or processes.*
- *create original works as a means of personal or group expression.*
- *use models and simulations to explore complex systems and issues.*
- *identify trends and forecast possibilities."*

We can discern the changes reflected in the refreshed standards in greater detail by considering six words that appear in the ISTE standards for the first time. These are addressed below.

Creativity and innovation. Two words that make their appearance in the new standards are *creativity* and *innovation.* They define Standard 1 for not only teachers but also for students (see sidebar).

From the refreshed (2007) ISTE National Educational Technology Standards for Students. Used with permission by ISTE. Available at www.iste.org/Content/NavigationMenu/NETS/ForStudents/NETS_for_Students.htm.

Note: They can also be found in the standards for administrators, but they're more subdued (www.iste.org/Content/NavigationMenu/NETS/ForAdministrators/2009Standards/NETS_for_Administrators_2009.htm).

Their prominence in the refreshed standards says three things:

1. **We must move beyond technology integration toward idea generation.** We are formally recognizing the fact that our new technologies

need to be used beyond mere curriculum integration or as a means to simply update the status quo with new tools. Instead, we need to use them to generate, explore, and use new ideas that challenge and redefine the status quo.

2. **We must shift away from operations and toward perspective.** Learning how to use digital technology is no longer the primary challenge. After all, with enough tenacity and sense of adventure, just about anyone can be a reasonably good technology user these days. The real challenge now lies in understanding how to place our new tools in a larger educational, social perspective in innovative, creative ways.

3. **We must meet new challenges with new ideas and new thinking.** The world has always been a complex place, but we were not really aware of it until recent advances in interconnectivity. The same interconnectivity that fuels our awareness forces us to share problems and opportunities within a global village with very diverse demographics. Thus, we need new ideas and new ways of thinking in order to meet new global challenges that make sense to an international, multicultural citizenry. To do this, we need to be creative and innovative in our thinking as we use the digital tools at our command.

Digital, citizenship, culture, and global. Four other important words that appear for the first time in the main headings of the ISTE standards are *digital, citizenship, culture and global.* Although they may be implied in the first set of ISTE standards, it is worth considering what their deliberate inclusion in the new standards signifies.

The word *digital* seems to replace references to "technology" found in the first set of standards. This signifies a move away from a machine focus and toward a focus on content and communication. That is, our interest has shifted from "the gear" to what we are doing with the gear. The machines themselves are analog constructs—things that take up space. The content and communication they facilitate is digital.

The appearance of the words *citizenship, culture,* and *global* are best considered with a side-by-side comparison of old and new standards that address technological impact: Standard VI from the original set and Standard 4 from the refreshed standards.

The older standard reads, "**VI. Social, ethical, legal, and human issues.** *Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PK–12 schools and apply those principles in practice.*" This suggests that as new technology appears, it is up to teachers to field the many

social issues that are implied by its presence and come up with practical ways to address them in the course of their professional practice. The refreshed standard related to this area reads, "**4. Promote and Model Digital Citizenship and Responsibility.** *Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.*" Here the notion of responsibility is now expanded from local to global spheres. This standard further acknowledges the power and responsibility that this expansion implies.

More important, this standard expands our sense of responsibility even beyond global culture to *digital culture.* One way to view the term *digital culture* is simply as a way to describe the age in which we live, the way *industrial age culture* might describe the previous two centuries. In fact, the term *digital culture* does work well as a comprehensive description of what it means to be living at this point in history.

But I think the implications in the term *digital culture* are much broader and deeper than this. We need to recognize that we are all part of a digital culture that exists within its right. That is, we need to explicitly recognize the fact that an alternative realm of existence is now in play, the digital realm, which has enough substance and ethos to be considered its own culture. It is the emergence of this new culture that drives the demand for digital citizenship.

The following important points emerge from the presence of the words *digital, citizenship, culture,* and *global*:

1. **We must engage students in the issues and opportunities of their local community.** While we may spend a good deal of time in cyberspace, the focus of our immediate lives is still our local community, including family, school, and community.

2. **We must help students engage in a global community.** The very real impact of digital community is that we are all connected to an international world of work, play, and common social enterprise. This has always been true to some extent, in that the common objects in our homes are often crafted by people we will never meet, from lands we may never visit. But now, through the use of international networks and social media, we can pursue global community much more easily, deliberately, and purposefully. Thus, we need to prepare students to understand and flourish in a world that is far more multicultural, pluralistic, and interconnected than it was just a decade ago.

3. **We must engage students in the issues and opportunities of digital culture and digital community.** Implied here is that there are communities in VR (virtual reality) that impact and at times transcend those in RL (real life), and that these communities have

reality and significance. Authors of the book *Digital Citizenship* (Mossberger, Tolbert, & McNeal, 2008) define digital citizens simply as "those who use the internet regularly and effectively—that is on a daily basis" (p. 1). This covers most people in most developed countries. Even those who use the Internet sparingly are still immersed in the secondary effects of digital culture by virtue of the digital, networked infrastructure that supports most of what they do.

4. **We must help students participate as a citizen of local, global, and digital communities simultaneously.** The original ISTE standards were developed during comparatively unnetworked times. Issues of ethics, social perspectives, and community participation were fairly immediate in nature, temporally and spatially. Now they occur within at least three community domains: local, global, and digital. Education must participate in all three. In addition, it must address how to participate in all three simultaneously, managing the concerns of each in one integrated approach to living.

It is the focus in ISTE Refreshed Standard 4 on culture and the many realms of communities that is truly new. Communities are the inevitable result of the networks that started linking people together in the 1980s via primitive e-mail and listserv connectivity. The "ancient human" (Dertouzos, 2001) in each of us who tasted immediate, distributed communication in the early days of computer-mediated communication helped to drive bandwidth development and push social software creation to degrees of great sophistication. While Facebook might have been difficult to predict 20 years ago, in retrospect it is not the least bit difficult to understand where it came from. It is in the context of the evolving nature of connected community that we consider the evolving nature of citizenship.

TRY THIS

BRAINSTORMING ISTE STANDARDS VERSION 3.0

The future goes on for a long time, change is inevitable, and technological evolution is unimaginable. Given that, what might the next iteration of technology standards look like? Of course you can never consider something like this in isolation. You will also need to ask the following questions: What will the overall approach to educating our children look like? How much of education will happen at what we now call a school? What will the average personal information device be capable of? What will the power of the Internet be? What will we value as a society? More about peering into the future in Part II of the book.