Learning Systems, Not Games

James Paul Gee
Mary Lou Fulton Presidential Professor of Literacy Studies
Arizona State University
james.gee@asu.edu

The worst educational technology we ever invented was the textbook. Evidence is replete that textbooks do not work well (Graesser, Lu, Jackson, Mitchell, Ventura, Olney, & Louwerse 2004). Why? Because they are meant to be one-size-fits-all, all-purpose solutions to learning. Today, more and more, digital games are being hyped as a new silver bullet in education. People want to teach everything through games, just like some people tried to teach everything through textbooks.

In reality, different tools—tools like oral language, written language, collaboration, video, social media, simulations, games, augmented reality, artificial agents, calculators, multi-modal media, graphic representations, and many more—have affordances to do some things well and some things less well, poorly, or not at all (Gee 2004). Regardless of affordances, any tool can be used in good or bad ways and is not good and bad all by itself.

Good learning is a system—a complex system—in which minds, bodies, times, places, language, and tools interact in complex ways (Brown 1994; diSessa 2000; Gee 2013). As educators we want to design and resource such systems. We want to ask questions like: What are the best ways to organize interaction and collaboration? What are best uses we can make of different

tools? How can we best integrate instruction, interaction, and tools? What are the best problems to focus on and what are the best ways in which to order or sequence them? What are the best ways to give feedback, resource learning, and assess growth and mastery across time? How can we prepare learners for future learning and make them resilient and able to persist past failure? How we can we teach what they need now and in the future? How do learning systems change across time, go bad, give rise to emergent properties, or begin to operate under their own steam?

Every prospective or new teacher soon faces three salient facts about our schools: First, all sorts of people criticize them (far fewer praise them); second, all sorts of people have different ideas about how to reform them; and, third teachers are among the last people we ask about how schools should be reformed, despite the fact that they are actually there and most reformers are not. Teachers are inundated with new fads and fashions and constant hype about silver bullets that will leave no child behind (Gee 2013).

Today there is a great deal of interest in and even hype about using video games in schools. This includes commercial games like "Civilization," "The Sims," "Portal," or "Minecraft" and educational games like "Dragon Box," "Quest Atlantis," "Immune Attack," or the" i-Civics" games. Video games are a new silver bullet.

Games can indeed create good learning because they often teach in powerful ways (Gee 2007). However, what many people miss in the rush to bring games to school is that the teaching method good games use can be implemented with or without games (though games are one good tool to be used with others). In fact, the best game learning, whether in school or out of school,

involves a learning system. The game offers guidance, mentoring, smart tools, well designed and well organized problems, feedback, and language just in time and on demand. But good commercial games are almost always now associated, as well, with interest- and passion-driven learning on the Internet in fan communities, interest-driven groups, or what I have elsewhere called "passionate affinity spaces" (Gee & Hayes 2010, 2011). Furthermore, both the game and its associated affinity spaces encourage and resource "modding", that is, using tools to modify the game or facilitate one's own learning or that of others. Learning connected to games is part of a system, not just interaction with a piece of software.

Recent work on learning suggests that human beings do not learn primarily from generalizations and abstractions (diSessa 2000;Gee 2004). They learn from experiences they have had and shared with others. They find patterns in these experiences with the help of good teachers. With enough experience, they can eventually generalize from these patterns to form larger generalizations or principles. For example, learners who have learned, through simulations or actual experiences in a lab or the world, how Newton's Laws of Motion apply to one situation (e.g., an accelerating car in a race) gain an embodied and situated understanding of those laws. As they gain understanding in more and more situations, they eventually come to see the laws as general and can think about them in abstract ways as applying to a great many situations.

Words in a text or textbook gain their meanings from the experiences people have had, not from definitions in terms of other words. The words in a manual for a game are about the actions and images in the game; the words in a biology text are about the actions and images in the world as biologists engage with it. The game or the world of plants, animals, and cells is what gives

meaning to the game manual or the biology text. If a student has no experiences (no actions or images) associated with a text, the student cannot understand the text deeply. That is why doing comes before reading. People need experiences before texts make sense, and then they can use them to learn new things and improve the learning they do in new experiences.

Because learning is based on experience, students do not learn facts ("information") well if we just focus on facts themselves. They learn and retain facts best when they use these facts as tools to solve problems. Teaching that focuses on facts can get paper-and-pencil tests passed, but such learning does not lead to problem solving. Teaching that focuses on problem solving and that uses facts as tools to solve problems leads both to fact retention and problem solving (Shaffer 2007).

However, there is a problem with learning from experience. It can take a lot of time, and learners can fail to know what to pay attention to in their experiences. The experiences that lead to the best learning are experiences that are well designed and well mentored through good teaching. And here is where games become one good tool among others: Games are just well-designed experiences in problem solving.

Games can inspire us to move beyond silver bullets and textbooks. They can inspire us to see teaching as designing, resourcing, and mentoring learning systems. They can inspire us to use many tools, not one, in well thought out and well integrated ways.

I have argued throughout my work on learning that good games (together with associated affinity spaces) and good learning systems in general have the following properties (e.g., Gee 2004, 2007, 2013, Gee & Hayes 2010, 2011):

- They focus on well-ordered problems, not facts and information alone
- They help learners develop crucial non-cognitive skills like being able to accept challenges, to persist past failure, and to fuel lots of practice through proactive effort and passion (Tough 2012)
- They give learners good tools with which to solve the problems, including other players in multiplayer gaming, and facts and information.
- They have clear goals, but, nonetheless, they encourage learners to rethink their goals from time to time.
- They lower the cost of failure so that learners will explore, take risks, seek alternative solutions, and try new styles of play and learning.
- They put performance before competence, and they put experiences and actions before words and texts. This means learners learn by doing and that they have images and experiences to give deep meaning to the words and texts they read later to resource their play and learning.
- They give copious feedback, and they assess all along the way to ensure that the learner is always well prepared for what comes next.
- They encourage learners and mentor learners to extend and articulate their knowledge and even produce new knowledge and designs.

- They ensure that at each new level (yes, learning systems, like games, should involve level design and how it helps learner "level up") learners face new problems that challenge the routine mastery they have developed through lots of practice on the last level. This has been called "the cycle of expertise" (Bereiter & Scardamalia 1993; Gee 2007).
- They hold everyone to the same high standard, but they allow learners to reach these standards in different ways and in different amounts of time. It does not really matter where or when a learner has started, only where she finishes.
- They deal with transfer as "preparation for future learning." You can see how well learners have learned by seeing how well they do in similar later and harder learning or problems in life.
- They teach learners to collaborate to solve hard problems and allow them to organize some of their own teaching and learning in terms of interests and passions they share with others.
- Gamers have to think like designers to play the games, since they have to figure out how the "rule system" in the game works and how it can be used to accomplish their goals. They can go further and "mod" the game (make new levels or versions) by using the design software by which the game was made. So, too, learners should learn to think like teachers, to teach others, and be able to "mod" the curriculum.

Teaching that accomplishes all of the above factors I will call Teaching as Designing (TAD) — that is, designing good experiences where students solve problems. Good game designers are

teachers, and good teachers are designers of good learning experiences. But both game designers and good teachers are designing systems with lots of good types of well integrated interactions and tools, each being used for what it good at.

REFERENCES

Bereiter, C. & Scardamalia, M. (1993). *Surpassing ourselves: An inquiry into the nature and implications of expertise.* Chicago: Open Court.

Brown, A. L. (1994). The advancement of learning. *Educational researcher* 23, 4-12.

diSessa, A. A. (2000). *Changing minds: Computers, learning, and literacy*. Cambridge, Mass.: MIT Press.

Gee, J. P. (2004). *Situated Learning and Language.* London: Routledge.

Gee, J. P. (2007). *What Video Games Have to Teach Us about Literacy and Learning*. Second Edition. New York: Palgrave/Macmillan.

Gee, J. P. (2013). *The Anti-Education Era: Creating Smarter Students through Digital learning*. New York: Palgrave/Macmillan.

Gee, J.P., & Hayes, E.R. (2010). *Women as Gamers: The Sims and 21st Century Learning*. New York: Palgrave/Macmillan.

Gee, J.P., & Hayes, E.R. (2011). *Language and Learning in the Digital Age.* London: Routledge.

Graesser, A. C., Lu, S., Jackson, G. T., Mitchell, H., Ventura, M., Olney, A., & Louwerse, M. M. (2004). AutoTutor: A tutor with dialogue in natural language. *Behavior Research Methods, Instruments, and Computers*, *36*, 180–193.

Shaffer, D. W. (2009). *How Computer Games Help Children*. New York: Palgrave/Macmillan.

Tough, P. (2012). *How Children Succeed.* New York: Houghton Mifflin.