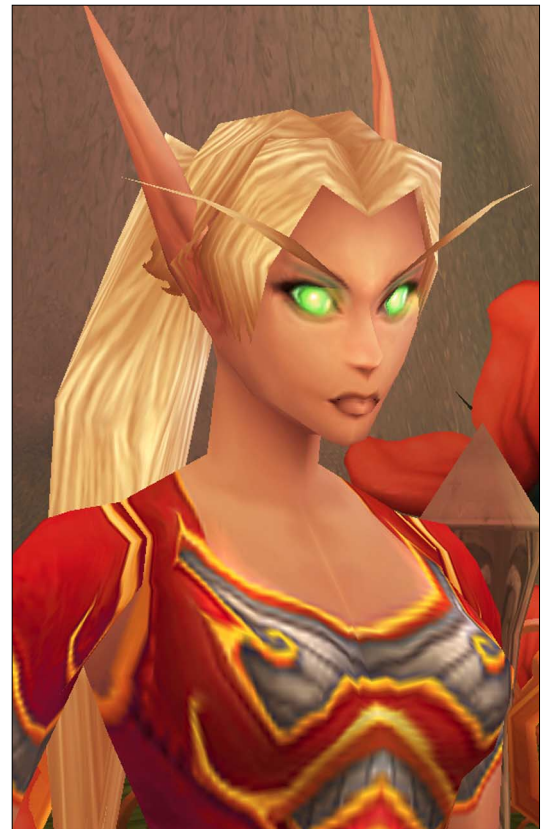


## Video Games

*Do they have educational value?*

**M**ore than three-quarters of American youths have video-game consoles at home, and on a typical day at least 40 percent play a video game. Some academic scholars claim playing games is good for literacy, problem-solving, learning to test hypotheses and researching information from a variety of sources. Others say gaming may be good for understanding technical information but not for reading literature and understanding the humanities. Enthusiasts claim gaming is preparing young people for the knowledge-based workplace. Critics worry that it's making kids more socially isolated, less experienced in working with others and less creative. Experts remain divided about whether addiction to games is widespread and whether violent games produce violent behavior. Increasingly, researchers are studying why games are so engrossing, and some are urging educators to incorporate games' best learning features into school programs.



*Multiplayer fantasy games like "World of Warcraft" allow players to assume the role of characters like this blood elf.*

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# Video Games

BY SARAH GLAZER

## THE ISSUES

On a hot summer afternoon, eight teenagers gathered in the darkened basement of the Bronx Central Library to play the top-selling football video game “Madden NFL.” The Madden tournament in the Bronx, complete with prizes, is part of a growing effort at libraries across the country to lure a client who rarely darkens the door of a public library — the adolescent boy.

“If it wasn’t for the gaming stuff dragging me in that first time, I would have gone maybe once in the past two years,” says Ian Melcher, 17, a gamer in Ann Arbor, Mich., who had just checked out two calculus books. “I realized the library was pretty cool and had other things I was interested in.”

To persuade skeptical libraries to put video games on the shelf next to books, young librarians who grew up on games are drawing support from a surprising source — academic researchers. They claim that playing video games is practically a requirement of literacy in our digital age.

To many parents and baby boomers, playing video games looks like mindless activity. Yet the knowledge built into “Madden,” for example, employs a playbook the size of an encyclopedia. To win, players must have a sophisticated understanding of strategy and make split-second decisions about which play to choose.

“Games stress taking your knowledge and applying it. That’s pretty crucial in the modern world,” says Uni-



Electronic Arts

*Detroit Lions running back Kevin Jones goes airborne for extra yardage in the 2007 edition of the popular video game “Madden NFL.” Some scholars claim video and computer games help literacy, but others say they don’t assist with reading literature or understanding the humanities. Experts also remain divided about whether addiction to games is widespread and whether some games produce violent behavior.*

versity of Wisconsin Professor of Reading James Gee, author of the 2003 book *What Video Games Have to Teach Us about Learning and Literacy*.

Indeed, the argument that video and computer games are superior to school in helping children learn is gaining currency in academic circles. Claimed benefits include improved problem-solving, mastery of scientific investigation and the ability to apply information learned to real-life situations. Some of the more complex games, especially multiplayer games like “World of Warcraft” — played online simultaneously with thousands of players — lead some teens to engage

in esoteric, online conversations about strategy and to create their own literary spin-offs or so-called fanfiction.

“Many video games require players to master skills in demand by today’s employers,” concluded a report released in October by the Federation of American Scientists, citing complex decision-making and team building. The organization urged the federal government to invest in research and development of educational games for K-12 students and for adult workforce training.<sup>1</sup>

Science writer Steven Johnson, who popularized the pro-game argument in his 2005 book *Everything Bad is Good for You*, argues that when a child enters the world of a computer game, he is “learning the scientific method” as he tries out multiple hypotheses.<sup>2</sup> For instance, today’s youngsters don’t first sit down and read a rule book, the way baby boomers did. They start pushing buttons to see what happens.

That willingness to learn from failure uniquely prepared members of the dot-com generation, giving them an advantage as entrepreneurs and creative thinkers in the new economy, argue business experts John C. Beck and Mitchell Wade in their 2004 book *Got Game*. “A kid in the classroom has to worry about looking like an idiot. In a game, they’re raising their hand all the time, and true learning comes from failing,” concurs Dmitri Williams, assistant professor of speech communication at the University of Illinois at Urbana-Champaign. “When you strip away all the explosions, blood, magic coins, princesses and castles, video games are problem-solving tasks —

## Sports and Multiplayer Games Most Popular

The 10 highest-selling video games are either about major-league sports, auto racing or “Star Wars,” which largely appeal to boys; most are rated suitable for the entire family. Among computer games, four of the top 10 are “Sims” games, which also appeal to girls, and several are warfare games. Multiplayer games like “World of Warcraft” — which has 6 million players — are heavily female.

### Top 10 Video Games, 2005

Rank	Title	Rating*
1.	Madden NFL 06 (PlayStation version)	E
2.	Gran Turismo 4	E
3.	Madden NFL 06 (Xbox version)	E
4.	NCAA Football 06	E
5.	Star Wars: Battlefront II	T
6.	MVP Baseball 2005	E
7.	Star Wars Episode III: Sith	T
8.	NBA Live 06	E
9.	Lego Star Wars	E
10.	Star Wars: Battlefront II	T

### Top 10 Computer Games, 2005

Rank	Title	Rating*
1.	World of Warcraft	T
2.	The Sims 2: University Expansion Pack	T
3.	The Sims 2	T
4.	Guild Wars	T
5.	Roller Coaster Tycoon 3	E
6.	Battlefield 2	T
7.	The Sims 2 Nightlife Expansion Pack	T
8.	MS Age of Empires III	T
9.	The Sims Deluxe	T
10.	Call of Duty 2	T

\* T = Teens (suitable for ages 13 and older)

E = Everyone (suitable for ages 6 and older)

Source: Entertainment Software Assn., “2006 Sales, Demographic and Usage Data”

puzzles. There’s some irony in the fact that kids are bored at school but rush home to solve these games where they learn math and history.”

As evidence that kids are willing to master language and concepts usually considered over their head, Johnson

describes an hour spent teaching his nephew to play the urban planning-style game “SimCity.” While Johnson was trying to figure out how to save a dying industrial neighborhood, the 7-year-old piped up, “I think we need to lower industrial tax rates.”<sup>3</sup>

“SimCity” creator Will Wright says the youngster probably didn’t understand tax rates any more than baby boomers understood mortgages when they played “Monopoly” as kids. But he thinks games teach something else. “The ability to reverse-engineer in your head a model of some arbitrarily complex thing is an incredibly valuable skill that you can apply to almost anything in this world,” he says, whether that’s doing your taxes, programming a new cell phone or predicting the effect of global warming.

Despite the worries of baby-boomer parents, there’s no evidence that video gaming is replacing reading among teens. According to a Kaiser Family Foundation survey, reading for pleasure has remained steady in the past five years even as video-gaming time has risen.<sup>4</sup>

But what about teens who seem to spend most of their leisure time on games? Heavy gamers — more than an hour a day — actually spend more time reading for pleasure (55 minutes daily) than teens who play no video games at all (41 minutes), according to the Kaiser survey. And Kaiser found only 13 percent of adolescents were heavy gamers.

Nevertheless, the persistent anecdotes about teens and adults who skip meals, classes and even work to indulge in hours of video-gaming has led some to worry the games are addictive. Clinics have even sprung up claiming to treat “Internet addiction disorder.”

But many psychologists remain skeptical. “There’s hardly anyone I would class as a genuine video-game addict,” says Professor of Gambling Studies Mark Griffiths of Nottingham Trent University in Nottingham, England. Few players, he says, meet a strict definition of addiction, which includes withdrawal symptoms and a preoccupation so single-minded that every other aspect of life is neglected.

Experts are also divided over whether graphic violence in games like “Grand Theft Auto” has any lasting negative effects on players’ behavior, de-

spite a few cases in which a teen's murderous frenzy has been blamed on games by the victim's parents. Recent studies indicate that the younger a player is, the more likely he is to be negatively affected by video violence and the longer lasting the effect. (See sidebar, p. 948.)

Concerns about both addiction and violence have led to efforts to curb on-line role-playing games like "World of Warcraft" and "Lineage II." Last year, the Chinese government imposed penalties on gamers who spend more than three hours playing a game by reducing the abilities of their characters. All the biggest online game operators said they would adopt the new system. The measures were designed to combat addiction in a country where more than 20 million Chinese play games regularly, mainly in net cafes. In one case, a player killed a fellow player who had stolen his virtual sword. (The penalties were later rescinded after widespread protests.)

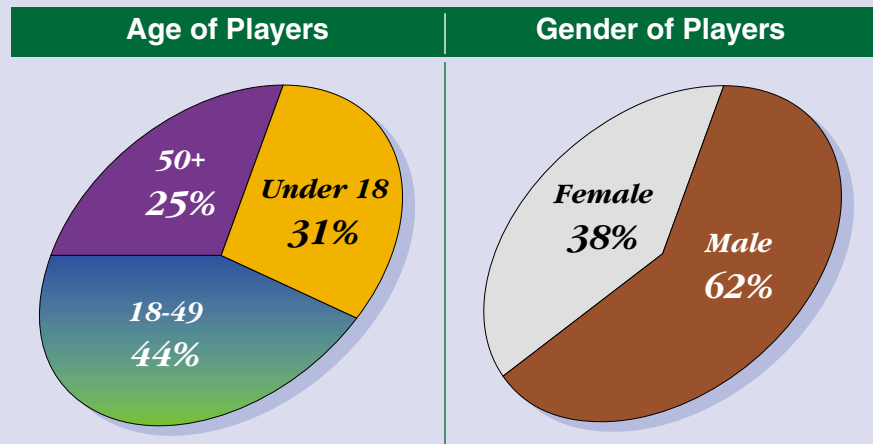
Aside from worries about addiction and violence, not all scholars are equally enthusiastic about the learning value of video games on the market. In most games, the content is "garbage," according to Harvard Graduate School of Education Professor Christopher Dede, "in the sense that it deals with imaginary situations that are not close to the knowledge and skills people need for the 21st century. To claim that learning magic spells is good preparation for the knowledge-based workplace is just plain silly."

Dede is among those interested in adapting one of the most popular offshoots of gaming — virtual worlds — to educational aims. Player create characters (or avatars) who enter a virtual world. Hundreds of thousands of teenagers now participate in virtual worlds like There.com and Second Life, where they can create a character, buy clothes and real estate and meet other players' avatars. (See sidebar, p. 952.)

In "River City," created by Dede's team at Harvard, players try to figure out the cause of a mysterious epidemic

## Most Gamers Are Males

*Sixty-two percent of video-game players are males between 18 and 49, and fully one-quarter are at least 50.*



### Gamers at a Glance

- The average gamer is 33 years old.
- Women over 17 represent a larger portion of the game-playing population (30 percent) than boys under 18 (23 percent).
- 69 percent of U.S. heads of households play computer/video games.
- The average age of the most frequent game purchaser is 40.
- Adult gamers have been playing for an average of 12 years.
- Among the most frequent gamers, adult males average 10 years of playing, females, eight years.

Source: Entertainment Software Association

in a 19th-century town. Researchers found that middle-schoolers using "River City" improved their biological knowledge and science skills more than peers taught more traditionally.<sup>5</sup>

Another sign of university interest: Colleges now offer courses in "Second Life." Starting this fall, teens entering There.com will be able to take classes in areas like copyright law taught by university professors.

But some advocates worry that all this high-level learning will be limited to middle-class kids, who have access to fancier, faster hardware and to educated parents who can guide their choice of games — creating a new equity gap on top of the existing reading gap between income groups.

While 83 percent of young people ages 8-18 have a video console at home, they may not be using them the same way.<sup>6</sup> A recent study of Philadelphia libraries with computers found that middle-class 12-13-year-olds typically used computers to increase their knowledge, by looking up — for example — Christopher Columbus on the encyclopedia site Encarta. But those from low-income neighborhoods were more likely to play "Magic School Bus," a game for 9-year-olds.<sup>7</sup>

The difference can be traced to the lack of guidance from a parent or other adult, which is as crucial for good games as for good books, says the University of Wisconsin's Gee. "Giving a kid a book [or game] is okay, but with no adult to

CQ Press/Joe King-Shaw

mentor the child and talk about the material it isn't very helpful," he says.

As video games increasingly become a fact of life in the lives of children and adults, here are some of the questions being debated by parents, academics, the gaming industry and players themselves:

### ***Does playing video games improve literacy?***

For the past year, nearly two-dozen 8-to-13-year-olds from low-income neighborhoods in Madison, Wis., have gathered after school to play the best-selling game "Civilization," under the watchful eyes of University of Wisconsin researchers. Players rule a society from 4,000 B.C. to the present, building cities, trading, gathering natural resources and waging war. A single game requires about 20 hours to play; achieving high-level mastery requires 100 hours or more.

The children encounter words like "monarchy" and "monotheism" for the first time — but more important, they have to figure out how those and other factors, like natural resources, help a civilization survive or fail, says Kurt Squire, an assistant professor of educational communications and technology, who is directing the study.

"We found when they're expert gamers, they can tell you the differences between civilizations, what technologies they would need, what resources they'd need," he says. To Squire, the game's lifelike simulation is a powerful twist on the progressive-education adage, learning by doing.



*High-school students in Laramie, Wyo., play "Restaurant Empire," a video game that teaches them about the restaurant industry, in March 2006. Researchers are increasingly urging educators to incorporate games' best learning features into school programs.*

AP Photo/Laramie Daily Boomerang, Rob Densmore

Students remember only 10 percent of what they read and 20 percent of what they hear but almost 90 percent if they do the job themselves, even if only as a simulation, according to research cited by the Federation of American Scientists.<sup>8</sup> The University of Wisconsin's Gee even claims that the mind works like a video game in that "effective thinking is more like running a simulation" than forming abstract generalizations.<sup>9</sup>

An academic camp led by Gee argues video games foster a more sophisticated kind of literacy than the simple decoding of words. Video games foster creative thinking — producing "gaming literacies" in the words of Katie Salen, a designer at Parsons The

New School for Design in New York City. Gamers not only follow the rules "but push against them, testing the limits of the system in often unique and powerful ways," she says.<sup>10</sup>

Digital literacy also means learning to take information from multiple sources, including Web sites and other players, rather than from one authoritative source like a teacher or textbook.

But Harvard's Dede says that while games may be powerful learning tools, their content leaves much to be desired, and so far no research backs up the claim that games teach kids to think like scientists. To produce those results, he argues the engaging qualities of games must be married to scientific content.

Dede developed "River City" to teach basic science skills, such as forming a hypothesis. After 7,000 middle-school students tested the game-like simulation, they improved

their scientific-inquiry skills and increased their knowledge of biology at twice the rate of peers using traditional hands-on labs.<sup>11</sup>

But hard data like Dede's is scant, and most studies have been done with only small numbers of children. The Federation of American Scientists, while enthusiastic about games' learning potential, noted that while kids "seem to do better," the research suffers from a lack of concrete measures of learning.<sup>12</sup>

"We don't have anywhere near sufficient evidence about whether playing computer games helps literacy," says Justine Cassell, professor of communication studies and computer science at Northwestern University. On the other

hand, she adds, “There’s no evidence that computers hurt literacy.”

A computer game Cassell has developed for toddlers with a clown-like character can — much like an imaginary friend — help them develop sophisticated language earlier because they must explain what’s happening to an absent person. (For example, toddlers get more precise on the phone, saying, “John went to the store” instead of “He went there.”) Teens, she says, have a similar experience when blogging because they learn to write like journalists for an unseen audience.

The more than 4 million players of “Lineage” compete against one another for castles in a virtual kingdom of wizards, elves and knights. These “castle sieges” engage players in complex arguments online about strategy, according to University of Wisconsin researcher Constance Steinkuehler.<sup>13</sup>

Steinkuehler found players’ online posts typically written at a 12th-grade reading level or above and often involve scientific reasoning. “I’ve watched kids who, in an effort to ‘cheat’ the game, gather data, build simple mathematical models and argue about those models,” which, she adds, educators say “is extremely difficult to get high-schoolers to do.”

Parents often despair because their teen is “not sitting on a couch reading a storybook, which is what we think literacy is,” says Gee. But “the kids’ version of literacy is better for a modern-world understanding of technical language,” Gee maintains.

In the best games, players must master a specialized game vocabulary, consulting Web pages for hints on winning that probably use syntax far more complex than their reading in school, Gee argues. “I believe firmly the key to school success is handling technical language,” he says.

To see how complex the language can get, Gee suggests looking at a Web site offering hints on playing “Yu-Gi-Oh” (both a video and card game). A typically impenetrable sentence reads,

## Gamers Are Not Isolated, Obsessed

*Contrary to the stereotype, gamers are not socially isolated people glued to their PlayStations, Xboxes or computers. Players say they spend more than three times as much time each week (23.4 hours) exercising, playing sports, volunteering, attending cultural activities or reading than they spend playing games (6.8 hours).*

### Percent of gamers who say they:

Exercise or play sports at least 20 hours a month	79%
Volunteer at least 5.4 hours per month	45%
Regularly read books or daily newspapers	93%
Attend concerts, museums, theater	62%
Play games with others in person at least 1 hr/wk	51%
Play games with others online at least 1 hr/wk	25%

Source: Peter D. Hart Research Associates, 2004

“The effect of 8-Claws Scorpion is a Trigger Effect that is applied if the condition is correct on activation.” Seven-year-olds are reading sentences like this, even though its complexity won’t be matched in the classroom until middle or high school, Gee says.

But can games produce the kind of literacy we most value? The technical material highlighted by enthusiasts is closer to technical manuals than novels and “more likely to appeal to techies than to dreamers, humanists and conversationalists” and to boys rather than girls, worries Harvard Professor of Cognition and Learning Howard Gardner. Immersing oneself in long novels like *Madame Bovary*, in poetry or in a philosophical text involves a skill many game enthusiasts disparage — linear thinking over many pages. That’s “an entirely different mental faculty than is exploited when one surfs the Web from one link to another,” Gardner argues.

Moreover, even a good video game can’t compete with a great teacher, asserts former teacher Joan Almon, coordinator of the Alliance for Childhood in College Park, Md. “It bothers me that people are using these as the great way of learning. They’re a modest alternative to very bad teaching,” she says.

In its recent report, however, the Federation of American Scientists urges teachers to change from their “tell and test” method — which encourages passive learning — to incorporating the highly interactive, challenge-reward environment of video games. Game developers have incorporated the best learning features recognized by cognitive science, the report says, including:

- tons of practice;
- continual monitoring and feedback on the player’s progress;
- encouragement to seek out information on the game strategy from other gamers, friends and Web sites; and,
- bridging the gap from what’s learned to real situations.<sup>14</sup>

Some enthusiasts point out that the Internet is already allowing teenagers to become online creators on a huge scale via blogs, music and mini-films known as *machinima* — often inspired by games. Players have posted several-hundred-thousand stories ranging from 10-page plots to small novels as part of the best-selling computer game of all time, “The Sims,” where players create their own family and play virtual house.

Some of that interaction could even raise the level of public discourse. In

## 'Sims' Inventor Exploring New Frontiers in Creativity

The creator of the most popular PC game of all time is lanky, bespectacled and surprisingly bookish. Will Wright is already famous for creating "The Sims," akin to playing house, which has sold close to 60 million copies.<sup>1</sup> He's also famous for designing one of the most creative games, "SimCity," an urban-planning game so sophisticated it was later used to train city planners.

But the game world is most excited about the new game — "Spore" — that Wright is developing to be released next year by Entertainment Arts. It started out as a game about extraterrestrial life. But in preparation, Wright says, he read 100 books, including many about biology, which led him to a fascination with evolution, the current game's theme.

In "Spore," players create characters who progress from a one-celled organism to an entire race of creatures using principles of evolution. Will your creature be an herbivore or a carnivore? Will you give it two limbs or 5? And will it survive with the claws you've picked out? (If not, go back and pick something different.) Once you've created a creature, you'll move on to creating tribes, communities and planets. Wright estimates it would take 70 years to visit every planet in "Spore."

But the most revolutionary part of "Spore," may be players' ability to access other gamers' creations for their own play.

Once players' creations are uploaded onto Spore's server, they can even request their friends' creations.

As a child, Wright was drawn to taking things apart, which got him interested in robots and ultimately computers, he said in an interview at his studio in Emeryville, Calif. Yet Wright, 46, considers himself part of the generation that grew up reading manuals. By contrast, today's kids press buttons in a game to see what happens — a practice he says leads to more creativity. It also gives kids an early experience with testing models in a simulated environment, an important skill as science and other fields increasingly revolve around simulation, he believes.

Wright challenges the basic notion that it's more educational to read a book than to play a game. "You can step back and see that our natural mode of interacting with the world is not to sit back passively, observe it as a movie or book would present it, but to interact with it and actually have effects on the system and study the effects," he says. Play was probably the first educational activity, he suggests, which permitted us to parse out patterns in the world around us.

"I think you can do that to a limited degree with storytelling but not nearly as deeply as with an interactive experience," Wright says. "Yeah, *Harry Potter* is a great universe and all that, but you can't take the stuff you know about Harry Potter's universe and apply it anywhere else."

a study of an international Internet community of 3,000 teens, Northwestern's Cassell found, "the boys came to talk like the girls in a way that would make many of us happy," such as incorporating language that synthesized the ideas of others, and younger teens adopted the language of older teens.

Thanks to the Internet, teens are "no longer just media consumers" but are producing content, which is good for literacy, says Cassell. "We know that media creation — in whatever medium — is good for children's imagination and good for their ability to create a text for someone else."

### ***Are video games addictive?***

Jeffrey Stark, a high-school student from Ontario, Canada, claimed his compulsive playing of the sword-and-sorcery game "EverQuest" ruined his life. He went for a week without bathing or eating a proper meal and stopped going to school for a semester.<sup>15</sup>

Similarly, a 30-year-old registered nurse who plays "EverQuest" with her husband said, "We spend hours — hours! — every single day playing this damn game. My fingers wake me, aching, in the middle of the night. I have headaches from the countless hours I spend staring at the screen. I hate this game, but I can't stop playing. Quitting smoking was never this hard."<sup>16</sup>

About 40 percent of players of multiplayer online games like "EverQuest" say they consider themselves "addicted."<sup>17</sup> Some players call the game "Evercrack." "EverQuest" is an early version of a so-called massively multiplayer online role-playing game (MMORPG), where players create a character who enters a fantasy world and interacts with other players. Online sites like EverQuest Widows, the Yahoo group WOW Widows for spouses of the more than 6 million players of the online "World of Warcraft," and gamewidow.com attest to the de-

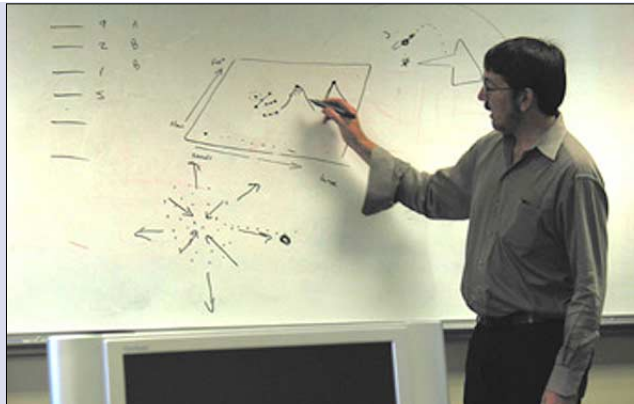
spair of gaming spouses and significant others.<sup>18</sup>

In South Korea, the epicenter of online gaming, game addiction reportedly claimed 10 lives in 2005, mainly by cutting off circulation when sitting for hours at the screen. In April, the South Korean government launched a game-addiction hotline, and hundreds of hospitals and private clinics treat the addiction, said to afflict an estimated 2.4 percent of Koreans ages 9-39.<sup>19</sup>

Europe's first clinic for video-game addicts opened in the Netherlands in 2005, and several psychologists treat Internet addicts in the United States. Since starting the Computer Addiction Services program at McLean Hospital — a noted psychiatric facility in Belmont, Mass. — in 1995, Harvard psychologist Maressa Hecht Orzack has treated many gamers who she said were neglecting their jobs, schoolwork and families. "They have withdrawal symptoms. They can't wait to get back on [the

Players are starting to use his games increasingly for self-expression, not just entertainment, Wright observes, which could help explain their enduring popularity. A feature added to "The Sims" that allows players to write stories in the game and save them on a Web page resulted in several-hundred-thousand short stories, novels and biographical accounts that players "were pouring their heart and soul into," says Wright. Fans "form a very tight community around these games," he observes, as they browse one another's stories, download content and create new elements. A moviemaking feature in "Sims2" led to tens of thousands of movies being created by players.

"Spore" will give players unprecedented room for creation. In "The Sims," players can manipulate the face, but it's still a two-legged creature, Wright points out. "This is designing content in a different way that allows the player to have all the freedom," he says. But when this visitor played a preview of the game, it was apparent even the most imaginative designers set limits, sug-



Will Wright, creator of "The Sims," loved to take things apart as a child.

www.will-wright.com

gesting that creativity inside a game isn't the same as creativity outside — a major concern of some educators.

First there's the aesthetic style — cute creatures familiar to young watchers of Pixar movies and reminiscent to older viewers of Flintstone dinosaurs. What if one wanted to create something more frightening?

"Within 'Spore' we offer a series of editors that serve as cre-

ative toolkits for making everything from creatures and vehicles to plants and buildings," says Executive Producer Lucy Bradshaw. "What these look like is up to the player. So, I might do something cute and cuddly and sort of Teddy Bear-ish, or I might make a really frightening creature with spindly spider legs and an angry-looking beak that looks like it came out of a horror film. It's all about my personal aesthetic. We want Moms to enjoy this just as much as their 15-year-old sons!"

<sup>1</sup> "How to Create a Game About Creating a Universe," *Computer Gaming World*, June 2006, p. 70.

game] again," she said, adding that the games "are made to be addictive."<sup>20</sup>

But some prominent addiction experts say even those who play games excessively rarely meet all the characteristics of addiction — such as developing physical withdrawal symptoms like sweating (true for gambling), needing to play more and more to get the same kick and being preoccupied to the point it is destructive to one's livelihood and family. Even though some psychologists talk about "Internet addiction disorder," the American Psychiatric Association has not recognized it in its official handbook, the *Diagnostic and Statistical Manual of Mental Disorders*.

Psychologist and gambling studies professor Griffiths, at Nottingham Trent University, found in a study that one-in-20 British children reported playing more than 30 hours a week. But Griffiths says very few of those children — or the population generally — meet all of the criteria for addic-

tion. "It's quite clear when a parent rings me and says, 'My little Johnny is addicted,' it's hard to fulfill more than one or two of the criteria," he says. "Their real concern is the vast amount of time they're playing. The real question is: To what extent is it having a negative effect on their life?"

For a 38-year-old man with three children and a good job, playing 14 hours daily will negatively affect his livelihood and family. But for an unemployed 23-year-old with no partner or children, the same amount of time "has nothing but positive effects" if it brings him into a social network and raises self esteem, says Griffiths.

Even if they're not technically addicted, users of multiplayer online role-playing games who play on average 20 hours a week tend to describe their game play as "obligation, tedium and more like a second job than entertainment," according to Stanford University researcher Nick Yee.<sup>21</sup>

For example, if a player wants to engage in pharmaceutical manufacturing, one of many possible career choices in "Star War Galaxies," it takes about three to six weeks of normal game play to acquire the abilities to be competitive. Most such games — which get harder as the player becomes more skilled — use designs based on behavioral conditioning, according to Yee, which conditions players to work harder and faster as they improve, creating a kind of digital treadmill of which players are often unaware.<sup>22</sup>

The work required to advance a character's abilities is so time-consuming that companies like TopGameSeller, based in Shanghai, China, offer services to bring one's character up to a more advanced level. Bringing a character in "World of Warcraft" to a higher level can cost up to \$1,488. "We assign two or three expert players to your character to do the leveling," the company promises on its Web site ([www.topseller.com](http://www.topseller.com)), which

largely involves “simply killing monsters over and over.”

Even Griffiths notes that magazines often rate games on their “addictiveness” as a positive attribute. “It’s quite clear that the reward systems in video gaming are similar to gambling,” he says. “I don’t pick up a video game unless I know I have six hours to burn. If I start now, I’ll still be playing at 10 p.m. As soon as you’ve beaten the high score, you want to beat it again.”

Many parents worry that video games are displacing other activities like socializing, creative play and reading. But recent surveys show that teen reading has not declined, even as video-gaming hours have risen. And researchers like Yee find that online gaming takes on a social cast, as players communicate over typed chat.

In any case, game enthusiasts and critics alike say parents must set limits, as with any activity.

### ***Do video games prepare young people for the future job market?***

“You play ‘World of Warcraft’? You’re hired!” Someday those words may be spoken by employers — if they’re not already — two technology experts wrote in *Wired*, praising multiplayer games for teaching important workplace skills.<sup>23</sup>

In “Warcraft,” players band together in guilds to share knowledge and manpower in a “quest,” such as slaying monsters. To run a large guild, a master must be able to recruit new members, create apprenticeship programs, orchestrate group strategy and settle disputes. One young engineer at Yahoo used to worry about whether he could do his job. “Now I think of it like a quest,” he said. “By being willing to improvise, I can usually find the people and resources I need to accomplish the task.”<sup>24</sup>

Indeed, becoming a guild master “amounts to a total-immersion course in leadership,” argue John Seely Brown, former director of Xerox’s Palo Alto Research Center, and Douglas

Thomas, an associate professor of communication at the University of Southern California’s Annenberg School for Communications.<sup>25</sup>

Business experts Beck and Wade came to similar conclusions after surveying 2,100 young professionals, mainly in business. In their book *Got Game*, they claim those with extensive gaming experience were better team members, put a high value on competence and had more potential to be superior executives. Perhaps most important, they argue, gamers understand that repeated failure is the road to success. They found that 81 percent of those under age 34 had been frequent or moderate gamers.<sup>26</sup>

In their most provocative assertion, Beck and Wade claim the dot-com phenomenon was “structured exactly like a video game” in that it called for entrepreneurial skills and a fearlessness toward failure in a generation that grew up gaming. Among the rules learned from gaming were:

- If you get there first, you win;
- Trial and error is the best and fastest way to learn;
- After failure, hit the reset button; don’t shrink away.<sup>27</sup>

As Stanford researcher Yee has discovered, many players view playing multiplayer online games as work. Players in “Star War Galaxies” who pick pharmaceutical manufacturing as a career must decide how to price and brand their products, how much to spend on advertising and whether to start a price war with competitors or form a cartel with them. Once players acquire the skills to be competitive in the market, their business operations require a daily time commitment.<sup>28</sup>

Yet today’s schools, obsessed with reading and writing, are preparing children for jobs that soon will be outsourced overseas, claims David Williamson Shaffer, associate professor of learning science at the University of Wisconsin-Madison. “The only good jobs left will be for people who can do innovative and creative work,” he writes, arguing that video

games that teach professional-level language can accomplish that task better than traditional schooling.<sup>29</sup>

A Federation of American Scientists report recently endorsed that view, urging government, industry and educators to take advantage of video-game features to “help students and workers attain globally competitive skills.”<sup>30</sup> It said video games could increase the speed at which expertise is acquired, improve players’ ability to apply learning and improve decision-making — all important for the coming “conceptual economy.”

Already gamers are running political campaigns, negotiating treaties and building environmentally sensitive communities, the report notes.<sup>31</sup> Ashley Richardson was a middle-schooler when she ran for president of Alphaville, the largest city in the popular multiplayer game, “The Sims Online.” She debated her opponent on National Public Radio in her campaign to control a government with more than 100 volunteer workers, which made policies affecting thousands of people.<sup>32</sup>

By contrast, students who pass typical school tests often can’t apply their knowledge to real-life problems, according to research cited by Shaffer. Students who can write Newton’s laws of motion down on a piece of paper still can’t use them to answer a simple problem like, “If you flip a coin into the air, how many forces are acting on it at the top of its trajectory?”<sup>33</sup>

Shaffer has designed games that teach middle- and high-school students to think like professionals in solving real-life problems. Students who play urban-planning or science games developed by Shaffer soon develop more sophisticated, professional-level language in those areas, he reports. For example in one game, students help the Chicago Transportation Authority choose what type of seats to put on new buses. “Before playing the game, a player was likely to say, ‘I’d choose this seat because it looks comfortable,’” says Shaffer. “Afterwards, the same player says, ‘I’d

*Continued on p. 948*

# Chronology

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## **1950s-1960s**

***Pinball becomes popular among young adults. Early video games are included on computers used by computer students.***

**1958**

Government physicist William A. Higinbotham invents first computer game — electronic Ping Pong.

**1961**

MIT student Steve Russell creates the rocket-ship game “Spacewar!” Loaded into computers used in tech courses, it exposes computer-science students to the first video game.

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## **1970s** *First commercial video games are marketed to families and young singles in arcades.*

**1972**

Magnavox introduces Odyssey, first home video-game console.

**1976**

Computer game “Adventure” first allows players to control characters’ behavior.

**1977**

Atari introduces first video home console with plug-in cartridges.

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## **1980s** *Video-game popularity spikes with Atari in early 1980s; Atari goes bust and industry collapses; Nintendo revives industry at end of decade.*

**1980**

“Pac-Man” is introduced.

**1982**

Atari sells almost 8 million units. . . . Surgeon general says games create taste for violence.

**1984**

Warner sells Atari as sales wane.

**1985**

Popular games “Tetris,” “Where in the World is Carmen Sandiego?” and “Super Mario Bros” are introduced.

**1989**

Nintendo introduces Game Boy; “SimCity,” popular urban-planning computer game, is released.

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## **1990s** *“First-person shooter” games introduce realistic violence; as sales spike, juvenile violence declines. Multiplayer online games, complex PC games are introduced.*

**1991**

“Civilization,” a history game that takes hours to play, is introduced.

**1992**

“Wolfenstein 3D” is introduced — the first first-person shooter game.

**1993**

Introduction of “Doom,” with more blood and gore.

**1994**

Sony PlayStation is introduced.

**1997**

“Grand Theft Auto,” a gang-member survival game, is introduced.

**1999**

“EverQuest,” early online multiplayer game, is introduced.

## **2000s** *Concern about excessive game violence and potential for game addiction leads to calls for curbs; number of female gamers rises.*

**2000**

“The Sims,” a game about relationships popular with girls, is introduced; becomes best-selling computer game of all time.

**2002**

Microsoft launches Xbox Live, the first online multiplayer console network. . . . U.S. Army launches “America’s Army” to recruit and train soldiers.

**Nov. 9, 2004**

“Halo2,” sci-fi game, creates biggest-grossing media day in history.

**2004**

The parents of British teenager Steven Pakeerah, murdered by a friend in England, blame his killer’s obsession with violent games.

**2005**

Chinese government penalizes gamers who play for more than three hours. . . . American Psychological Association calls on companies to reduce violence in video games for children and teens. . . . Sen. Hillary Rodham Clinton, D-N.Y., introduces bill to ban rentals, sales of Mature or Adult Only games to minors.

**October, 2006**

MacArthur Foundation announces grant of \$50 million over five years to research how people learn from video games, other digital media. . . . Federation of American Scientists recommends federal research on educational potential of video games.

## Do Video Games Make Kids More Violent?

After 14-year-old Stefan Pakeerah was savagely murdered in England by a friend, his parents claimed the murderer had been obsessed by the violent computer game “Manhunt,” which awards points for savage killings. Warren Leblanc, 17, who pleaded guilty in 2005 to the murder, had beaten Stefan with a hammer and stabbed him repeatedly after luring him to a local park, the press reported.

Stefan’s parents blamed the game and asked retailers to stop selling it. “It’s a video instruction on how to murder somebody; it just shows how you kill people and what weapons you use,” Patrick Pakeerah said last year, after several major British retailers agreed to stop selling the game.<sup>1</sup>

There is substantial debate among psychologists over whether violent behavior can be blamed on video games, since game players are often exposed to violence from other sources, such as TV or their own lives. Although few long-term studies have been done to see if the effects are long-lasting, many U.S. psychologists are alarmed. Last year, the American Psychological Association adopted a resolution recommending that all violence be reduced in video games marketed to children and youth. The policy decision came after an expert committee reviewed research indicating that exposure to video-game violence increases youths’ aggressive thoughts and behavior and angry feelings.<sup>2</sup>

In violent scenes, the committee noted, perpetrators go unpunished 73 percent of the time — teaching children that violence is an effective way to resolve conflict. Some studies also suggest that the active participation peculiar to video games may influence learning more than the kind of passive observation involved in watching TV, the panel pointed out.

“Playing video games involves practice, repetition and being rewarded for numerous acts of violence, which may intensify the learning,” said Elizabeth Carll, a New York psychologist who co-chaired the committee. “This may also result in more realistic experiences, which may potentially increase aggressive behavior.”<sup>3</sup>

Mark Griffiths, a psychologist at Nottingham Trent University in Nottingham, England, agrees. “I’ve concluded the younger the person, the more likely there is to be an effect,” he says. “If children watch or play video games, right afterwards they will mimic what they see on the screen.”

But Griffiths is more skeptical about the lasting effects of video-game violence, especially in older teens and adults. “Video games may have a contributory effect, but overall the evidence is quite slim,” he says. “I think there’s a predisposition of people who play violent video games to violence anyway. Youthful offenders play more violent video games [than average]. My guess is these people already have problems to start with and seek out that kind of game — not that they become more violent as a result of playing those games.”

Another leading researcher at the other end of the spectrum, Iowa State University psychologist Craig Anderson, finds some effects persist in young children. In a recent study of third-, fourth- and fifth-graders, he found that those who played more video games than their peers early in the school year became more verbally and physically aggressive over the course of the year. He describes exposure to violent video games as a “risk factor” — one of many — that could contribute to this behavior.<sup>4</sup>

Seven states limit or ban the sale of violent video games to minors. But most such laws have been overturned after legal challenges by the game industry, usually as unconstitutional in-

*Continued from p. 946*

choose this one because you get more seats on the bus, it’s less expensive and has a higher safety rating.’ These were exactly the criteria the bus company was looking at.”

Indeed, simulation games have long proven to be effective in training people for a variety of skills, including performing surgery. More than 6 million people have registered to play “America’s Army,” a game released by the military in 2002 to teach military skills; 3 million completed the basic combat-training course and 3 million completed the three-lecture medic course.<sup>34</sup> And some soldiers in Iraq say playing video games gave them the skills they needed for real battles.<sup>35</sup>

Simulations might be a powerful technique, but they are not the same as real life, observes Harvard’s Gardner. “I am happy to have medical students or airplane pilots in training learn as much as they can from simulations — but I also want them to have some real, high-stakes experience,” he says. And these are two areas where simulation makes sense, he notes. “I don’t think it makes sense for many professions, ranging from poet to priest.”

The biggest success stories involve skills associated with science, technology or engineering. “I want my children — indeed all young people — to learn how to think like a historian, a philosopher, an economist, a literary critic,” says Gardner. “I want to stimu-

late their imaginations to create their own worlds, not just that conjured up by the makers of ‘World of Warcraft.’”

Some critics worry that the game-playing 20-something generation never gained some of the socialization skills and creativity needed in the workplace. The Alliance for Childhood’s Almon doubts that chatting online in a multiplayer game can substitute for face-to-face interaction.

“We’ve been told by one software company that they have to spend so much time teaching the young 20s how to work with others because they’ve grown up in isolation,” she says. The way children traditionally developed those problem-solving skills was by creating their own play situa-

fringements on free speech. None of the laws is currently being implemented, according to the Child-Responsible Media Campaign, which advocates restrictions.<sup>5</sup>

Sen. Hillary Rodham Clinton, D-N.Y., introduced a bill in Congress last year that would make it illegal to rent or sell a video game with Mature or Adult Only ratings to minors. Clinton, who said she was disturbed by the sexually explicit content of "Grand Theft Auto," as well as the violence, cited findings that boys as young as 9 often could buy Mature-rated games.<sup>6</sup> But Clinton's bill also could run into constitutional problems, say even those who advocate restrictions.<sup>7</sup>

"Grand Theft Auto: Vice City," which debuted in 2002, drew criticism for its violence. Players can steal vehicles, engage in drive-by shootings and robberies and buy weapons ranging from submachine guns to hand grenades. Members of gangs also engage in shoot-outs.

Courts have been skeptical of a link between video games and violence. For example, a district court in Michigan blocked implementation of a state ban on sales of violent video games to minors. The decision reflected concern that Anderson's studies had "not provided any evidence that the relationship between violent games and aggressive behavior exists. It could just as easily be said that the interactive element in video games acts as an outlet for minors to vent their violent or aggressive behavior, thereby dimming the chance they would actually perform such acts in reality," the court declared.<sup>8</sup>

Yet game-industry spokesmen also point out that juvenile-crime statistics dropped sharply as the violence in video games crested and have not spiked since. (The breakthrough in realistic video-game violence can be traced to the 1992 release of

"Wolfenstein 3 D," the first major "first-person shooter" game, where the player saw the game world through the eyes of the character and enemies fell and bled on the floor.)

"Just as violent video games were pouring into American homes on the crest of the personal-computer wave, juvenile violence began to plummet," according to University of Pennsylvania criminologist Lawrence Sherman. "Juvenile murder charges dropped by about two-thirds from 1993 to the end of the decade and show no signs of going back up. If video games are so deadly, why has their widespread use been followed by reductions in murder?"<sup>9</sup>

<sup>1</sup> BBC News, "Manhunt Game Withdrawn by Stores," Feb. 18, 2005; <http://news.bbc.co.uk>. See also "Grand Theft Auto Sparks Another Lawsuit," *GameSpot*, retrieved Aug. 18, 2006.

<sup>2</sup> American Psychological Association press release, "APA Calls for Reduction of Violence in Interactive Media Used by Children and Adolescents," Aug. 17, 2005; [www.apa.org/releases](http://www.apa.org/releases).

<sup>3</sup> Quoted in *Ibid.*

<sup>4</sup> Douglas A. Gentile and Craig A. Anderson, "Violent Video Games: The Effects on Youth, and Public Policy Implications," in N. Dowd, *et al.*, *Handbook of Children, Culture and Violence* (2006), p. 231 (from page proofs.)

<sup>5</sup> Washington, Illinois, Michigan, California, Minnesota, Oklahoma and Louisiana have passed laws restricting the sale of violent games to minors. See [www.medialegislation.org](http://www.medialegislation.org). Also see Gentile and Anderson, *op. cit.*, p. 240. In the past five years, U.S. courts have ruled at least eight times that computer games and video games are protected speech under the First Amendment, according to the Entertainment Software Association; on Oct. 11, 2006, a U.S. district judge in Oklahoma issued a preliminary injunction halting implementation of Oklahoma's law, calling the act's language unconstitutionally vague.

<sup>6</sup> News release, "Sens. Clinton, Lieberman and Bayh Introduce Legislation to Protect Children from Inappropriate Video Games"; <http://clinton.senate.gov>.

<sup>7</sup> The Child-Responsible Media Campaign; [www.medialegislation.org](http://www.medialegislation.org).

<sup>8</sup> Entertainment Software Association, "Essential Facts about Video Games and Court Rulings"; [www.theesa.com](http://www.theesa.com).

<sup>9</sup> Quoted in John C. Beck and Mitchell Wade, *Got Game* (2004), pp. 53-54.

tions with one another, which were "extremely complex, nuanced and filled with social learning, problem-solving and creativity," she says. But children don't do that much independent play anymore, she observes.

Some enthusiasts counter that video games can turn gamers into little scientists who have to figure out the rules on their own. Simulation games like "The Sims" help in mastering sciences that utilize computer-based simulation, including biology and cognitive science, suggests the University of Wisconsin's Gee.<sup>36</sup>

But Harvard's Dede is skeptical. "Do kids learn some things about taking a confusing situation and puzzling about it? Sure. But we wouldn't need schooling if

learning was as simple as just putting people into experience and letting them figure it out," he says. "That's just as true for gaming experiences as for real-world experiences." The key is to adapt the methods developed for entertainment to educational games so they can be "a powerful vehicle for education." ■

## BACKGROUND

### Pinball Precursor

**P**inball was the mechanical precursor of video games, say some

historians, rousing many of the same fears that video games do today. In the 1930s, New York Mayor Fiorello La Guardia smashed pinball machines with a sledgehammer and banned them — a ban that was only lifted in the 1970s.<sup>37</sup>

In 1958, William A. Higinbotham, a physicist at Brookhaven National Laboratory on Long Island, invented a game of electronic Ping-Pong. Although the game was dismantled the next year — its components were needed for other projects — it was remembered by a future editor of *Creative Computing* magazine, David Ahl, who had seen the game during a high school visit. He dubbed Higinbotham the grandfather of video games.<sup>38</sup>

However, Massachusetts Institute of Technology (MIT) student Steve Russell is generally considered the inventor of video games. In 1961, he created a rocket-ship game called "Spacewar!," which could be played on one of MIT's computers. The manufacturer of the computer, Digital Equipment Corp., began shipping its computers pre-loaded with the game, exposing computer-science students across the country to "Spacewar." <sup>39</sup>

In 1972, Magnavox introduced "Odyssey," the first home video-game console, which Magnavox marketed as a family game. Until the early 1980s manufacturers also marketed arcade games to single adults as having sex appeal.

Slow adoption of video games through the 1970s culminated in the 1977 introduction of Atari — the first video-game console to use plug-in cartridges rather than built-in games. Atari became one of the most successful introductions in history, selling about 3 million consoles a year. Atari was considered wildly popular in the early 1980s until its manufacturer collapsed. <sup>40</sup>

Nintendo revived the industry in the late 1980s, and since then a wide variety of consoles and games have been introduced, including Sony's PlayStation and Microsoft's Xbox. A variety of other games have been designed for personal computers. As computer animation permitted film-like dramas with original scripts and music, computer games became increasingly sophisticated, bearing little resemblance to the black and white blips of Higinbotham's original game.

The late 1980s were a crucial turning point in the social history of video



*Software engineer Tammy Yap designs video games at Midway Home Entertainment in San Diego. Some experts blame girls' lower interest in video games on the scarcity of sympathetic female characters and game designers.*

AP Photo/Lenny Ignelzi

games, according to Williams, at the University of Illinois. Games began moving from bars, nightclubs and arcades to homes as prices dropped, houses expanded and Americans had more disposable income. Driven by Nintendo's marketing, games became the province of children for the next 10 years. <sup>41</sup>

Video games also ushered in a new generation of young people "comfortable and techno-literate enough to accept personal computers, electronic bulletin boards, desktop publishing, compact disks and the Web," he writes, and pushed the development of microprocessors, broadband networks and display technologies. <sup>42</sup>

Today half of all Americans 8-18 have a video-game player in their bedrooms. <sup>43</sup> They also have less contact with people they know (within the family) but more contact with unknown people from a variety of backgrounds, particularly with the rise of multiplayer games, Williams points out. That gives a 12-year-old boy access to the knowledge of a 40-year-old lawyer playing the same game (and vice versa) but also rouses fears about whom children are meeting online. <sup>44</sup>

Besides worrying that children might meet potential predators online, adults also were concerned about the violent content of video games. In 1982, Surgeon General C. Everett Koop claimed that video games were hazardous, creating aberrant behavior and increasing a taste for violence. Nearly 25 years later, researchers still have not found definitive proof of long-lasting negative effects from video violence, or of the predicted increase in withdrawal and social isolation, according to Williams. But these worries survive.

Meanwhile, video games long ago became more than child's play. Today, the average age of video gamers is 33, a quarter of gamers are over 50 and only 31 percent are under 18, according to the Entertainment Software Association. <sup>45</sup>

## Equity Gap?

With video-game consoles in 83 percent of the homes of the under-18 crowd, one would expect the benefits of gaming to be pervasive. <sup>46</sup> But surveys suggest that low-income children aren't getting the same access to technology as their middle-class peers — a video-gaming "equity gap" that resembles the so-called digital divide between those with and without Internet access. Although 87 percent of teens use the Internet, those who don't are generally from lower-income households with limited access to high-tech hardware and are disproportionately African-American. <sup>47</sup>

That could mean they lack access to some of the more complex games played on computers and online. Con-

vinced of games' educational potential, Global Kids, a nonprofit that provides education on international issues to urban youth, has obtained a Microsoft grant to teach disadvantaged New York City teens to design and play games.

"Some of these kids don't know how to move a cursor into a Web browser," says Global Kids' Online Leadership Director Barry Joseph. Paradoxically, most attend schools with plenty of computer equipment — courtesy of Clinton-era funding. But many of the students are not connected to the Internet because teachers are often unfamiliar with the technology, Joseph says.

"Middle-class homes have multiple gaming consoles, broadband and adults familiar enough with systems to encourage young people" to play games with learning potential, Joseph says. By contrast, lower-income kids may only have access to a computer at the school library, where daily time is limited to 10 minutes, mandatory filters block the ability to blog and computers have no capacity to store kids' creations, notes MIT's Director of Comparative Media Studies Henry Jenkins.

However, surveys about access may not tell the real story about who's benefiting from technology. "Some folks are using the technology in new ways; others are less digitally savvy and are just playing Gameboy. That may be the real divide in who has positive effects," says Connie Yowell, director of educational grant-making at the MacArthur Foundation, which is helping Global Kids and other groups study how young people are using technology.

## Gender Gap Narrows

Boys between 8 and 18 spend more than twice as much time playing video games as girls, according to a recent Kaiser Family Foundation survey.<sup>48</sup> Some have blamed girls' lower interest on the scarcity of

sympathetic female characters and game designers.

"Games were built by boys for boys," Northwestern's Cassell found in 1997 when she co-edited *From Barbie to Mortal Kombat*, a book of scholarly essays on the gender slant of video games.<sup>49</sup>

But Cassell and other experts say the gender gap has been narrowing. Today, women over 18 represent 30 percent of U.S. gamers — a greater proportion than do boys 17 and under (23 percent).<sup>50</sup> "Boys may be playing more traditional video games," Cassell says, "but girls are playing more 'Sims,' " which is akin to playing house.

And virtual worlds are much more popular among females. Females make up the majority of the 400,000 subscribers to There.com, a virtual world where participants can create a character to interact with others, according to Michael K. Wilson, CEO of Makena Technologies, the company behind the site. Socializing and shopping seem to be two major draws for teenage girls, he says.

"It's very clear to us that teens are very interested in shopping. There.com is the holy grail of shopping sites. You can try on a dress [or your avatar can] and ask friends how you look in it," says Wilson. There.com has also experimented with Nike and Levi Strauss & Co. to turn that click on a product into a real-world purchase.

In Second Life, another virtual world, companies like Reebok and Amazon have set up shops to sell real-world versions of their products as well as virtual ones.<sup>51</sup>

Another magnet drawing women has been the rise in so-called casual games — which may take as little as 10 minutes to play, such as Solitaire, mahjong and some short action games. In the past few years, thousands of such games have sprung up on the Internet and game consoles.

The typical casual game players are women in their 40s, one of the fastest-growing sectors of the industry, according to the International Game De-

velopers Association. From almost nothing in 2002, casual games grew to a \$600 million business by 2004, and by 2008 industry experts expect to see \$2 billion in U.S. sales alone.<sup>52</sup>

Female gamers spend an average of two hours more per week playing video games than a year ago, for an average of 7.4 hours a week, according to the Entertainment Software Association. While male gamers still spent more daily time than females on video games in 2003, the gap had narrowed from 18 minutes to six minutes by 2004.<sup>53</sup>

Males still comprise the majority of those who play online, but the games played most often online — puzzle board and trivia games — are among those most favored by females.<sup>54</sup>

Nevertheless, many young girls don't think they're good at games, Cassell says, because they buy the traditional definition that "real" video games involve action or sports. In the late 1990s, many experts feared the gender gap in game playing would further widen the gender gap in access to technology and science generally. But that may be changing as girls become a major presence in games and virtual worlds that emphasize interaction and creativity over competition.

And some researchers, like Harvard's Dede, find girls are just as interested in a game involving science if it minimizes the things that bore them — like scoring points and violence — and stresses personal interaction instead. For instance, girls trying to discover the cause of a mysterious epidemic in the "River City" simulation game approach the problem differently from boys. "Girls on balance try to establish a relationship with the residents of this virtual town," through the characters they create, and use those relationships to solve the mystery, Dede says.

"Typically, research shows girls aren't interested in science," notes "River City" Project Director Jody Clarke, particularly in middle school, the age the Harvard team is observing.

## Entering the New Virtual World of Education

Students enrolled in “Law in the Court of Public Opinion” at the Harvard Extension School in fall 2006 log onto their computers every Thursday evening and send animated versions of themselves into a virtual classroom. There, a so-called avatar — another animated persona — representing Law Professor Charlie Ness (looking about 20 years younger) teaches the course in real time, using Ness’ real voice. An avatar representing Ness’ daughter Rebecca, a computer expert, occasionally flies down from the ceiling to help teach the course.

Harvard is one of several universities that have begun entering game-like virtual worlds to reach a wider audience. The audience is large and growing at a rate of 10-20 percent a month by some estimates.<sup>1</sup>

Ness teaches his course in the virtual world of Second Life, which boasts more than 1 million inhabitants.<sup>2</sup> Participants enter the Second Life fantasy world to meet people and buy and sell virtual real estate, clothes and other goods. (Linden Labs, the company behind Second Life, makes most of its money leasing virtual land to tenants.) In spring 2006, the 20 courses offered in Second Life included “Theatre and Culture,” from Case Western Reserve University, and Stanford University’s “Critical Studies in New Media.”

Second Life’s virtual library offers monthly book discussions, talks by authors (as avatars, of course) and a reference service. It was created because of college students’ tendency to use online resources instead of brick-and-mortar libraries, according to Lori Bell, director of innovation at the Alliance Library System in East Peoria, Ill., which helped create the virtual library. As for being in virtual worlds, she observes, “The library needs to be there or we’re going to start losing people.”

So far, 2,000-3,000 people a day visit the library, according to Bell. “We get a lot of people coming because it’s a safe place.” Elsewhere in Second Life, she notes, “There’s a lot of sex, gambling and adult places. The library is somewhere you don’t have to buy anything, you don’t have people hitting on you, and people are friendly.”

Much like the real world, people enter a virtual universe for a variety of reasons, and education is not necessarily at the top of the list. Lauren Gelman, associate director of the Stanford Law School’s Center for Internet and Society, says when she first entered the popular virtual world of There.com — with 400,000 subscribers between ages 13 and 26 — “the first thing that happened is I got propositioned.” With islands populated by avatars in bikinis, she says, “It’s a very Club Med kind of environment.”

This fall, Gelman became dean of a virtual university in There.com — the State of Play Academy — which will offer courses by experts in technology-related areas of law such as copyright, patents and trade secrets.<sup>3</sup> Eventually, the academy might even offer a degree-like certificate, Gelman says.

Students who come to these classes are expected to bring a better grasp of technology than the law professor, permitting a two-way transfer of information. “Sometimes I’ll be the teacher and sometimes the student,” says Gelman, who teaches a course on technology and law at Stanford.

The power of virtual worlds to project situations in 3-D means students can “experience” what they’re learning. To train health-care professionals in how to deal with bioterrorism and natural disasters, for example, Idaho State University provides simulations in Second Life of earthquakes and fires, injured victims and how to treat them.<sup>4</sup> Recently, the library invited residents to heckle Tudor King Henry VIII of England and ask his wife Ann Boleyn what it felt like to be beheaded. Two librarians acted out the roles as avatars in full 16th-century dress.

This summer, teens in Second Life participated in a virtual summer camp aimed at building awareness of global issues like sex trafficking, sponsored by Global Kids, a New York-based group that teaches urban youth about leadership and global citizenry.<sup>5</sup> “We take real-world issues and do something about it in a way you could never do in real life,” says Barry Joseph, online leadership director at Global Kids. “In Second Life, you can click on someone’s ‘Save Darfur’ green wrist band and get information about what’s going on right now in Darfur.”

The argument that kids learn better in the video universe has been a major influence on pioneers like Gelman. “If we know there’s educational value in that kids think differently when they navigate these worlds, could we put it to better use to teach them substantive stuff while they’re sitting in front of ‘World of Warcraft’ for 10 hours on a Saturday?” asks Gelman. “It could be at the cusp of something completely revolutionary in education — or it might not work.”

<sup>1</sup> Richard Siklos, “A Virtual World But Real Money,” *The New York Times*, Oct. 19, 2006. According to the Second Life Web site, \$7.4 million changed hands in September.

<sup>2</sup> <http://secondlife.com>. Regular users — those who logged on in the last 30 days — totaled 427,838 in mid-October 2006.

<sup>3</sup> <http://stateofplayacademy.com/>

<sup>4</sup> [http://www.isu.edu/irh/IBAPP/second\\_life.shtml](http://www.isu.edu/irh/IBAPP/second_life.shtml).

<sup>5</sup> [www.globalkids.org](http://www.globalkids.org).

But “we’re finding girls are interested in open-ended exploration and engaging with teams, so they’re doing science differently,” she says. Similarly, multiplayer online games that are drawing female players are designed around

open-ended exploration that allows team-like player networks to develop, she says.

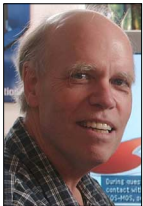
“I ask girls whether they’re good at computers and they say ‘No’ even though they are,” says Northwestern’s

Cassell, noting their growing presence in games and blogging. “The traditional definition of a game excludes the kinds of things girls like. It’s not true that girls don’t like games.” ■

*Continued on p. 954*

# At Issue:

## Do video games significantly enhance literacy?



**JAMES PAUL GEE**  
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**AUTHOR, WHAT VIDEO GAMES HAVE TO  
TEACH US ABOUT LEARNING AND LITERACY**

WRITTEN FOR *CQ RESEARCHER*, NOVEMBER 2006

**P**opular culture today often involves quite complex language, and that matters because the biggest predictor of children's school success is the size of their early vocabularies and their abilities to deal with complex language.

Consider, for example, a typical description of a "Pokemon" ("pocket monsters" found in video games, cards, books, movies and television shows): "Bulbasaur are a combination of Grass-type and Poison-type Pokémon. Because they are Grass-type Pokémon, Bulbasaur have plant-like characteristics." Or consider this from a Web site for "Yu-Gi-Oh" (another card, game, book, movie phenomenon): "The effect of '8-Claws Scorpion' is a Trigger Effect that is applied if the condition is correct on activation." Lots of low-frequency words here; complex syntax, as well. Children as young as 6 and 7 play "Pokemon" and "Yu-Gi-Oh." To play they have to read — and read complex language.

The biggest barrier to school success is the child's ability to deal with complex "academic" language, the sort of language in textbooks. Such language starts to kick in about fourth grade and ever increases thereafter in school. Children who learn to decode, but can't read to learn in the content areas later on, are victims of the well-known "fourth-grade slump." Worse yet, research shows that even children who can pass tests in the content areas often can't apply their knowledge to real problem-solving.

Without lots of practice, humans are poor at learning from words out of their contexts of application. Good video games put young people in worlds composed of problems to be solved. They almost always give verbal information "just in time" — when players need and can use it — and "on demand," when the player asks for it. They show how language applies to the world it is about.

Research suggests that people really know what words mean only when they can hook them to the sorts of actions, images or dialogues to which they apply. That is why a game manual or strategy guide makes much more sense after someone has played a game for awhile than before. So, too, science textbooks, cut off from the images and actions science is about, are like a technical game manual without any game.

But, a warning: Good video games — good commercial ones like "Civilization 4" and good "serious games" made around academic content — will not work by themselves. Mentors are needed to encourage strategic thinking about the game and the complex language connected to them.



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WRITTEN FOR *CQ RESEARCHER*, NOVEMBER 2006

**i**t's difficult to argue with many of Gee's points, and the jury is still out on others. Yet I'd point to several biases in the cited examples. 1) They are oriented toward competition (despite the fact that some also entail cooperation); 2) The literacy highlighted is that used in technical manuals; 3) These games, and the epistemology underlying them, are more likely to appeal to boys rather than to girls, and to "techies" rather than dreamers, humanists and conversationalists; 4) They foreground simulation, a very powerful technique, but it's not the same as real life.

I am happy to have medical students or future airplane pilots train on simulations — but they also require real, high-stake experience. Patients have feelings; simulacra and robots don't. And note that these are two areas where simulation makes sense. In many other professions, from poets to priests, they don't.

Which leads to the most important point. Literacy is far more than expertise in technical manuals or even in understanding science and technology, important as they are. It entails the capacity to immerse oneself and, ultimately, to love long, imaginative pieces of fiction, such as *Madame Bovary* or *One Hundred Years of Solitude*; poring over difficult philosophical texts and returning time and again to key passages (Kant, Wittgenstein); and spending time and exercising emotional imagination with challenging poets (Gerard Manley Hopkins, Jorie Graham).

Literacy involves linear thinking over many pages — an entirely different mental faculty than is exploited when one surfs the Web from one link to another, often randomly encountered one. I want all young persons to learn how to think like a historian, a philosopher, an economist, a literary critic (four very different "frames of mind"). I want to stimulate their imaginations to create their own worlds, not just that conjured up by the makers of "World of Warcraft."

In sum, the treasures and skills entailed in the video games of today are impressive, but they still represent only a very partial sampling of the kinds of minds that young people have and the kinds that can and should be cultivated. Some can be cultivated in front of a screen. But too much time there is not healthy on any criterion — and any slice of life — no matter how engrossing — is only partial at best. So two cheers for Jim Gee — but two cheers as well for Mark Hopkins\* on one end of a log, and an eager questioner and listener on the other.

\* A 19th-century president of Williams College.

Continued from p. 952

## CURRENT SITUATION

### Big Business

Today, about half of all Americans play computer and video games, according to the Entertainment Software Association (ESA), and Americans spend more money on video games each year than they do going to the movies.<sup>55</sup> Americans also spend more time playing video games than watching rented videos.<sup>56</sup>

In the past 10 years, U.S. video-game sales have almost tripled to \$7 billion last year — after peaking at \$7.4 billion in 2004 — representing nearly 230 million computer and video games.<sup>57</sup>

In fact, the largest-grossing one-day media sale ever occurred on Nov. 9, 2004, when stores sold \$125 million worth of “Halo 2” games — the eagerly awaited sequel to the hit Xbox game “Halo”, in which individual players defend Earth against alien invaders.<sup>58</sup>

Today, the personal computer is the most popular game machine, contrary to earlier industry predictions that game consoles would dominate. Until recently, Microsoft hadn’t marketed games as a core part of its computer. But now it plans to make games easier to install and will emphasize that in its marketing.

Hundreds of millions of people around the world use computers that run the Windows operating system, and about half of them play games, according to Microsoft surveys. The driving force, most analysts say, are subscription-based online multiplayer games played on computers. Games like “World of Warcraft” are expected to take in more than \$2 billion worldwide.<sup>59</sup>

Teens have been a big contributor to this growth, with 81 percent of teens — 17 million people — using the Internet to play games online, according to the Pew Internet & American Life Project. That’s a 52 percent jump since 2000.<sup>60</sup>



*A young man receives an electroencephalogram at a clinic for video-game “addicts” in Beijing in July 2005. Such clinics have opened in several countries, but many psychologists question whether game playing can lead to true addiction.*

Getty Images/Cancan Chu

“As with all things on the Internet, it’s possible to meet all sorts of people,” says Lenhart. “I’ve heard from a law-enforcement officer about a person who was preyed upon by somebody they met in a game. But the vast majority of people I’ve talked to have not mentioned any trouble with that sort of thing.”

Virtual worlds help teens with two crucial developmental issues — developing an identity and interacting with peers, says Northwestern’s Cassell. “That’s why they’re so popular. They’re all about trying on different identities and manifestations,” she says.

Although multiplayer games and virtual worlds are clearly places for social networking, they have not become the target of legislation, as have other networking spaces like Myspace.com.<sup>62</sup> Rep. Fred Upton, R-Mich., and others in Congress have proposed restricting children’s access to social-networking Web sites. Due to such efforts, as well as entertainment-industry threats to tighten copyright restrictions on kids’ variations of games or movies, MIT’s Jenkins fears that authorities will “shut down [digital media] before we understand them.”<sup>63</sup>

Meanwhile, age, ethnic and social stratifications are breaking down as youngsters play online with older people from cultures around the world. “This is social broadening, which can be scary” to society, says the University of Illinois’ Williams. While mixing is positive for diversity, the bonds are different than with a face-to-face friend. “An online friend can console you but can’t drive you to the hospital,” he points out.

### Social Networking

With 81 percent of all teens playing online video games — up from 66 percent in 2000 — online games have become a widespread form of social networking, according to Amanda Lenhart, senior research specialist at the Pew Internet & American Life Project.<sup>61</sup>

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## Libraries Log On

One Friday night each month, nearly 100 Michigan teenagers gather at the Ann Arbor District Library to compete in the Nintendo racing game "Mario Kart." "It's just like story-time, only noisier and smellier," says the library's technology manager, Eli Neiburger.

Libraries increasingly are offering such gaming events, and younger librarians are trying to persuade colleagues that video games are a legitimate part of libraries' mission. A new Young Adult Library Services Association task force is examining whether to recommend video games for teens alongside its annual list of recommended books.

When kids ask, "What can I read?" librarians should give the answer a gaming spin, advises task force member Beth Gallaway, a trainer/consultant for youth services at the Metrowest Massachusetts Regional Library System in Waltham. "No matter what kind of game kids are playing, they come in genres just like the books we're so familiar with — science fiction, fantasy — and you can pull out these elements from the game," she says.

"There seems to be a lot of interest right now," says Christopher Couzes, director of institutional marketing at Baker and Taylor in Charlotte, N.C., which sells books and other media to libraries. But so far, only about 200 libraries have purchased video games from his firm.

According to the University of Wisconsin's Squire, nearly every student he's met who has played a content-rich game like "Civilization" has checked out a library book on a related topic. But those mind-teaser games are not the games libraries are purchasing. "Libraries want to bring in titles that are popular and that circulate," says Couzes, such as sports games and the popular "Mario Brothers."

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## Saying Less?

Although no one knows for sure whether the rising use of video gaming is affecting national literacy and problem-solving abilities, the percentage of U.S. college graduates with proficient English literacy has declined — from 40 percent in 1992 to 31 percent in 2003.<sup>64</sup>

Citing that decline, longtime technology critic Jeremy Rifkin, founder of the Foundation on Economic Trends, blames the increasing use of video games and other electronic media like TV and text messaging. "The human vocabulary is plummeting all over the world, making it more difficult to express ourselves," he says. "It appears that we are all communicating more, but saying less."<sup>65</sup>

However, science writer Johnson observes IQ scores in most developed countries have increased over the past century. He also notes the rate of increase has accelerated in the past 30 years and attributes the rise to the increasing cognitive labor in our mental diet. Compared to the simple children's games of a century ago, today's 10-year-old must master "probing and telescoping through immense virtual worlds," switching from instant-messaging to e-mail and troubleshooting new technologies, Johnson writes. The fact that the U.S. lags behind other countries in educational assessments just shows that students are getting their IQ advantage outside of school, he argues.<sup>66</sup>

A Federation of American Scientists report recently called on the federal government to research the education and work-force-training potential of video games. The report followed a yearlong evaluation and conference sponsored by the National Science Foundation, which is funding projects to develop educational science games, including multiplayer online games.<sup>67</sup>

While video games could improve learning and motivation, the scientists' report said most commercial games probably will not accomplish those goals, and more educational games should be developed. More research is needed to understand exactly which features of games are important for learning, it said.

High costs and an uncertain market make production of purely educational games too risky for private industry to develop, the federation report said. While some classrooms already use games like "Civilization" for history, "SimCity" for urban planning and "Roller Coaster Tycoon" for physics, schools are unwilling to abandon textbooks and traditional teaching for games whose effectiveness is unknown. The scientists urged educators to develop educational materials around content-rich games like "Civilization" and develop tests to find out what students learn in games. ■

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## OUTLOOK

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### Testing the Hypothesis

As video games become more sophisticated and broaden their audience, some cultural observers say it's time to look beyond fears of lurking pedophiles and rotting brains and conduct research to find out what's genuinely good and bad about games.

In October the MacArthur Foundation announced it was committing \$50 million to understanding how video games and other digital media affect learning by young people.<sup>68</sup> The foundation is giving grants to game enthusiasts like Wisconsin's Gee and Global Kids' Joseph, as well as to skeptics like Harvard's Gardner.

Unlike school, games are producing "kid-driven learning," says Yowell, noting the foundation will fund innovations

based on “what we learn from the kids.” MacArthur’s hypothesis is that digital media *do* affect how children learn. “That has huge implications for parents, teachers and policymakers, and we need to understand that,” Yowell says.

Edward Castronova, an associate professor of telecommunications at Indiana University, will use his \$240,000 grant to build an online game around Shakespeare’s plays, then study how kids’ alter-egos dressed in 17th-century costumes learn the bard’s words and change their social behavior while living in a very different society.<sup>69</sup>

Some of the enthusiasts’ biggest claims will be tested with MacArthur-funded research. Do kids experience failure differently in games? Are they problem-solving differently? What’s the effect of giving kids immediate feedback in a game? How do you test what they’ve learned in a game?

MacArthur grantees will also be asking some of the critics’ questions, such as: What’s being lost with all the time spent playing? Are players socially isolated? Are they daydreaming less? “We’re agnostic,” says Yowell.

At least one grant, to Gardner, will examine how kids make ethical decisions about what they share publicly about themselves and their creations. In virtual worlds and multiplayer games, “If I get to pretend to be someone else, what does that mean about how I make ethical decisions?” Yowell asks.

Increasingly, much of our national political debate comes down to disagreements over whether a model is

accurate: Will the Earth really suffer from global warming? Did the Iraq war reduce terrorism or stimulate more of it? Since games are all about testing models, they could provide a test-bed for citizenship. Increasingly, they’re also about collecting information from many sources — not just rote memorization from a central source.

The big question, enthusiasts say, is whether educators will adapt those techniques to make school as engaging and complex as the best video games. But can games move beyond blood and monsters to become socially positive? Global Kids thinks so and has developed a game about poverty set in Haiti. In a family’s struggle to survive, the player has to choose between sending the children to school (and going into debt) or sending them out to work and reaping short-term additional income.<sup>70</sup>

Yet will these kinds of games fly with children who’ve grown up on the thrills of “Grand Theft Auto”? It’s hard to predict, especially as games become ever more realistic and enthralling in this fast-changing industry.

One of the more futuristic visions foresees virtual characters who can respond emotionally to players. “Laura,” a computerized exercise trainer developed at MIT, provides empathetic verbal and facial feedback. To technology critic Rifkin, it’s hard to know whether to see such attempts as “sadly pathological . . . or whether to be truly frightened.”<sup>71</sup>

Ultimately, says MIT’s Jenkins, video games are not simply an add-on to

mainstream education but a “basic paradigm shift” in how kids learn — one that’s here to stay. Parents will have to be actively involved in the digital world to understand it and offer guidance, he says — whether it’s questioning the ethics in Second Life or steering kids to the fanfiction sites where they can learn to become better writers.

His advice to parents: Sit down and play a game with your kids.<sup>72</sup> ■

## Notes

<sup>1</sup> Federation of American Scientists (FAS), “Summit on Educational Games 2006,” October 2006; www.fas.org.

<sup>2</sup> Steven Johnson, *Everything Bad is Good For You* (2006), p. 45.

<sup>3</sup> *Ibid.*, p. 31

<sup>4</sup> Kaiser Family Foundation, “Generation M,” 2005; www.kff.org. The survey was among children ages 8-18.

<sup>5</sup> C. Galas and D.J. Ketelhut, “River City,” *Leading with Technology*, 2006, pp. 31-32; <http://muve.gse.harvard.edu/rivercityproject/research-publications.htm>.

<sup>6</sup> Kaiser Family Foundation, *op. cit.*

<sup>7</sup> Susan B. Newman and Donna Celano, “The Knowledge Gap,” *Reading Research Quarterly*, April/May/June 2006, pp. 176-201; [www.reading.org/publications/journals/rrq](http://www.reading.org/publications/journals/rrq).

<sup>8</sup> FAS, *op. cit.*

<sup>9</sup> James Paul Gee, “Reading, Specialist Language Development, and Video Games,” unpublished paper, p. 36.

<sup>10</sup> MacArthur Open Forum, “Dialogue 2: Gaming Literacies”; <http://community.macfound.org>.

<sup>11</sup> Galas and Ketelhut, *op. cit.*

<sup>12</sup> Federation of American Scientists, *op. cit.*, p. 43.

<sup>13</sup> Constance A. Steinkuehler, “Massively Multiplayer Online Video Gaming as Participation in A Discourse,” *Mind, Culture and Activity*, 2006, 13 (1), pp. 38-52.

<sup>14</sup> FAS, *op. cit.*

<sup>15</sup> Julia Scheeres, “The Quest to End Game Addiction,” *Wired News*, Dec. 5, 2001; [www.wired.com](http://www.wired.com).

<sup>16</sup> Nick Yee, “The Labor of Fun: How Video Games Blur the Boundaries of Work and Play,” *Games and Culture*, January 2006, pp. 68-71. This and other articles/surveys by Yee are at [www.nickyee.com/daedalus](http://www.nickyee.com/daedalus).



### About the Author

**Sarah Glazer**, a New York freelancer, is a regular contributor to the *CQ Researcher*. Her articles on health, education and social-policy issues have appeared in *The New York Times*, *The Washington Post*, *The Public Interest* and *Gender and Work*, a book of essays. Her recent *CQ Researcher* reports include “Increase in Autism” and “Gender and Learning.” She graduated from the University of Chicago with a B.A. in American history.

- <sup>17</sup> www.nickyee.com/daedalus.
- <sup>18</sup> [http://games.groups.yahoo.com/group/WOW\\_widow/](http://games.groups.yahoo.com/group/WOW_widow/); Scheeres, *op. cit.*
- <sup>19</sup> Anthony Faiola, "Experts Fear Epidemic of Gaming Addiction," *The Miami Herald*, June 4, 2005, p. A25.
- <sup>20</sup> Gregory M. Lamb, "Are Multiplayer Games More Compelling, More Addictive?," *The Christian Science Monitor*, Oct. 13, 2005, p. 13.
- <sup>21</sup> Yee, *op. cit.*, p. 68.
- <sup>22</sup> *Ibid.*
- <sup>23</sup> John Seely Brown and Douglas Thomas, "You Play World of Warcraft? You're Hired," *Wired*, April 2006, p. 120.
- <sup>24</sup> *Ibid.*
- <sup>25</sup> *Ibid.*
- <sup>26</sup> John C. Beck and Mitchell Wade, *Got Game* (2004), p. 10.
- <sup>27</sup> *Ibid.*, p. 42.
- <sup>28</sup> Yee, *op. cit.*, p. 69.
- <sup>29</sup> David Williamson Shaffer, *How Computer Games Help Children Learn* (2006).
- <sup>30</sup> Federation of American Scientists, press release, "Study Recommends Fix to Digital Disconnect in U.S. Education and Workforce Training," Oct. 17, 2006; www.fas.org.
- <sup>31</sup> Federation of American Scientists, "Summit on Educational Games 2006," *op. cit.*, p. 14.
- <sup>32</sup> Henry Jenkins, *et al.*, "Confronting the Challenges of Participatory Culture," John D. and Catharine T. MacArthur Foundation, 2006, p. 5; www.digitallearning.macfound.org.
- <sup>33</sup> *Ibid.*
- <sup>34</sup> Federation of American Scientists, "Summit on Educational Games 2006," *op. cit.*, p. 12.
- <sup>35</sup> Jose Antonio Vargas, "Virtual Reality Prepares Soldiers for Real War," *The Washington Post*, Feb. 16, 2006, p. A1.
- <sup>36</sup> James Gee, *What video games have to teach us about learning and literacy* (2003), p. 48.
- <sup>37</sup> Chris Suellentrop, "Playing With Our Minds," *Wilson Quarterly*, summer 2006, pp. 14-21.
- <sup>38</sup> *Ibid.*
- <sup>39</sup> *Ibid.*
- <sup>40</sup> Beck and Wade, *op. cit.*, p. 8.
- <sup>41</sup> Dmitri Williams, in P. Vorderer and J. Bryant, eds., *Playing Computer Games* (2006) in press; <https://netfiles.uiuc.edu/dcwill/www/>.
- <sup>42</sup> *Ibid.*, p. 6.
- <sup>43</sup> Kaiser Family Foundation, press release, "Media Multi-Tasking Changing the Amount and Nature of Young People's Media Use," March 9, 2005.
- <sup>44</sup> For background see Brian Hansen, "Cyber-Predators," *CQ Researcher*, March 1, 2002, pp. 169-192.

## FOR MORE INFORMATION

**Federation of American Scientists**, 1717 K St., N.W., Suite 209, Washington, DC 20036; (202) 546-3300; www.fas.org. Scientists' organization that has called on the federal government to use video games to strengthen education.

**Games, Learning and Society**, University of Wisconsin, Teacher Education Bldg., 225 North Mills St., Madison, WI 53706; (608) 263-4600; <http://website.education.wisc.edu/gls/research.htm>. Studies the learning potential of video games.

**Global Kids, Inc.**, 561 Broadway, New York, NY 10012; (212) 226-0130; www.globalkids.org. Educates urban youth on international issues and is teaching disadvantaged teens to design and play games.

**Kaiser Family Foundation**, 2400 Sand Hill Rd., Menlo Park, CA 94025; (650) 854-9400; www.kff.org. Conducts surveys on media use by youth and teens.

**MacArthur Foundation**, 140 S. Dearborn St., Chicago, IL 60603; (312) 726-8000; www.macfound.org. Provides grants for research on the learning potential of video games and other digital media.

**www.nickyee.com/daedalus**. The research findings of Stanford researcher Nick Yee, who has surveyed more than 35,000 players of online multiplayer games.

**Pew Internet & American Life Project**, 1615 L St., N.W., Suite 700, Washington, DC 20036; (202) 419-4500; www.pewinternet.org. Surveys youth media use.

<sup>45</sup> Entertainment Software Association; www.theesa.com. See "Facts and Research."

<sup>46</sup> Kaiser Family Foundation, "Generation M: Media in the Lives of 8-18 Year Olds: Executive Summary," March 2005; www.kff.org.

<sup>47</sup> Pew Internet & American Life Project, "Teens and Technology: Youth are Leading the Transition to a Fully Wired and Mobile Nation," July 27, 2005; www.pewinternet.org. For background see Kathy Koch, "Digital Divide," *CQ Researcher*, Jan. 28, 2000, pp. 41-64.

<sup>48</sup> Kaiser Family Foundation, *op. cit.*, March 9, 2005, p. 17. Boys spend an average of 1 hour 12 minutes a day compared to girls' 25 minutes.

<sup>49</sup> Justine Cassell and Henry Jenkins, eds., *From Barbie to Mortal Kombat: Gender and Computer Games* (1998).

<sup>50</sup> Entertainment Software Association, "Facts and Research"; www.theesa.com.

<sup>51</sup> Richard Siklos, "A Virtual World But Real Money," *The New York Times*, Oct. 19, 2006.

<sup>52</sup> International Game Developers Association, "2006 Casual Games White Paper"; www.igda.org/casual.

<sup>53</sup> *Ibid.*

<sup>54</sup> *Ibid.*

<sup>55</sup> Suellentrop, *op. cit.*, pp. 16-17.

<sup>56</sup> Beck and Wade, *op. cit.*, p. 3.

<sup>57</sup> The NPD Group, Point-of-Sale Information.

<sup>58</sup> Kurt Squire, "From Content to Context," presentation made at Serious Games Summit, Feb. 24, 2004, p. 2.

<sup>59</sup> Seth Schiesel, "The PC Embraces Its Gaming Abilities," *The New York Times*, July 18, 2006, Arts Section, pp. 1, 4.

<sup>60</sup> Pew Internet & American Life Project, *op. cit.*

<sup>61</sup> *Ibid.*

<sup>62</sup> For background see Marcia Clemmitt, "Cyber Socializing," *CQ Researcher*, July 28, 2006, pp. 625-648.

<sup>63</sup> MacArthur Foundation Webcast of briefing, "Building the Field of Digital Media Learning," Oct. 19, 2006; www.macfound.org.

<sup>64</sup> National Center for Education Statistics, "A First Look at the Literacy of America's Adults in the 21st Century," Dec. 15, 2005; <http://nces.ed.gov>.

<sup>65</sup> Jeremy Rifkin, "Virtual Companionship: Our Lonely Existence," *International Herald Tribune*, Oct. 12, 2006, p. 8.

<sup>66</sup> Steven Johnson, *Everything Bad is Good for You* (2006), pp. 142-144.

<sup>67</sup> Federation of American Scientists, "Summit on Educational Games 2006," *op. cit.*

<sup>68</sup> MacArthur Foundation press release, "MacArthur Investing \$50 Million in Digital Learning," Oct. 19, 2006; www.macfound.org.

<sup>69</sup> Daniel Terdiman, "Shakespeare Coming to a Virtual World," *The New York Times*, Oct. 19, 2006.

<sup>70</sup> "Ayiti — the Cost of Life"; thecostoflife.org and www.holymeatballs.org.

<sup>71</sup> Rifkin, *op. cit.*

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# The Next Step:

## *Additional Articles from Current Periodicals*

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