AFTERWORD

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The papers in this volume offer a state-of-the-art overview of educational scholarship and practice at the intersection of video gaming, literacies, schooling, out-of-school learning, and two related areas of "content" (L1 and L2 education). The authors of these papers rightfully stress that videogames and gaming take many forms, that what people actually do in and around games is as crucial to learning and literacies as the games themselves, and that gaming is intertwined with other literacy practices that vary considerably across the contexts of school, home, community, and online spaces. As with any overview as good as this one, one marvels at far we have come. Two decades ago, when Jim wrote What Video Games Have to Teach Us about Learning and Literacy (Gee, 2003), video gaming primarily was viewed as a deterrent to literacy and learning; at best, a form of mindless entertainment and at worst a medium that contributed to violence and aggression. The idea that the educational benefits of gaming would become a legitimate area of scholarship in literacy education would have seemed absurd. Still, with all this activity, we can't help but wonder (like Robert Frost) about the paths not taken in our collective interest in video gaming. After all, the world we live in today is in crisis and wondering about paths not taken is an order of the day.

One thing evident in this collection is that what is being studied here is massively complex. As the papers make clear, literacy alone is a complex phenomenon. Even if we restrict it to reading and writing, literacy – or rather, literacies - comprise a set of social practices that draw on cognitive, social, cultural, interactional, collaborative, and institutional "moves" where all elements interact as well as vary alone and in combination across different contexts. If such practices do not comprise a complex system in the sense physicists use the term, they are very close indeed (Siegenfeld & Bar-Yam, 2020). Such systems cannot be understood through controlled studies because many variables simply cannot be controlled. Think, for example, of how

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people access, circulate and make meaning of news about national events. The literacy practices associated with such "information literacies" involve not simply reading (or viewing or listening) but also how one finds news (most commonly these days, through social media), what other people say or write about the news on social media and in person, how one's stance towards particular events is tied to political and cultural identities, and so forth and so forth.

Schools are complex systems as well. Classrooms typically involve at least one teacher and two dozen or more learners, all humans with brains whose complexity rivals the universe. These complex systems interact with larger systems of schools as institutions, cultures, and parts of society. These systems certainly meet the criteria for complex systems in the physicists' sense. While the U.S. Department of Education (Coalition for Evidence-Based Policy, 2003) tells us that controlled studies of classrooms are the "gold standard", they can't be, since complex systems cannot be studied that way.

Broadly speaking, learning involves using experiences in the world, often influenced by social and cultural groups, institutions, and society as whole, as well as by individual variation, and heaps of contextual variation, to build the massive web of connections that make up the human brain, a system that no one doubts is an authentic complex system. Furthermore, our brains – these complex systems - are oriented towards action. People learn in order to do things, not just to acquire information. Content, like L1 and L2 as school subjects, is a fiction. School still tends to treat content as discrete bodies of information, information to be acquired now and used later (or potentially put to no use at all). However, any meaningful content is just the fodder for particular kinds of activities that involve solving problems. In reality, there is no "physics" as a noun, save in schools and textbooks, there is only "physics-ing", which is like gaming. Physicists "do physics" by developing and using theories like quantum mechanics and the uncertainty principle to make predictions and solve physical problems. It has never been clear what L1 as a school subject means in terms of doing (L1 curricula have many goals, ranging from highly skills-focused to personal growth) and L2 had better be more than a school subject if learners are to flourish with a new language. Thus, doing (which also involves being—becoming something—taking on a new identity) is surely a complex system too.

Games need not be all that complex. You can make games for multiple choice testing or simple skill and drill. These were never the sorts of games that Jim had in mind when he wrote What Video Games Have to Teach Us. However, games as a combination of software, content, player actions, and all the affinity spaces—real and digital spaces—in which gamers interact outside and during games are surely complex systems. And these systems, too, interact with society, culture, politics, institutions, and history.

So, the focus of this issue, the various configurations of video gaming, literacies, schooling, out-of-school learning, L1 and L2 education, is a huge complex system composed of interacting complex systems, a universe of complex systems. It surely will not be fully understood through controlled studies or "mere" descriptions, thick

though they may be. Even the carefully crafted studies in this volume can only touch on this complexity. What are the implications of such a systems perspective as we move forward with scholarship on these topics, or for scholarship on learning and literacies in general? Is this a counsel of despair? Hardly. Physicists deal with complex systems and gain some insights, though tempered by much humility. Design-based research, post hoc analysis, model building, simulations, and working collaboratively across disciplines, methods, and tools, again coupled with humility, might work. The problems faced here are harder than those physicists face, since humans introduce a degree of complexity physicists gladly don't deal with. They also are problems with moral and ethical implications, for the futures of our children and society are at stake. We do know, from our world today, that complex systems can interact in ways that send them all out of control and create chaos. The recent pandemic, and its multifarious effects on all aspects of society, including schools, is just one example. The challenge, then, that we pose, or perhaps the path that might still be taken, is for scholars and educators to use this systems perspective, and questions of moral value, to inform their work. Just as making rote learning into a game by adding point systems or leaderboards still results in rote learning, using traditional educational research methods with games and game-based learning will still yield results that are unlikely to have a transformative effect on our understanding of or efforts to enhance literacy learning.

Indeed, games and gaming are only one aspect of these systems, and not an essential aspect at that, in terms of changing schools and schooling. One of Jim's goals in What Video Games Have to Teach Us was to share his newly found appreciation for the powerful ways that well-designed videogames engaged players in complex problem-solving, interpreting sophisticated multimodal texts, and collaborating in and around the game. However, his primary goal, a goal that is often overlooked, was to use games and gaming as examples of how schools and other learning environments might be reimagined and redesigned. Games, or rather well-designed games, within larger systems of players, affinity spaces, and so forth, illustrate principles of learning and features of literacies that are supported by decades of scholarship in education and beyond. Ironically, many games instantiate these principles better than many (not all) schools. While Jim's work inspired many efforts to introduce videogames of all sorts into schools, that was never his original purpose. And sadly, if these games are poorly designed, or teachers are not adequately prepared for and enthusiastic about game-based learning, or games are not well integrated with other activities, the results may be disastrous, as some papers in this issue illustrate.

We do not argue that efforts to incorporate games into formal or informal learning environments should be discontinued, or that research on how games "in the wild" can serve as hubs for a multitude of important and fulfilling learning experiences will not remain valuable. However, here we wish to describe "what games are good for" in a way that differs from using them as illustrations of more general learning principles. We hope to suggest yet another path that might still be taken.

The papers in this issue reflect how far we have come in using and understanding games and gaming for learning and literacies, in and around school. Like so much work in this area, the question "What is a game?" is often asked and answered, as it should be (although Wittgenstein long ago told us there is no answer to this question in terms of necessary and sufficient conditions, but that is a topic for a different afterword). While definitions of games and digital games abound, we wish to challenge some popular and taken-for-granted assumptions about games, particularly about the aspects of games that are particularly important for learning and literacies. To do so, we need to take a brief trip back in human history.

Humans became modern cognitively and biologically about 50,000 years ago. By that time, they had modern language and it was the first time any living creature had drawn and painted realistic images on rocks and cave walls (Clottes, 2020). By then, humans had been making tools and even aesthetic objects for millions of years. It took our ancestors a very long time to learn to make realistic images on surfaces. This was revolutionary.

Humans long ago evolved a superpower that allowed them, for better and often worse, to dominate all other animals and the world. That power is the capacity to use images in their brain to simulate. In their brain, they can create scenarios, act them out, even play the role of different people or animals in them, see the consequences, and replay the whole thing with revisions. They can imagine things that existed, may exist but have not been experienced, and things that cannot exist but still dance around in our heads and later on in our rituals and religions. This capacity to simulate is much like having a videogame platform in your head and being able to play it yourself.

Those cave paintings of majestically beautiful animals (humans were represented just as stick figures—we knew our place in nature back then) were the first realistic externalizations of humans' simulation capacities. Of course, making a hand axe already externalized imagination and people already had language, so they could create representations in words (symbols). What was new was the ability to project actual mental images and scenarios (not symbols) onto a surface for others to see and appreciate. It was the difference between writing a book and creating a movie or videogame.

As these paintings were incorporated into rituals led by what later would be called shamans, they became part of experiences akin to early multiplayer videogames, in which humans played with moving images and moving bodies. These rituals were not just role playing. They were mental simulations made public as embodied experiences, enhanced through music, costumes, dancing, and artifacts. Shamanic rituals connected people with each other, with the natural world, and with spiritual realms, through the external instantiation of imagination. Videogames, as a technology, are a much later development of this revolution in human capacities. They are a form of external imagination that is modeled on humans' ability to use their brains to run simulations. Have we yet to tap the massive potential power this

technology has? Surely not. The first externalized mental games played in those caves gave rise to spirituality. What have videogames given rise to?

We are often deceived about the powers of different technologies. The invention of the washing machine arguably had more impact on society than does the internet. It doubled the number of humans who could go to work and, in many ways, created the modern world. People still moan that videogames cause violence, yet the numbers of people killed because someone played a violent videogame (sure not more than 1000, probably much less) are dwarfed by the millions of people killed across history as a result of conflicts over religious texts. And, make no mistake, formal institutional religion would never have had the power it had, and has today, if some local religions had not been written down and universalized. The impact of videogames simply pales in comparison.

Videogames potentially have the full power of the form of imagination that arose only in humans and first was externalized in those caves. Still, videogames are relatively new and, like other media in our current society, their development has been driven in part by desire for profit and distraction. We ought not lose sight of the incredible power and potential of the human imagination interacting with its own external doppelganger. If we take this view of games and gaming as a starting point, what questions might we ask about their potential for enhancing human learning and experience, for helping us imagine and realize new ways of being and doing that are not as harmful as the current path our global society is taking? Gaming alone will not create a better world, but it may help us harness our will and imagination to envision one, or even many possible worlds. We don't have much time to spare.

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