GAME-BASED LEARNING

By Joel Foreman

HOW TO DELIGHT AND INSTRUCT IN THE 21ST CENTURY

Not long after he completed his Ph.D. at the University of Michigan, Mike Van Lent used his interest in videogames and artificial intelligence to land a research professorship at the University of Southern California (USC). There he edits the *Journal of Game Development* and conducts studies for the Institute for Creative Technologies, a $45 million defense and entertainment industry collaboration "that advances the state-of-the-art in virtual reality and immersive environments" (http://www.ict.usc .edu). When Van Lent moved into his campus office, one of his first acts was to line the bookshelves with forty videogame boxes and wait for visitors so that he could ask them, with a twist on conventional academic one-upsmanship, how many of the games *they* had played.

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Illustration by Steve McCracken, © 2004

James Paul Gee is the Tashia Morgridge Professor of Reading in the Department of Curriculum and Instruction at the University of Wisconsin–Madison. His many books include *What Video Games Have to Teach Us about Learning and Literacy* (2003). Trained as a theoretical linguist, he has spent the past twenty years studying education-related issues.

J. C. Herz is the author of *Joystick Nation: How Videogames Ate Our Quarters, Won Our Hearts, and Rewired Our Minds* (1997). She wrote essays on game design for the *New York Times* from 1998 to 2000 (www.nytimes.com/library/tech/reference/indexgametheory .html). She is currently a member of the Defense Advanced Research Projects Agency study group on massively multiplayer persistent worlds and teaches "Anthropology of Multiplayer Games" at NYU's Interactive Telecommunications Program.

Randy Hinrichs is the Microsoft Research Group Research Manager for Learning Science and Technology, which includes a number of college and university collaborations, most notably MIT's iCampus project. He is especially interested in simulation technologies that support activity-based learning, discovery learning, and game-based learning.

Marc Prensky is the author of *Digital Game-Based Learning* (2001) and the founder and CEO of Games2train. He has produced numerous computerized learning games. His clients include IBM, Nokia, Pfizer, and the U.S. Department of Defense.

Ben Sawyer is cofounder of the technology project development firm Digitalmill and is codirector of the Serious Games Initiative sponsored by the Woodrow Wilson International Center for Scholars. With Sloan Foundation support, he produced *Virtual U,* a game-based university-management simulator. He organized the first Serious Games Summit at the 2004 Game Developers Conference.

"Kids today are seeing more power-performanced learning in their popular culture than they're seeing in their schools."

Such behavior seems quite reasonable at a university where a recent $8 million donation to the School of Cinema-Television created the Electronic Arts Interactive Entertainment Program and funded the Electronic Arts Endowed Faculty Chair.

Herein lies a moral about how videogames (arguably one of the most sophisticated forms of information technology to date) are influencing higher education. To learn more about videogames in academe, I sought out the insights of five leading-edge thinkers in the field: James Paul Gee, J. C. Herz, Randy Hinrichs, Marc Prensky, and Ben Sawyer. All five had traveled to San Jose, California, in March 2004 for the Serious Games Summit at the annual Game Developers Conference.

We discussed the following six topics:

- The dysfunctions of conventional instruction
- The power of simulations
- The importance of game-based learning communities
- The reasons videogames promise a better learning future
- The changes necessary for the new paradigm to take hold
- The practical steps that colleges/universities and influential academics can take to move institutions down the trail blazed by USC and others

I spoke with each of the five individually, culled their comments from several hours of recordings, and then combined the comments to simulate the continuity and interaction of a group discussion. I have also asserted some editorial license to eliminate the infelicities and redundancies of speech.

"One Tape Recorder Talking to Another"

Foreman: What is wrong with the current instructional model?
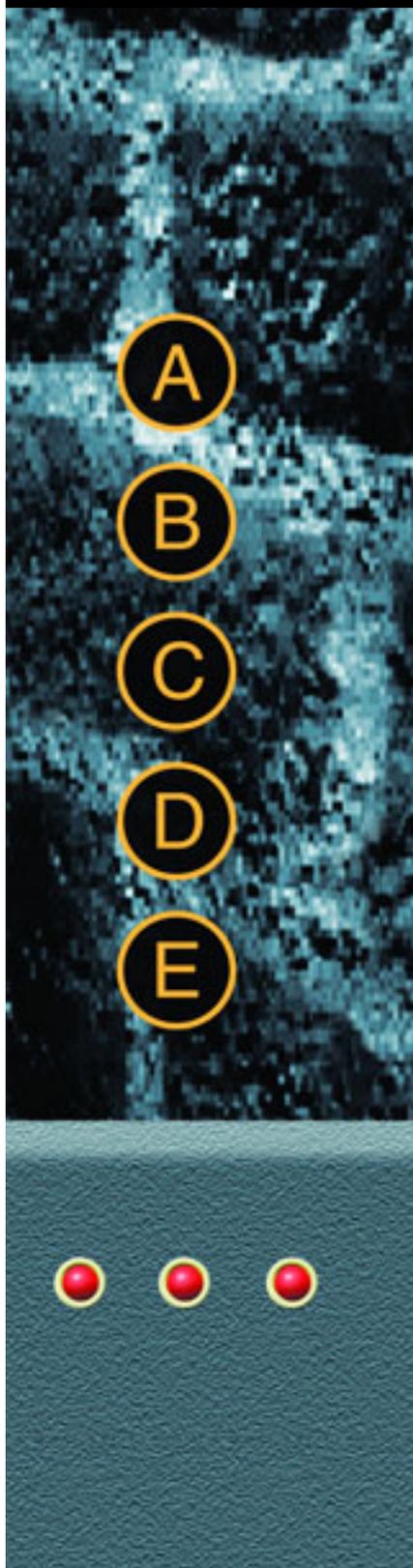
Gee: Kids today are seeing more power-performanced learning in their popular culture than they're seeing in their schools. When they go to high school and college, they're going to demand that we do at least as well. They are going to say, "Why am I sitting here for this lecture (thirteen lectures, thirteen weeks for every subject matter I'm taking) in a room with the same people when this form of learning is so out of kilter with what I've seen in other spaces where it's worked much better?"

Hinrichs: Recently, I spoke with Richard A. Detweiler at a Microsoft summit on the Next Generation of Learners. He was waxing on why educational models are outdated. In summary, up to this point, education has been based on a model of scarcity because it was very hard to get good academic material. It was hard to get the right kinds of books. It was hard to get access to the teachers. So naturally, school formed a solution, an economical way of delivering information, using the classroom model, using the teacher model.

What you basically got is a really constrained environment. Today, it's about abundance: what do the models for learning look like now?

Gee: It is amazing to me that in the modern age, when we have technologies like the Internet and the hand-helds and the computers and the computer games, we are still teaching inside four walls, where all the information is coming from within those walls and where all students, regardless of the amount of preparation they have, are sitting together.

Herz: Right now, universities are still, to a large degree, structurally nineteenth-century institutions. Everyone says, "We want to go to the twenty-first century, and we want to get this latest technology." But it's not about the technology. It's about the way that your culture is organized.

Gee: The Pew study shows that modern college kids also spend very little time studying outside of the classroom.[1] The

idea that the college kid is spending a lot of time on books and study outside of class is wrong. It's not there. When people have measured this, it's embarrassingly low. College is becoming, for many undergraduates, a social experience. It's a way to network with other kids, and they have already in a sense detached themselves from the intellectual enterprise, partly because they see both high school and college as out-of-date in terms of how learning works.

Prensky: I think we're going to see a move away from the industrial classroom approach, especially for the big courses, to the tutored approach. And most tutors, to a large extent, will be computer-based and game-based, supplemented, of course, by people working online together, people having human tutors online. I think that the era of listening to a professor tell you something is fast coming to an end.

Lectures are just one tape recorder talking to another. Some people can learn

that way, especially if you could speed it up four times, which is a perfectly legitimate way of taking in spoken information. That might help a lot. But I think we are going to wind up with other methodologies, and I just hope that any class with more than ten people will become a thing of the past.

Hinrichs: What I care most about in education is how we motivate students to learn. There is a lot of difference between a kid sitting in a classroom early in the morning because he had to be there at 8:30, trying to soak in the information, and a kid sitting in front of a computer, responsible for the next action that's going to happen, operating at twitch speed. The

fire that motivates self-directed learning is just turned on.

Herz: What games allow you to do that lectures don't is to explore the solution space and ask, "What if I did this?" or "What happens in that event?" You can do that in an online or a computer-based environment. Ultimately, what you want are models that you can push and test and explore—truly interactive systems. When I was in college, I was fortunate enough to have a faculty advisor who was a biologist, and I had a one-on-one tutorial about tropical rainforest ecology. He asked me questions based on what he thought I knew, and he'd push me to the limits of my knowledge. But absent a one-on-one tutorial, it's very difficult to do that. You get into small groups, and you have active discussions, but once you scale the group up, it becomes very difficult because you can't push sixty people individually to the limits of their knowledge. But you *can* create an online environment where those sixty people can push against the limits of their knowledge. And that becomes something different and very important. That's what simulations are good for.

"Worlds in a Box"

Foreman: Can the environments simulated in 3-D videogames expand a student user's comprehension of circumstances and situations that are not a part of his or her normal, everyday experience?

Gee: Games greatest potential is that they're worlds in a box. They allow you to create a world that somebody can be in and take on an identity. People learn most deeply when they take on a new identity that they really want. Let's say I really want to know what it's like to be a biologist of a certain sort. I really want to know what it's like to feel that way, to value that way, to talk that way. I can do that now. I can be in that world. That's going to be a deeper form of learning.

There are all sorts of experiences that we could never have before and that we can now have by being in these worlds in a box. Like in the game *America's Army.*[2] You can hate the military, but what that

game will do is at least let you know what it is like to be in the military. You will see the military as a value system and a world. Even if you want to oppose it, you are now in a much better position to do so.

Prensky: There are huge benefits from the simulation in games. Things that we just had to assume in the past, we can now simulate. Things that we had to read about, we can now live.

Herz: If you're creating a simulation, the question is, "What is the context for that simulation whereby groups of people can learn?" Because one of the most effective uses of simulation is as a mechanism to surface assumptions. You put the simulation up there, and people play it out, and in the course of playing it out, they question the underlying rules of the game.

Simulations are particularly important for inherently systemic things that you are trying to teach: a lot of stuff in the natural sciences, the physical sciences, and the social sciences. There are a lot of opportunities with regard to modeling stuff, which is difficult to understand as equations on a page. I think if we had more simulation and visualization, even of basic things like multivariable calculus, a lot more people wouldn't struggle with it. Being able to ask "what if?" is tremendously enlightening in a way that looking at equations on a page of a textbook is not.

Sawyer: Games may also work as experiential tests. These involve the use of well-done simulations in which you are immersed in the subject and through which you also need to demonstrate your knowledge of the subject. Say you were running a business simulation. The experiential test would be if you were able to complete the entire game and then give a presentation on what you did, why, and when. Or perhaps you would be running a game about psychiatry and you would need to provide the right DSM-IV [*Diagnostic and Statistical Manual of Mental Disorders*] analysis.

"Another Dimension of Learning"

Foreman: Many people fear that an immersion in solitary game play, with only a screen as a companion, deprives young

people of the social learning that takes place in classrooms. How would you address that anxiety?

Prensky: One of the hallmarks of a good game is that it creates a game community. In order to play this game, players have to get information from other sources. They have to explore. They have to communicate. They have to post. An entire large community grows up around the core-game mechanism, which is really just a set of complex decision-makings that come very quickly and are well-paced.

What has been observed in the multi-player games is that they foster both competition and cooperation in interesting ways. Teams have self-formed to accomplish tasks. Typically in these games, one of the nice parts is that you need a mix of skills, so that you can't have just a team of warriors. You need warriors, and you need thinkers, and you need wizards. This is no different from saying, "We want to figure out a physics problem, so we need theoreticians, and we need experi-

menters, and we need people with other kinds of skills."

Hinrichs: When you have the kids involved together in group play, you have one holding the controller, making the decisions, and the other ones influencing those decisions. Some of them actually demand the controller be put into their hands so that their particular skill comes out. They are handing off and reinforcing each other's learning. You don't get that in a classroom. Not often.

Herz: The higher degree of social mesh you have, particularly in the game industry, the more learning you get, because the real power of the stuff is in peer-to-peer learning, not in what goes on between a single individual and a document. You really have to think in terms of how to bring learning to networks of people, to groups of people. The question you have to ask yourself is, "How do groups of people learn with this?" The minute you ask that question, you get into

another dimension of learning. If you're going to be using simulation, say, in a sociology class, as an object for a discussion in which people try out different hypotheses and see how things work out demographically, that doesn't have to be a multiplayer game. But it *is* a multiplayer experience when people can create different scenarios and those scenarios are then shared; and in fact, this is the interaction typology of *The Sims*.[3] The ecology around it is massively multiplayer, because people are creating a lot of objects and scenarios for *The Sims*. Those are then exchanged and shared and traded, and that's where the real interaction is.

Prensky: What is different about a massively multiplayer game[4] is that you have a persistent world, so that when you do something in the world, it changes that world forever. If you have students who are working in that world, and they build something—a piece of equipment, a tool for somebody to use to do something—it would be there, and others could then

use it. So there's a real opportunity to share stuff with other people.

"The Teacher Is Embedded in the Programming"

Foreman: So, what is the source of learning? Why will videogames improve learning?

Herz: Discourse is the important thing. You can use debate for discourse, or you can use simulation for discourse, but the discourse is where the learning happens. It's where intelligence or intelligences bump up against each other, and that's where you find something that might not even have been in the original content, something that emerges from the interaction.

Hinrichs: What game-players are getting is fluency in language and motion. If they immerse themselves for long periods of time in a content area, they become familiar with all of the visual cues that are around them and they interact with these cues in context. This is why people learn language better when they go to foreign countries than when they sit in a classroom. It's all those implicit cues that are coming to them, so they pick up vocabulary as well. You see that today in young gamers who are eight, nine, ten years old, using words like, "How do I manage my resources?" I mean, what would a kid be doing asking how to manage her resources? Or even understanding what that means?

Gee: Every game realizes that words are best learned just in time and on demand. You should get verbal information close to when you are going to be able to see how it works in the world, so that you have some experience to connect to give it real meaning. Colleges still give information out of any context of demand— big blocks of information that students can't tie to experience, or when they get the experience, it is far detached from when they got the words.

If you want somebody to do biology, and you want students to see how the biological words relate to actual experiences, games let you simulate those experiences as activities that people do. So you are actually getting ready for action. The best way of understanding a word is seeing how it applies in the world, how it applies when you have to do something. You have to use it in talk, or you have to use it in action. That's a fundamental principle of language acquisition. Games are good at that.

Prensky: We want games because they are the most engaging intellectual pastime that we have invented. Kids are intellectually engaged by them.

Gee: The commercial games have created a form of learning that young people are very familiar with. It's a very powerful form of learning, and the principles behind that learning are reflected in the best research we have in cognitive science. If you look at what current cognitive

science argues about how people learn best, you will find those principles embedded deeply in good videogames, but you will not find them deeply embedded in a lot of elementary schools and high schools. Not in colleges, either.

Prensky: If we take the notion of gameplay and we break it down into what distinguishes a good game, perhaps the single most important thing is decision-making—frequent decision-making, speed of decisions. When you play a game, you make a decision typically every couple of seconds, or if it's a turn-based game, every few minutes. Being forced to make those decisions increases the learning enormously.

Hinrichs: The game-players are spending long periods of time immersed in visual environments in which they have to make decisions. They have to think critically. They have to make choices. They have to reflect on all of their actions. Doesn't that sound like learning? Doesn't that sound

like how we want cognition to occur? And who's the teacher? The teacher is embedded in the programming.

Herz: It's very important for educators to think about dynamic systems as opposed to static documents. You can turn to any page in a book, and you know to some degree that is a hypertext experience, but it's not dynamic and it's not socially meshed in any way.

Hinrichs: But we don't need a lot of highfalutin visualization for every subject that we're talking about. If I'm going to study biology, I really need visualization there. But think about dropping down to the SPOT technology for some learning applications. SPOT stands for Smart Personal Objects Technology. It includes watches and a host of other products that are able to receive high-value, personalized information that is time-, location-, and context-relevant. SPOT just starts feeding you information every now and then. That's a whole

different way of looking at this thing. I can reduce a game down to a mobile SPOT technology environment, and I could teach you Italian.

"People Want to Build Stuff"

Foreman: What changes are needed in order to implement this new instructional model? And is there still a role for the conventional textbook and student term papers?

Hinrichs: It would be interesting if students were writing software instead of papers. I learned this from our relationship with MIT. I love text, and I love conversation, but it just seems to me that everybody in business is turning to software to figure out how to change our business processes, how to streamline, how to move data across the planet, how to change sales—everything. So why don't we build that level of competency and start getting students to write software in the form of 3-D visualizations?

Let's ask them to start building these environments as homework, as proof to the faculty that they understand electromagnetism, that they understand optics, that they understand quantum algebra, because this stuff really does get turned into software. Then, of course, you could also do the same thing with faculty. There is an emerging generation of faculty who are younger, who are more computer-literate, who are also capable of producing this integrated software environment.

Gee: There are ways for people to make mods[5] of games or extend games or make scenarios out of them. People can actually produce pieces of them. I think that will become more user-friendly, so that you'll see colleges where people are given assignments like "Build a particular wall with this engine that reflects some of the principles that you think are important in architecture." That's gonna happen. We're going to see colleges going in that direction. There is resistance from the baby-boomer faculty, but many faculty who are earning their Ph.D.'s now are people who played games, and a nontrivial number are actually putting games into their research, and that changeover, I think, is going to be pretty quick. They are sympathetic to these technologies.

Sawyer: What every administrator has to understand is that not only are there game-players on campus, but within those game-playing communities are people who want to build stuff. Administrators should be out there encouraging this, because those groups could then be builders for the applications that we need within schools. I don't think we can ask students to build every last thing that we need. They're not going to have the full skill set of the guy or woman who has been doing this for twenty years. But they can build prototypes. I don't think they could build some stuff that will actually be commercial quality, but they can help the colleges to experiment.

Prensky: One of my visions is to create systems where these things can be shared and improved on by students and professors around the world. I was just talking with somebody yesterday who had an idea for a game built around corporate

ethics. I said: All you have to do is put an ad somewhere in the school paper or online, wherever your business school students will see it, that says, "Do you mod, or modify? Do you do modding? Are you interested in game development? Come to a meeting on such-and-such a date." My guess is that you will get a room full of kids, all of whom are eager to work on whatever game you have, for free. If you want to, you could offer them credit, and that would be even better, but what you'll get is all these people you can work with, divide into teams, have some competitions among. You can say: "We want to make an ethics game that's gonna be the best ethics game in the world, that every other school is gonna want to use. Go to it. Who can design? Who can program? Who can do graphics? Let's come up with three or four designs, and let's do this kind of thing."

You don't have to do this stuff yourself. You don't have to program a whit, because your kids do that. Your students do that. They can do it in Flash. They can do it in C++. You want more sophistication? Involve the IT department. What you'll find is that the troops are already there, eager to work, because they are dying to transform their own learning this way. You probably don't have to pay them. You can go up one level of sophistication by either paying them or giving them credit, and if you come up with something good, then you can start getting some money to improve it, make it more sophisticated. But the core of it can just come from the kids and yourself and the ideas that you have.

Herz: Any teacher knows that you learn by teaching, and when you have to create a scenario that is then used by some other person, you have to explain it, and in the course of explaining it, you yourself learn. You think things through more thoroughly when you have to defend them to other people. So what you're really moving toward is more of a peer-based interaction and more peer-to-peer learning. If you ask people if they learned more in college from their professors or from their fellow students, most will say that they learned more from their fellow students. How can we enable that with interactive media and technology?

Sawyer: Massachusetts State Senator Richard T. Moore wanted a game that would teach people how the state budget worked and would allow them to play budget chief so that they could learn that it's not easy to deal with a $3 billion deficit. Instead of turning to Arthur Andersen or some Joe Average software developer, he found a bunch of students at the Worcester Polytechnic Institute Game Development Club who built this.[6] To call it a *game* is to be a little bit generous, but it's a really cool application.

Gee: I would say that in the not-too-distant future, virtually every college is going to have a game-design program. Colleges are going to train people not just to use those technologies for getting into the game industry, but to use those

technologies pervasively in the world. Those technologies are going to rapidly advance. There's going to be a whole field in which people expect game design and game technologies to be part of the curriculum. This is going to happen in the near future, and the colleges that pay attention will benefit financially, and the ones that don't will lose.

"Let Their Culture Begin to Flourish"

Foreman: What practical advice would you offer to academics and to institutional leaders for leveraging the benefits of game-based learning?

Prensky: One way to organize that opportunity would be to let every school that wants to participate pick a subject area, which can be either broad or narrow, like photosynthesis. That particular school would then be responsible for putting online everything related to that subject. This could be any engaging materials, and the postings should be open-source so that others can contribute, can add, can enhance. The students would participate, hopefully for credit, in creating new ways to do this.

Schools can use this to build a reputation. They can build a focus, build a reputation, recruit people who are interested in particular areas and try to create the best products that there are in the world. People who are interested in that particular subject area would come to them and add to what they have, and then all this would be shared.

Hinrichs: It's time for academia to stand up and say, "We really want industry and the government to help us understand what is the effective way of integrating technology into the academic system, and we need to come together to do this." Academia needs to drive the "why," government needs to drive the "how," and industry needs to drive the "what," so that they can produce the market and the technologies to make this easy.

I've been working with government, universities, and other industry partners to build a research agenda around learning technologies: the Learning Federation R&D Roadmap

(http://thelearningfederation.org). It's been submitted as a bill to Congress in an initiative called the Digital Opportunity Investment Trust. The bill is trying to take the spectrum option money and appropriate it back into digital education, as the government did with the Land Grant Act and the G.I. Bill, so that the government can stimulate growth in educational technology research. If we don't come together with a national plan, we're just going to be sitting here poking holes into something that will get us nowhere. We've done enough of that.

Gee: I would say, "Get your baby-boomer professors retired as soon as you can." Yeah, that's us. Change in society has happened so fast that the baby boomers were raised in a different world. They were

taught to think about the world in a way that college kids today do not.

We've found at Wisconsin that many of the young faculty we're hiring have very high technological skills. They are really going to be the future of colleges. We find, in search after search, that a percentage of the people—whether in psychology or education or anthropology—are actually studying games because this is the generation that played them. They are sympathetic to these technologies.

Sawyer: I think one of the things leaders have got to start grappling with is if more institutions are going to be installing games, how do they deal with just the mundane issues: how those games install, where files are dealt with. If a professor says she wants to use two hundred copies of *Civilization*[7] for an economics class, all of a sudden, whoa, how do we set the lab up? How do we do it? What are the licensing rights with games, which are somewhat restrictive in some cases? So they—the admin people—should become more familiar with games.

Prensky: When we start educating the faculty about games, let's include the administration, and also let's figure out ways that we can bring more students into the academic counsels. We have decisions being made for the younger generation by groups in which nobody is under the age of thirty. That's just wrong, especially because the younger generation is no longer simply a younger version of the older generation. They are very different. Bring the students in, especially for thinking about instruction and how to evolve and do things differently.

One of the things that was very eye-opening for us was the beginning of the project that Microsoft funded at MIT, called Games-to-Teach. They had a meeting of senior-level professors, and they brought in a number of very articulate top students to demonstrate state-of-the-art games. We saw a lot of jaws dropping because the professors, just like most other adults, people that I call "digital immigrants," really have no conception of the depth and the sophistication of contemporary games.

Most people look at games and they see the eye-candy and the graphics, and
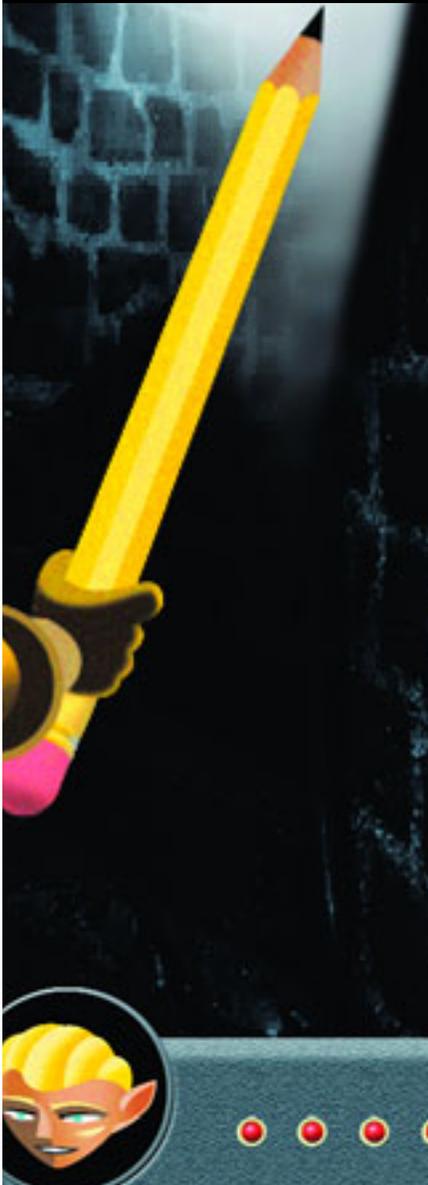
they assume that these are just as simple as the games they played when they were kids. This is not the case. So, a very practical suggestion is to hold periodic sessions to find the best and the brightest kids, and to put your entire faculty, over time, through these small sessions in which the kids get to show-and-tell and explain the degree of sophistication that attracts them to these games and why they play the games and why a third of them are sitting in class playing games rather than listening to the lecture.

Hinrichs: Colleges just have to change. The market will demand it. The kids will continue to push up, and our competitors abroad, who are becoming highly computer-literate, are already giving us some interesting competition. So the institutions of higher learning that you and I think are the bulwarks of society have just got to evolve. There is no way around it.

It is incumbent upon the higher-order thinkers to educate themselves about the digital decade in education. Not to educate yourself is to live in denial about how this technology is going to affect all of our institutions, borders, and culture. This technology is already changing the way we do research. It is changing the quality of students. Technology-enabled educational and research institutions will become a competitive force as some of the faster, more nimble schools produce the kinds of environments that demonstrate better learning mechanisms—especially the ones that get online competency performance and measurement.

Gee: What will change colleges is the competition from any other college that actually changes. It won't be Princeton. It won't be Harvard. They don't have to change at all. Change is going to come from small colleges or other colleges that really want to revamp in order to become competitive. When people get some models for how to do this, I think we'll see real change.

Hinrichs: It's going to take some development of the community to be able to do that. I think that the change will emerge out of community colleges, where you've got lots of game-development programs emerging. That's breeding a generation of doers, who will probably start asking themselves, "Wouldn't it be easier if we used our own technology to create learning environments?" What's to stop them—innovation?

Gee: The colleges that are going to win are going to protect the young faculty and let their culture begin to branch. Many of the young faculty see their teaching mission and their technology mission and their intellectual research mission as much more tightly related than the baby boomers did. The most important advice

I would give concerns the indigenous natives, these new faculty members: let their culture begin to flourish. The sooner you do that, the better. *e*

Notes

1. Steve Jones, "Let the Games Begin: Gaming Technology and Entertainment among College Students," Pew Internet & American Life Project, July 6, 2003, <http://www.pewinternet.org/report_display.asp?r=93>.
2. This game may be accessed at <http://www.americasarmy.com/>.
3. *The Sims* is, to date, one of the most successful and innovative game franchises. It is the work of Will Wright and Maxis; see <http://www.maxis.com/>.
4. Massively multiplayer online games (MMOG) are virtual Web-based environments that can accommodate huge numbers of simultaneous participants. The Korean MMOG *Lineage* is reputed to have four million subscribers.
5. A number of game developers package their games with the tools used to develop the games. This has given rise to the practice of "modding," in which the more ambitious and technically inclined gamers build their own modifications. Mods range from the creation of single characters to new action sets and new environments.
6. The Worcester Polytechnic Institute Game Development Club (WPI GDC) is a sixty-member student group that fosters the creation of games in a university environment. The club is modeled after a typical game-development studio, with multiple development teams working on various projects. The club developed the state budget game, *MassBalance,* in nine weeks. At the same time, the students were attending classes as full-time students, and some were even working part-time jobs. "WPI Students Create Online Game to Simulate Massachusetts State Budget Process," WPI news release, May 24, 2003, <http://www.wpi.edu/News/Releases/20023/massbalance.html>.
7. Created by Sid Meier in 1990, *Civilization* is another of the most successful game franchises. It is produced by Firaxis, a leading game-development company located in Maryland. For information about the game, see <http://www.civ3.com/>.

RELATED RESOURCE

e "Games, Simulations, and Learning" is an EDUCAUSE NLII 2004 Key Theme (http://www.educause.edu/nlii/keythemes/2004/games.asp). Key themes are chosen annually from the larger domain of the transformation of teaching and learning with technology. The "Games" key theme is exploring whether games and simulations have changed how students learn and whether there are principles and practices from games that should be integrated into collegiate learning environments.