Digital Game-Based Learning

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Research published by University of Rochester neuroscientists C. Shawn Green and Daphne Bavelier [Green and Bavelier, 2003] has grabbed national attention for suggesting that playing "action" video and computer games has the positive effect of enhancing students' visual selective attention.   But that finding is just one small part of a more important message that all parents and educators need to hear: Video games are not the enemy, but the best opportunity we have to engage our kids in real learning.

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A *sine qua non* of successful learning is motivation: a motivated learner can't be stopped. Unfortunately, in this day and age much of the content that needs to be learned by students is not directly motivating to them – the word "boring," or one of its politically correct synonyms such as "dry" and "technical" often crosses their lips – whether the learners be in school, college, corporations, professions, or even the military. It is probably safe to say that today's teachers, trainers, and educators are rarely as effective as they might be in the motivational department, and this often causes real problems in getting our otherwise highly-stimulated students to learn.

Yet there is a place where *motivation itself* is the expertise, and is, in fact the *sine qua non* – the $30 billion worldwide computer and video games industry. In its incredibly rapid rise over the past 30 years since *Pong* was introduced in 1974, the unique expertise that game designers have honed to a superfine edge is player engagement: the ability to keep people in their seats for hour after hour, day after day, at rapt attention, actively trying to reach new goals, shouting with glee at their successes, determined to overcome their failures, all the while begging for more.

Of course the attitude of today's children toward their video and computer games is the very opposite of the attitude that most of them have toward school. Yet it is the very attitude we would all *like* our learners to have: interested, competitive, cooperative, results-oriented, actively seeking information and solutions.

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It therefore makes a great deal of sense to try to merge the content of learning and the motivation of games, and this is indeed what is happening. The first comprehensive description of this growing phenomenon, *Digital Game-Based Learning* [Prensky, 2001], discusses how learners have changed, how games teach and why they work, Examples (from all types of learners and subject matter), and issues in implementation. (Several sample chapters are online at www. marcprensky.com/writing/default.asp)

The book focuses on the many ways that today's learners are different from their parents and from all previous generations – a result, to a large extent, of their growing up immersed in digital technology (see Chapter 2, as well as the article "Digital Natives, Digital Immigrants," both at www.marcprensky.com/writing/default.asp). The amount of time today's young people spend playing computer and video games, estimated at 10,000 hours by the time they are 21 – often in multihour bursts – belies the "short attention span" criticism of educators. And while years ago the group attracted to video and computer games was almost entirely adolescent boys, it is now increasingly girls and all children of all ages and social groups. One would be hard-pressed today to find a kid in America who doesn't play computer or video games of one sort or another.

Digital Game-Based Learning also discusses the mounting evidence that our "digital native" children's brains are changing to accommodate the new technologies with which they spend so much time (see "Do They Really Think Differently" at www.marcprensky.com/writing/default.asp). Not only are the natives better at spreading their attention over a wide range of events, as Green and Bavelier report, but they are better as well at multitasking and parallel processing, taking in information and making decisions quickly (at "twitch-speed"), understanding (i.e., "reading") multimedia, and collaborating over networks.

What attracts and "glues" kids to today's video and computer games, I believe, is neither the games' violence, nor even their subject matter, but rather the learning the games provide. Kids like all humans love to learn when it isn't forced upon them. Modern computer and video games provide learning opportunities every second, or fraction thereof.

What kinds of learning? On the surface, game players learn to do things – to fly airplanes, to drive fast cars, to be theme park operators, war fighters, civilization builders, and veterinarians. But on deeper levels they learn infinitely more: to take in information from many sources and make decisions quickly; to deduce a game's rules from playing rather than by being told; to create strategies for overcoming obstacles; to understand complex systems through experimentation.   And, increasingly, they learn to collaborate with others. Many adults are not aware that games have long ago passed out of the single-player isolation shell imposed by lack of networking, and have gone back to being the social medium they have always been. "Massively multiplayer" games such as *EverQuest* and *Lineage* now have hundreds of thousands of people playing simultaneously, collaborating daily and nightly in clans and guilds.

Today's game-playing kids enter the first grade able to do and understand so many complex things – from reasoning, to building, to flying – that the curriculum they are fed in school often feels to them like a depressant. And it gets worse as the

students progress. "Every time I go to school I have to power down," says one. Sadly, our "digital immigrant" teachers know so little about the digital world of their charges – from their online gaming, to their online exchanging, sharing, meeting, evaluating, coordinating, programming, searc-hing, customizing and socializing – that it is often impossible for teachers to design learning in the language and at the speed their students need and relish, despite their best efforts. This is why so many of our children find school so uselessly irrelevant – they no longer understand their teachers' outdated language (e.g., "dial" a telephone, play a "record") and the teachers no longer speak theirs (e.g., "blog," "avatar," "MMORPG"). Of course this goes much deeper than just words – the conceptual world of the two generations are very different. And so are the ways in which they have learned to learn: the young people of today understand instinctively that their games are their very best teachers.

The good news for these students is that an emerging coalition of academics, writers, foundations, game designers, companies such as Microsoft and, increasingly, the U.S. Military is working to make parents and educators aware of the enormous potential for learning contained in the gaming medium. While the "edutainment" now found on store shelves may work for pre-schoolers, it is extremely primitive relative to the enormous sophistication of today's computer and video games. We need new learning games that are better and deeper, and these are finally beginning to appear. Microsoft has sponsored a "Games-to-Teach" project at MIT which is building games for learning difficult concepts in physics and environmental science on the X-Box and Pocket PC (http://cms.mit.edu/games/education/index.html). LucasArts has lesson plans on its website to help teachers use its games to teach critical thinking (http://www.lucaslearning.com/edu/lesson.htm). A UK study by TEEM (Teachers Evaluating Educational Multimedia) has shown that particular off-the-shelf games can help youngsters learn logical thinking and computer literacy (http://www.teem.org.uk/aboutteem/press/article?nid=92). And the Liemandt Foundation has designed a contest in which college and graduate students create learning games to teach middle school subjects, competing for a $25,000 first prize (http://www.hiddenagenda.com).

Given the almost perfect overlap between the profiles of gamers and military recruits, the US Military uses over 50 different video and computer games to teach everything from doctrine, to strategy and tactics (http://www.dodgamescommunity.com). One of these, "America's Army: Operations," a recruiting game released for free in 2002, now has almost 2 million registered users, with almost a million having completed "virtual basic training" (http://www. americasarmy.com).

Academic research into the positive effects of games on learning, which not so long ago sat unread on the shelf, is now being noticed by national media. Theoretical and practical guides such as *What Video Games Have To Teach Us About Learning And Literacy* by James Paul Gee, and my own *Digital Game-Based Learning* are now on bookshelves. Experts, such as William Massy, who created the learning game *Virtual U,* are working with designers to build games that communicate their knowledge and experience. Foundations like Sloan, Markle and others are funding these efforts. The Woodrow Wilson Center has begun a project

called "Serious Games" to increase the use of gaming in public policy debates, picking up an effort that began a decade ago with *Sim Health* from Maxis.

But despite all the findings, research, and cries for help from the kids in school, many parents and educators still tend to think of video and computer games as frivolous at best and harmful at worst. The press often encourages this with headlines about "killing games," when in fact two-thirds of all computer and video games are rated "E (everybody)," and 16 of the top 20 sellers are rated either "E" or "T (teen)." To counteract this "name prejudice," users and funders of today's "new" educational games often refer to them by "code" names, such as "desktop simulators," "synthetic environments," or "immersive interactive experiences."

Yet what these new, highly effective learning tools really are is a combination of the most compelling and interactive design elements of the best video and computer games with specific curricular content. The tricky part, of course, is combining the two in ways that retain, rather than lose, the learner's interest and attention; we are now becoming much better at this. The money and will are there to do it, and our students are crying for it.

In the two years following *Digital Game-Based Learning*'s publication, the phenomenon has grown rapidly. As learners demand something different and better; as game designers, many of whom are now reaching the age where they have children of their own, strive to maximize the social impact of their work; and as funders see the potential to reach students in more effective ways, digital game-based learning has moved from the realm of R&D and early adopters toward the mainstream. An online catalog of "Social Impact Games" (http://www.socialimpactgames.com) lists over 100 examples, in fields as diverse as environmental science, public policy, health, politics, history, and military strategy.

So hang on, learners, engaging, motivating digital game-based learning is finally on the way!

REFERENCES

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