EDUCATIONAL THEORY

DEWEY AND VIDEO GAMES: FROM EDUCATION THROUGH OCCUPATIONS TO EDUCATION THROUGH SIMULATIONS

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Abstract. Critics like Leonard Waks argue that video games are, at best, a dubious substitute for the rich classroom experiences that John Dewey wished to create and that, at worst, they are profoundly miseducative. Using the example of *Fate of the World*, a climate change simulation game, David Waddington addresses these concerns through a careful demonstration of how video games can recapture some of the lost potential of Dewey's original program of education through occupations. Not only do simulation games realize most of the original goals of education through occupations, but they also solve some of the serious practical problems that Dewey's curriculum generated. Waddington concludes the essay with an analysis of Waks's critiques and some cautionary notes about why it is important to be temperate in our endorsement of educational video gaming.

Introduction

In a 1984 article, "The Shame of American Education," B. F. Skinner wrote of the fascination that video games hold for children and asked, "What would teachers not give to see their students applying themselves with the same eagerness?"[1] For Skinner, the recipe for pedagogical success was simple — successful video games were well-executed schedules of reinforcement built around a set of tasks, and successful curricula should be arranged similarly. Skinner's influential educational followers agreed, and, as a result, many of the top-selling educational games of the early 1980s were built around this principle; they were basically programmed instruction modules with a thin veneer of "gamification" around them.[2]

There has been a lot of water under the bridge since then, however, and the nature of academic support for video gaming has changed significantly. Some of the strongest advocates of educational video gaming now come from a quarter that is diametrically opposed to Skinnerian behaviorism: the modern-day inheritors of the Deweyan tradition. David Shaffer, for example, dedicates a substantial portion of his book *How Computer Games Help Children Learn* to the claim that games "embody some of the ideas about learning popularized by one of the giants of progressive education, John Dewey."[3] Schaffer maintains that certain kinds of video games immerse children in simulated worlds that pose the kinds of experiential, structured problems of which Dewey would have approved, and

1. B. F. Skinner, "The Shame of American Education," *American Psychologist* 39, no. 9 (1984): 952.

2. See, for example, Janice Davidson and Richard K. Eckert, *Math Blaster*, 5.25" diskette (Torrance, CA: Davidson and Associates, 1983).

3. David Williamson Shaffer, *How Computer Games Help Children Learn (*New York: Palgrave Macmillan, 2006), 123.

other scholars sympathetic to progressivism, including Linda Darling-Hammond, Craig Cunningham, and James Paul Gee, have echoed this view over the years.[4]

Yet not all progressives are equally sanguine about the Deweyan elements of video games. In an analysis that will serve as the point of departure for this essay, Leonard Waks contends that video games are, at best, a second-rate substitute for the rich classroom experiences that Dewey wished to create and, at worst, profoundly miseducative.[5]

My aim in what follows is to address the concerns of Waks and others by offering a careful demonstration of how video games can recapture some of the lost potential of Dewey's original educational agenda. In order to construct this case, I will begin by outlining Dewey's program for education through occupations and offer a brief analysis of why it failed to work. I will then suggest that we should attempt to revitalize education through occupations and that simulation games are a promising tool for doing so due to the fact that they address some of the original program's most debilitating problems. In developing this argument, I will make use of an extended example: *Fate of the World*, a climate change simulation game. Finally, I will engage with Waks's arguments against gaming and demonstrate that although his arguments fall short in certain respects, there are still a number of compelling reasons to be temperate in our enthusiasm for simulation gaming.

What Was Education through Occupations?

In the opening pages of the first chapter of *School and Society*, Dewey discusses the problem that gave rise to his system of education through occupations. From his academic post in Chicago, he clearly understood that America was transitioning to an industrial society, and he thought that important social knowledge was being lost in this transition. Dewey felt that in the mid-nineteenth-century rural America in which he had been raised, people had understood the social systems of production that underpinned everyday life. He commented,

> Those of us who are here today need go back only one, two, or three generations to find a time when the household was practically the center in which were carried on … all the typical forms of industrial occupation. The clothing worn was for the most part made in the house; the members of the household were usually familiar also with the shearing of the sheep, the

4. James Paul Gee, *What Video Games Have to Teach Us About Learning and Literacy* (New York: Palgrave Macmillan, 2003); Craig Cunningham, "Transforming Schooling Through Technology: Twenty-First-Century Approaches to Participatory Learning," *Education and Culture* 25, no. 2 (2009): 46–61; and Robert Cwiklik, "Dewey Wins! If the 'New' Teaching Methods Pushed by High-Tech Gurus Sound Familiar, It Isn't Surprising," *Wall Street Journal*, November 17, 1997, R17.

5. Leonard J. Waks, "Computer Mediated Experience and Education," *Educational Theory* 51, no. 4 (2001): 415–432.

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> carding and spinning of the wool, and the plying of the loom. Instead of pressing a button and flooding the house with electric light, the whole process of getting illumination was followed in its toilsome length, from the killing of the animal and the trying of fat to the making of wicks and dipping of candles. The supply of flour, of lumber, of foods, of building materials … was produced in the immediate neighborhood, in shops which were constantly open to inspection and often centers of neighborhood congregration. The entire industrial process stood revealed … [6]

For the urban, early twentieth-century child, these processes and the beneficial educational experiences and outcomes that accompanied them were often out of reach — everyday life had changed, and urbanization and industrialization meant that many children's everyday realities were vastly different from what they had once been in nineteenth-century rural America. Industrial and social processes that had once been widely visible and broadly distributed were being transitioned into far less transparent centralized industrial processes. Dewey noted, however, that it was no use simply bemoaning the loss of these valuable experiences that were falling by the wayside in the face of industrialization and urbanization. Instead, what was needed was a concrete plan to recapture these experiences through a new curriculum.[7]

Education through occupations was one of the centerpieces of Dewey's new educational program at the University Laboratory School, and it was intended, among other things, to recapture the value of these informal production experiences in the home. The teachers at the University Lab School were tasked with reconstructing educative occupations, and in *School and Society* Dewey explains how this was done through the example of textile work. Students would start the process at the beginning, with the raw materials (for example, wool). They would analyze the affordances of these raw materials, coming to understand the challenges of processing them into a more finished state. They would then work the wool fibers toward their finished state, and, with guidance from their teachers, they would reinvent carding and spinning devices. Next, with an understanding of the basic production processes in hand, the children would transition toward knowledge of the ways in which the modern, industrialized versions of this process functioned. This discussion not only included technical details, but focused significantly on social implications as well. Dewey remarked,

> Then the children are introduced to the invention next in historic order … seeing its necessity, and tracing its effects, not only upon that particular industry, but upon modes of social life. … I need not speak of the science involved in this … nor, again, of the historical side — the influence which these inventions have had upon humanity.[8]

In their account of the Dewey School, teachers Katherine Camp Mayhew and Anna Edwards discuss the emphasis placed upon the social implications of

6. John Dewey, *The School and Society and the Child and the Curriculum (*Chicago: University of Chicago Press, 1990), 12.

7. Ibid.

8. Ibid., 21.

industrialization, noting that life had acquired "comfort and beauty" for some, which raised "the goading query — why not comfort and beauty for all?"[9]

The rediscovery of industrial and agricultural processes was not the only critical aspect of education through occupations — in concert with these reenactments, the students also simulated social systems. Mayhew and Edwards describe a situation in which six-year-olds built a simulated wheat farm and its associated supply chain. The children constructed a pretend play in which they grew winter wheat, harvested it, ground it, distributed it, and manufactured it into other products. Mayhew and Edwards comment, "Some of [the children] were to be farmers, some trainmen, some mill hands, and some grocers in different towns."[10] This kind of scenario was repeated numerous times: the children reenacted cattle farming, sheep ranching, irrigation, lumber camps, and coal mining.[11] In each case, the children would not only be led to understand the details of the production process, but also the various social roles that were implicated in these processes.

Education through occupations had a number of educational aims. First, Dewey felt that the tasks that children performed were salutary from the standpoint of teaching them habits of self-discipline and cooperation. Both the occupational tasks and the social simulations were designed to be cooperative, and some of the occupational tasks (for example, building a smelter or building a shed outside the school) required substantial attention to detail. Second, and more importantly, children were also expected to develop habits of scientific inquiry. Education through occupations required the children to figure things out; it was not enough simply to build a smelter from a plan — the children first had to make several unsuccessful attempts to build it, discovering principles of draft and combustion on their way to developing a successful plan for the smelter. Likewise, in the textile tasks, the children had to invent their own carding and spinning devices. The teachers encouraged the children to experiment and to develop habits of thinking through problems systematically and carefully.[12]

An additional desired outcome, the outcome that will concern us most in this analysis, was coming to understand how social systems worked. This, as Dewey himself indicated above, was a critical goal of education through occupations. Nineteenth-century citizens had had a better of sense of the technologies and social systems that underpinned everyday life, but the transition to industrialism had made acquiring this kind of understanding more difficult. Dewey felt that this kind of understanding was critical from the standpoint of citizenship — by looking at sociotechnical systems such as cloth production, he thought, "the mind is introduced to much more fundamental and controlling influences than appear

9. Katherine Camp Mayhew and Anna Edwards, *The Dewey School: The Laboratory School of the University of Chicago, 1896–1903* (Chicago: D. Appleton Century, 1936), 314.

10. Ibid., 86.

11. Ibid., 92.

12. Dewey, *School and Society*, 20.

in the political and chronological records of history."[13] The kind of sociotechnical understanding that Dewey hoped children would develop has been referred to elsewhere as "technological transparency," which is a term that has been adapted from the work of Jean Lave.[14] For Dewey, empowered workers and citizens were people who had acquired at least some level of familiarity and facility with this kind of understanding.

Ultimately, however, the various intended outcomes of education through occupations — namely, habits of scientific inquiry, technological transparency, and cooperation — amount to a comprehensive educational program that is substantially more ambitious than any of these individual outcomes. In order to see this, it is helpful to turn to *Democracy and Education,* where Dewey discusses the true meaning of "vocational education." For Dewey, the development of a vocation, which he defined as "any form of continuous activity which renders service to others and engages personal powers in behalf of the accomplishment of results," was critical for human flourishing on both the individual and social level.[15] The origins of this concept can be traced back to Dewey's 1891 book *Outlines of a Critical Theory on Ethics,* in which he drew upon G. W. F. Hegel's analysis in the *Philosophy of Right* to emphasize the primary importance of developing a work life that fulfilled one's own interests as well as contributed to one's community, and it also lay at the heart of the Dewey School, as Dewey acknowledged when he suggested that the school's "chief task" was to create a form of life that reconciled the individual and the social in this way.[16] Chris Higgins has written of a vocation as an "axis of salience that defines an environment" for the person who experiences it, and, perhaps above all, one can think of education through occupations as a proving ground for helping students discover and develop this axis of salience that will help them navigate their lives.[17]

This does not obviate the importance of technological transparency, however — at the end of his chapter on vocation in *Democracy and Education*, Dewey took pains to note that preparation for vocation in this broad sense would necessarily include "training in science to give intelligence and initiative in dealing with material and agencies of production, and study of economics, civics, and politics,

13. Ibid., 22.

14. David I. Waddington, "Scientific Self-Defense: Transforming Dewey's Idea of Technological Transparency," *Educational Theory* 60, no. 5 (2010): 621–638; and Jean Lave and Etienne Wenger, *Situated Learning: Legitimate Peripheral Participation* (Cambridge: Cambridge University Press, 1991).

15. John Dewey, *Democracy and Education* (New York: Macmillan, 1916), 319.

16. David I. Waddington, "Uncovering Hegelian Connections: A New Look at Dewey's Early Educational Ideas," *Education and Culture* 26, no. 1 (2010): 67–81. See also John Dewey, *Outlines of a Critical Theory of Ethics*, in *John Dewey: The Early Works, 1882–1898*, vol. 3, ed. Jo Ann Boydston (Carbondale: Southern Illinois University Press, 1969); and G. W. F. Hegel, *Elements of the Philosophy of Right*, ed. Allen W. Wood, trans. H. B. Nisbet (New York: Cambridge University Press, 1991).

17. Christopher Higgins, "Dewey's Conception of Vocation: Existential, Aesthetic, and Educational Implications for Teachers," *Journal of Curriculum Studies* 37, no. 4 (2005): 441–464.

to bring the future worker into touch with the problems of the day and the various methods predisposed for its improvement."[18] A critical part of the development of a vocation was the development of what Dewey called a "courageous intelligence," which one might define as the ability to respond knowledgeably, effectively, and experimentally to the challenges posed by both public and private life.[19] Being well versed in technological transparency gives students the courage to work to decode the world.

Why Didn't Education through Occupations Catch On?

Despite the fact that Dewey's educational experiments at the Laboratory School were widely hailed and helped make him a successful public intellectual, the system of education through occupations was not especially successful. Today, Dewey is remembered much more as a key progenitor of child-centered education, and the actual educational program laid out in *School and Society* is broadly misunderstood and largely forgotten.

There are a number of possible reasons for the lack of success of Dewey's program, and one of the most significant can be assigned to Dewey himself. In *School and Society*, Dewey does not lay out the purposes and procedures behind his education system particularly systematically. This is partly a result of the fact that some of the essays that make up this collection were originally given as public addresses and hence do not fit together especially well, but the fact remains that *School and Society* lacks the kind of extended examples and stepwise explanations that are helpful in explicating a new curriculum.

Yet even if Dewey had transmitted his message more effectively, education through occupations would have faced two other serious practical problems. The first of these is the amount of effort that it demanded on the part of the teacher. To set up a single child to, say, recapitulate the historical development of the textile industry is not an easy task, and in a class of children, this task is even more difficult. Conducting a social simulation, especially as the simulation becomes more complex (that is, with older children and more intricate tasks and roles) is also demanding. Although the Dewey School managed to put these programs in place, Dewey benefited (as he should have) from ideal experimental conditions: small class sizes, highly trained and dedicated teachers, adequate funding, and a clientele of relatively high socioeconomic status. In a regular classroom setting, none of these material attributes are likely to be in place, and the teacher, who is really the most critical component of this curriculum's success, is likely to be equivocal in his or her enthusiasm for this labor-intensive progressive curriculum.

The second practical problem is this curriculum's vulnerability to what Edward Haertel has dubbed "lethal mutation" — a seemingly small change in

18. Dewey, *Democracy and Education,* 318.

19. Ibid., 319.

enacting a curriculum that makes a substantial difference in its outcomes.[20] With education through occupations, it is all too easy to shift from a focus on learning about social systems and scientific inquiry to a focus on "learning by doing," or "learning through work," or, in other words, mildly progressive curricula in which much of the scientific and technological content that makes Dewey's curriculum so valuable is lost. Worse yet, it is possible to offer an interpretation of education through occupations that places much of its emphasis on the development of vocational skill. Notably, the fact that Dewey was vehemently opposed to this latter interpretation of "Deweyan" education did not stop proponents of strictly vocational education like Charles Prosser from seeing themselves as operating within the Deweyan tradition.[21]

Reenvisioning Education through Occupations

Clearly, education through occupations faced a number of obstacles, both practical and ideological, and it is highly likely that these obstacles contributed to its low level of implementation. Therefore, if the curriculum is to have any possibility of being resuscitated, at least some of these obstacles are going to need to be addressed. In addition, the curriculum will certainly have to be updated, as recapitulations of the history of the textile industry are not what today's citizen needs. I will make the case that certain types of video games may offer us a way to get around some of the most significant obstacles that caused education through occupations to fail the first time around, but before I make this argument, it is necessary to make the case for why the vision of citizenship that underlies education through occupations is still relevant.

One promising sign of relevance is that the citizenship education challenge that we face today is similar in some important respects to the challenge that Dewey confronted. Dewey was concerned about citizenship in the context of an emerging sociotechnical system (industrialism) that had made many of the locally developed understandings about the way things worked obsolete. He was worried about the fate of the citizen in a society in which scientific and technological change was the major driver of political and economic change. As I noted previously, education through occupations aims to develop citizens who are both inclined to intervene and are capable of intervening in the increasingly national and international problems that affect their lives. These citizens are not experts, but they are what science education scholar Noah Feinstein has called "competent outsiders," which he defines as "people who have learned to recognize the moments when science has some bearing on their needs and interests and to

20. Haertel, cited in Ann L. Brown and Joseph C. Campione, "Psychological Theory and the Design of Innovative Learning Environments: On Procedures, Principles, and Systems," in *Innovations in Learning: New Environments for Education,* ed. Leona Schauble and Robert Glaser (New York: Routledge, 1996), 259.

21. Charles Prosser, *Vocational Education in a Democracy* (Chicago: American Technical Society, 1949), 36.

interact with sources of scientific expertise in ways that help them achieve their own goals."[22]

Today, we are faced with a scenario in which a key citizenship challenge that concerned Dewey — understanding the currents of scientific, technological, and social change that underpin one's society — has become significantly more complex. The industrial system has grown immensely since Dewey's time and is now a global phenomenon. In addition, a complex and rapidly changing information system has grown atop the industrial system, affecting it in turn. The pace of scientific and technological change is rapid, and it is difficult to understand the implications of some of the discoveries and inventions that will, inevitably, affect us. Beyond these developments, but also linked with them, are a number of global environmental challenges, including global warming, ozone depletion, nuclear waste disposal, desertification, and resource depletion.

Being an informed citizen with respect to these questions, even at the level of a minimally invested "competent outsider," is a tall order indeed, but it is a worthwhile one, and all of Dewey's original educational goals are relevant in the achievement of it. If a citizen has a systematic understanding of the network of relationships that cause global warming, he or she will understand that voting for parties that support the exploitation of the tar sands could cause tremendous, irremediable future difficulties while nonetheless yielding short-term economic gains. A disposition to dialogue and cooperate with other individuals could grow new communities on the Internet and on the ground to lobby for the causes that the citizen is able to identify as important. The habit of experimentation could, on the social level, serve this person well in helping to think through and engineer positive piecemeal social change, while also being useful in manifold ways (including in the labor market) on the individual level.

There can be little doubt that these outcomes are worthwhile; the problem is in bringing them about, and as I pointed out in the preceding section the original Deweyan program is impracticable. This sets up a challenge: if the ends are worthwhile and should be kept in place, new means must be found. With regard to this task of finding new means, some of the spirit of Dewey's original program has been captured by diverse efforts of the science-technology-society (STS) movement, which has attempted to bring socioscientific problems (such as global warming) closer to the heart of the science curriculum, which is currently still mostly focused on knowledge of canonical science content.[23] In this account, however,

22. Noah Feinstein, "Prepared for What? Why Teaching Everyday Science Makes Sense," *Phi Delta Kappan* 90, no. 10 (2009): 180. It should also be noted that this conception of the citizen is very much in line with what Dewey says in *The Public and Its Problems,* partly in response to some of the concerns raised by Walter Lippmann. Dewey comments, "It is not necessary that the many should have the knowledge and skill to carry on the needed investigations; what is required is that they have the ability to judge of the bearing of the knowledge supplied by others upon common concerns." John Dewey, *The Public and Its Problems* (Athens: University of Ohio Press, 1927), 209.

23. See, for example, various papers collected in *Science Education as/for Sociopolitical Action,* ed. Wolff-Michael Roth and Jacques Désautels (New York: Peter Lang, 2002).

I would like to reach beyond STS to talk about the educational possibilities of simulation video games, which I argue can realize some of the original key tenets of Deweyan education through occupations, particularly scientific inquiry and technological transparency. I will further contend that video games have the power to solve some of the practical challenges that posed significant obstacles to Dewey's program. In the next section, in order to illustrate the Deweyan potential of simulation video games, I will take a close look at a climate change simulation game, *Fate of the World*.

Learning from *Fate of the World*

In *Fate of the World,* the year is 2020, and the climate crisis has finally come to a head. As a result, the UN has decided to create a new agency, the Global Environmental Organization (GEO), with absolute power to regulate worldwide environmental policy. The player is given the responsibility of running this organization, and the core mission is to avoid having the average global temperature rise more than three degrees by 2100. The game proceeds by turns of five years, during which the player is asked to decide upon policies in each major global region.[24]

The amount of data that the player must process in the game is substantial. Each turn, the player receives a summary of global events (generally fairly negative), as well as a summary of how his or her policies are being received in each region. The player must also observe a vast network of statistics — agricultural, business, and industrial output; employment; disease; population growth; water scarcity; deforestation; resource consumption; and, above all, emissions. These data are presented in the form of graphs, but the player can also dig down into the game's underlying model to see how the various variables are related.

An extended example may be helpful here. Early in the game, the player will observe that China is producing an enormous amount of carbon emissions. Given that emissions are the single most important statistic in the game, it is critical that the player figure out where these emissions are coming from and develop a strategy to combat them. Using the model, the player can dig into the regional breakdown of China's emissions, discovering that most of the emissions are being produced from energy generation. This results in a further need to drill down into the data, as there are several different methods by which energy is generated. Once the player has dug three layers down into the game's model, he or she can discover that most of China's power plants are coal-fired, which is undoubtedly the source of many of the emissions.

At this point in the game, the tempting policy for the player is to enact a regional ban on coal use. This strategy, however, has substantial negative impacts in the game. China has to generate energy somehow, and it has few nuclear, oil, solar, or gas-fired plants to fall back on. Industry and commerce use much of the energy generated by the power plants, and the production of these sectors falls precipitously once the coal ban deprives them of the power

24. Red Redemption, *Fate of the World*, digital download (Oxford: Red Redemption, 2011).

necessary to run. Mass layoffs result, which has a substantial impact on Chinese incomes and employment levels, causing political instability and high levels of discontent with the player's policies, not to mention substantially lower tax revenues.

For the player of *Fate of the World*, it swiftly becomes clear that the system encompasses a complex network of variables, and that quick, simplistic, and radical approaches to climate change are unlikely to work from a policy standpoint. It is necessary to dig deep into the system, to discover the relationships between variables and monitor their fluctuations over time as different kinds of policies are implemented. In the case of the Chinese emissions problem, a more helpful strategy is to pursue a number of more modest and gradual policies, including building renewable energy power plants, working to change citizens' attitudes, and launching a campaign to gradually reduce industry's reliance on coal. This policy will eventually lead to a steady decrease in Chinese emissions, which will allow the player to focus on other pressing challenges that the game generates.

The Chinese example highlights a significant aspect of *Fate of the World*: its unusual level of seriousness in simulating a social system. Within the context of this game, there is plenty of room for experimentation in terms of enacting policies, but mistakes are punished severely and on an ongoing and compounding basis, much as they would be in reality. In addition to this, the game's internal model generates a relentless stream of problems and difficulties for players to solve, which gives them a clear sense that global warming poses an enormous collective challenge. Invariably, as the simulation proceeds, economies flag, government money runs out, floods and superstorms strike, and populations become restive. As a player, one has a sense that one is constantly just a single small mistake away from seeing the world slide into disaster.

Now that I have provided an overview of what *Fate of the World* does, I would like to shift the discussion back to the key goals of Deweyan education through occupations: technological transparency, habits of scientific inquiry, and a disposition to cooperate. Turning first to technological transparency, the most important educational outcome of *Fate of the World* is undoubtedly its ability to do something that is very difficult to achieve in the classroom: simulate a complex social system on an ongoing basis. One does not simply gain an idea of the problems of global warming on a retail basis; one develops a much more systematic and thorough understanding of the overall shape of the coming disaster. In my own experiences with the game, I felt that I came to understand the underpinnings of a phenomenon that I had previously merely understood at a surface level. As a moderately well-informed person, I had known that global warming would potentially cause significant future problems at some unspecified date, but by playing the game, I experienced these problems much more directly, came to understand their causes better, and developed a much more in-depth understanding of the links between the various factors that make the broad phenomenon of global warming such a serious collective action problem.

While this type of understanding of social systems was something that Dewey wanted to accomplish by means of education through occupations, it was nonetheless hard to accomplish in the traditional Deweyan classroom. This is not only due to the practical challenges I discussed earlier, but it is also due to the fact that it can be difficult to see the forest for the trees when one is conducting these kinds of simulations on an in-person, in-classroom basis, without the aid of computer technology. Imagine, for example, how easy it would be for children to get sidetracked during an in-classroom simulation of predator/prey relationships as opposed to a computer-game version of the same relationship. As amusing as this sort of "live action" simulation might be for the students, it is arguably less likely to lead quickly to the sort of systematic understanding that interested Dewey. The more complex the social phenomenon under discussion is (and global warming, it must be said, is one of the most complex), the more this would hold true. Arguably, there is no better way to model a complex social system than by using a computer simulation. There are some caveats that are attached to this statement, but I would like to postpone discussion of them until later in the essay.

Technological transparency is not the only Deweyan goal that simulations work toward effectively: they are also excellent tools for helping learners develop an experimental attitude. There are four principal reasons for this. First, the system virtually requires user experimentation — if users do not provide the system with input of some kind, the simulation usually either grinds to a halt or moves swiftly in the direction of disaster. Second, habits of experimentation are usually scaffolded by the system itself. Within the context of *Fate of the World*, one has to decide to play cards representing policies, and the range of those cards is fairly restricted. In addition, within the starting context of many simulation games, the system also provides hints to the users, encouraging them to try out promising strategies and showing them how to monitor the results. Third, the system allows users to experiment with relatively little penalty. Within a lab environment, a failed experiment means cleaning up and restarting from the beginning, but within a computer simulation, correcting a mistake is often simply a matter of opening a save game file from before the mistake was made. Fourth, and finally, simulations make the results of experiments clear and visible. In *Fate of the World*, as in most other simulation games, one can (and generally must) chart one's ongoing progress versus the goals of the simulation. For example, emissions graphs generated each turn demonstrate instantly whether a region is going in the right direction and facilitate the identification of both failed strategies and new test beds for future action.

Yet although *Fate of the World* and, more broadly, computer simulations are potentially very good at generating both technological transparency and the disposition to approach situations experimentally, they are likely to be far less good at generating some of the other important outcomes of education through occupations. The habits of self-discipline and cooperation that the Deweyan classroom produced cannot be instilled through playing a game like *Fate of the World*, which is an intensely individual experience. The advantage of the kinds of cooperative occupations taken on at the Dewey School were that they brought

children together to work on projects that required thoughtful, long-term personal interactions. As it stands, most simulation games are not capable of generating this outcome.

This may not always be the case, however. In the past ten years, multiplayer gaming has become the norm in many genres, including first-person shooters, real-time strategy games, and, perhaps most significantly, massively multiplayer online role-playing games such as *World of Warcraft*. As researchers have documented, and as is obvious in any event from the nature of these games themselves, cooperative team skills are necessary for success.[25] With the rise of networked gaming, one could conceivably build a game like *Fate of the World* that required a cooperative approach to the social problem being simulated.

To summarize, *Fate of the World,* and other games like it, provide a space in which two of the most important educational outcomes of education through occupations — technological transparency and scientific inquiry — are made possible. As I will explain in the next sections, simulation games also solve some of the most difficult practical problems of progressive education; at the same time, however, they create significant new problems that, while they are less obvious than some of the old challenges that faced progressive education, still have to be addressed.

Solving Old Problems

It is not difficult to see how relying upon simulation games sweeps away some of the toughest problems that originally faced education through occupations. The first and most significant gain is that these games represent an enormous labor savings for the teacher. As I noted previously, the original Deweyan social simulations were labor-intensive, requiring the teacher both to set up the simulation and to take sole responsibility for leading the students through it. In a simulation game, by contrast, these tasks are managed by the game itself, which, at least in the ideal case, will have a curriculum carefully scaffolded into it. Simulation games also depend far less heavily on teacher knowledge for their operation. Recapitulating the essence of nineteenth-century industrial development is not easy, and even if one has a sanguine view of teachers' existing background knowledge, requiring them to figure out how to translate this knowledge into a social simulation that keeps students on track is a tall order.

In an important way, simulation games deliver on the worthwhile part of the original promise of the Skinnerian teaching machines of the 1960s and 1970s: a self-guided curriculum. These machines purported to shepherd students through curriculum materials with only minimal aid from teachers.[26] The proponents of the system claimed that a curriculum that proceeded in baby steps and a carefully

25. Mark G. Chen, "Communication, Coordination, and Camaraderie in *World of Warcraft*," *Games and Culture* 4, no. 1 (2008): 47–73.

26. B. F. Skinner, "The Science of Learning and the Art of Teaching," in *Cumulative Record* (New York: Appleton-Century-Crofts, 1959), 145–157.

calibrated reward system would enable students to develop the appropriate learning outcomes simply by working through the program. This research program (at least in its original form) failed, largely because of its artificial and overly regimented approach to learning.[27] Simulation games, however, avoid this problem by offering students an entire social system to discover. Although students are scaffolded within the simulation to some extent, they must be active inquirers within the context of the simulation's world rather than passive consumers of a preset curriculum that has been chopped into bite-sized behaviorist niblets.

However, while they provide significant guidance to the student, simulation games do not (or at least should not) marginalize the teacher unduly. Unlike the supposedly teacher-proof teaching machines, a game like *Fate of the World* would require substantial support from a knowledgeable teacher in order to make it work. Although these games often do a good job of helping students learn to navigate the simulated world, even the most able students will occasionally benefit from help when they get stuck or when they are having difficulty seeing the affordances of the system. Perhaps more importantly, teachers also need to add extra content to the simulation by discussing it in class. Imagine, for example, the productive classroom discussions that could be undertaken about *Fate of the World*. Assuming that the simulation captured their interest, students would be motivated to discuss the problem of global warming and to look carefully at our current feeble attempts to deal with (and avoid dealing with) this problem.

Simulations also address the problem of lethal mutation toward vocationalism that has always dogged Deweyan simulations of social systems. As I pointed out before, when one works with concrete occupations, it is very easy to slide from the avowed pedagogical purpose of learning about how things work into simply learning how to work. A well-designed social simulation, by contrast, shifts the classroom inexorably in the direction of macro-level questions. One no longer addresses the world at the level of the individual thing; one deals with social systems and the data that accompany them. One has to address the concepts and phenomena that comprise this system because they are the core rules that make up the micro world that one is dealing with, and if one does not come to understand them, the simulation simply either fails to progress or degrades significantly. In other words, good simulation games are constructed such that they are very difficult to dumb down. They can, of course, fail to engage the interest of students, but they are otherwise resistant to redirection from their original purpose.

Creating New Problems

So far, I have made an argument that simulation games are able to deliver some of the benefits originally promised by Deweyan education while dodging some of the serious practical challenges that Dewey's system faced. There are, however, a number of criticisms within the literature on video games and education to which

27. Fund for the Advancement of Education, *Four Case Studies of Programmed Instruction* (New York: Fund for the Advancement of Education, 1964).

this argument must respond.[28] One criticism, offered by Leonard Waks, holds that simulation games simply cannot deliver the *quality* of experience that is demanded by Dewey's own educational principles. Another, perhaps more worrisome, line of argument is that simulation games have the potential to promote problematic patterns of thinking. Both of these claims have merit, and I will explore each of them in turn.

Waks begins his argument about the quality of experience in simulations in the same way that I began this analysis: with a quote from the first chapter of *School and Society*. Dewey comments,

> Again, we cannot overlook the importance for educational purposes of the close and intimate acquaintance got with nature at first hand, with real things and materials, with the actual processes of their manipulation, and the knowledge of the social necessities and uses. In all this, there was continual training of observation, of ingenuity, constructive imagination, of logical thought, and of the sense of reality acquired through first-hand contact with actualities. No number of object lessons … can afford even the shadow of a substitute for acquaintance with the plants and animals of the farm and garden acquired through actual living among them and caring for them.[29]

Using this quote as the point of departure, Waks constructs an argument that has two basic poles: the first concerns the advantages of direct experiences with natural materials, and the second addresses some of the miseducative aspects of simulations.

In the first pole of the argument, Waks notes that Dewey was concerned about the opacity of the modern world. In other words, although modern technologies lend themselves easily to use, they often do not lend themselves to disassembly, analysis, and reconstruction. To use the terminology of philosopher of technology Albert Borgmann, many of the machines we use every day are "devices" that are entirely opaque in their function — they work beautifully when they are switched on or started up, but that is the extent of our understanding of them.[30] Crude, natural materials, by contrast, are much easier to understand in terms of their ways of functioning. One plants a seed, and one can observe the process of it growing from a seed into a plant that can be used for food. In addition to transparency, these materials also offer both flexibility and challenge. Lumber, for example, can be used to build many things, but only if the children pay careful attention to the planning and building process, as well as to the qualities of the material itself (for example, its hardness, its knottiness, its dryness). Waks valorizes the quality of experiences in which learners use these types of materials to conduct experimental projects. He comments, "*Only* by starting with crude materials and subjecting them to the

28. See, for example, C. A. Bowers, *Let Them Eat Data: How Computers Affect Education, Cultural Diversity, and the Prospects of Ecological Sustainability* (Athens: University of Georgia Press, 2000).

29. Dewey, *School and Society*, 11.

30. Albert Borgmann, *Technology and the Character of Contemporary Life: A Philosophical Inquiry* (Chicago: University of Chicago Press, 1984).

kinds of purposeful handling lying within their understanding can children acquire the intelligence embodied in the finished material."[31]

In a critique that is a corollary of this "power of crude materials" argument, Waks also levels the charge that simulations are "ready-made cognitive objects abstracted from living experience." Unlike the messy, flexible, productively chaotic experiences of children growing a garden together, in which learners gradually become more sensitive to the complex natural environment, simulation games offer a much more rigid environment. He notes that that the puzzles involved in a simulation game emerge much more predictably and can be solved more neatly. As a result, he suggests that they are "drastic abstractions" that, if overused, will eventually reduce learners' sensitivity and response flexibility when they are faced with real-world environments.[32] Habituated to the cut-and-dried puzzle solving of the virtual environment, learners will apply their simplistic and hasty interpretations and solutions to the real.

Waks begins the second pole of the argument by highlighting four Deweyan criteria of miseducative experience:

1. it can induce *callousness* to the materials of subsequent experience;
2. it can lead to an *inflexible* or *mechanical response pattern*, landing learners in a behavioral *rut*;
3. it can through its *immediate pleasureableness* promote a *slack or careless* attitude; or
4. it can, by being *fragmentary* rather than *cumulatively linked*, promote *scatterbrained* habits, dissipating energies and leading to *split* and hence *poor control* in subsequent experiences.[33]

Waks then applies these criteria to *SimCity*, a popular series of simulation games in which one plans and manages a city.[34] Much of this criticism stems from the fact that *SimCity* functions largely in a "sandbox" mode in which the user can simply tinker endlessly with the city. This means that if the player is ineffective and/or inactive, the game does not deliver much negative feedback, which could potentially lend itself to both carelessness and routine behavior. Furthermore, the simulation's lack of defined goals could indeed lead the user in the direction of fragmentary experiences, as it is possible simply to fiddle around endlessly with one's city, building a police station here and a fire station there, but never really getting anywhere. Waks's claim about callousness stems from the observation (undoubtedly correct) that children like to spend time blowing things up in *SimCity*, which he thinks may create a blasé attitude toward real risk.

31. Waks, "Computer Mediated Experience and Education," 425.

32. Ibid., 428.

33. Ibid., 418.

34. Ibid., 426.

Let us first deal with the second pole of Waks's analysis: the *SimCity* arguments. With the exception of the callousness claim — which, while there is not space to address this point here, has been disputed by video game ethicists — all of Waks's criticisms have broad validity and should actually be taken much more seriously than they have been so far.[35] However, their validity is nevertheless contingent upon the type of game being played. *SimCity* is vulnerable to Waks's analysis, but *Fate of the World,* as well as other games like it, are much less so. In *Fate*, users are directed to solve clear and specific problems, and although multiple approaches to a problem are possible, it is difficult to get sidetracked from the game's goal of coming to understand social systems. Furthermore, *Fate* is not the only carefully structured and challenging social simulation that could be placed in this category. Around the time of the publication of Waks's article, one could have cited *Railroad Tycoon I* (1990) and *II* (1998), as well as *Capitalism Plus* (1996).[36] More recently, one could point to *Defcon* (2006), an acclaimed nuclear war simulation/strategy game; *Dwarf Fortress* (2006), an extremely complex and difficult social simulation game; and *Prison Architect*, a game currently under development.[37] All of these games, and perhaps *Fate* most of all, have a learning curve that is relatively steep, but this is the price of admission to a social simulation that does not correspond to the aforementioned criteria of a miseducative experience. Complex, well-made simulations make up for their lack of immediate pleasurableness with the particular satisfaction of solving challenging problems. Granted, these games are a minority in the marketplace, even among simulation games, but there is no reason that we should not choose deliberately among available games for good curricular reasons.

Turning now to the first pole of Waks's argument — namely, that Dewey thought there are unique affordances associated with natural materials — we must acknowledge that it too makes an important point. Even if one replaces some of the Deweyan occupational tasks with simulations of social systems, it will be vital for children to have some relatively unmediated contact with the environment. The goal of technological transparency in agriculture, for example, is greatly facilitated if one has some idea of what one is *really* dealing with, at bottom. Waks is also right to point out that the crudeness of the natural material offers important challenges to the children. Whereas with a Lego block (or, better yet, a virtual Lego block), snapping things together is a neat, speedy transaction, banging together a couple of boards or growing a plant is subject to much more productively messy chaos. Dewey always placed significant importance on gaining a consciousness of how humans have progressively developed power and control over the natural environment, and this emphasis on natural materials does seem to serve this goal.

35. See, for example, Miguel Sicart, *The Ethics of Computer Games* (Cambridge, MA: MIT Press, 2009).

36. *Railroad Tycoon I,* PC/Mac (USA: Microprose, 1990); *Railroad Tycoon II*, PC/Mac (USA: PopTop Software, 1998); and *Capitalism Plus*, PC (USA: Interactive Magic, 1996).

37. *Defcon*, PC/Mac (UK: Introversion Software, 2006); *Dwarf Fortress,* PC/Mac/Linux (USA: Bay 12 Games, 2006); and *Prison Architect,* PC/Mac (UK: Introversion Software, forthcoming).

Although we may now have some doubts about Dewey's triumphalist rhetoric on this point ("The earth is the great storehouse, the great mine"), we can nevertheless recognize his point that unmediated interactions with the natural world have an important place in the curriculum.[38]

Waks, however, seems to have a more far-reaching interpretation of Dewey than the one I offer in this essay, as is evident in the following claim:

> Thus, for Dewey firsthand manipulation of natural materials is the *natural foundation* upon which subsequent learning-for-action may securely be built. *Only* by starting with crude materials and subjecting them to the kinds of purposeful handling lying within their understanding can children acquire the intelligence embodied in the finished material. *Only* a firsthand, aim-directed, problem-based manipulation of such materials can supply the model for the full extraction of meanings … [39]

Our everyday educational experiences in certain domains, however, sometimes seem to contradict this. To take just one example, it is not at all clear that interacting with crude materials in this sense is the best way to begin to understand the fundamentals of what computer systems mean and do in everyday life. Although it is helpful to understand how computers are manufactured, what they are made of in terms of crude, natural materials, and how they work at the level of hardware, these are not the best starting points to begin learning about them. Even if one interprets "crude materials" more broadly in terms of computer software (which, in this case, could mean learning the fundamentals of a programming language), the case is still dubious, as some of the difficulties with Seymour Papert's LOGO demonstrate.[40] What is much more important, from the standpoint of intelligent citizenship, is to understand the basics of how computers work on the everyday level (programs, networks, and so on) and the kinds of social difference that these tools make. In this particular case, this is best accomplished through working with the tools themselves (and not their crude antecedents) as well as through thoughtful discussions of their social impact.

The corollary of Waks's "crude materials" argument — his suggestion that simulations unduly prepackage and simplify the real world — also has a lot of resonance.[41] Still, there are at least three possible responses to this critique. An initial rejoinder is to point out that simulation games are not nearly as cut-and-dried as this kind of critique alleges, especially these days. More sophisticated simulations like *Fate of the World* present players with problems that, while diagnosable, are productively messy in terms of how they are presented and that admit of several

38. Dewey, *School and Society*, 19.

39. Waks, "Computer Mediated Experience and Education," 425 (emphasis in original).

40. D. Midian Kurland et al., "Mapping the Cognitive Demands of Learning to Program," in *Mirrors of Minds: Patterns of Experience in Educational Computing*, ed. Roy D. Pea and Karen Sheingold (New York: Ablex, 1987), 103–127.

41. In the past few years, as political figures who offer libertarian solutions (for example, Ron Paul) have gained popularity among techies, I have wondered whether gaming has facilitated an allegiance to simplistic approaches.

different kinds of solutions. A second response is to point out that this kind of simplification is pedagogically necessary: in order for the simulation to capture a complex phenomenon that would otherwise be unworkable from an instructional standpoint, certain background assumptions need to be built into the system and the system needs to be simplified to the degree that it can be manipulated effectively. In both *Democracy and Education* and in some of the early educational writings, Dewey recognizes this when he speaks of the importance of school providing a "simplified environment."[42] Third, and finally, one can point out the critical role of teachers in mediating the "simulation gap": teachers need to have discussions with students about how simulations correspond to reality and how they radically depart from it. Given that gaming (simulation/strategy gaming as well as other genres) serves as an everyday reality for an increasingly large number of children, this is a critical task for schools to undertake.

Waks's criticisms are, to my knowledge, the only explicitly *Deweyan* critique of video gaming, and since my aim here is to vindicate video games from a Deweyan perspective, they needed to be addressed with particular care. Before concluding, however, I would like to highlight briefly two other serious potential problems with simulation gaming: efficiency mindsets and technocratic thinking. Unlike Waks's critiques, which, while important, can be remedied to some extent, these problems are more deeply rooted.

Efficiency-mindedness is a phenomenon that is easy to see in *Fate of the World*: as with many strategy games, one needs to find a strategy that will consume relatively few resources and yet offer maximum yield. If, for example, the player expends too many resources on social welfare and economic stimulus policies, then there are fewer resources left to fund the construction of solar power facilities or the implementation of new emission regulations. *Fate of the World* is, at its core, what one might call a "spreadsheet game" — it forces the user to scrutinize a range of data and to ask the same question over and over again: "How can I get the most for the least?"

Given that "the most" is, in the case of a climate change game, environmental benefit, one might think that this is unproblematic. But the fact remains that, regardless of what resources are being allocated, when one thinks this way, one is thinking in the mode of efficiency maximization. Philosophers of technology like Martin Heidegger and Jacques Ellul have identified this way of thinking as the dominant destructive characteristic of modern technology. For Ellul and Heidegger, it is not the technologies themselves that are significant, but rather the thinking behind the technology.[43]

The difficulty with simulation gaming is that it is the apotheosis of this kind of thinking. Within the framework of a game of this type, everything that matters

42. Dewey, *Democracy and Education,* 20; and, for some of these early writings, see John Dewey, *John Dewey: The Early Works, 1882–1898*, vol. 5, ed. Jo Ann Boydston (Carbondale: Southern Illinois University Press, 1973), 87.

43. See Jacques Ellul, *The Technological Society,* trans. John Wilkinson (New York: Alfred A. Knopf, 1964); and Martin Heidegger, "The Question Concerning Technology," in *The Question Concerning Technology and Other Essays,* trans. William Lovitt (New York: Harper and Row, 1977), 3–25.

is a resource that can be harnessed, and one must think about this constantly in order to survive in the game environment. Simulation and strategy games are thus a training ground for a particular kind of thinking that is arguably abundant in some of the most ruthless and least ethical members of society. Furthermore, the ubiquity of the quest for efficiency within games means that players are often unable to identify this implicit emphasis and criticize it, and even in the event that one is able to identify it, it still implicitly reinforces a bad pattern of thinking. Repeated action may build a habit, even if one is able to bracket the significance of that action with the proviso that "it's just a game."

A second problem with simulation gaming, which is even more visible than efficiency-mindedness in *Fate*, is technocratic thinking. *Fate of the World*, perhaps even more than some other simulations, places the player in the role of the knowledgeable, powerful expert. As the chairperson of a fictional global organization, one can set policy in every single region of the world. It is simply a matter of interpreting the immense amount of data the game generates and making appropriate decisions. All costs are accounted for within the game itself, and the poverty, climate refugees, and deaths that may result from some of the player's harsher policies are just more lines in the spreadsheet. Dewey wanted students to get a sense of the power and control over the environment that civilization had been able to develop over time, but simulations often go far beyond this and give the impression that effective social reform is simply a matter of choosing the correct rule set and having the courage to implement it. This constitutes a radical oversimplification of social reform that could have significant miseducative consequences if one were to view the game as more analogous to reality than it actually is. Furthermore, if one is to recall the famous debate between Dewey and Walter Lippmann, in which Dewey argued in favor of the participation of individual citizens and Lippmann encouraged the delegation of power to an elite group of experts, it is straightforward to see how the setup of a game like *Fate of the World* favors Lippmann's technocratic vision of democracy.[44]

A Cautious Look Forward

Although efficiency-mindedness and technocratic thinking are two of the most significant educational difficulties with video gaming, there is no shortage of other critiques that I could take up in this analysis. We could, for example, revisit Skinner's enthusiasm for video gaming and analyze the ways in which the educational video game industry has used his insights as design principles. We could also reprise analyses of how simulation/strategy games tend to glorify imperialism and colonialism.[45] There are a number of compelling reasons to be cautious about the use of video games in education, and despite the best efforts

44. See Walter Lippmann, *Public Opinion* (New York: Macmillan, 1922); and Robert Westbrook, *John Dewey and American Democracy* (Ithaca, NY: Cornell University Press, 1993).

45. Nick Dyer-Witheford and Greig de Peuter, *Games of Empire: Global Capitalism and Video Games* (Minneapolis: University of Minnesota Press, 2010).

of critics like Waks, caution often seems to be in short supply when educational researchers discuss and analyze video games.

We could also agree with Waks that simulation games are not in themselves sufficient to deliver the kind of comprehensive educational experience that Dewey envisioned when he developed the program for education through occupations. A simulation can help students understand social processes, but it is unlikely to help them develop the broader notion of a vocation as an "axis of salience" that helps people navigate their lives, nor is it likely to develop the particular harmony between individual and social interests that Dewey hoped to promote. If used in isolation or if chosen poorly, simulations are unlikely to develop the kind of citizen Dewey wanted his educational system to build, and as some of the critiques that have been explored in this essay indicate, they may even promote some tendencies that run counter to his cooperative, democratic vision.

Nevertheless, the fact remains that simulation games can recreate complex and pivotal social systems in such a way that children and adults can experiment with and learn about them at a profound level. Anyone who is sympathetic to Deweyan educational principles should be excited about these possibilities. Developing a degree of technological transparency with respect to key social challenges is an aspect of Dewey's educational program that is critical for today's citizens, and it has historically been very difficult to accomplish. The technology may have arrived too late for Dewey and the other pioneers of progressive education, but it is here now for us, and we should use it mindfully to create powerful educational experiences.

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