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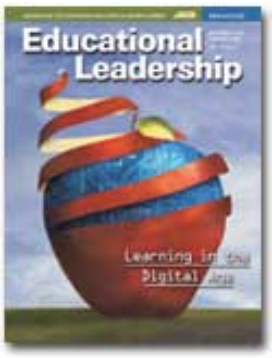

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Listen to the Natives

Schools are stuck in the 20th century. Students have rushed into the 21st. How can schools catch up and provide students with a relevant education?

Marc Prensky

> *School didn't teach me to read—I learned from my games*.
>
> —A student

Educators have slid into the 21st century—and into the digital age—still doing a great many things the old way. It's time for education leaders to raise their heads above the daily grind and observe the new landscape that's emerging. Recognizing and analyzing its characteristics will help define the education leadership with which we should be providing our students, both now and in the coming decades.

Times have changed. So, too, have the students, the tools, and the requisite skills and knowledge. Let's take a look at some of the features of our 21st century landscape that will be of utmost importance to those entrusted with the stewardship of our children's 21st century education.

Digital Natives

Our students are no longer "little versions of us," as they may have been in the past. In fact, they are *so* different from us that we can no longer use either our 20th century knowledge or our training as a guide to what is best for them educationally.

I've coined the term *digital native* to refer to today's students (2001). They are native speakers of technology, fluent in the digital language of computers, video games, and the Internet. I refer to those of us who were not born into the digital world as *digital immigrants*. We have adopted many aspects of the technology, but just like those who learn another language later in life, we retain an "accent" because we still have one foot in the past. We will read a manual, for example, to understand a program before we think to let the program teach itself. Our accent from the predigital world often makes it difficult for us to effectively communicate with our students.

Our students, as digital natives, will continue to evolve and change so rapidly that we won't be able to keep up. This phenomenon renders traditional catch-up methods, such as inservice

training, essentially useless. We need more radical solutions. For example, students could learn algebra far more quickly and effectively if instruction were available in game format. Students would need to beat the game to pass the course. They would be invested and engaged in the process.

We also need to select our teachers for their empathy and guidance abilities rather than exclusively for their subject-matter knowledge. We all remember best those teachers who cared about us as individuals and who cut us some slack when necessary. In today's rush to find teachers qualified in the curriculum, we rarely make empathy a priority.

Shifting Gears

As educators, we must take our cues from our students' 21st century innovations and behaviors, abandoning, in many cases, our own predigital instincts and comfort zones. Teachers must practice putting engagement before content when teaching. They need to laugh at their own digital immigrant accents, pay attention to how their students learn, and value and honor what their students know. They must remember that they are teaching in the 21st century. This means encouraging decision making among students, involving students in designing instruction, and getting input from students about how *they* would teach. Teachers needn't master all the new technologies. They should continue doing what they do best: leading discussion in the classroom. But they must find ways to incorporate into those discussions the information and knowledge that their students acquire outside class in their digital lives.

Our young people generally have a much better idea of what the future is bringing than we do. They're already busy adopting new systems for communicating (instant messaging), sharing (blogs), buying and selling (eBay), exchanging (peer-to-peer technology), creating (Flash), meeting (3D worlds), collecting (downloads), coordinating (wikis), evaluating (reputation systems), searching (Google), analyzing (SETI), reporting (camera phones), programming (modding), socializing (chat rooms), and even learning (Web surfing).

We need to help all our students take advantage of these new tools and systems to educate themselves. I know this is especially hard when we're the ones floundering, but teachers can certainly ask students, “Does anyone do anything on the Web that is relevant to what we're discussing?” or “Can you think of any examples of this problem in your computer games?” Teachers can also help students figure out who has the best access to technology outside school and encourage students to form study groups so that more students benefit from this access. Teachers can learn what technological equipment they need in their classrooms simply by asking students, and they can lobby to get these items installed in school computer labs and libraries.

Student Engagement

More and more of our students lack the true prerequisites for learning—engagement and motivation—at least in terms of what we offer them in our schools. Our kids *do* know what engagement is: Outside school, they are fully engaged by their 21st century digital lives.

If educators want to have relevance in this century, it is crucial that we find ways to engage students in school. Because common sense tells us that we will never have enough truly great teachers to engage these students in the old ways—through compelling lectures from those rare, charismatic teachers, for example—we must engage them in the 21st century way: electronically. Not through expensive graphics or multimedia, but through what the kids call "gameplay." We need to incorporate into our classrooms the same combination of desirable goals, interesting choices, immediate and useful feedback, and opportunities to "level up" (that is, to see yourself improve) that engage kids in their favorite complex computer games. One elementary school in Colorado, for example, takes its students on a virtual journey to a distant planet in a spaceship powered by knowledge. If the students don't have enough knowledge to move the ship, they need to find it—in one another.

Collaborating with Students

As 21st century educators, we can no longer decide *for* our students; we must decide *with* them, as strange as that may feel to many of us. We need to include our students in everything we do in the classroom, involving them in discussions about curriculum development, teaching methods, school organization, discipline, and assignments. Faculty or administration meetings can no longer be effective without student representation in equal numbers. Our brightest students, trusted with responsibility, will surprise us all with their contributions.

This may sound like the inmates are running the asylum. But it's only by listening to and valuing the ideas of our 21st century students that we will find solutions to many of our thorniest education problems. For example, putting a Webcam in every classroom is a digital native way to show administrators and parents what really goes on. Teachers could also volunteer for this activity to document and share best practices.

Students could quite feasibly invent technological solutions to streamline homework submission and correction, freeing up teachers for more meaningful work. Encouraged to share their expertise, students can be a teacher's best resource for suggesting better access to technology, defining the kinds of technology that teachers should be using in the classroom, and showing teachers how they can use specific hardware and software tools to teach more effectively.

Flexible Organization

In this century, we *must* find alternatives to our primary method of education organization—what I call *herding*. Herding is students' involuntary assignment to specific classes or groups, not for their benefit but for ours. Nobody likes to be herded, and nobody learns best in that environment. As educators become "teacherds" rather than teachers, we all lose. And creating smaller schools or classrooms is no solution if the result is simply moving around smaller herds.

There are two effective 21st century alternatives to herding. The first is one-to-one personalized instruction, continually adapted to each student as he or she learns. This practice has become next to impossible with growing class sizes, but it is still doable. Modern computer

and video games have already figured out how to adapt every moment of an experience to a player's precise capabilities and skills. So has computerized adaptive testing. Classrooms need to capitalize on students' individual capabilities and skills in the same way.

How can we make our instruction more adaptive and, as a result, far more effective? Just ask the students; they'll know. Adaptivity, along with connectivity, is where digital technology will have its greatest impact on education.

The second alternative to herding is having all learning groups self-select. Kids love working with their friends, especially virtually. I'm not saying, of course, that students should join *any* group in this context, but that they should be able to choose their own learning partners rather than having teachers assign them. Optimally and under proper supervision, a 4th grader in one school could choose a learning partner in any 4th grade class in the world. Teachers could also guide students in selecting an approved adult expert to partner with.

If we let our students choose all the groups they want to be part of—without forcing them into any one group—we will all be better off. One great advantage of virtual groups over herds is that nobody gets left out. Everybody can find *someone* in the world to work with. Teachers and administrators must be willing to set this up, provide the necessary vetting, and let it happen.

Digital Tools

Today's students have mastered a large variety of tools that we will never master with the same level of skill. From computers to calculators to MP3 players to camera phones, these tools are like extensions of their brains. Educating or evaluating students without these tools makes no more sense to them than educating or evaluating a plumber without his or her wrench.

One of the most important tools for 21st century students is not the computer that we educators are trying so hard to integrate, but the cell phone that so many of our schools currently ban. “Cell Phones Catapult Rural Africa to 21st Century,” blared a recent front-page *New York Times* headline (LaFraniere, 2005). They can catapult our students into the future as well.

Cell phones have enormous capabilities these days: voice, short messaging service (SMS), graphics, user-controlled operating systems, downloadables, browsers, camera functions (still and video), and geopositioning. Some have sensors, fingerprint readers, and voice recognition. Thumb keyboards and styluses as well as plug-in screens and headphones turn cell phones into both input and output mechanisms.

The voice capabilities of the cell phone can help users access language or vocabulary training or narrate a guided tour. Teachers could deliver interactive lessons over a cell phone and use short messaging service to quiz or tutor students. Students could access animations in such subjects as anatomy and forensics. Students will soon be able to download programs into their cell phones, opening up new worlds of learning.

In Europe, China, Japan, and the Philippines, the public is already using mobile phones as learning tools. We in the United States need to join them and overcome objections that students are “using them for cheating” (so make the tests open book!) or for “inappropriate

picture taking" (so instill some responsibility!). In the United Kingdom, teachers are evaluating student projects over mobile phones. The student describes the project, and the teacher analyzes the student's voiceprint for authentication.

Let's admit that the *real* reason we ban cell phones is that, given the opportunity to use them, students would "vote with their attention," just as adults "vote with their feet" by leaving the room when a presentation is not compelling. Why shouldn't our students have the same option with their education when educators fail to deliver compelling content?

Programming

The single most important differentiator between 20th century analog and 21st century digital technology is programmability. Programming is perhaps *the* key skill necessary for 21st century literacy. In this arena, teachers and schools are stuck in ancient times. If you wanted to get something written back then, you had to find a scribe; today, you need a programmer.

All 21st century kids are programmers to some degree. Every time they download a song or ring tone, conduct a Google search, or use any software, they are, in fact, programming. To prepare kids for their 21st century lives, we must help them maximize their tools by extending their programming abilities. Many students are already proficient enough in programs like Flash to submit their assignments in this medium. Schools should actively teach students this technology and encourage them to use it.

Of course, extending this literacy with our current teaching corps is problematic. A number of teachers I know have taken matters into their own hands, creating programming courses—especially in popular game programming—for students during the summer months, after school, and even in class. We need to capture these approaches and curriculums and make them available over the Web for all to use. Teachers can also arrange for certain students to teach these classes to their peers. In addition, outside experts are often willing to volunteer their services.

Legacy Versus Future Learning

Currently, the curriculums of the past—the "legacy" part of our kids' learning—are interfering with and cutting into the "future" curriculum—the skills and knowledge that students need for the 21st century. We need to consolidate and concentrate important legacy knowledge and make room in school for 21st century learning. Our schools should be teaching kids how to program, filter knowledge, and maximize the features and connectivity of their tools. Students should be learning 21st century subject matter, such as nanotechnology, bioethics, genetic medicine, and neuroscience.

This is a great place for involving guest teachers from professions doing cutting-edge work in these emerging fields. If every district or school found just one expert willing to contribute his or her expertise; set up and videotaped a meaningful series of Q&A exchanges with students; and put those videos on the Web, enhancing them with additional relevant materials, we'd soon have a 21st century curriculum.

Students want and deserve to receive this content through 21st century tools that are

powerful, programmable, and customizable—through tools that belong to them. We could offer this content to them on their cell phones, for example. A big part of our problem is figuring out how to provide this before the end of the 21st century.

School Versus After School

Pragmatically, our 21st century kids' education is quickly bifurcating. The formal half, "school," is becoming an increasingly moribund and irrelevant institution. Its only function for many students is to provide them with a credential that their parents say they need. The informal, exciting half of kids' education occurs "after school." This is the place where 21st century students learn about their world and prepare themselves for their 21st century lives. It is revealing that one of the most prevalent student demands regarding technology is to keep their schools' computer labs open until midnight (and for us to stay out of their way while they are there). It is equally telling that so many software and Web programs aimed at enhancing kids' education are designed for after-school rather than in-school use.

If our schools in the 21st century are to be anything more than holding pens for students while their parents work, we desperately need to find ways to help teachers integrate kids' technology-rich after-school lives with their lives in school. It doesn't help if, in the words of Henry Kelly, president of the Federation of American Scientists, "the cookies on my daughter's computer know more about her interests than her teachers do." It helps even less that a great many of our teachers and administrators have no idea what a *cookie* or a *blog* or a *wiki* even is.

Techno-Byte

U.S. teachers who say that computer technology has affected the way they teach:

- To some extent—86 percent.
- A great deal—55.6 percent.

—*eSchool News*, 2005

Student Voice

Our students, who are empowered in so many ways outside their schools today, have no meaningful voice at all in their own education. Their parents' voices, which up until now have been their proxies, are no longer any more closely aligned with students' real education needs than their teachers' voices are. In the 21st century, this lack of any voice on the part of the customer will soon be unacceptable.

Some organizations are trying to change this. For example, NetDay (www.netday.org) conducts an annual online student survey of technology use through its Speak Up Days. All school districts should participate in this survey. Then, instead of hearing from just the 200,000 students who responded in the last survey, we would know what 50 million of them are

thinking. Districts would receive valuable input from their students that they could apply to improving instruction.

As we educators stick our heads up and get the lay of the 21st century land, we would be wise to remember this: If we don't stop and listen to the kids we serve, value their opinions, and make major changes on the basis of the valid suggestions they offer, we will be left in the 21st century with school buildings to administer—but with students who are physically or mentally somewhere else.

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