JAMES PAUL GEE & MICHAEL LEVINE

TV Guidance

Educators should embrace—not castigate—video games and TV.

It has been 25 years since the landmark education study "A Nation at Risk." But even after the resulting hundreds of billions of dollars spent trying to ramp up children's mastery of basic skills, American school performance is, tragically, stuck in wet cement. Millions of children, including the majority of low-income students, are behind in the most important predictor of future achievement: fourth-grade reading. Unfortunately, the current approach to the literacy crisis is locked in a time warp, almost totally removed from the ubiquitous digital media consumption that currently drives children's lives. Unless we change course fast to integrate literacy and digital culture, our current educational paradigm and policies will make academic achievement gains even more difficult in the decade ahead.

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Why is fourth grade such a critical time? When children fall behind in the early grades they tend to stagnate at a critical moment, facing what the Harvard educational psychologist and literacy pioneer Jeanne Chall famously called the "fourth grade reading slump," constraining children from moving on to understand the academic and more complex language of a wide variety of content domains. International comparisons show that in part because of these early literacy setbacks, we are losing the global race in science and math education, areas central for twenty-first-century skilled jobs. Early literacy abilities have become a vital "gateway" for high-skill work that increasingly requires all high-wage workers in the global economy to understand scientific and increasingly technical materials. While other nations have raced ahead since the 1980s, our weak educational performance has confirmed our status as a nation still at risk.

But instead of preparing for new needs with modern technologies, programs like No Child Left Behind have turned many of our schools into test-prep academies that are focused on standardized skill sets, in a world that demands higher-level thinking. With the most tech-savvy administration ever now in office, we need a new strategy that relies on the untapped power of digital media. Much like how the computer chip helped define our information age and multiplied productivity in the past two decades, media technologies can help transform children from the bored, reluctant learners of today to an excited, engaged, and creative twenty-first-century workforce of tomorrow.

The New Innovation Skills

Some observers, including the National Endowment of Humanities, have argued that popular digital media like video games are at least partially to blame for the literacy crisis in America. Kids today, they claim, are wasting their time playing games when they should be reading. But a more realistic approach must use children's natural inclinations to embrace digital media—including video games, mobile devices, and virtual worlds—and acknowledge that such tools might be a missing link for possible breakthroughs in solving the fourth-grade reading slump.

According to the Kaiser Family Foundation, children as young as eight years old are spending an average of six hours a day on media consumption. Many children, who are just learning to read, including those who are struggling at school, play video games like *Pokemon,* where they must learn to read the polysyllabic names and descriptions of hundreds of creatures. For example, in a description of the creature "Shuckle," they will see language like, "[Shuckle] stores berries in its shell. The berries eventually ferment to become delicious juices." This language is more complex than what a first-grader will see in

school for some time. Indeed, scholars like Rebecca Black have shown that many kids, including those who are English language learners, are becoming more immersed in writing through online fan fiction sites for popular titles, such as J.K. Rowling's *Harry Potter* or Maurice Sendak's *Where the Wild Things Are*, than they are in school.

Digital media hold great promise to speak to our educational problems in two important respects. First, they can move learning from being "book-centered" to being "experience-centered," while improving reading skills. Biology, for example, is not first and foremost about words, but about actions in and around the world. So why should its education be limited to textbooks? Second, digital tools today are the foundation of what we might call "passion" or "professional-amateur" (pro-am) communities. Today, many young people are using the Internet and other digital media to become "amateur experts"—sometimes rivaling traditional experts trained in more traditional ways—in a great variety of domains. They use the Internet, communication media, digital tools, and membership in often virtual, sometimes real, communities to develop expertise in different areas such as digital video, games, storytelling, machinima (making movies from video-game engines), fan fiction, history and civilization simulations, music, political commentary, fashion design, and nearly every other endeavor the human mind can imagine. They join with others around a shared passion—as opposed to age, race, gender, or class—to learn and practice important twenty-first-century skills. These pro-am communities—and the ways in which they are organized—hold out promise as new sites for closing our literacy, digital, and knowledge gaps, if we can learn to use them well for all our young people.

Preventing the Fourth-Grade Slump

President Barack Obama's emphasis on building high-quality preschools and early-intervention programs is right, but none of that investment will pay off unless we follow through with a new approach in the early grades. American schools resemble a football team that keeps losing because it plays poorly in the second quarter. While the country has strongly emphasized the need for all children to learn to decode print in the early grades, it has not dealt sufficiently with the fourth-grade slump. Many students who appear to be learning to read well in the early years of school cannot "read to learn"—i.e., use written texts to master content in areas such as science, mathematics, social studies, and litera-ture—by the fourth grade. From then on, they are always playing catch up.

What leads to the fourth-grade slump? It is not caused just by poor early "decoding" instruction (learning to match letters and sounds, a skill that has tended to be stressed in current educational policies), since many children who

can decode adequately still fall victim to it. Probably the most important cause of the slump is language, or mastery of vocabulary. As school progresses, the language of learning (for content areas) becomes more complex and specialized, and less like everyday conversational language. What gives students a good running head start to engage this complex language is a wide-ranging, sturdy vocabulary of words introduced before school entry. Unfortunately, we don't teach early literacy in a way that provides most students with that vocabulary if they don't already have it.

The complex language associated with school success is often called "academic language." Different academic subject areas and disciplines use different varieties of academic language, and academic language itself is just one type of specialist language. Specialist varieties of language are used in many workplaces, institutions, and professions such as law, medicine, and business. For success in school, students need to acquire lots of words that are used regularly across academic areas (words like "maintain" and "process"), as well as technical terms used more narrowly (words like "nucleus" and "legislature"). Such words are mainstays of the classroom and of books, but do not occur regularly in everyday conversation.

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As school proceeds, content for students is increasingly couched in academic language. In the twenty-first century, academic knowledge is being increasingly applied to complex systems—systems such as the environment, the economy, even weather. In the future, learning of "content" will increasingly mean working with others collaboratively to pool disciplinary knowledge and tools.

If we are to teach literacy in ways that prevent the fourth-grade slump and make all children adept at academic language and school content, then the preschool and middle childhood period—roughly ages four to 10—is absolutely crucial. It is during this time that children are making the transition from learning to read to reading to learn and, we now hope, reading to discover. It is during this time when children's background knowledge and vocabulary development are set in motion, when the foundations are laid for meeting the demands of comprehending and using academic language connected to content. If these foundations are not well set, young people cannot successfully navigate high school, let alone graduate from college.

One key reason that some children are successful in school with academic language is their early, home-based preparation. Many successful students enter

kindergarten with a large and varied vocabulary acquired through regular dialogue with parents or grandparents, being read to frequently, and exposure to a wide variety of experiences in the world.

Beyond such practices, Kevin Crowley, an expert on out-of-school learning, has studied how young children develop "islands of expertise," which he defines as "any topic in which children happen to become interested in." One example is a boy who develops a "sophisticated conversational space" about trains and related topics after he is given a *Thomas the Tank Engine* book and is supported in his interests by a tuned-in, guiding adult.

Many students today, especially from low-income families, do not get these sorts of early language-based preparation for schooling. Although billions of dollars have been spent developing and administering reading intervention programs for four-to-nine year olds under No Child Left Behind and Title I, these policies have made scant progress and have failed to fundamentally improve reading skills, especially the skills that lead to mastering school-based content.

Closing Two Gaps at Once

If we do not get the transition from early schooling to later schooling right so that all young people have a solid foundation for learning language and content, we will face two educational gaps—an old reading gap and a new digital gap—both detrimental to our success as a leading nation.

These two gaps intersect. The old reading gap can only worsen as the high-tech world makes larger and more complex demands on literacy and content learning. At the same time, the old reading gap prevents certain children from meeting these demands. What exactly is the connection between digital media on the one hand, and literacy, content learning, and complex academic language on the other?

Put simply, digital media—video games, simulations, modeling tools, hand-held devices, and media production tools—can allow students to do two fundamentally important things. First, they can see how complex language and other symbol systems attach to the world. We can put kids into virtual worlds and let them engage in goal-based interactions with others. Consider the video game *Dimenxian* from Tabula Digita, in which children use an algebraic Cartesian coordinate system to allow their avatar to navigate the landscape and eventually construct coordinate systems to map their environment and solve algebraic problems in the virtual world. They have to "algebratize" the world to play the game, and the game world gives them constant feedback and mentoring. They now have vivid images and actions associated with algebraic symbols that give them "situated meanings"—that is, meanings tied to

experiences they can remember when they need to use coordinate systems for further problem-solving.

Second, young people can use digital media to produce knowledge and to display, argue for, and demonstrate their learning. This can transform our traditional notions of assessment towards more genuine mastery of skill sets. Digital media can also combine assessment more intimately with teaching. When media tools are used to track what learners do moment by moment, we can study different trajectories toward mastery, give students constant feedback based on this knowledge, and assess progress across time and not just in terms of a one-off test.

Of course, in the best schools, kids have always learned not just out of books, but also through technologically advanced media, greatly expanding the possibilities available. In the past it was projectors and stand-alone computers; today, young people still read books and textbooks, but through networked technologies and interactive digital media, they can also interact directly with worlds previously described passively, and act with others to learn and produce knowledge.

During the past decade we have made giant leaps in children's and educators' access to digital technologies. Data from national studies conducted by the Kaiser Family Foundation indicate that families across income and demographic categories now have access to the Internet, cell phones, and video game platforms and that the amount of time spent on digital media for children out of school has accelerated dramatically.

Formal education systems play an equalizing role in educational opportunity. School connectivity to the Internet, for example, has grown enormously in the past decade, due to policy and financing efforts such as E-Rate, which spent approximately $16 billion to wire schools and libraries between 1998 and 2008. Teens across income groups reported use of the Internet in school growing by 45 percent between 2000 and 2006. But policy failures such as a lack of effective technology integration into classrooms, and adult concern about media distractions, has increasingly fragmented what children do at home and in the school environment, often to the detriment of low-income kids. In other words, it's not enough to be digitally connected—schools, and their students, need to know how to use those connections.

Three Policy Challenges

We must address three major policy challenges to prepare our children to enter the globalized, automated, increasingly complex world. First, early reading instruction will yield insufficient benefits if it does not prepare children for later content learning. Our current approach is failing too many students who

experience the avoidable fourth-grade reading slump. In addressing this fateful indicator, three fundamental issues quickly arise: How do we ensure that all children, not just those from highly educated homes, get good early preparation, not just for reading but for academic language as well? What do we do for young people who have gotten past the early years of schooling, but are now on a tragic path to academic failure? And, with the enormous growth in the number of English language learners, how do we teach rigorously in the larger context of multilingual language development?

Using new digital media for learning, supported by well-trained and committed adult guidance and instruction, can address all these questions at once. Such media allow learners—young and old, behind or ahead in school, first- or second-language speakers of English—to visualize and experience the meanings of words, rather than just associate words with others that may not be understood in context. This can lead to better preparation for future learning, as well as deeper learning that enhances problem-solving—and not just passing paper-and-pencil tests.

Digital media hold out the potential to enhance the new skills necessary for success in a global age.

Second, addressing America's science, technology, engineering, and math (STEM) crisis must always include language learning embedded in digital knowledge and skills beginning in the early grades. Many people think that learning science has nothing to do with language or literacy and everything to do with concepts and facts. However, these subjects are accessible only through the language and other symbol systems they use to represent their concepts, content, and practices. And science is not unique—this dependence on language is true of all academic domains and, indeed, most professional domains. Furthermore, different academic domains develop different forms of language and use different sorts of symbols. By the time a student is in high school or college—not to mention a high-tech workplace—the ability to handle complex forms of language and other symbol systems is crucial. It is an entry ticket into the forms of thinking, problem-solving, and knowledge production that are the essences of higher-order skills today.

Third, new digital tools can transform learning and innovation if they are wisely and equitably deployed. Simple access to digital media for learning will not narrow achievement gaps. What is crucial is access to support and structured mentorship as well. In a recent study of high-end computers and reputable learning software placed into libraries in economically diverse communities, it was found that well-off parents accompanied their children to the library and

mentored them to read at or above their reading levels, to sustain their engagement with particular learning activities, and to do so in strategic ways. Poorer families engaged much less in such mentoring, which means their children will likely gain less school-based knowledge from digital media and print literacy, read less well, be more passive in their activities, have less of a foundation to build on, and thus fall further behind. In contrast, the more-well-off students progressively build on their achievements. In this way, digital media—much like print literacy—can make "the rich richer and the poor poorer."

These findings do not mean that parents are the only effective source of mentoring. Good digital media made for learning build into themselves important mentoring devices such as well-ordered problems and artificial (virtual) or real tutors. However, they can only be useful if parents, teachers, and more advanced peers help children seek out good learning media and fruitfully draw on their internal design features for learning.

The crucial issue is how to address new digital literacies—that is, expertise with digital media as a form of communication and knowledge production—without forgetting traditional literacy. America's goal must be to close both the reading gap and the digital gap at the same time and in ways that create learners who are able to innovate and produce knowledge, not just recapitulate standard answers on tests.

Digital media hold out the potential to enhance the new skills necessary for success in a global age. They can integrate oral and written language and real-world interactions as well as provide an enormous source of images, actions, and dialogue, all of which help users learn to situate meanings in a great variety of domains, including school subjects such as algebra, science, social studies, art, and literature. They can help level the playing field for learners whose families have not introduced them to a wealth of experiences connected to these domains. In today's marketplace, being tech-savvy, literate, and constantly learning new content is the equation for learning to innovate.

The Digital Promise

Current early literacy practices and policies have cost tens of billions of dollars over the past decade with almost no integration of the new digital tools and teaching practices that have the potential to build the skills and knowledge demanded by universities and employers in the twenty-first century. Of course, this is a new area and more research is needed, but there is enough agreement and pioneering models to show that digital media can have an enormous impact on children's learning. Three major policy steps can leverage their potential.

BUILD A DIGITAL TEACHER CORPS

Teachers cannot teach what they do not know. Unfortunately, the skill set needed to modernize early literacy learning is not being transmitted in teacher education programs in the United States. We need to radically transform the almost Stone Age approach to using digital technologies in the preparation and professional development to transform classrooms for discovery and problem-solving. Teachers need to master content at much higher levels across vital STEM, language, and literacy areas, and they need to learn to collaborate with other educators and children to become guides of others' learning, not mere conduits of information or "storage."

As a "down payment" on new teacher capacity, why not establish a Digital Teachers Corps of some 6,000 literacy leaders, two for each of the 3,000 lowest-performing school communities in the U.S. that all told serve approximately three million learners? Modeled after other programs such as the North Carolina Teaching Fellows, which has successfully recruited strong new teachers from underserved minority groups, or Teach for America, which has a track record of attracting the "best and brightest" young minds, the Corps would recruit members from university-based preparation programs, community organizations, and technology-oriented businesses. They would be deployed initially to integrate new digital content to reverse the fourth-grade reading slump, attack the weak performance of English language learners on basic literacy problems, and use new strategies to teach higher-level content in STEM subjects and world languages.

Digital media can then enhance the development of teachers and can create a new team of adults who would support children's learning across school and extended learning settings. Funds from the new infrastructure investments in schools and libraries supported by the Obama Administration should be accompanied by a new provision in the teacher-quality portions of the Higher Education Act to support both the Corps idea and new online communities so teachers can interact with each other and young people to mentor them. Games and simulations can be used to teach and introduce rich content in areas for which young children have a natural affinity, such as environmental issues and civic participation.

CREATE A "DIGITAL PLACE" IN EVERY COMMUNITY

Many elementary school children are gamers and emerging tech-savvy "digital natives." They crave engaging experiences with new technologies and want to use digital tools that allow them to participate in learning communities. Their evident skills usually outstrip those of adults around them, but they still need

teaching applicable to the digital world. They often need help with evaluating information available online and putting their tech skills to the most productive uses. Kids' enthusiasm for digital activities presents a great "hook" for teaching, but if schools ignore the digital world, that world becomes reserved for home and the resources only more privileged families can marshal.

Despite billions of dollars invested in infrastructure programs such as E-Rate, enrichment efforts like the Supplemental Educational Services, and expanded community after-school programs, most low-income and minority children have no or little access to the best technology-assisted learning available today. Beyond access, they also lack appropriate guidance and attention from grown-ups on how best to use and leverage the technology.

Building on important models developed by corporations such as Intel (Computer Clubhouses), national informal education leaders such as the Boys and Girls Clubs (Club Tech), and the federally supported Community Learning Centers, it is time to create a place in every community where young children can gain confidence in their literacy and interactive technology skills. These centers, funded with what Andy Rotherham (in *Democracy*'s spring 2008 issue) has described as "after school coupons," should expose children to high-quality, engaging digital worlds and tools that integrate language and literacy development with deep content learning. The knowledge tools would include simulations, games, and media production capabilities delivered on mobile and handheld devices. And these centers should be staffed in part by knowledgeable members of a Digital Teachers Corps who can help children make the most of technology.

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In addition, over the past two decades, governors, philanthropies, and business leaders have created choice or magnet schools on key themes ranging from science and math, to arts and culture, to international education, with some notable successes. Secondary school models such as High Tech and New Tech High Schools offer helpful lessons on new school creation and how to teach essential skills in a digital age.

These schools, funded with innovation dollars provided by a newly structured NCLB, would be laboratories for testing different digital approaches to learning and assessment, as well as for breaking down the barriers between in- and out-of-school learning. They could become a hub for the professional development of digitally savvy teachers. The model schools could also link to

state innovations such as virtual high schools to deliver strong instruction in key areas that most children have no access to, such as high-quality second-language instruction, which is associated with higher levels of performance on native language skills in the early grades. Finally, these schools could become a fulcrum for demonstrating how businesses could get involved by donating mentors, training teachers, or funding model initiatives.

MODERNIZE AND RECOMMIT TO PUBLIC MEDIA

Educational television media for young children, stimulated by the pioneering "Sesame Street," have accumulated a four-decade track record indicating that under the right conditions, basic reading, math, and social skills can be enhanced for young children, especially those from underserved communities. It is past time for these television-based efforts, largely paid for with taxpayer dollars, to be modernized to advance a public trust to meet the needs of low-income children and families.

A first step would be a radically redesigned "Ready-to-Learn" program financed by Congress and the U.S. Department of Education, which now reaches millions of low-income children with quality television broadcast fare but which has paid little attention to extending learning on new platforms, or widening low-cost, linguistically diverse distribution in schools and community settings. Successful shows like "Blues Clues," "Ghost Writer," and "The Electric Company" demonstrate that television can teach skills in ways that encourage adults to be involved with children's learning as an interactive experience between parent and child. The digital media and games spawned by such shows have been used informally to accelerate children's cognitive growth, language development, and affiliation with school learning. Digital media may provide opportunities for the more intensive exposure needed to accelerate struggling students' performance that these television programs have not delivered in the past.

To that end, a modernized Corporation for Public Media should follow a framework for production that includes wider experimentation with new formats such as games, virtual worlds, mobile learning, and social network communities to engage children on both traditional and newer literacy skills. Any new taxpayer commitment should promote the development of different business models and incentives to ensure that intellectual property is more open, available for modification by children and teachers, and widely distributed to schools and other learning centers.

Five decades ago, the threat to our nation's security posed by the Soviet launch of Sputnik galvanized an education reform movement that invested wisely in basic research, higher education, and area studies. As a result, the United States

catapulted to dominant leadership in math, science, and technology. Today, the threat is to America's economy, and it comes from the inexorable but less visible currents of globalization and substantial self-imposed hemorrhages in our financial systems. American leadership in the new economy can be assured only if students are prepared to read for effective content learning and if we promote the types of knowledge, creativity, communications, and innovation skills young people will need to compete and cooperate in a global age. Leveraging the power and potential of digital media for literacy learning, starting now, can play a pivotal role in ensuring a bright future for all of our children. ◗