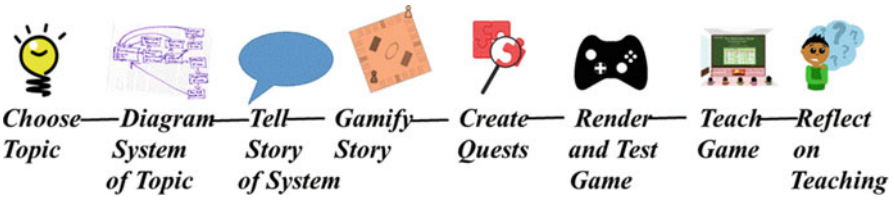
Chapter 9
End Game: Passing It On

In theory, there is no difference between theory and practice, but in practice there is.

-Attributed to multiple people including Yogi Berra, Karl Marx, and computer scientist Jan L. A. van de Snepscheut

Abstract This chapter explores the potential, or "transformational possibilities" (Digital games and learning, Continuum, London, 2011), of game-based teaching and what scaling it up might mean for education. It revisits the themes of the first chapter such as teaching for transfer and developing novice thinking into expert thinking in order to encourage readers to think about what happens beyond their curricular game. It also encourages readers to mentor other teachers to help them develop their own curricular games. Finally, it concludes by proposing that game-based teaching can radically alter the path of education by transforming teaching and learning in a way that brings a new approach to thinking in the twenty-first century by exploring what it means to take a gaming stance.



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MENTORING QUEST

Success! The second time around after turning your curricular game into a teaching tool, you win the Commander over! At one point in the game play, you even caught her laughing! Even she is capable of having fun! You become the hero of the future! How are you going to go back to your ordinary citizen past after such adulation?

After a well-deserved celebration and rest, the Commander calls you into her office.

"*Well played!*" *she declares. You bask in the glow of her admiration.* "*Now*," *she continues*, "*you need to teach others since you cannot do all of this alone. Besides, I suspect you might have a life to return to in the past. You can* "*level up*"*—hone your mentoring skills—by working with one Elder of your choosing. Then, two, then four, and so forth. However, make sure you also mentor your mentees on how to mentor so we can have a ripple effect.*"

"'*We*,' *she said* '*we*'*! Finally, acceptance!*" *you think to yourself. You decide to begin with your friend, the Engineering Elder who slipped you the text time traveling device. And so the game of teaching curricular game design begins. Pass it on!*

ACTION: Help someone else design a curricular game.

While I have many automatically graded activities throughout my courses, the major assignments usually require me to grade them manually. I discovered that requiring students to earn a certain number of points before moving to the next level meant that students were stuck until I got a chance to grade their assignments. This created frustration among students as they had to wait for me to grade something before they could move on. Initially, I made it clear to students that they could always use the syllabus, which laid out the assignments and the readings, to work ahead. But then I figured out ways to troubleshoot this dilemma within the structure of the game. One way I did this was by having two tracks that covered two different, but interrelated, aspects of a course. This way, while students were waiting for one assignment to be graded, they could move forward in the other track. However, I did create certain points along the way where students had to have made a certain amount of progress in both tracks before moving ahead. Another tactic I used was to have turning in an assignment unlock the next section and then earning a certain number of points on that assignment unlock a later section. In these ways, I managed to stay true to the mastery component of my game-based classes while addressing the pragmatic problem of the time it takes to grade assignments.

Games have served lots of functions throughout the history of mankind. Jane McGonigal (2011) in *Reality is Broken* tells the story of Herodotus to demonstrate the ability of games to help people survive:

> When Atys was king of Lydia in Asia Minor some three thousand years ago, a great scarcity threatened his realm. For a while people accepted their lot without complaining, in the hope that times of plenty would return. But when things failed to get better, the Lydians devised a strange remedy for their problem. The plan adopted against the famine was to engage in games one day so entirely as not to feel any craving for food … and the next day to eat and abstain from games. In this way they passed eighteen years, and along the way they invented the dice, knuckle-bones, the ball, and all the games which are common. (pp. 5–6)

She goes on to say, "Games made life bearable. Games gave a starving population a feeling of power in a powerless situation, a sense of structure in a chaotic environment. Games gave them a better way to live when their circumstances were otherwise completely unsupportive and uninhabitable" (McGonigal 2011, p. 6). There are other "transformational possibilities" (de Freitas and Maharg 2011) as well. Games have also been a way to play out strategies by running simulations to try to predict results:

> Claims that the game [*Kriegspiel*] was behind Prussia's military victories stimulated interest internationally. Prussia's *Kriegspiel* dry runs of war with Austria supposedly led to a strategy that proved decisive in the Six Weeks' War of 1866. After that, the Austrian Army took no chances and began playing *Kriegspiel*." (Poundstone 2006, p. 384)

This technique is also being used today in sports: "Silberman (2009) studied athletes and video games and found that players ranging from the University of Wisconsin baseball team to the Boston Red Sox use them as visualization tools. It helps them see the playbook, identify patterns, or generally just keep their heads in the game on off days" (Squire 2011, p. 11). However, our original goal in gamifying the curriculum is not for survival or strategy, but rather to move our students from novice thinking toward expert thinking and, in doing so, to build to transfer.

The first chapter laid out the argument that people learn primarily through experience. Indeed, Fullerton, et al. (2004) argue that this is why games have been a part of every culture throughout history: "It's important to remember that what has made games such a long-lasting form of human entertainment is not intrinsic to any technology or medium, but to the experience of the players" (p. 1). Recent studies in various fields including neurosciences (Doidge 2007), learning sciences (Bransford et al. 2000), and cognitive psychology (Stavenga de Jong et al. 2006), have supported this claim:

> Newer work argues that people primarily think and learn through *experiences* they have had, not through abstract calculations and generalizations. … There are conditions experiences need to meet in order to be truly useful for learning. First, experiences are most useful for future problem solving if the experience is structured by specific goals. Humans store their experiences best in terms of goals, and how these goals did or did not work out. Second, for experiences to be useful for future problem solving, they have to be interpreted. Interpreting experience means thinking—in action and after action—about how our goals relate to our reasoning in the situation. It means, as well, extracting lessons learned and anticipating when and where those lessons might be useful. Third, people learn best from their experiences when they get immediate feedback during those experiences so that they can recognize and assess their errors and see where their expectations have failed. It is important too that they are encouraged to explain their errors and why their expectations failed, along with what they could have done differently. Fourth, learners need ample opportunities to apply their previous experiences—as interpreted—to similar new situations, so they can 'debug' and improve their interpretations of these experiences, gradually generalizing them beyond specific contexts. Fifth, learners need to learn from the interpreted experiences and explanations of other people, including both peers and more expert people. Social interaction, discussion, and sharing with peers, as well as mentoring from others who are more advanced, are important. Debriefing after an experience—that is, talking about why and how things worked in the accomplishment of goals—is important. Mentoring is best done through dialogue, modeling, worked examples, and certain forms of overt instruction, often 'just in time' (when the learner can use it) or 'on demand' (when the learner is ready). One way to look at what is going on here is this: When the above conditions are met, people's experiences are organized in memory in such a way that they can [run] simulations in their minds that allow them to prepare for action. They can test out things in their minds before they act, and they can adjust their predictions after they have acted and gotten feedback. They can play various roles in their own simulations, seeing how various goals might be accomplished. (Gee 2008, pp. 21–22)

Based on this theory of learning, Gee (2007) asserts that learning best takes place when "performance" occurs before "competence":

> It dawned on me that school books—for example, a high school biology book—are like those manuals. Both are technical documents. Just like the game manual, the biology book makes no real sense unless and until students have gotten to play the game, the game of biology in the case of the biology book. Things will get easier still if they get to understand the genre of the activities they are involved in by engaging with multiple examples. They will get yet easier if they get to participate in dialogue with people affiliated with and devoted to biology in some substantive, yes, even passionate, way. If all kids have in school are verbal understandings and not situated ones, then, while some of them may pass paper-and-pencil tests, few of them will be able to solve real problems in the world. (p. xi)

However, I would argue that "performance" begets "competence" which begets "performance": "The whole game changed my life" (a quote by a student in one of Squire's CivCamps who ended up volunteering for the Obama campaign, Squire 2011, p. 176). In fact, "games researchers like Dmitri Williams (2006) have found empirical evidence that gamers are more likely to be civically engaged than nongamers" (cited in Squire 2011, p. 196). Squire (2011) offers his theory as to why this is: "Once a person has had profound learning experiences in a world that is noticeably 'designed' (or 'socially constructed'), there is a tendency to ask, 'Why is our world designed the way that it is?' and 'Could it be designed differently?'" (Squire 2011, p. 195). In other words, games promote not just content and skill transfer, but an attitude transfer as well.

Earlier I said that you know you have achieved a gaming stance when you see games in everything and everything *as* a game. You also know you have achieved a gaming stance when you realize everything *is* a game. All our business, educational, governmental, and other structures consist of rules that humans made up. Success involves learning how to play those games well. However, how people define success can differ. Realizing that different people have different "in-game" goals in terms of real life can help diffuse insecurities and false senses of competition. Ideally, it would also give people a sense of playfulness toward life.

When done well, game-based teaching not only teaches students the content and skills, but transforms students' identities. Not only does this mean taking on the characteristics of experts in the field: "[students] had become the kind of person who asks questions about history and marshals resources to find answer questions" (Squire 2011, pp. 177–178), but also taking on characteristics of gamers. These characteristics include measured risk-taking, exploration, and playfulness. It is worth reprinting the quote from chapter one about gamers' stance:

> Surveys of gamers show that they have an increased appetite for risk, a greater comfort with failure, a stronger desire for social affiliations, a preference for challenges, a capacity for independent problem solving, and a desire to be involved in meaningful work when compared with nongamers (Beck & Wade, 2004). Underlying Beck and Wade's argument is a notion of changing literacies. Gamers have grown up with a medium built on assumptions unlike those in print cultures (e.g., a game engine can be tinkered with, a text is not necessarily print based or defined by book covers); game players are coauthors along with game designers, co-constructing the game-as-text through their own action (cf., Robison, 2005). Gamers have grown up in simulated worlds, worlds where anything is possible, and where learning through trial and error is expected, information is a resource for action, and expertise is enacted through both independent and collaborative problem solving in self-directed tasks (Simpson, 2005). (Squire 2008, p. 658)

This cultivation of a playful mind means asking hypotheticals, exploring "what-if?" scenarios, the ability and desire to try things out by running mental simulations, and exploring alternative solutions.

Studies on the learning effects of gaming for learning have shown an increase in expertise in the content. For example, students playing *Civ3* went from viewing history as a series of events to seeing "world history as a pattern of interactions" and that "history could be represented through rules" (Squire 2011, p. 137). What this can mean is that even if game players do not end up going into a field that has the same content as the games they play, it impacts how they view the world. For example, Squire (2012) cites an example of an interview where a *Civ* player applies *Civ* terms to frame his take on the Iraqi war; then Squire (2012) states:

> Thus, playing *Civ* didn't inspire one particular read of history or politics but instead provided a language for thinking about it. … Steve used *Civ*'s model, it's [sic] grammar and lexicon, to think through historical questions. *Civ* gave Steve a symbol system and interconnected set of rules to use in analyzing historic scenarios. Steve's interpretations are quite flexible. *Civ* doesn't provide one 'answer' or interpretation but is instead a set of possibilities for thinking through the problem. … To a player such as Steve, *Civ* is a *game* to play, a *framework* to think with, and a *tool* to author with. (p. 22)

Game-based learning can give players the language and the concepts and promote ways of thinking used by experts in the field.

Studies have also suggested that game-based learning promotes transfer to real-world settings. Chatham (2011) found that army enlistees that played military-designed video games were better prepared. Players who become "virtual medics" in *America's Army* used those skills to administer first aid/save lives (p. 91). However, no simulation is perfect; when these "virtual medics" were doing "room clearing" for the first time in the real world, some "slipped on the blood" (Chatham 2011, p. 94). Tobias et al. (2011) in their "examination of a wide range of games and simulations used in instructional and training settings" found that "they do facilitate transfer" (p. 167). This skill transfer is not just in the content itself, but also the skills involved with playing with technology: "Some worry that all this intellectual effort and all these skills [put into games] will not 'transfer' to the real world. But the reality is that games—which today, for the most part, involve real people collaborating and working and playing socially with each other—are the real world. … The evidence that the cognitive surplus devoted to games transfers to other aspects of the real world is the large number of game players, modders, and designers who have moved on to other technical, artistic, and entrepreneurial enterprises" (Gee 2012, p. xix). Because of the vast array of skills involved, the interdisciplinary connections, and the attitudes needed, games can "transfer" in lots of ways.

Beyond expertise and transfer, game-based learning also improves general cognitive skills as well. Researchers found adults older adults than 60 had a "dose-related effect" where more time spent playing *Rise of Nations* improved both specific game-related skills ("switching between tasks") and general cognitive skills ("working memory and reasoning ability") (Basak et al. 2008 cited in Chatham 2011, p. 90). Because of the problem solving involved in playing well-designed games, it is no surprise that seeing alternative solutions, questioning the taken for granted, and hypothesis testing become real-life skills as well.

Game-based learning, however, also changes people. Pro-social games have been found to increase pro-social behaviors (Tobias et al. 2011). Shaffer (2012) contends that it is these changes in values and identity that go hand in hand with transferring content and skills. He argues that in order for transfer to occur, someone has to be enculturated enough into a community of practice so that the various epistemic elements (ways of knowing, thinking, and being) within that community are connected enough to be stable when that community setting is not present. When this happens, when the learning is powerful enough to become a part of one's identity, players carry this learning outside of the gaming community into the real world. McGonigal (2011) cites multiple examples of games that changed people's habits of mind and thus real-world habits:

- "I really mean it when I say *WWO* [*World Without Oil*] changed my life. I really have been using my cloth bags at the stores, walking more/driving less, turning off lights, and, yes, recycling. My friends, family and co-workers have all noticed the difference. In all seriousness, this entire thing has made me a different person" (p. 310)
- "As a result, at the end of the game [a dispatcher at a General Motors plant] decided to go back to school in real life to prepare for a new career in a post-oil economy" (p. 306)
- "a video game called *EVOKE* prompted people from around the globe to collaborate in coming up with solutions to problems led to a pilot program in South Africa designed to teach people how to grow their own food" (p. 338)

Will Wright, designer of *Sims* and *Spore*, claims that "most of the really bad stuff that's happening right now is the result of very short-term thinking" (McGonigal 2011, p. 301). McGonigal (2011) argues that games can be a way of changing that mindset: "We can break free of the cognitive chains of short-term isolated thinking, with games that direct our collective attention to the future and challenge us to take a global perspective" (McGonigal 2011, p. 301). One way games lengthen our range of thinking is through delayed gratification: "pleasure [from games] is an effect of submitting to the rules of the game, that pleasure delayed and constrained is pleasure enhanced" (Salen and Zimmerman 2004, p. 33). However, games also change mindsets by requiring both short-term and long-term goal-setting.

Games can also "act as a tool to help us imagine and invent the future together" (McGonigal 2011, p. 302). Indeed, the tagline for the game *World Without Oil* (*WWO*) was "the best way to change the future is to play with it first" (McGonigal 2011, p. 304). There is one more ingredient, however, in turning people into change agents, and that is hope. Jamais Cascio coined the term "super-empowered hopeful individual" or SEHI for someone who "feels not just optimistic about the future, but also *personally capabl*e of changing the world for the better" (McGonigal 2011, p. 315) thus developing an internal locus of control not just about your own life, but about the life of the planet. A mother who played *I Love Bees*, a massive multiplayer alternate reality game, with her son said to one of the game's designers:

> It is really important to me that you, and other people, understand the differences that alternate reality gaming has made in our way of thinking. It has powerfully affected our attitudes about what is possible. The game for me has been about gathering a first-hand knowledge of how a large community can function, including the role of technology. I know that large scale communities can work and be extraordinarily effective. I am not afraid of the complexities. (McGonigal 2008, p. 223)

The skills plus the knowledge plus the mindset plus the hope equal changing the world.

Choontanom and Nardi (2012) contrast game playing with traditional schooling and noticed that school is not collaborative, the student products are only read by the

teacher, the students do not care about the word problems because they have no meaning in their lives, and subsequently students cannot apply the answers to a situation (p. 187). Games, on the other hand, inspire: "There are a lot of guitar and drum teachers in this country now who are seeing steady business because people started with *Guitar Hero* or *Rock Band* and then developed a taste for the real thing" (LoPiccolo et al. 2012, p. 114). As a matter of fact, "in a 2008 study of more than seven thousand *Rock Band* and *Guitar Hero* players, 67 % of nonmusicians in the group reported that they had been inspired to pick up a real instrument since they'd started playing the video game" (McGonigal 2011, p. 75). Barab et al. (2012) argue that "unless we begin to engage youth in rich situations that add meaning to disciplinary concepts—as part of the learning process—the content of schools will be perceived as a thing to be acquired and exchanged for a test score (having *exchange value*) and not as a useful tool that has direct functional value in the world or to the learner" (p. 306). However, transfer does not happen automatically: "Mayer and Johnson (2010) found significant gains on a transfer task following game play for participants in the self-explanation condition in comparison with the control condition" (Clark and Martinez-Garza 2012, p. 287). Teachers must structure curricular games in ways that prompt reflection in order for students to move tacit knowledge to explicit knowledge.

There is some evidence, however, that the curricular game itself can inspire student reflection inside and outside of classrooms:

> One teacher shared this comment with us about the Virus game: ''I was amazed at the kids' ability to problem-solve … these incredibly low kids who are generally disengaged. I had a look through the post-virus questionnaire … without exception … every single kid said that the game was fun and I know from being out in the hallways between classes that the kids were talking to each other about the game, about who is getting everyone sick and so the kids were very engaged. From that perspective I think the game was incredibly successful." Another teachers stated about the Tit-for-tat game: "But a lot of times you find them getting into what they have to do. And how often do you go into a math class and see a bunch of kids sitting around a table arguing no it's really this, no I swear, look what I did and then the other kids saying no it's this way. And they just kind of like duke it out and sort it out and it's really cool to watch."(Klopfer 2008, p. 86)

With all knowledge available at our fingertips, perhaps it is this kind of curiosity that should "become a top educational priority … Could it be that shifting our educational system toward more play-based models might be the best possible way to prepare children to thrive in the 21st century?" (Schell 2008, p. 448). This book argues that playing and creating curricular games promote not just content learning, not just skill development, and not even just habits of thinking and doing, but also a gaming stance that transforms how students see themselves, see others, and see the world. As one of my students said of his game-based teaching class: "Participation went from zero to fun … in no time. So I guess I'm thinking in 'game mode' now anyway." As you go forth with your new content knowledge, game design skills, playful habits of thinking and doing, and newfound gaming stance, I hope you have a "wonderful time of adventuring" (Loh 2007, p. 344).

> *The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.*
>
> – Alvin Toffler

Appendix

Suggested Mentoring Quest Rubric

Criteria	"Wow! I mean, I think this might work." (3)	"Hmm, this might be acceptable." (2)	"I need more convincing." (1)	"Go back to the drawing board." (0)
Tailored to teacher	Teacher pushed just beyond level of tech use with appropriate scaffolding	Adjusted to teacher's level of tech use	Teacher's level of tech use identified	No mention of teacher characteristics
Tailored to content area	Interdisciplinary connections explored	Discussion capitalizes on synergy created when games and content area integrated	Discussion of how games fit or do not fit with content area	No mention of content area
Tailored to students	Discuss adaptations for potential future students including ELLs and special ed students	Range of students in particular class taken into account	Twenty-first-century learners' needs taken into account	No mention of students
Tailored to resources	Ways to capitalize on affordances and counter-constraints discussed	Affordances discussed	Constraints discussed	No mention of resources
Revision cycle	Discussion gets teacher to think of ideas about how to use playtesting to revise game on his/her own	Discussion of how feedback will be used to revise game	Discussion of how feedback will be collected	No mention of revision cycle
Techie (1 extra point)				
Post a comment on an article or blog post about game-based teaching (provide link)				
Tech Savvy (2 extra points)				
Post a description of how you used game-based teaching on a blog, listserv, or other online space that is either public or frequented by teachers (provide link)				
Tech Guru (3 extra points)				
Use of screencasting tools to share examples of your curricular game with others				

Suggested Reading: Non-Fiction

Bogost, I. (2007). *Persuasive games: The expressive power of videogames*. Cambridge, MA: MIT Press.

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Fiction

Card, O. S. (1985). *Ender's game*. New York: Tor Books. In the novel *Ender's Game*, the main character is led to believe that he is playing a video game as practice for real warfare when, in fact, he is actually orchestrating his side's spaceships. Because he believes he is playing a game (although it is debatable whether or not he is completely duped) as practice and not the real thing, he is willing to take a huge risk, one that pays off in the end.