GOOD VIDEO GAMES AND GOOD LEARNING

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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 "super-hero" Sam—mine and the virtual one—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 I could support Sam's problem solving. Though *Pajama Sam* is not an "educational game", it is replete with the types of problems 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*—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 things I needed to know. All my Baby-Boomer ways of learning and thinking didn't work. I felt myself using learning muscles that hadn't 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 enjoy it. I became intrigued by the implications good video games might have for learning in and out of schools. And, too, I played many more great games like *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 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 wouldn't know that.

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 they are learning (e.g., Gardner 1985).

A science like biology is not a set of facts. In reality, it is a "game" certain types of people "play". These people engage in characteristic sorts of activities, use characteristic sorts of tools and language, and hold certain values; that is, they play by a certain set of "rules". The *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 what you learn when you learn to 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's not a case of "anything goes"—this is not a permissive "progressivism" writ large. You have to inhabit the identity the game offers (be it Battle Mage or field biologist) and you have to play by the rules. 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 like *Full Spectrum Warrior* is a game when I buy it off the rack, but serious learning when a soldier "plays" the professional training version.

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

1. **Identity**. No deep learning takes place unless learners make an extended commitment of self for the long haul. 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—e.g., 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 and doing science be less appealing?

2. **Interaction**. Plato in the *Phaedrus* famously complained that books were passive in the sense that you cannot get them to talk back to you in a real dialogue the way a person can in a face-to-face encounter. Games do talk back. In fact, nothing happens until a player acts and makes decisions. Then the game reacts back, 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 they take and the decisions they make. An open-ended game like *Elder Scrolls III: Morrowind* is, by the end, a different game for each player. In a massive-multi-player game like *World of WarCraft* thousands of people create different virtual careers through their own unique choices in a world 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 new scenarios in *Age of Mythology* to building whole new games. Players help "write" the worlds they live in—in school, they should help "write" the domain and the curriculum 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, 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 with 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 each player chooses for his or her character determines how the game will be played. Players can even try out new styles, thanks to the risk taking principle above. Customized curricula in school would 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. They have a real sense of ownership over what they are doing. Such ownership is rarer in school.

7. **Well-Order 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 solutions that don't 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's why games have "levels". Equal thought 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 they have virtually routinized or automatized their solutions. Then the game throws a new class of problem at the players (sometimes this is called a "boss"), 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 expert at anything worth being an expert in. In school, sometimes the poorer students don't get enough opportunity to

consolidate and the good students don't get enough real challenges to their school-based mastery.

9. **"Just in Time" and "On Demand"**. People are quite poor at dealing with lots and lots of words out of context; that's 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 a word means in terms of yet other words. Recent research suggests that people only really know what words mean and learn new ones when they can hook them to the sorts of experiences they refer to—that is, to the sorts of actions, images, or dialogues 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 of use (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 they relate to, and show how they vary across different actions, images and dialogues. They don't just offer words for words. School shouldn't either.

11. **Pleasantly Frustrating**. Thanks to many of the above principles, 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 is a highly motivating state 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 like *Rise of Nations*, for instance, players need to think of how each action taken might impact on their future actions and the actions of the other players playing against them as they each move their civilizations through the Ages. In a massive multi-player game like *World of WarCraft*, players must think of the ramifications of their actions not only on all aspects of the game world, but on lots of other players as well. In our complex, global world, 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 too fast, to think laterally and not just linearly, and to use such exploration and lateral thinking to reconceive one's goals from time to time. 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 one manipulates in a game—and many other aspects of the game world—are, in reality,

"smart tools". The virtual characters have skills and knowledge of their own which they lend to the player. For example, in *Full Spectrum Warrior*, the soldiers the player controls know how to move to and take various formations in battle. Thus, this is something the player does not have to know. The player must know when and where to order each formation so that the soldiers can move safely from cover to cover. The knowledge it takes to play the game is distributed between the player and the soldiers. In a massive multi-player 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 multi-player game like *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 Druid). Players must each master their own specialty (function), since a Mage plays quite differently than a Warrior, but understand enough of each other's specializations to integrate and coordinate with them (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 work, 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" the game offers, and often, too, the support of other, more advanced players (in multi-player games, in chat rooms, or standing there in the living room). This is how language acquisition works, though not always schools, which often demand that students gain competence through reading texts before they can perform in the domain they are learning.

So the suggestion I leave you with is not "use games in school"—though that's a good idea—but: 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 young people see in good games every day when and if they are playing these games reflectively and strategically?

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