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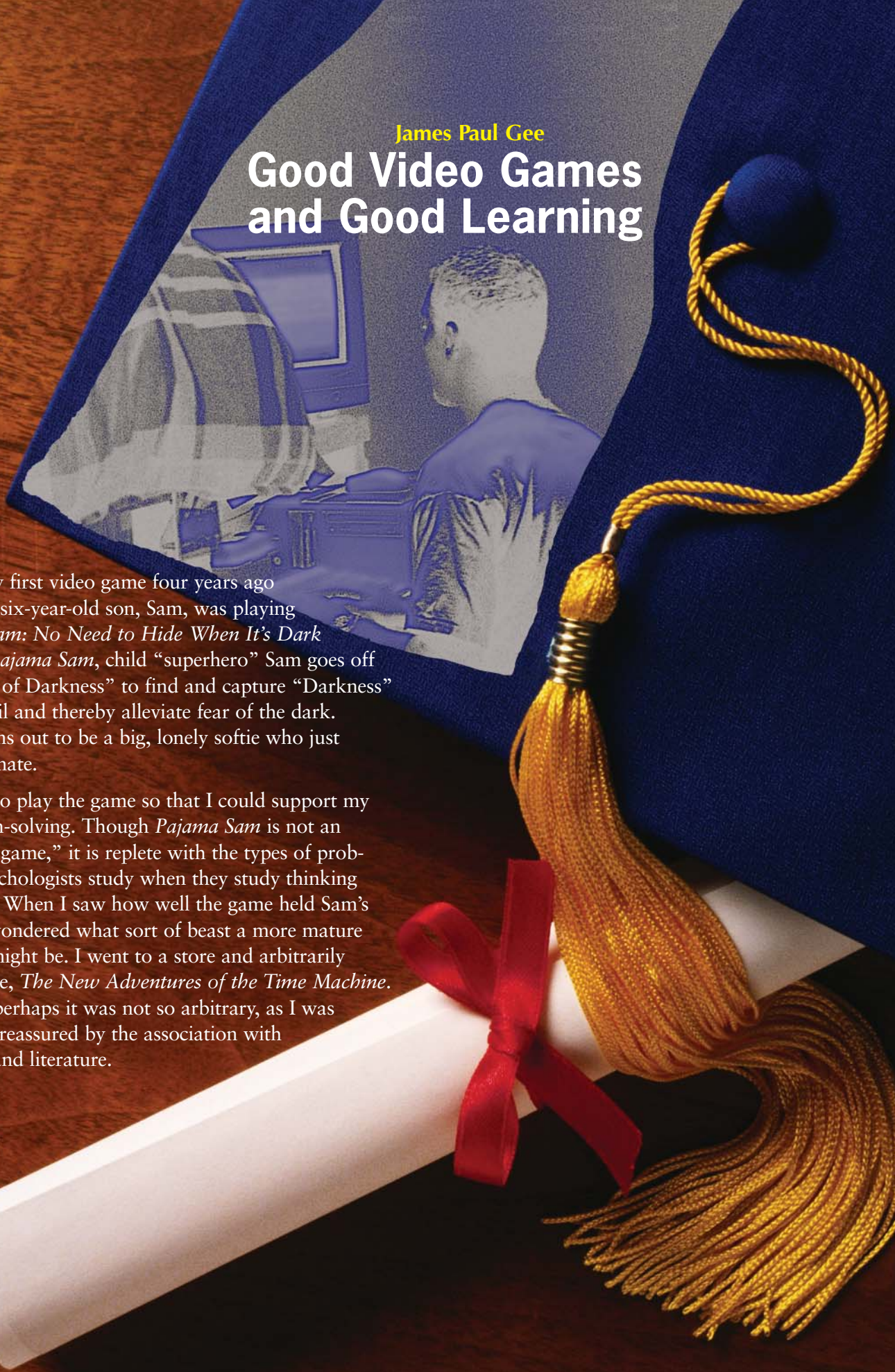
Good Video Games and Good Learning



I played my first video game four years ago when my six-year-old son, Sam, was playing *Pajama Sam: No Need to Hide When It's Dark Outside*. In *Pajama Sam*, child "superhero" Sam goes off to the "Land of Darkness" to find and capture "Darkness" in a lunch pail and thereby alleviate fear of the dark. Darkness turns out to be a big, lonely softie who just needs a playmate.

I wanted to play the game so that I could support my son's problem-solving. Though *Pajama Sam* is not an "educational game," it is replete with the types of problems that psychologists study when they study thinking and learning. When I saw how well the game held Sam's attention, I wondered what sort of beast a more mature video game might be. I went to a store and arbitrarily picked a game, *The New Adventures of the Time Machine*. Then again, perhaps it was not so arbitrary, as I was undoubtedly reassured by the association with H. G. Wells and literature.

As I confronted the game, I was amazed. It was hard, long, and complex. I failed many times and had to engage in a virtual research project via the Internet to learn some of the things that I needed to know. All of my Baby-Boomer ways of learning and thinking did not work, and I felt myself using learning muscles that had not had this much of a workout since my graduate school days in theoretical linguistics.

As I struggled, I thought: Lots of young people pay lots of money to engage in an activity that is hard, long, and complex. As an educator, I realized that this was just the problem our schools face — how do you get someone to learn something long, hard, and complex, and yet still enjoy it? I became intrigued by the implications that good video games might have for learning in and out of schools. And, I also played many more great games such as *Half-Life*, *Deus Ex*, *Halo*, *Elder Scrolls III: Morrowind, Rise of Nations*, and *Legend of Zelda: The Wind Waker*.

Good video games incorporate good learning principles, principles supported by current research in cognitive science (Gee 2003, 2004). Why? If no one could learn these games, no one would buy them, and yet players will not accept easy, dumbed-down, or short games. At a deeper level, however, challenge and learning are a large part of what makes good video games motivating and entertaining. Humans actually enjoy learning, though sometimes in school you would not know it.

A QUESTION OF CONTENT

Before I talk about learning in games, I must deal with the "content" question. People are prone to say, in a dismissive way, "What you learn when you learn to play a video game is just how to play the game." Ironically, we actually find here our first good learning principle. Some people think of learning in school — for example, learning biology — as all about learning "facts" that can be repeated on a written test. Decades of research, however, have shown that students taught under such a regime, though they may be able to pass tests, cannot actually apply their knowledge to solve problems or understand the conceptual lay of the land in the area that they are learning (see Gardner 1985).

A science such as biology is not a set of facts. In reality, it is a "game" that certain types of people "play." These people engage in characteristic sorts of activities, use characteristic tools and language, and hold certain values; that is, they play by a certain set of "rules." They *do* biology. Of course, they learn, use, and retain lots and lots of facts — even produce them — but the facts come from and with the doing. Left out of the context of biology as activity, biological facts are trivia.

So, ironically, just as in part what you learn when you successfully play a good video game is how to play the game, so too, what you learn when you learn biology should be how to play that game. However, for both video games and biology, it is not a case of "anything goes" — this is not a permissive "progressivism" writ large. You must inhabit the identity that the game offers (be it Battle Mage or field biologist), and you have to discover what the rules are and how they can best be leveraged to accomplish goals. Perhaps the word "game" rankles — some use "simulation" instead. However, keep in mind that a game such as *Full Spectrum Warrior* is a game when I buy it off the rack, but it is a serious learning tool when a soldier "plays" the professional-training version.

LEARNING PRINCIPLES

So, let's take a brief look at some of the learning principles that good games incorporate (Gee 2003, 2004, 2005).

1. Identity

No deep learning takes place unless learners make an extended commitment of self. Learning a new domain, whether it be physics or furniture-making, requires the learner to take on a new identity: to make a commitment to see and value work and the world in the ways in which good physicists or good furniture makers do. Good video games capture players through identity. Players either inherit a strongly formed and appealing character — for example, Solid Snake in *Metal Gear Solid* — or they get to build a character from the ground up, as in *Elder Scrolls III: Morrowind*. Either way, players become committed to the new virtual world in which they will live, learn, and act through their commitment to their new identity. Why should the identity of being a scientist and doing science be less appealing?

2. Interaction

Plato in the *Phaedrus* famously complained that books are passive; you cannot get them to talk back to you in a real dialogue the way that a person can face-to-face. Games do talk back. In fact, nothing happens until a player acts and makes decisions. Then the game reacts, giving the player feedback and new problems. In a good game, words and deeds are all placed in the context of an interactive relationship between the player and the world. So, too, in school, texts and textbooks need to be put in contexts of interaction where the world and other people talk back.

3. Production

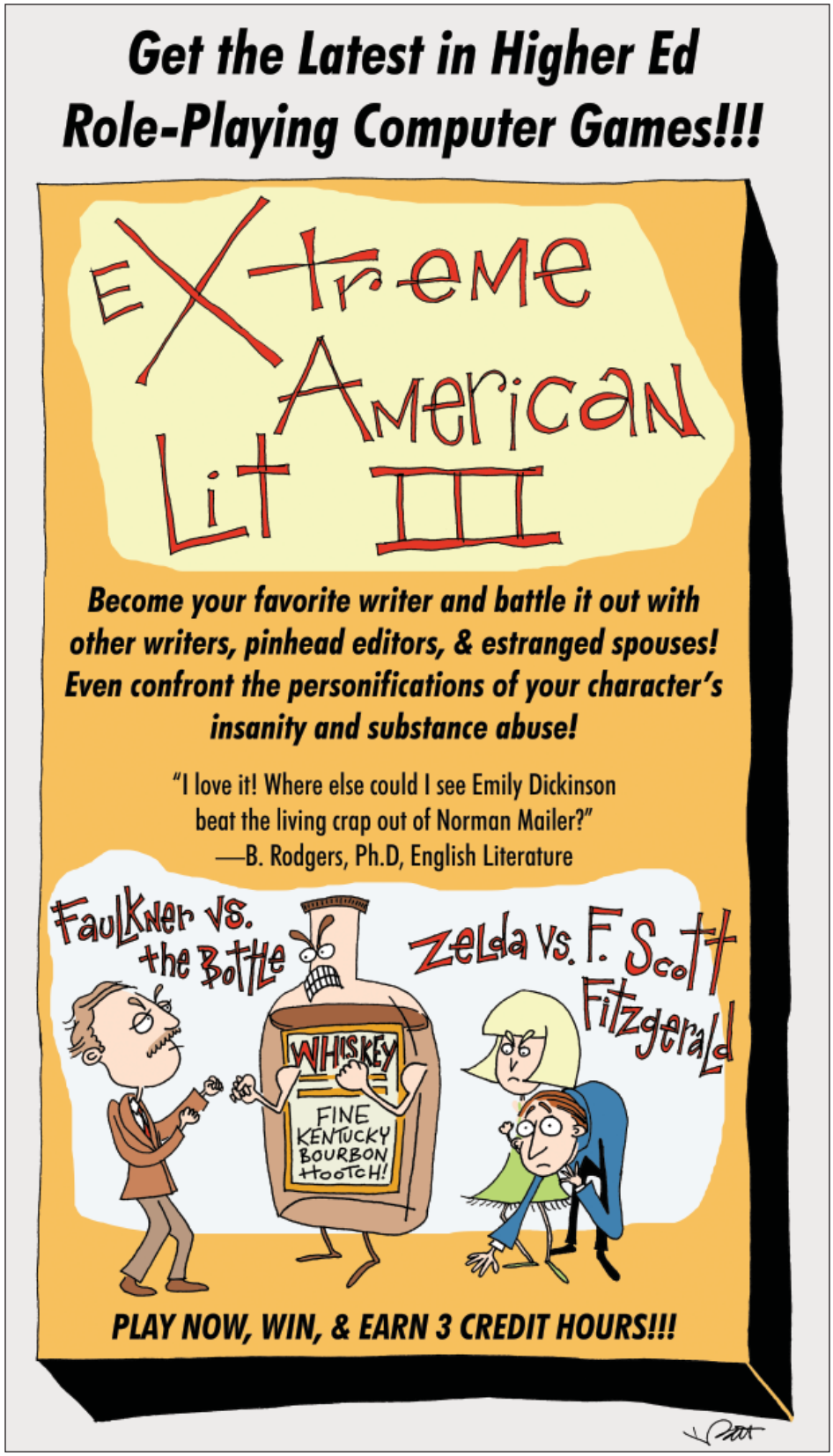
Players are producers, not just consumers; they are "writers," not just "readers." Even at the simplest level, players co-design games by the actions that they take and the decisions that they make. An open-ended game such as *Elder Scrolls III: Morrowind* is, by the end, a different game for each player. In a massive multiplayer game such as *World of WarCraft*, thousands of people create different virtual careers through their own unique choices in a world that they share with many others. At a higher level, many games come with versions of the software with which they are made, and players can modify them. Such modifications range from building new skate parks in *Tony Hawk* or creating new scenarios in *Age of Mythology*, to building whole new games. Players help "write" the worlds in which they live — in school, they should help "write" the domain and the curriculum that they study.

4. Risk Taking

Good video games lower the consequences of failure; players can start from the last-saved game when they fail. Players are thereby encouraged to take risks, explore, and try new things. In fact, in a game, failure is a good thing. Facing a "boss" (that is, a new level of problems), the player uses initial failures as ways to find the boss's pattern and to gain feedback about the progress being made. School too often allows much less space for risk, exploration, and failure.

5. Customization

Players can usually, in one way or another, customize a game to fit their learning and playing styles. Games often have different difficulty levels, and many good games allow players to solve problems in different ways. In a role-playing game, the distinctive attributes that players choose for their characters determine how the game will be played.



Players can even try out new styles, thanks to the risk-taking principle above. Customized curricula in school should not just be about self-pacing, but about real intersections between the curriculum and the learner's interests, desires, and styles.

6. Agency

Thanks to all the preceding principles, players feel a real sense of agency and control and a real sense of ownership over what they are doing. Such ownership is rare in school.

7. Well-Ordered Problems

Research has shown that when learners are left free to roam in a complex problem space — as they sometimes are in permissive "hands-on" environments — they tend to hit on creative solutions to complex problems, but these solutions do not lead to good hypotheses about how to solve later, even easier problems (Elman 1991). In good video games, the problems players face are ordered so that the earlier ones are well built to lead players to form hypotheses that work well for later, harder problems. It matters how the problem space is organized — that is why games have "levels." Equal attention needs to be paid to how to order problems in a rich immersive space in a science classroom, for example.

8. Challenge and Consolidation

Good games offer players a set of challenging problems and then let them solve these problems until their solutions are virtually automatic. Then the game throws a new class of problems at the players, requiring them to rethink their now taken-for-granted mastery, learn something new, and integrate this new learning with their old mastery. In turn, this new mastery is consolidated through repetition (with variation), only to be challenged again. This cycle has been called the "Cycle of Expertise" (Bereiter & Scardamalia 1993); it is the way anyone becomes an expert at anything worth being an expert in. In school, sometimes the poorer students do not get enough opportunity to consolidate, and the good students do not get enough real challenges to their school-based mastery.

9. "Just-in-Time" and "On Demand"

People are quite poor at dealing with lots of words out of context; that is why textbooks are so inefficient. Games almost always give verbal information either "just in time," that is, right when players need and can use it; or "on demand," that is, when the player feels a need for it, wants it, is ready for it, and can make good use of it. Information should work the same way in school.

10. Situated Meanings

People are poor at learning what words mean when all they get is a definition that spells out what it means in terms of other words. Recent research suggests that people know what words mean and learn new ones only when they can hook them to the sorts of experiences they refer to — that is, to the sorts of actions, images, or dialogues that the words relate to (Barsalou 1999; Glenberg 1997). This gives the words situated meanings, not just verbal ones. And, indeed, words have different situated meanings in different contexts (consider "The coffee spilled, go get a mop" versus "The coffee spilled, go get a broom"). Games always situate the meanings of words in terms of the actions, images, and dialogues that they relate to, and show how they vary across different actions, images, and dialogues. They do not just offer words for words. School should not either.

11. Pleasantly Frustrating

Thanks to many of the principles above, good games stay within, but at the outer edge, of the player's "regime of competence" (diSessa 2000). That is, they feel "doable," but challenging. This state is highly motivating for learners. School is often too easy for some students and too hard for others, even in the same classroom.

12. System Thinking

Games encourage players to think about relationships, not isolated events, facts, and skills. In a game such as *Rise of Nations*, for instance, players need to think of how each action taken might affect their future actions and the actions of the other players playing against them as they all move their civilizations through the ages. In our complex global society, such system thinking is crucial for everyone.

13. Explore, Think Laterally, Rethink Goals

My schooling taught me, as it did many other Baby Boomers, that being smart is moving as fast and efficiently to your goal as possible. Games encourage a different attitude. They encourage players to explore thoroughly before moving on; to think laterally, not just linearly; and to use such exploration and lateral thinking to reconceive one's goals from time to time. This process sounds just like what many a modern high-tech, global workplace wants (Gee, Hull, & Lankshear 1996).

14. Smart Tools and Distributed Knowledge

The virtual character or characters that one manipulates in a game — and many other aspects of the game world — are, in reality, "smart tools." Characters have skills and knowledge of their own that they lend to the player. For example, in *Full Spectrum Warrior*, the soldiers whom the player controls know how to move to and to take various formations in battle. Thus, this information is something the player does not have to know. What the player must know is when and where to order each formation so that the soldiers can move safely from cover to cover. The knowledge that it takes to play the

game is distributed among the player and the soldiers. In a massive multiplayer game, players work in teams where each member contributes his or her distinctive skills. The core knowledge needed to play the game is now distributed among a set of real people and their smart virtual characters. Smart tools and distributed knowledge are key to modern workplaces, though not always to modern schools.

15. Cross-Functional Teams

When players play a massive multiplayer game such as *World of WarCraft*, they often play in teams (parties) in which each player has a different set of skills (say a Mage, a Warrior, or a Druid). Players must each master their own specialty (function), because, for example, a Mage plays quite differently from a Warrior, but they also must understand enough of each other's specializations to integrate and coordinate with the others (cross-functional understanding). Furthermore, in such teams, people are affiliated by their commitment to a common endeavor, not primarily by their race, class, ethnicity, or gender. These latter are available as resources for the whole group if and when they are needed and if and when the player wishes to use them. Again, such forms of affiliation are commonly demanded in modern workplaces, though not always in modern schools (Gee 2004).

16. Performance before Competence

Good video games operate by a principle just the reverse of most schools: performance before competence (Cazden 1981). Players can perform before they are competent, supported by the design of the game, the "smart tools" that the game offers, and often, too, the support of other, more advanced players (in multiplayer games, in chat rooms, or standing there in the living room). Language acquisition itself works this way. However, schools frequently do not. They often demand that students gain competence through reading texts before they can perform in the domain that they are learning.

So the question that I leave you with is not about the use of games in school — though using them is a good idea — but this: How can we make learning in and out of school, with or without using games, more game-like in the sense of using the sorts of learning principles that young people see in good games every day, when and if they are playing these games reflectively and strategically? Figuring out how to achieve this goal is a worthwhile endeavor.

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