What Would a State of the Art Instructional Video Game Look Like?

by J. P. Gee

What would a state of the art instructional video game look like? As far as I am concerned, we already know the answer to this question. A good many of the best commercial video games are already state of the art learning games—though their designers would go broke if too many people knew this, thanks to the poor reputation our schools have given learning in recent years (Coles 2003). A good instructional game, like many good commercial games, should be built around what I call "authentic professionalism." In such games, skills, knowledge, and values are distributed between the virtual characters and the real-world player in a way that allows the player to experience first-hand how members of that profession think, behave, and solve problems.

There is no shortage of people today who want to create "serious games" for learning (for more information, see **The Serious Games Initiative** or **The Education Arcade**). However, I believe we need to examine how good commercial games deliver learning as part and parcel of gameplay. People who want to make serious games often say they can not match the sophistication of today's commercial games because they do not have as much money for development as commercial game designers. But the failure, in my view, is often one of imagination as well as continued allegiance to bad theories of learning. After all, young gamers make **mods** for next to no money, some of which, like ***Counter Strike***, have gone on to world-wide commercial success and put many serious games to shame.

The purpose of this article is to argue that good commercial video games are designed around a good theory of learning—one supported by current research in cognitive science, the science that studies human thinking and learning (Gee 2003, 2004). After a brief discussion of learning theory and commercial gaming, I will give an example of how a good video game can engage deep learning, and I will close with a discussion of the implications of my claims for the creation of good instructional video games.

Theories of Learning and Commercial Gaming

Bad theories of learning lead to boredom and failure on the part of the learner. Commercial game designers can not afford bad theories of learning because if no one

could play their games or if playing them was a bore, their companies would go broke. And yet, their games are often long, hard, and complex. Commercial game designers must therefore use superior theories of learning in order to engage and guide players through the intricacies of the game. By contrast, the theory of learning in many of our schools today is based on what I call the "content fetish" (Gee 2004). The content fetish is the view that all academic disciplines, from physics to sociology to history, are composed of sets of facts or bodies of information, and that learning works through teaching and testing such facts and information.

But "know" is a verb before it is a noun, "knowledge." Any domain of knowledge, academic or not, is first and foremost a set of activities and experiences. That is, domains of knowledge are special ways of acting and interacting in ways that produce and use the domain's knowledge; they are special ways of seeing, valuing, and being in the world. Physicists *do* physics. They *talk* physics. And when they are being physicists, they *see* and *value* the world in a different way than do non-physicists. The same goes for good anthropologists, linguists, urban planners, army officers, doctors, artists, literary critics, and historians (diSessa 2000; Lave 1996; Ochs, Gonzales, and Jacoby 1996; Shaffer 2004a).

Something very interesting happens when one treats knowledge first and foremost as activity and experience, not as facts and information—the facts come to life. A large body of facts that resist out-of-context memorization and rote learning becomes easier to assimilate if learners are immersed in activities and experiences that use these facts for plans, goals, and purposes within a coherent knowledge domain (Shaffer 2004b).

But this does not mean that anything goes, or that educators should simply turn learners loose in interactive environments and wait for the results. And it certainly does not mean that there is no need for teachers. These, too, are bad theories of learning. They are the progressive, though equally limited, counterpoints to the traditionalists' skill-and-drill approach to learning. Learners are novices. Leaving them to float amidst rich experiences with no guidance only triggers the penchant for finding creative but spurious patterns and generalizations that send learners down garden paths (Gee 1992, 2001). The fruitful patterns or generalizations in any domain are best recognized by those who already know how the complex variables of the domain interrelate with each other. And this is precisely what the learner does not yet know.

Here we reach the central paradox of all deep learning. On the one hand, it will not work to try and tell newcomers everything. We, as educators, can not put it all into words because a domain of knowledge is composed of ways of doing, being, and seeing. When we do put what we know into explicit words, learners cannot adequately retain or even understand them because they have not yet performed the specific activities or undergone the experiences to which the words refer. On the other hand, simply turning learners loose to engage in the domain's activities will not work either, since newcomers do not know how to start, where to look for the best leverage, and what generalizations to draw, or how long to pursue them before giving them up for alternatives. We can hardly expect learners to create for themselves domains that took thousands of people and hundreds of years to develop.

Unfortunately, our schools are still locked in endless and pointless battles between "traditionalism" and "progressivism," between lecture-style teaching and immersion learning, as if these were the only two alternatives. In contrast, given that good commercial games have been so successful in attracting and maintaining learners, it is clear that they appear to have solved this central paradox of learning. This is in large part because good commercial games are based on good theories of learning. Since different types of games use different theories, I do not have the space here to explicate the theory of learning behind each category of game. I will instead explore one theory relevant to several categories and, perhaps, most relevant to those interested in making serious games.

Distributed Authentic Professionalism: *Full Spectrum Warrior*

Many good commercial video games are based on a theory of learning I will call "distributed authentic professionalism," a theory that resolves the learning paradox quite nicely (see also Shaffer 2004a and his important notion of "pedagogical praxis"). I will consider in detail one such game: ***Full Spectrum Warrior*** (Pandemic Studios, for PC and Xbox).

Full Spectrum Warrior is based on a U.S. Army training simulation, though the commercial game only retains about 15% of the Army's simulation (Buchanan 2004, 150). *Full Spectrum Warrior* teaches the player (yes, it is a teacher) how to be a professional soldier. It demands that the player thinks, values, and acts like a soldier to "win" the

game. The player cannot simply bring conventional game playing skills, such as those needed to succeed at ***Castlevania***, ***Super Mario***, or ***Sonic Adventure 2 Battle***, to this game. The player needs not only these skills, but others as well. In *Full Spectrum Warrior,* the player must acquire the professional skills of a soldier commanding two teams of a dismounted light infantry squad.

In *Full Spectrum Warrior*, the player uses the buttons on the controller to give orders to the soldiers as well as to consult a GPS device, radio for support, and communicate with command. The instruction manual that comes with the game makes it clear from the outset that players must think, act, and value like a professional soldier to play the game successfully. For instance, the manual says: "Everything about your squad . . . is the result of careful planning and years of experience on the battlefield. Respect that experience, soldier, since it's what will keep your soldiers alive" (Buchanan 2004, 2). Significantly, the virtual characters and the real-world player control different parts of the domain of professional military expertise; that is, the knowledge is distributed between a human player and the virtual soldiers.

Full Spectrum Warrior is designed in such a way that certain types of knowledge and certain skills are built into the virtual characters. The soldiers under the player's command and the enemies against whom the player fights possess a professional knowledge that the player seeks to understand and master. As a result, the player is constantly learning and using knowledge to succeed at playing the game. The virtual soldiers know part of what needs knowing (for instance, various movement formations) and the player knows another part (for instance, when and where to engage in such formations). This dynamic between virtual character and real-world player is true in every aspect of military knowledge in the game. The player is successful when using the virtual characters as smart tools or resources in order to master the specific situations presented in the game.

As such, the player is immersed in specific activities, values, and ways of seeing. And the player is supported by the knowledge built into the virtual characters and the weapons, equipment, and environments in the game. The player is supported, as well, by explicit instructions given at the precise moment that they can be understood within a specific context of action (i.e., explicit information is given "just in time" or "on demand"). The learner is not presented with knowledge devoid of context, nor is the learner left to his or

her own devices to rediscover the foundations of a professional practice that took hundreds of years to develop. Thus, our paradox of learning is solved.

The term "professional" may bring to mind people of high status, who are paid well for specialized skills. But this is not what I mean. Perhaps the best term to use is "authentic professionalism." Authentic professionals have special knowledge and distinct values tied to specific skills gained through a good deal of effort and experience. Authentic professionals do what they do, not for money, but because they are committed to an identity in which their skills and the knowledge that generates them are seen as valuable and significant. They do not operate merely by following well-practiced routines; rather, they think for themselves and create in their domains when they have to. Finally, authentic professionals welcome challenges at the cutting edge of their expertise (Bereiter and Scardamalia 1993). Good carpenters, good skateboarders, good musicians are authentic professionals just as much—and sometimes more so—than good doctors, lawyers, and professors.

Good video games, like *Full Spectrum Warrior*, distribute authentic professional expertise between the virtual character(s) and the real-world player. We can represent this notion by the formula: Virtual Characters ← Authentic Professional Knowledge → Player. The game *Thief: Deadly Shadows*, for example, requires the player to identify with a professional thief. In the game, thieving expertise is distributed between the virtual character and the real-world player. Likewise, *The Chronicles of Riddick: Escape from Butcher Bay* features the professional identity of a "tough guy prison escapee," and *Tony Hawk's Underground* features the professional identity of a skateboarder.

Many people might object to *Full Spectrum Warrior* because of the ideology, values, and world view it advances. Indeed, many will object, as well, to the ideologies of *Thief*, *Riddick*, and *Tony Hawk*. What these games exemplify, though, is how real learning is often linked to ideology. Adopting a certain set of values and a particular world view is intimately connected to performing the activities and having the experiences that constitute any specific domain of knowledge. Physicists hold certain values and adopt a specific world view because their knowledge-making is based on seeing and valuing the world in certain ways. The values and world views of an astrologer comport badly with those of an astronomer; the values and world view of a creationist comport badly with those of an evolutionary biologist.

As one masters *Full Spectrum Warrior* through activity supported by distributed knowledge (i.e., the knowledge built into the virtual soldiers), many aspects of military professionalism come to life. All sorts of arcane words and information that would be hard to retain through rote drill become part of one's arsenal, tools through which activity is accomplished and experience understood. For example, I now know what "bounding" means in military practice, how it is connected to military values, and what role it plays tactically in achieving military goals. A mere dictionary definition could not begin to compete with mine.

Games like *Full Spectrum Warrior, Thief, Riddick,* and *Tony Hawk* share knowledge and skills between virtual characters, objects, and environments and the real-world player. By the end of the game, the player has experienced a "career" and has a story to tell about how his or her professional expertise grew and was put to tactical and strategic uses.

Conclusion

"What would a state of the art instructional video game look like?" One way it would look is like *Full Spectrum Warrior*. A good instructional game that followed the model I have described would pick its domain of authentic professionalism well, intelligently select the skills and knowledge to be distributed, build in a related value system as integral to gameplay, and clearly relate any explicit instructions to specific contexts and situations. There are many other ways to accomplish these goals, and there is much to learn from good commercial games, many of which are serious games, indeed.

The prevalence of video games has shaped how younger adults and children—both males and females—think and learn (Beck and Wade 2004). Research in the learning sciences as well as in science and technology studies is making progress in mapping out the distinctive ways of doing, valuing, and knowing in various professional knowledge domains (Goodwin 2000 and Latour 1999). Thus the time may be ripe for authentic professional games.

Are there grave limitations on the professional skills and domains that games can represent? While no one wants to claim that all learning should be via games, at one level the answer to this question is no. Games are simulations with a goal structure in which the player has a distinct purpose and desired outcome. Good professionals simulate their

actions before carrying them out (Bereiter and Scardamalia 1993), so, in theory, there are few limitations here. Good video games are a way to externalize the mental imagery behind professional action. Of course, it remains for us to discover the range of professional actions that are within or beyond simulation. Furthermore, I am by no means arguing that learning ought to take place only through simulations. Rather, simulations should be part and parcel of larger learning systems that include a variety of different learning devices (including texts, of course).

My example in this paper—*Full Spectrum Warrior*—may make it sound as if what I have said here applies only to older learners, since this is not a game for young children. But I intend no such thing, nor do I intend my remarks to apply only to schools. I believe games have a role to play in learning from kindergarten through the workplace and on into retirement because they allow people to inhabit and learn through new worlds of experience.

Even young children learn best when they pick up "islands of expertise" (Crowley and Jacobs 2003). Whether those "islands" are model trains, toy dinosaurs, or Pokémon, they constitute centers of expertise that introduce learners to complex languages and the ways in which such languages are married to specific experiences, like gravity to a tossed coin. These experiences are then used to solve problems and answer questions. With authentic professionalism, "knowing" is not merely the mastery of facts; rather knowing involves participation in the complex relationships between facts, skills, and values in the service of performing a specific identity. Here, word and deed are united and the knower is a knower of specific kind—a type of active professional, not just a generic recipient of knowledge.

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