Games and play have always served an educational function. Computer games are only the latest incarnation in a vast history of playful learning environments and educational game tools. Three particular threads interweave in this general introduction. First, play and games are ancient elements of human learning. The former instills basic social cues that facilitate human interaction and group cohesions, while the latter improve complex skill acquisition, abstract thinking, and peer cohesion. Johan Huizinga, who described play as an essential (although not sufficient) element to cultural development, paid tribute to this dual nature by titling his book *Homo Ludens*, or “Man the Player.” His oft-quoted opening line is worth citing again: “Play is older than culture, for culture, however inadequately defined, always presupposes human society, and animals have not waited for man to teach them their playing.”

Second, a simple dichotomy between “play” and “game” belies the complexity that exists between them. Roger Caillois places the tension between play and game on a spectrum with *paidia* at one end of the axis, reflecting unstructured, spontaneous play, and *ludus* at the other, reflecting rule-based, explicit games. The ancient Romans understood the spectrum between play and game. The Latin word *ludus* meant both play and sport, but also training, as the word was used to describe primary schools for boys and girls. And, reflecting the seriousness with which some games were taken, *ludus* also described gladiatorial schools. Generally, humanity tends to formalize play into games, at both the individual level as children become adults, and at the cultural level as cultures become increasingly complex and economically
developed. As seen in the differences between children kicking stones on a playground and professionals earning a living on the soccer pitch, this spectrum reflects instantiations of cultural formation. Indeed, the tendency to translate the \textit{paidic} into the \textit{ludic}, from the organic to the planned and structured, may reflect the very essence of cultural development.

Third, the spectrum between play and game in terms of definition mirrors the playfulness in which people participate in games. Players can “game” a system by adapting, bending, or breaking the rules, resulting in a completely satisfying gaming experience for them that readily thwarts the intentions of the designer or instructor.\textsuperscript{4} With respect to education, this playfulness means, in part, that the prescribed educational message may be completely ignored or subverted by the student game-player. The medium may not effectively impart the desired message. A parallel to television may help. Some of the earliest critics of television, for example, saw it as a tool of cultural and industrial domination as the viewers passively absorbed the privileged message of capitalistic giants.\textsuperscript{5} Television, like games, however, is a heavily mediated environment with complex modes and messages that are actively constructed by an active audience.\textsuperscript{6} It is a demanding ephemeral medium requiring conscious construction of meaning but does so through a series of images and conventions that are deeply familiar—close, but not quite, like reality. Games are similar. What is learned from playing a game may not reflect the desired outcome of the game designer.

This chapter surveys the history of games and how they have been used in teaching, especially teaching the liberal arts. While there is a long history of games and research into the history of gaming, there is less research into how serious games can enhance learning. We are at an experimental stage where games are being designed, often without much educational theory behind them. We propose that one promising area, especially in history, is to teach through game design where students do not just play games, but have to design games and through the design of games, learn about the subject matter being simulated.

\textit{Doll Houses}

Although recent trends in educational philosophy have highlighted the importance of creating play spaces for creative development, these efforts are not new. Miniaturized domestic settings have been found in Egyptian tombs of children and adults dating back four thousand years. By the seventeenth century, doll houses became common play spaces for little girls and young (and older) women.\textsuperscript{7} These miniature settings implied “a space specifically
designated for play, often by adults who intend that children play nowhere else.”8 Often large and heavy, doll houses created spaces relatively free of interference where complex games could be set up and played out over a long period of time. To the designers and the purchasers, these spaces provided training for moral instruction, a point made clear in early modern literary references to tidiness, order, and domestic roles. Certainly much of the play that took place within the minds of the children reflected common domestic routines, even if adults did not structure the play along these lines, although some extant narratives may have encouraged such activity. The affordances offered by these ludic spaces, however, permitted significant interpretive play outside intended moral lessons: “It seems quite clear that most girls were able to regard doll houses as their own ludic spaces, places dedicated to their own play, rather than as sites for training in compliance.”9 Unsupervised, children often engaged in transgressive play, giving the dolls more interesting lives than their roles intended, moving them into spaces they should not have occupied, and exploring anxieties experienced during the daily domestic routine.10

Card Playing

In eighteenth-century Europe a rage for card play developed throughout all levels of society, even though most historical academic attention has been placed on aristocratic play. Popular card games such as Whist, Faro, and Pope Joan promoted not only a common framework for understanding gameplay mechanics, but also a common set of social norms associated with hosting and attending a night of cards. These card games created a common framework underpinning not only the mechanics of play, but also gentility and hospitality, which evolved from a learned habit to a seemingly natural state. This change was particularly important for merchants, most of whom maintained financial dealings with the aristocrats. Social commentators remarked on “the increasingly genteel manners of the middling sort, especially those in the hospitality, retail and commercial sectors, and credited their frequent contacts with aristocratic customers with the change.”11 An understanding of polite society and commercial affability paved the way for better financial relationships and allowed those in the middle classes to move more self-assuredly among the social circles of their customers. Card games helped solidify a growing set of social rules that defined the emerging middle class. Carding was a part of this learning to fit in.12

Such lessons were not restricted to adults; children were encouraged to play as well. Games such as “commerce,” which involved small pots
of money, introduced children to accepted norms of social interaction at first with family members, then later with guests and friends. As children matured and expanded their social networks, “they joined more advanced adult players at more involved games, absorbing lessons in risk management as they dropped their pocket money into the pool.” The games framed social conventions that reinforced a comfortable system of expected behaviors and developing cultural norms for the middle class, essentially a blend of gentility with moderation and restraint.

**War Games**

Games in military training are perhaps the most studied aspect of games as teaching tools. The visualization of hunting and battlefield situations is an effective form of tactical communication and has served humanity in one form or another for millennia. Some scholars assert that military leaders in Asia used icons (colored stones, etc.) more than five thousand years ago. Certainly, convincing evidence exists that generals of the Roman Republic abstracted the chaotic nature of battlefield movements with sand tables and figures. This military tool allowed competing strategies to be played out in advance of battle, and later, to provide training exercises for generals and their staff. Games, as such, appear to have gone hand in hand with such developments. Three games in particular appear to be either descendants of, or antecedents to, battlefield visualizations.

*Wei Hai*, meaning “encirclement,” is dated to approximately 2500 B.C.E. and, in some sources, is attributed to Sun Tzu, the author of *The Art of War*. It features players’ use of colored stones to represent large army units. The game appears to have been an early predecessor to *Go*, and the goal of encircling one’s opponent has obvious military and hunting parallels. *Petteia*, meaning “pebbles,” is an ancient Greek game that may have had an older Egyptian origin. It is played with black and white stones and the goal is to surround your opponent’s piece between two of yours. Pots and vases, which appear to be contemporary with the Trojan War, depict soldiers and heroes playing the game. Polybius, commenting on the Carthaginian general Hamilcar’s battlefield prowess, compared his considerable tactical talent to that of a skilled *Petteia* player. And *Chaturanga*, probably meaning “army,” was developed in India in the sixth century and is often considered a precursor to chess. Here, game pieces represented specific military formations and resources, such as elephants and chariots.

Although different in rules and form, all three games share the same abstractions of landscape and pieces, which permit the development and
refinement of strategic thinking. These lessons included military parallels in addition to flanking and encirclement mentioned before: removing pieces from play, controlling resources, slowing battles of attrition, and controlling space. Furthermore, depending on skill level, players and observers may deduce the “game state,” determining what had recently come to pass and what would likely happen in the future, simply by looking at the current position of the pieces on the board.

Such advances led to the development of more realistic warfare games, the first of which, most scholars agree, was Christopher Weikhmann’s *King’s Game* (*Koenigspiel* in German). The game was more realistic in the sense that the board was larger and included more playing pieces representing a broader array of military figures with more diverse movement options; these included a “king, his marshal, a pair of chaplains, chancellors, heralds, couriers, lieutenants, adjutants, bodyguards, halberdiers, and a set of eight private soldiers, which were given sixteen different powers of movement on the board.” *Koenigspiel* was more visually realistic than its predecessors, and certainly contained more complicated gameplay elements. The game functioned more like an enhanced version of chess, however, and did not possess realistic technical details about unit strength and ability—essentially lacking a sense of procedural realism meaning that a paradigm for simulating gameplay processes with an emphasis on conceptual realism was noticeably absent.

The inclusion of such elements in war games appeared rather quickly, with new games and their various iterations appearing between the late eighteenth and early nineteenth centuries. These games introduced a number of realistic game innovations, including real topographical and terrain maps with an overlying grid as a game board, realistic movement limits that were affected by the terrain, the representation of multiple units with one figure, supply and support logistics (bridges, bakeries, and wagon convoys), and the inclusion of an umpire to mediate disputes over game rules. In 1811, all these features appeared in Baron von Reisswitz’s *Kriegsspiel* (War Game), which was presented to the Prussian king, Friedrich Wilhelm III. The king was soon “contesting his friend the Czarevich Nicholas in their diplomatic trips between Moscow and Berlin, the two young royals acting out little conflicts just as their elders had ordered men of flesh and blood into battle.” Reisswitz’s son published an updated version of the game that came with a sixty-page manual entitled *Rules for a New Wargame for the Use of Military Schools*. The most significant aspect of this update was that the game attempted to “codify actual military experience and introduced the details of real-life military operations lacking in his father’s game. In particular, he quantified the effects of combat so that results of engagements
were calculated rather than discussed. Later versions even included dice to mimic the random, often chaotic occurrences that can tip a battle.

The increasingly realistic nature of war games, while suitable for battlefield planning, training, and re-enactments, had lost its “playful” nature in the complexity. As such, the later nineteenth century saw the split of war games along two equally popular tracts: rigid Kriegspiel, which focused on formal rules and realism, and free Kriegspiel, which focused on playability and symbolic play. Both versions worked their way into training academies in Britain and the United States, and then into the hands of enthusiasts and hobbyists the world over, as pointed out by Milton Weiner in 1959:

The free play game has received support because of its versatility in dealing with complex problems of tactics and strategy and because of the ease with which it can be adapted to various training, planning and evaluation ends. The rigid play game has received support because of the consistency and detail of its rule structure and its computational rigor.

These two streams codified the various game elements and mechanics that would influence game design over the next century and a half. The inclusion of computing technologies would add several others.

As early as 1960, computers were introduced to enhance the procedural realism of tabletop war games. While the initial efforts of computation focused on speeding up gaming mechanics, computers began to enhance the realism and utility of the game in a number of significant ways: the concurrent evaluation of hypothetical game decisions prior to action, the modeling of the complex interactions of multiple players, the simulation of multiple views of the same game state, and the ability to play against the computer rather than another human. As computers became more and more powerful, these games and simulations found a home not only in military academies around the world, but also in the homes of civilians. That the U.S. military developed America’s Army as both a training and recruitment tool reflects this ready transition.

Games and Education Theory

The manner in which instructors use computer games in the classroom, particularly at the university level, necessitates an examination of educational theory because, in this case, theory drives practice. On the whole, efforts to include gaming in the classroom, particularly at the university level, rely
on intuitive leaps by faculty attempting to bridge the gap between dissemination and uptake, often without due consideration or even awareness of the efforts by educational theorists to assess the efficacy of using games in the classroom. These often-inspired efforts may remain isolated from similar efforts elsewhere, falling by the wayside when the professor teaches a different course or takes a research leave.27

When considered from a broader theoretical perspective, the motivation to use games (technologically enhanced games in particular) as teaching tools falls into two broad pedagogical paradigms. The first relates to student engagement, often invoking some aspect of active or experiential learning as a pedagogical approach, even if that term is more intuitively understood than precisely defined. This is particularly true with respect to learning hierarchies, such as Benjamin Bloom’s taxonomy, where instructors instinctively prompt students to move from passive recipients of knowledge to active participants in the synthesis and evaluation of information and argument. Theoretical frameworks, however, do exist. Within the larger frame of Jean Piaget’s constructivism, which argues that education is not a transfer process but a process in which students construct their own knowledge through observation of the surrounding reality, Seymour Papert takes the leap from the contemplative to the action driven. He argues that learning occurs especially when students are required to construct the tools of their own learning experience.28 His constructionism is not the only pragmatic view on learning, but it is one of the most radical. David Kolb’s experiential learning cycle, for example, posits two elements to effective learning: a prehension element, where students take hold of an event through concrete experience; and a transformation element, where internal reflection and active manipulation reconsider and apply the event.29 The key here is that experiential learning occurs “only after experiences or events have been transformed by either reflection or action, or preferably both.”30

The second incorporates variations of Fred Davis’s technological acceptance model, which evaluates the likelihood of individuals and groups adopting a particular technology. This well-validated model has technologically focused variables (specifically, perceived usefulness and perceived ease of use) as well as more common metrics used to evaluate the likelihood of acceptance of information technology.31 Its effective use can correct or at least mitigate assumptions that students generally familiar with technology (so-called digital natives) will prefer and benefit from digital game-based learning. Even a brief consideration of this assumption should raise flags in the minds of researchers. Students need to learn the affordances of video games in the same way that traditional classroom mechanics, such as note taking during lectures, are learned. To ensure the effective adoption of
gaming technologies, educators need not only assess the perceived effectiveness of the game as a pedagogical tool, but also the video game literacy of the students (essentially, the perceived ease of use by students with disparate gaming experience) and the learning opportunities as an effect of its utility.32

In a study that implicitly reflects these two theoretical perspectives, Henry Jenkins, a leading light in the design and study of computer games, and Kurt Squire conducted important preliminary work on the use of video games in the classroom. They tested five different games (ranging from commercially available software to games developed at the MIT Media Lab) as teaching tools at various education levels.33 Under certain circumstances, they argued, games can model complex scientific, social, and economic processes, thus increasing the students’ understanding of such complex subject matters.

- **Civilization III**—a real-time strategy game employed to teach high school disadvantaged students about large-scale, long-term historical change and the ways various aspects of a civilization are interconnected.34
- **Revolution**—a multiplayer historical role-playing game developed at MIT, used to teach the impact of short-term events, and the potential for and limitations of individual activity within these constraints.35
- **Prospero’s Island**—a single-player game based in the complex world of Shakespeare’s *Tempest*, aimed to increase the players’ understanding of the play; the story is not retold, but reinvented in this environment and the player is given freedom of choice.36
- **Environmental Detectives**—an augmented reality game (ARG) with an ecological theme, played in teams with personal digital assistants (PDAs); the game emphasized win-loss strategies employed during imagined contamination scenarios.37
- **Biohazard: Hot Zone**—a training simulation game designed by MIT, which helped students learn introductory biology and environmental science.38

The experiments described show that game-based learning is often a holistic, immersive experience that encouraged a type of critical learning beneficial to the intellectual development of the students. Such efforts appear, at least on the surface, to improve cognitive learning outcomes among students. In a large meta-analysis of studies publishing results of game-enhanced teaching, Jennifer Vogel et al. synthesized the conclusions of 32 studies (from a list of 248 potential studies) that compared traditional teaching methods to teaching that included games and simulations.39 The authors concluded the following: “significantly higher cognitive gains were observed in subjects utilizing interactive simulations or games versus traditional teaching methods.”40
These authors, and other critics, argue that these conclusions are tentative at best. The Vogel study, for example, contains a number of secondary conclusions that speak to the topic’s complexity. First, there appears to be a significant gender difference, with male students preferring traditional teaching approaches while female students prefer games and simulation—a perhaps counterintuitive assertion given common, albeit incorrect, perceptions of the average gamer.41 Second, they suggest that user control over the environment is an important indicator of cognitive gain. The more freedom the student has to navigate the environment, the better the result.42 Third, factors often considered important to engagement, such as graphic realism, do not seem to have a significant impact on cognitive learning.43 Perhaps most significantly, most of the studies included in the meta-analysis focused on teaching engineering, science, or the health sciences.

Proponents of the inclusion of video games in the science curriculum have explicitly championed it as a form of active learning—exploring problems within the constraints and affordances of software. These participatory simulations and experiences “immerse players in complex systems, allowing them to learn the points of view of those systems and perhaps even develop identities within the systems.”44 In addition, the very nature of computer games allows students to learn at their own pace, receive immediate and often continuous feedback, and review through replay elements that were misunderstood. These features have shown increased learning outcomes over traditional lecture approaches for students in science, technology, engineering, and mathematics.45 University students who played the game Virtual Cell as part of the biology curriculum, for example, obtained a 40 percent increase in learning outcomes over students who attended lectures instead.46 Other studies report similar improvements in the quality of learning outcomes in computing science education studies.47 Here, the potential for video games seems enormous.

Take, for instance, the demand for educational reform in the medical profession, where the lack of appropriate skill acquisition has dramatically increased the use of simulation and role-playing environments.48 Human patient simulators, virtual emergency rooms and intensive care units, and role-playing environments employ many of the gameplay mechanics established over the past century.49

Liberal Arts

The application of video games in the liberal arts seems, on the face of it, a more risky proposition. The paucity of good “serious games” at the
university level in the humanities and social sciences speaks to this difficulty. In addition, despite popular perception, university-level history courses are not litigies of facts and dates. Good history courses evaluate and synthesize the interpretations of historians about why something happened, not just what happened. This sort of scholarly debate does not readily lend itself to a gripping game mechanic. In addition, when such games are attempted, they frequently focus on either entertainment, which oversimplifies the content, or on education, which detracts from the gameplay. As games may only adhere to the “broader strokes of history,” as one game commenter claims, they are not suitable as a digital textbook. Too often designers sacrifice the education content of the game to improve game mechanics, graphic detail, or production values. This dumbing down or “sweetening” of the content is clearly a poor pedagogical choice. Such games make poor substitutes for traditional teaching techniques. There are exceptions, such as games like Power Politics III, which places the player in the role of a campaign manager of current and historic presidential candidates. Released in 2005 by Kellog Creek Software, the game has been used with some success in political science classes at American universities.

Combining university-level learning outcomes with entertainment is the principal challenge facing postsecondary serious games. Overcoming this challenge requires attention to a number of factors: active involvement and stimulation of all players, sufficient realism to convey the essential truths of the simulation, clarity of consequences and their causes in both rules and gameplay, and the repeatability of the entire process. Educational and domain experts must, therefore, be included at all levels of the game design process, and not simply viewed as content creators. In particular, agreement on and iterative assessment of three elements of the game design process will reduce the likelihood of the educational content being lost: the purpose of the game (acquiring skills or knowledge), the affordances of the gameplay (improved social interaction, for example), and the effects of gameplay (learning outcomes, enjoyment, etc.). Without proper consideration to these elements throughout the design process, it is unlikely that specific learning outcomes would be achieved. This is a significant challenge considering that there is little empirical evidence that games are even capable of teaching what the educators think they can. This challenge is due in part to the paidia-ludus tension inherent in gameplay (the game may increase cognitive output, but may not in any way affect a teacher’s specific education outcomes). There is reason to doubt that assigning a competitive game in a class so that it is now mandatory is an effective teaching tool; as Charles Bailey states, mandatory games do not necessarily “build character.”
One popular approach to overcoming this difficulty is to create learning environments that improve students’ campus experience. Given the popularity of massively multiplayer online role-playing games (MMORPGs), educators have sought to leverage the open-ended nature of these environments for learning purposes. Virtual worlds are not necessarily games; however, they do mimic many game-like elements. Second Life, perhaps the most well-known manifestation of this technology, extended previous technologies such as multiuser dungeons (MUDs) and the somewhat recursive MUD object orienteds (MOOs). In Second Life many universities have created models of their campuses (often for promotional purposes). There is also a university-focused space called Campus, which adds additional tools restricted to postsecondary institutions. Campus serves as an interesting middle ground between MMORPGs and virtual worlds, essentially adding curriculum creation tools to a large, digitally populated campus environment. Players may “game” the system, however, subverting the intent of the game’s designer and transforming the instructional intent in ways not intended. Like many technologies that once seemed cutting edge, Second Life may already have seen its glory days. Second Life now seems a research environment where academics use other academics (rather than students) as subjects in experiments on teaching effectiveness and engagement. Still, researchers have published significant research on the potential of virtual worlds. Andrea De Lucia et al., for example, describe the establishment of a virtual campus for e-learning courses. The virtual campus consists of four virtual spaces—a common student campus, collaborative zones, lecture rooms, and recreational areas—bound together with a Moodle plug-in to allow the integration of multimedia content. Similarly, Marcus Childress and Ray Braswell describe in detail the effectiveness of Campus at a small Midwest university. Their project sought to increase student participation within the university community and curriculum, particularly for those uncomfortable with lack of visual feedback associated with chat rooms and email. The authors of both studies conclude that when compared to less immersive environments, MMORPGs create a stronger sensation of presence; this arises from an increased awareness of others within the setting and to enhanced communication resulting from avatar gestures and expressions. On the downside, users describe particular difficulties with navigation and the use of the 3D interface. On the whole, the authors concluded that virtual environments support synchronous communication and social interaction, and increase the participants’ level of motivation, although discipline-specific efforts remain understudied. Similarly, Yolanda Rankin et al. found that by facilitating interactions with native speakers in MMORPGs (Everquest II), English-as-a-second-language (ESL) students
improved significantly more in second-language acquisition than students learning through more traditional methods.63

Using these games as objects of study for the depiction of particular instantiations of historic events is another matter altogether. José Lopez and Myriam Caceres, for example, theorized that many popular commercial games can be classified not by their genre or technical features, but by their subject matter as defined by the liberal arts: war and conflict, urbanism and territorial management, democracy and citizenship, economy and trade, and the environment. 64 As objects of study thematically defined, games become a sociocultural resource readily mined by humanists and social scientists in terms with which they are more familiar.

Learning through Game Design

A constructionist, rather than an instructionist, approach to video games provides students with the means to build their own games, rather than simply play someone else’s.65 In order to design a game, not only do students need to develop and consider the content of the game (synthesizing and evaluating the most pertinent elements of the topic), they must also consider how to convey that information in a meaningful manner that makes sense to someone with less domain expertise.

Teaching meaningful communication through game design is a double-edged sword. On the one hand, video games specialize in the development of knowledge transfer and skill acquisition, which may provide important pedagogical lessons:

- Good games make information available to the player at the moment and place where said information is needed, seamlessly integrating this information into the game world.
- Good games push the player’s competence by being both doable and challenging, a pleasant frustration with the task at hand.
- Good games are customizable, placing the player in the role of co-creator of the game world.
- Good games introduce skills gradually, usually through a tutorial section that is integrated into the game’s story, building on “a cycle of expertise,”66 in which the player integrates old skills with newly acquired ones.
- Good multiplayer games are highly collaborative, allowing the players to pool and share both knowledge and skills.67
On the other hand, the skill passed down to the player may be only suitable for improving the playing of video games. Neil Postman’s caution regarding educational television seems an obvious parallel, where the skills acquired watching *Sesame Street*, for example, only better prepare children to absorb and decode the signs and symbols associated with television. According to Postman, the skills are not transferable. It could be that teaching through game design teaches primarily about game design, leaving little time for the student to learn the target subject matter. The complexity of game-authoring environments could distract from what the course is supposed to be about even if there is some learning in game design.

That said, a constructionist approach in the liberal arts could also ameliorate the disconnect between what a teacher thinks a game is teaching and what the students are actually learning. As students must develop sufficient domain expertise prior to (or concomitant with) the creation of the game, cognitive learning outcomes desired by the instructor are more likely, particularly if the game is embedded in an authentic context. An added benefit of creating such games themselves is that students gain additional skills not normally associated with traditional liberal arts courses. Technical fluency, such as that acquired using the game toolsets, such as Aurora for Bioware’s *Neverwinter Nights*, will introduce students to computer scripting, databases, flow control, variables, and basic logic structures. Positive results in this area have been documented at multiple education levels. More ambitiously, educators have created game design engines to create specific games for specific pedagogical purposes. Pablo Moreno-Ger et al. designed and described a toolset for the creation of adventure games that can readily be adapted for use by students, particularly those working in interdisciplinary teams with some facility in document markup. At the University of Alberta we have developed an alternative—augmented reality gaming platform with which students may design games rather than just play them.

*Closing Thoughts*

Although there are historical precedents and many experimental projects to examine, the application of gaming technologies to teaching in the humanities and social sciences remains an understudied area. Games may promote discovery and exploration in a manner that traditional teaching techniques do not—skills which when acquired may, through proper reflection and mentorship, be transferred to disparate situations. What remains sorely lacking is comprehensive testing of the efficacy of such games in improving
learning outcomes at the university level in the liberal arts.\textsuperscript{74} In the Humanities Computing program at the University of Alberta, we caution students about rose-colored views of technology. The application of computing technologies to the complicated, nuanced arguments made by liberal arts scholars is full of potential and risk. It will always cost more money than expected. It will always take longer than expected. But, if done carefully, with considered, measured steps, it will almost be as good as the way you were doing it before.

\section*{Notes}

1. Clearly, the title served as a play on the Pleistocene species \textit{homo habilis} (the “handy man”), as well as \textit{homo faber} (“Man the Maker”), described by Henri-Louis Bergson in the \textit{L’Evolution créatrice} (1907). As Huizinga places his anthropological work within an evolutionary structure, his title seems quite cleverly chosen.


6. See, for example, John Fiske and John Hartley’s \textit{Reading Television}, 2nd ed. (New York: Routledge, 2003), and Ien Ang, \textit{Living Room Wars: Rethinking Media Audiences for a Postmodern World} (London: Routledge, 1996).


8. Armstrong, 27.


Abort, Retry, Pass, Fail / 135


15. Smith, 7. See also Perla.


17. Smith, 7.


22. Halter, 41.

23. Perla, 25; emphasis added.


32. Jeroen Bourgonjon et al., “Students’ Perceptions about the Use of Video Games in the Classroom,” *Computers & Education* 54, no. 4 (May 2010): 1145–56. The authors came to their conclusions based on descriptive statistics applied to a survey questionnaire given to 858 Flemish secondary school students.
34. Squire and Jenkins, 11.
35. Squire and Jenkins, 15. Although the article does not state it, the screenshot on p. 16 suggests that the games were developed using Bioware’s *Aurora* toolset for *Neverwinter Nights*.
36. Squire and Jenkins, 19.
37. Squire and Jenkins, 23.
38. Squire and Jenkins, 26.
40. Vogel et al., 233.
41. Vogel et al., 234.
42. Vogel et al., 234.
43. Vogel et al., 235.
46. Mayo, 81.

51. “The Ten Commandments of Assassin’s Creed: Brotherhood,” http://xbox360.ign.com/articles/112/1125500p1.html. For example, the visual re-creation of Renaissance Italy in *Assassin’s Creed: Brotherhood* is remarkable. The historic accuracy of people and events (outside of the fantasy elements) is less so. The game designers approached historical accuracy quite practically. According to the mission director Gaëlec Simard: “if you can find the information within 30 seconds on the net, then it should be accurate in our game.”


53. *Power Politics III* was released in 2005 by Kellog Creek Software. The complexity of the game can be varied depending on the skill level of the player, and deals with topics like dirty tricks, electoral crises, and disputed results.


55. Clark C. Abt, *Serious Games* (Lanham, Md.: University Press of America, 1987); see also Michael.


62. De Lucia et al., 231.

63. Rankin et al., 46.


have to Teach Us about Learning and Literacy,” *ACM Computers in Entertainment* 1, no. 1 (October 2003): 1–3.


69. Kevin Kee and John Bachynski, for example, suggest this difficulty in “Outbreak: Lessons Learned from Developing a ‘History Game,’” *Loading . . .* (The Canadian Game Studies Association) 3, no. 4 (2009).


73. de Freitas, 344.

74. Michael, 74–75.