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Welcome to Our Virtual Worlds

It's far more likely that students will learn complex language and sophisticated problem-solving skills—when the fate of a (digital) world depends on it.

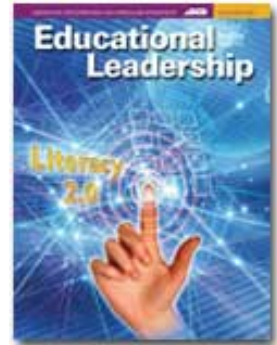
James Paul Gee and Michael H. Levine

The United States is witnessing a growing student engagement crisis. With dropout rates approaching 50 percent in many urban school districts (Swanson, 2008) and recent education surveys showing that students are overwhelmingly bored in school (Bridgeland, DiIulio, & Morison, 2006; Yazzie-Mintz, 2007), we clearly need to find new ways to motivate learners.

A crucial first step in promoting student engagement is to rethink literacy for the 21st century. One path to this new learning equation comes, perhaps paradoxically, from popular culture. Many young people today play long and difficult video games that involve complex thinking and problem solving married to complex language. Although the most frequent criticism of video games is that many involve shooting and killing, a good many focus on other things. *Civilization* and *Rise of Nations* force players to think on a large scale about history, development across time, and civilizations. *SimCity*, *The Sims*, and, for very young children, *Animal Crossing* ask players to build and sustain cities and communities. *Age of Mythology* players regularly read and write about mythologies across the world, specifically from Greek, Egyptian, and Norse civilizations. Some gamers write strategy guides for the games they play—technical writing at its best—and share them over the Internet.

Many young people today also design and produce media, often collaboratively, in a popular culture that stresses production and participation, not just consumption and spectatorship. In fact, we live in the age of "Pro-Ams." Pro-Ams—professional amateurs—become experts at whatever they have developed a passion for. Young people are using the Internet, communication media, digital tools, and membership in virtual communities of practice to develop technical expertise in such areas as digital video, digital storytelling, machinima, fan fiction, history and civilization simulations, music, graphic art, political commentary, robotics, anime, fashion design, and nearly every other endeavor the human mind can think of.

Digital media hold out the potential to hone the skills necessary for success in our globalized world. They can enhance the learning of traditional print literacy and "situation understandings" in the content areas (Gee, 2003, 2007; Shaffer, 2007). They can help all learners become tech



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savvy—that is, unafraid of technical learning, adept at technology, and able to use it in productive and innovative ways. And they can do all these things in a way that enables young learners to accumulate a store of knowledge that cuts across home, community, and school settings. A key challenge is to overcome traditional barriers to integrating the informal media that young people love into the more formal settings of schools.

What Students Stand to Gain

A Solid Basis in Foundational Literacy

Digital media offer a largely untapped but essential resource for students to develop basic reading skills. This is especially important for students who learn to decode print but then falter when they face the more complex academic language of specific content later in school, in areas such as mathematics, science, and social studies.

What gives some students a good running head start to engage with this complex language is a wide-ranging, sturdy vocabulary of complex words developed in the early years, before age 5. Many successful students enter kindergarten with a large and varied vocabulary acquired through regular dialogue with parents or grandparents (Hart & Risley, 1995); they have been read to frequently and exposed to a wide variety of experiences.

But some students come to school without this language-based preparation. This is where digital media in school can make perhaps their most important contribution. This technology requires action in an environment; it generates vocabulary used in actual situations, which makes meanings clearer and easier to remember.

For example, consider *SimCity*, a classic commercial game often used in schools, in which players build and manage a city. Players can zone land as commercial, industrial, or residential. They can change the tax rate. They can build power grids and transportation systems and take many other such actions. As students play the game, words like *zone*, *commercial*, *industrial*, *tax rate*, *power grid*, and *transportation* take on situated meanings, that is, meanings associated with actions and images. Today, game designers are building serious educational games that deal with content in academic terms. Games such as *SimCity Societies*, *Rise of Nations*, *Age of Mythology*, *Civilization*, *Zoo Tycoon*, *Logical Journey of the Zoombinis*, and the older classic *Oregon Trail* engage students in such learning.

Some learning in school today is inspired by gamelike learning. Web quests—in which students use the Web to engage in research—are sometimes organized like role-playing games. For example, in the Web quest Global Education (www.globaleducation.edna.edu.au/globaled/page2030.html), students take on roles as representatives of different types of people who are affected by desertification in Inner Mongolia, China. They play the roles of Mongolian herders, environmentalists, government officials, mining companies, or tourism companies. The students use the Web and other resources to research their role's perspective and then work with the other roles to argue, in a public forum, for a list of actions that will enable people to live sustainably in the desert, protecting the environment, economy, and traditional cultures.

When teachers use meaningful digital media for learning—such as good video games or Web quests—their role changes. They become designers of and resources for their students'

learning. They become mentors and guides, offering feedback and formative assessment that fuel students' self-initiated learning.

Essential 21st-Century Skills

Our innovation-based global age requires us to retool foundational literacy skills and link them with other competencies—such as critical thinking, collaborative problem solving, and media literacy. Digital media enable students to practice these competencies in virtual worlds—through games or player-built worlds like Second Life. Learners see how language is used in those worlds; they also learn how to use that language and other symbol systems—such as those in math and science—to solve authentic problems.

For example, David Shaffer at the University of Wisconsin–Madison has developed a game called *Urban Science* (<http://epistemicgames.org/eg/?cat=14>), in which middle school students replan the city of Madison in a *SimCity*-like virtual environment, using professional knowledge and tools. These learners must use the language of urban planning, economics, and social policy to solve problems, form arguments, and make decisions. They hear from angry virtual citizens, see spaces change, and hear people's reaction to these changes. They see how different variables in the city relate to one another in complex ways and how language works as a tool for identifying and handling that complexity.

For instance, one student argued that to build a recycling plant, a city could zone more space as commercial, a decision that would lead to the creation of more stores and thus to more tax revenue, which could then be targeted for the construction of the recycling plant. To engage in such an argument, the student needed to understand and be able to use the languages of urban planning and of social causation.

Students act as professionals, albeit in a game world, but one that has consequences that mirror those in the real world. In Shaffer's curriculum, students must write a report to actual urban planners, making clear and well-integrated economic, policy, social, and environmental arguments. You can bet the students know what every technical word in their report actually means.

As a result of their workshop experience with this game, students were able to provide more extensive and explicit definitions of the term *ecology*, and their concept maps showed an increased awareness of the complexities present in an urban ecosystem. They developed a richer understanding of urban ecology—and a language with which to express this understanding.

Also consider *Quest Atlantis* at University of Indiana (<http://atlantis.crlt.indiana.edu>). *Quest Atlantis* offers a 3D virtual multiuser environment in which students use scientific information and tools to solve problems collaboratively. A 4th grade unit takes place in an aquatic park with serious ecological problems, including the pollution of fish habitats. The students are invited to assume the role of field investigators: They gather information from virtual characters, report on how different users might relate to the fish problem, develop theories about causation, and propose an informed solution.

In carrying out quests like these, students see how problems arise and how the solution to one problem can create other problems—a concept that is, in fact, one of the Indiana 5th grade science standards. Students can interview virtual characters—such as farmers, loggers, commercial fishermen, and representatives of tourism companies—as well as real people, about problems and possible solutions. They evaluate the information they obtain and assess each group's contribution to the pollution problems in the river. In so doing, they learn language and argumentation associated with science, economics, politics, and ethics.

Teachers can track learners' progress moment by moment and in great detail in this medium, assessing students' trajectories of learning across time and not just in terms of one-shot tests. Researchers working on *Quest Atlantis* have found that students learn both the science behind the game world and the linguistic and symbolic ways of communicating about this science. Researchers have also found that the learning transfers to achievement on standardized tests (Barab et al., 2007).

What Teachers Need to Know

Teachers want to prepare their students for life in the 21st century, and they want their kids to love being in school. Yet they regularly witness a disconnect between the real world outside their classrooms and the contrived, dated world that exists within. They see the stark contrast between squirmy bodies and the glazed stares brought on by textbook-based lessons and the palpable energy brought on by artfully designed, technology-infused lessons. They know they must transform their classrooms and their teaching, but, like the students they serve, they need scaffolding to change and grow.

To leverage the potential of digital media to transform classrooms and motivate students, teachers must become tech savvy. This does not mean that they have to become as technologically adept as some of their digitally native students. They merely need to gain a basic level of comfort with technical learning and be open to opportunities to gain expertise in not just using—but also producing with—such technologies as YouTube, blogs, and social networking sites.

These 21st-century skills of production, collaboration, and complex problem solving don't just develop without intentional supports. They require mentoring and learning from adults and advanced peers within communities of practice in schools, community centers, libraries, afterschool programs, or on the Internet. Teachers who are newcomers to the world of technology-based learning should seek out and participate in thoughtfully designed and ongoing professional development programs that help them produce content with Web 2.0 applications (word processing and e-mail skills are insufficient). Reading and talking about technology integration is not enough; hands-on work with digital tools is required. Research should be shared with educators so they understand how these technologies will help them improve their craft and engage their digital students.

Computer-based, Web 2.0-oriented courses for teachers are the best way for digital immigrants to learn the language of the 21st century. The following resources can support this new learning:

- **Classroom 2.0 Wiki** (<http://wiki.classroom20.com>) provides resources for classroom teachers, free workshops and live conversations about using Web 2.0 applications in the classroom, and information about such helpful education tools as podcasts, blogging, collaborative idea maps, Google Earth, Webcasts, VoiceThread, and social bookmarking.
- **Route 21** (www.21stcenturyskills.org/route21) is a resource portal developed by the Partnership for 21st Century Skills (www.21stcenturyskills.org) that contains information, resources, and community tools related to 21st-century skills.
- **The International Society for Technology in Education** (ISTE) recently released an updated version of its National Educational Technology Standards (NETS) for Students (www.iste.org/AM/Template.cfm?Section=NETS). Also available is NETS for Teachers, which lists the specific standards and performance indicators in technology that teachers should be meeting.
- **The Technology in Education Resource Center** (www.rtec.org) was established to help schools, districts, states, and other education institutions implement advanced technologies to improve teaching and student achievement.
- **Teaching Every Student in the Digital Age: Universal Design for Learning** (www.cast.org/teachingeverystudent/ideas/tes), by David H. Rose and Anne Meyer at the Center for Applied Special Technologies, discusses how digital content, tools, and networks can deliver a curriculum that will accommodate every learner's needs.
- **Edutopia** (www.edutopia.org) contains an archive of continually updated best practices, from classroom tips to recommendations.
- **Apple Learning Interchange** (<http://edcommunity.apple.com/ali>) enables educators to share lesson collections, tips and tricks, and even find like-minded folks for collaboration.

Of course, the first step is not to worry about being an expert or experiencing failure, but to step into these digital worlds, see what young people are doing, and think about how to use those existing practices to develop 21st-century skills in schools. Stepping in and not worrying about failure—now that's a gamer's attitude.

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