

Gaming Redefines Interactivity for Learning

by Nick DeKanter

The new definition of interactivity has as its focal point the skills of people, not the capabilities of the technology. Our goal is to enhance the interaction between people and the learning that can only occur among curious and motivated individuals working together.

Like any powerful concept, interactivity is an idea that is constantly evolving. Flash back to the introduction of CD-ROMs. With huge volumes of programming and playback space on an easy-to-use disk, everyone from book publishers to game developers began spicing up inert programs with pictures, sounds and moving images. Multimedia was born and with it the earliest definition of interactive technology, based primarily on the ability to animate the text-based computing experience.

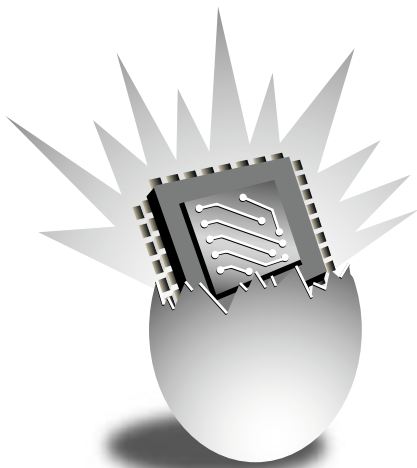
The second major shift in interactivity arrived with the World Wide Web. The hyperlinked global network reshaped the possibilities of business, education and society in general by providing the ability to roam freely across an almost infinite array of information sources.

As important as these advances have been, the link between interactive technology and improved learning has been tenuous. This is largely due to overly comfortable assumptions about the learning process. For example, does adding a photograph or a video clip to a lesson about the rise of Nazi Germany inspire a distracted teenager to think critically about the economic triggers of World War II? Does a soundtrack of Stuka dive bombers teach a student about the political subterfuge of treaty negotiation?

Even the internet, with its trademark ability to connect people anywhere anytime, to spawn communities and engender collaboration, lacks an essential ingredient when it comes to effective learning. The net has no physical form. You can't pop it into your backpack. Cyberspace is everywhere, and it is nowhere. You can get access to the web from handheld devices, but the content of the internet is, by definition, out "there."

In a classroom virtual tools are problematic. Several dozen students led by a teacher in an experience bounded by time is the epitome of non-virtual, and it is in this setting (and others like it in corporate and government training scenarios) that interactivity is still decidedly human.

The social nature of people, the increasing capabilities of technology and the demands of a nation for better education are putting into play the next big evolution in interactivity: networked game simulations. Game simulations are a merger of content and collaboration that shift the focus of interactivity from the technology itself to the people using it. By integrating artificial intelligence and by leveraging the best elements of multimedia and the internet, new multiplayer strategy games allow people to relive events with the responsibility for the outcome of those events.



**EMERGING
TECHNOLOGIES**

The result is what some experts have called a constructivist learning environment which weaves together the essential and interdependent ingredients for productive learning. Many texts and lectures exist on the topic of constructivist learning.

Matched with the appropriate content, multiplayer games offer a three-dimensional learning construct, with teachers talking to students, students challenging each other and an entire classroom discussing the causes and effects of a game scenario. Indeed, by taking a look at the primary tenets of a constructivist learning environment as described by John Savery and Thomas Duffy (1995), we can see how closely aligned the characteristics of game simulations are to the theoretical principals of constructivism:

1. Anchor all learning activities to a larger task or problem.
2. Support the teacher in developing ownership of the overall problem or task.
3. Design an authentic task.
4. Design the task and the learning environment to reflect the complexity of the environment they should be able to function in at the end of learning.
5. Give the learner ownership of the process used to develop a solution.
6. Design the learning environment to support and challenge the learner's thinking.
7. Encourage testing ideas against alternative views and alternative contexts.
8. Provide opportunity for reflection on both the content learned and the learning process.

One of the most important intersections between next-generation strategy games and the constructivist learning framework is the idea that, as Savery and Duffy (1995) point out, "knowledge is socially negotiated." Simply glance back at the Learning Pyramid, first constructed in the 1960s, and you realize that educational thought-leaders have consistently believed in the learning power of collaboration and the application of learned material in real-world scenarios. These ideas lead to the emphasis in current game development on driving continuous interaction between the students, the game itself and the teachers.

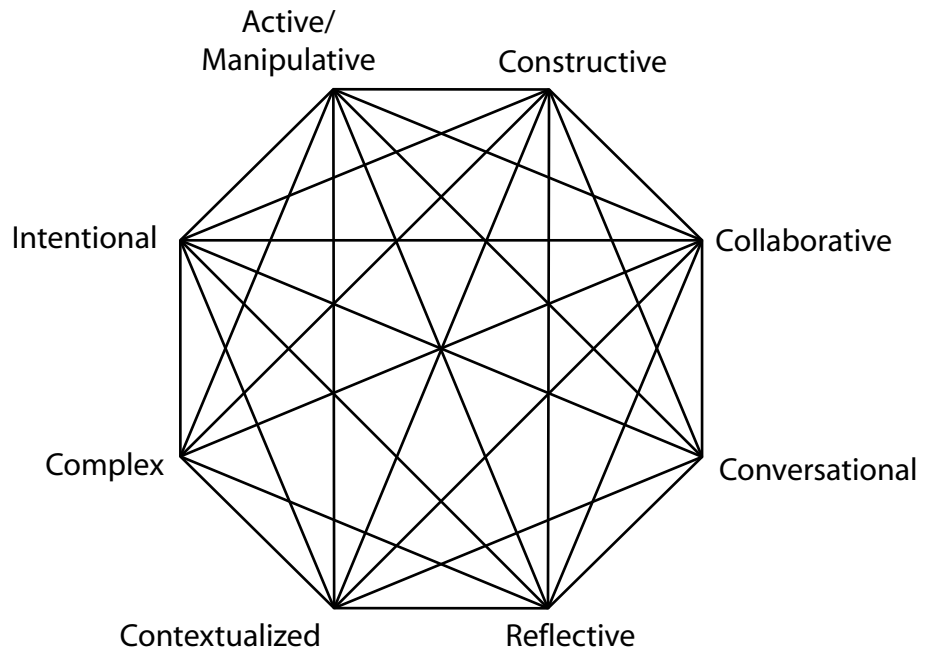


Figure 1. From a website presentation on constructivist learning environments, University of Missouri-Columbia, College of Education (Jonassen, 2005).

The Power of Interactive Learning

The classic study by National Training Laboratories, represented as "The Learning Pyramid," demonstrates the lasting impact of interactive learning on a person's ability to retain information. Below are the average retention rates associated with different methods of presenting information:

teach others/use immediately	90%
practice by doing	75%
discussion group	50%
see a demonstration	30%
learn from audio/visual	20%
reading	10%
lecture	5%

“We see interactive video games as a complement to, not a replacement for, other teaching tools and methods.”

If done correctly we can create what you might call a “multiplexed” environment that is far different from the single-user games of the past, or even the internet-based games that stimulate multiplayer interactivity but don’t integrate the educator as part of the game and learning experience.

Let the games begin

The typical middle-class teenage student has a laptop computer or at least a PC in the dorm room. He or she may also have an array of digital lifestyle devices: an MP3 player; a PDA; a wireless broadband Internet connection; an Xbox or Playstation; a cell phone; a digital camera (or a digital camera with a cell phone). Behaviorally, this digital teen spends hours sending instant messages and expects his cell phone to ring during a movie.

We may quickly be running out of alphabetic designations to describe them, but one other thing is certain — today’s learning generation is extremely game literate. Even the intuitive assumption that a lot of people today play video games doesn’t begin to measure how widespread game playing really is. Half the population of the United States plays video games, and of all the games purchased for use on personal computers, strategy games are the most popular (Entertainment Software Association, 2004).

And game savvy is hardly limited to kids; the average age of a video game player is 29 (Entertainment Software Association, 2004). And while games are obviously fun, they are having a huge impact on the workplace as well, which becomes a crucial observation in considering game-based curriculum for our high school and college students preparing for leadership roles in the businesses, government institutions and philanthropies that keep our society moving forward.

In the new book *Got Game: How the Gamer Generation is Reshaping Business Forever*, authors John Beck and Mitchell Wade (2004) reveal that video games have created a new generation of employees and executives — bigger than the baby boom — that will dramatically transform not just the composition of the office but the work styles of employees. The game culture is becoming the work culture. An estimated 90 million game-generation professionals are coursing through the ranks of commerce. Notably, they share leadership traits such as more open communication and creative problem solving (Beck & Wade, 2004).

Speaking of speaking, statistics also show that the quintessential form of youthful communication — IM or “chat”— is rapidly moving upward into the adult ranks and the corporate work environment (Pew Internet & American Life Project, 2004). Clearly, the rules are changing. The elements of interactive game playing — adaptivity, competition, communication — are becoming the traits of successful students and workers. These ingredients establish a new benchmark for technology if it is to be useful in a modern learning environment.

The new rules

Computer strategy games are not a new idea, and neither is software for education. But putting the two ideas together and building a game platform from the ground up to work seamlessly at a high school or college level is a radical departure from the conventional wisdom.

Historically, video games are extremely expensive to develop, largely because games for the entertainment market are one-hit wonders and are highly dependent on the sizzle (end expense) of 3D graphics. Given the huge investment required to make a single game, and the perceived disinterest of schools in game software, major video game companies large and small have avoided the academic market, especially in higher education where technology must meet a more rigorous standard of content than the games like Reader Rabbit and Math Blaster that are readily available for kids in elementary school.

Instant messaging is moving into the American workplace. Some 21% of IM users, or 11 million American adults, use instant messaging at work.

Pew & American Life Project (2004)

One of the great challenges — and opportunities — of developing games that will be successful in academia is the bipolar nature of our educational system. As a nation we have standardized non-standardization in our schools. It's the blessing and the curse of a culture that prides itself on individuality but also demands national accountability for educational outcomes. To wit, we have a single national test, the SAT, for getting into college, but no two classrooms teach the same subject exactly the same way once kids get into college. Taking all of this into account, we believe content-rich strategy games built on a highly flexible simulation engine is the perfect hub to the spokes of educational duality.

Currently, high schools and colleges across the country are testing our new game series called *Making History*. It's more than a game or even a series of game titles; it's a full gaming platform designed for higher education. Our current game content is focused on teaching history but is capable of extending easily into any subject or complex learning system, such as economics, environmental science or even creative writing, to name a few.

We're building *Making History* to pick up where lectures, CD-ROMs and distance learning leave off by integrating all the advantages of a networked game experience and developing tools that will enable teachers to customize the game for their unique teaching styles and academic objectives. We believe *Making History* and future games of this kind will bridge the widening gap between the digital teenager and the traditions of bricks-and-mortar classroom teaching.

It is important to underscore that we see interactive video games as a complement to, not a replacement for, other teaching tools and methods. The buzz created in a classroom by a game like *Making History* is produced by the natural energy of students — and teachers — engaging each other. In a word: dialogue. It's what every teacher wants to create, and in the media-saturated culture of the 21st century, dialogue is the hardest thing to create unless you're talking the same language as the students. In this case, the language of video games becomes part of the teaching ecosystem that will, and should, continue to employ traditional tools such as textbooks, lectures, field study, standardized tests and all the rest.

From the perspective of teachers, professors, deans and administrators, a certain fear factor must be overcome in order for video games to be embraced as an integral part of modern pedagogy. The testing we've done and the conversations we've had with high schools and colleges clearly tell us we're on the right track.

While it is a game, and it is fun, a properly designed video game creates a common ground between distracted students and time-starved teachers. This ground becomes fertile territory for teaching the way it was meant to be — with full and active participation of motivated students.

The educational goal of *Making History* is a person who can think critically and who can apply the techniques of collaborative problem solving to new and unfamiliar situations. In relation to specific subject matter, such as the history of World War II, a networked game-simulation immerses the learner in the "how," not simply the "what." This is achieved by presenting real-world scenarios that are devoid of forgone conclusions about the way things turn out. The uncertainty of the outcome — and at the same time, the student's responsibility for that outcome — is precisely what makes a game-simulation such a potent learning tool.

Salem State College in Salem, Mass., is a progressive user of technology for education, and is an active participant in the statewide Laptop Initiative in Massachusetts. As a prelude to a full-scale rollout of *Making History* planned for fall 2005, history professor Chris Mauriello rallied a group of freshman students for a "game day" to test student reactions to the game and gather feedback for curriculum design. Some of the students were more computer savvy than others, yet to a person they were fully engaged in the game sessions and in fact most of them stayed well after the game sessions to discuss their experiences. "You invaded me!" one student shouted. Clearly, the treaty she had negotiated with a fellow student using the game's chat feature was a ruse. "When is politics fair?" replied her challenger. All told, there was nothing faint about the level of energy and historical debate inspired by *Making History*.



Professor Mauriello interacts with students at a *Making History* game day.

On the most practical of levels, one of the great advantages of using computer-based strategy games in the classroom is that these games are so familiar to the students who have grown up using them. *Making History* presents itself to the student like many other games they've already seen, with a log-on screen and basic instructions for choosing a game scenario. Once engaged, the graphical user interface of the game presents the critical learning material in windows and pop-up screens that require literally no training or user guide; the flow of the game and the navigational schemes are entirely intuitive and familiar to the gamer generation.



Figure 2. Making History enables live interaction between students using the online chat feature.



Figure 3. Students engage in strategic decision making based on the real historical context of the country they are playing.

As depicted on the screen in Figure 3, *Making History* gives the student complete control of—and responsibility for—a nation's economic, diplomatic, political and military conditions. The ongoing status of each country—the “score” of the game if you will—is completely fluid; things change as each player makes decisions, deciding to tap a country's treasury, for example, to boost its oil reserves.

Academic simulations share some of the known learning advantages of task-based simulations that have long been used in commercial and military training; consider the familiar image of a pilot learning to fly a new-generation jet in a computer-animated virtual cockpit. While focusing more on cognitive skills than motor coordination, game-based simulations are uniquely effective at creating what researcher Diane Oblinger calls a “multisensorial environment.” In comparing a video game to reading a book, she says “the students are there in body as well as in spirit, and thus memory is enhanced” (Oblinger, 2004).

The action of each player affects the other players. Moreover, the parameters of historical fact influence the course of events in each session of game play. If, for example, a student leading Great Britain wishes to launch a preemptive strike against Nazi troops amassed at the southern border of France, that brilliant military decision may be stalled or completely nullified by the antiwar sentiment of the general public in England, or by the student's inability to negotiate overland transit rights from the volatile French government, leaving Her Majesty's finest troops all dressed up with nowhere to go.

How it all adds up

To be effective and broadly adopted in higher education, interactive software must meet these critical requirements:

1. Customization: Making it easy to modify content to meet specific educational objectives of any school and the teaching styles of individual teachers.
2. Transparency: Using an open architecture that makes the underlying models of game behavior visible and accessible to the instructor.
3. Feedback: Providing a variety of ways for the student to get feedback from the teacher, and for teachers to see the overall progress of the class.

These features are not simply technical advances in the capabilities of software; they are the missing links in making interactive tools usable on a broad scale in higher education. By moving forward, this technology moves software simulations back into the comfort zone of time-starved educators who, by and large, still rely on textbooks and lectures to do their jobs. And as techno-savvy students of the game generation change the rules of education (Beck & Wade, 2004), software simulations become something that teachers and students can adopt with almost no learning curve.

This new generation of interactive educational games uses the proven learning techniques of task-based simulations, but takes the next big step in making games useful for conceptual tasks that are at the heart of the high school and college curricula. Networked game simulations create a habitat filled with “what if” scenarios and proceed based on the combined actions and interactions of the players. As these actions and their consequences unfold — and are discussed in the classroom — a new kind of interactivity occurs. It’s computing in a social context.

Nick DeKanter is vice president of Muzzy Lane Software.

References

- Beck, J., & Wade, M. (2004). *Got game: How the gamer generation is changing business forever*. Boston, MA: Harvard Business School Press.
- Entertainment Software Association. (2004). *Essential facts about the computer and video game industry*. Available online: http://www.theesa.com/facts/gamer_data.php
- Jonassen, D. (nd). *Constructivist learning environments*. Retrieved May 2, 2005, from University of Missouri-Columbia, College of Education Web site: <http://www.coe.missouri.edu/~jonassen/courses/CLE>
- NTL, Institute for Applied Behavioral Sciences. (nd). *The learning pyramid*. Alexandria, Virginia.
- Oblinger, D. (2004). The next generation of educational engagement. *Journal of Interactive Media in Education* (8). Available online: <http://www-jime.open.ac.uk/2004/8>
- Pew Internet & American Life Project. (2004). *How Americans use instant messaging*. Washington, D.C.
- Savery, J., & Duffy, T. (1995). Problem based learning: An instructional model and its constructivist framework. *Educational Technology*, 35, 31-38.

“This new generation of interactive educational games ... takes the next big step in making games useful for conceptual tasks that are at the heart of the high school and college curricula.”

Copyright of TechTrends: Linking Research & Practice to Improve Learning is the property of Association for Educational Communications & Technology. The copyright in an individual article may be maintained by the author in certain cases. Content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.