

his goal is just so that people have fun playing the scenario. See also <http://forums.civfanatics.com/showthread.php?t=111105> [<http://forums.civfanatics.com/showthread.php?t=111105>] and <http://forums.civfanatics.com/showthread.php?t=111488> [<http://forums.civfanatics.com/showthread.php?t=111488>] from the same thread for a discussion by the modding community on the “Historiography of Civilization.”[♣] [[#N15k-ptr1](#)]

16. If one is using an LMS (learning management system) such as WebCT or Moodle, there is a plug-in that will provide these sorts of metrics automatically on discussion board posts. See “SNA Diagrams,” *Social Networks in Action*, accessed July 31, 2012, <http://research.uow.edu.au/learningnetworks/seeing/snapp/index.html> [<http://research.uow.edu.au/learningnetworks/seeing/snapp/index.html>].[♣] [[#N16k-ptr1](#)]

17. Steven Borgatti, accessed July 31, 2012, <http://www.analytictech.com> [<http://www.analytictech.com>].[♣] [[#N17k-ptr1](#)]

18. *The Year of the Four Emperors*, accessed July 31, 2012, <http://forums.civfanatics.com/showthread.php?t=171164> [<http://forums.civfanatics.com/showthread.php?t=171164>].[♣] [[#N18k-ptr1](#)]

19. See Kee and Graham in this volume, chapter 13 [http://quod.lib.umich.edu/d/dh/12544152.0001.001/--pastplay-teaching-and-learning-history-with-technology?g=dculture;trgt=div2_ch13;view=fulltext;xc=1].[♣] [[#N19k-ptr1](#)]

11. Simulation Games and the Study of the Past: Classroom Guidelines

Jeremiah McCall [http://quod.lib.umich.edu/d/dh/12544152.0001.001/--pastplay-teaching-and-learning-history-with-technology?g=dculture;trgt=p_McCall;view=fulltext;xc=1#p_McCall]

What does an effective use of a simulation game in a history class look like? For too many interested in the games and learning field, it is not entirely clear. While the theory delineating the potential of games as learning tools is growing steadily,^[1] [[#N11](#)] discipline-specific practical applications are still too few and far between.

Developing practical uses of games as learning tools requires two components: the formulation of discipline-specific theories and classroom-specific implementations. As an early offering in the area of practical uses for games, this chapter proposes a theory for effectively using simulation games in the history classroom, a theory developed through my training as a historian and experiences as a high school history teacher who uses simulation games. Subsequently, this theory is translated into practical guidelines for using simulations in a history class.

The Importance of Taking Risks

The practical guidelines offered here have emerged from a cyclical process over the last five years of designing, implementing, refining, and even sometimes wholly rejecting lessons involving simulation games. While simulation games offer compelling learning opportunities, they come with significant challenges. Success using simulation-based learning in these early stages of the medium progresses equally as much from learning what not to do as what to do. Philosophically, teachers learning to use simulation games as learning tools need to be willing to engage in play. We must take risks,

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wading into the chaos, navigating the mess, and implementing a sense of order and meaning that helps students learn how to study the past. We must be willing to make mistakes and accept failures, for learning from mistakes enables us to design ever more compelling and effective lessons about the study of the past.

How does this work in practice? Accepting several important principles can help empower teachers to experiment, take risks, and make mistakes. First, teachers must come to see themselves as the expert guides rather than the sources of all worthwhile information and arbiters of what is true or false. Second, history must be approached as a discipline that embodies a set of core skills, not solely or even primarily a set of content. Among these skills are the ability to analyze and evaluate evidence, sequence ideas, and form compelling written and oral arguments. Third, a main goal of history teachers is to create learning environments where students can engage interesting source materials, analyze them, and construct formal responses to them in written, oral, and digital media. In this context, so long as students are engaged and tasked to hone these skills, a simulation-based lesson will not truly be a failure even when there is room for improvement.

The Advantages of Simulation Games

There is good reason to take risks where simulations are involved. Simulation games provide educators powerful tools that offer particular strengths for teaching the authentic skills of a historian, not to mention familiarity with twenty-first-century media. Quite simply, the advantages of simulation games for promoting meaningful study of the past demand concrete and effective classroom applications. The first step to developing this argument is to ground the key terms. At its broadest, a simulation is a dynamic and, to some necessary extent, simplified representation of one or more real-world processes or systems. Into this category fall a great number of analog and digital models of biological, physical, and chemical processes and systems. There are also interactive trainers, whose primary function is to prepare participants to function effectively in real-world tasks: flight simulations, air traffic control simulations, and business simulations are some of the best known examples in this category. [2] [#N2] A game, on the other hand, to paraphrase the definition of Katie Salen and Eric Zimmerman, is a rule-based system in which players undergo a conflict or competition in an attempt to achieve a quantifiable goal, such as winning or losing. [3] [#N3] So, a simulation game is a game that functions as a dynamic model of one or more aspects of the real world. A number of commercial and nonprofit computer games fall into

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this category, strategy games that place the player in historical roles, ranging from traders and subsistence farmers, to rulers and generals. The commercial game *Civilization*, for example, tasks players with exploring and colonizing a digitally rendered landscape, while the free, browser-based *Ayiti* challenges players to manage a family's economy in an impoverished country. These games, indeed all simulation games, invite players to explore and manipulate digital worlds defined by representations of real-world geography, structures, institutions, and inhabitants.

The educational advantages historical simulation games can offer may best be thought of as advantages of immersion and provocation. When playing a simulation, as opposed to using other forms of instruction, a learner can become immersed in a virtual representation of the past and, in doing so, be provoked to consider how and why humans lived, made choices, and acted the way they did in the past. These are insights about the systemic contexts in which people lived, which is really just another way of saying the networks of obligations, necessities, and desires that link

individuals to the environment and to the rest of human society. It is all too easy for students and teachers to forget the fundamental realities of the past that shaped decisions and actions. People of the past acted in physical and spatial contexts, securing food, walking places, and working to obtain their basic needs and, ideally, gain some comforts. To look at it another way, they lived and acted, as do we all, as parts of systems. These past people were both influenced by and influenced the systems in which they lived and operated. When the study of the past is treated as simply a set of established facts and interpretations to be learned, it becomes far too easy to divorce the people of the past from their physical, spatial, and social systems and from reasonable considerations of cause and effect.

Simulation games can help bridge this conceptual divide between humans and their systemic contexts because the games themselves are interactive systems. The principle is straightforward: to analyze a system, use a roughly analogous, but simplified, model of the system, which is just what a simulation game is. The moving parts, as it were, of the game bear a closer analogy to the moving parts of the past than other representations of the past, whether speech, text, videos, images, or discussion. These simulations place student-players into dynamic models of the past where problems must be solved and challenges overcome. [4] [#N41] The players must make choices based on limited information and experience the effect of those choices on the game world and their assumed persona in it. Such simulation games provide a virtual systemic context, a source of experience that provides learners a rich frame of reference when considering the motives and actions of people in the past. They provide students with visual, interactive models and experiences,

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however vicarious, of how their own decisions influenced, for example, the success of a trade, the development of a culture, the creation of an empire, or the outcome of a battle.

Perhaps because simulations provide the opportunity to study systems from the inside as an active participant, they are also able to provoke students to raise deep and meaningful historical questions. Though no firm conclusions can be drawn without formal research, important considerations suggest simulation games may actually inspire more students to ask a variety of deep historical questions better than other forms of media. Why might this be the case? Consider that research

clearly suggests students all too easily accept what they read in texts at face value. This is especially true when reading from a textbook. At the high school level, even the best student readers often have a tendency to read without offering the level of challenge and criticism required for a historian. To put it another way, they read for information rather than to discern a point of view. [5] [#N5] This habit can continue to be a problem with college readers. Without a high level of commitment to analyzing the information received and its source, it is exceedingly difficult to raise substantial questions about a text and its implications. If it is quite normal for students to accept most texts they read at face value, will they actively critique the ideas presented by their teachers in class? A simulation, on the other hand, may simply not be perceived as quite as authoritative a source of information. At the very least it is harder to treat a simulation as a text that must simply be read for facts. It may also be the case that, because simulation games provide immersive, rich audiovisual and tactile experiences with numerous opportunities for students to play and process at their own pace—including sidetracks—there may simply be more going on, for lack of a better phrase, to provoke questions in the time spent playing a simulation game than during a comparable amount of time reading a text or listening to a lecture. Perhaps, too, being put in the role of a decision maker causes a player to be more aware and more engaged in the historical environment presented by the game, and this leads to the formation of deep questions. Again, it will require substantial research to test these implications, but they are worth noting. At the very least, it can be said that simulations can be harnessed to inspire deep historical questioning.

It is worth noting that nowhere in this chapter is the use of simulation games advocated because they are fun. This is quite purposeful, but deserves an explanation. Certainly, simulations can be incredibly engaging, it is a good feeling when students are enjoying a lesson, and creating an educational atmosphere where students want to come to class is a worthy goal. Nevertheless, there are serious flaws with using the idea of fun as a criterion for effective lessons, particularly lessons involving simulation games. First, fun is both

relative and broad in scope. Suppose a student was asked if her sessions playing, observing, and intensively critiquing a simulation game were fun. What should the student use for comparison when answering? Spending time with friends outside of school? Riding a roller coaster? Watching a movie? These all can be considered fun

and arguably more fun than having to critique a game. Really, by the standards of fun playing a game without being required to take notes and present a critique is generally superior. The second problem is that fun is not equivalent to educationally valuable. Teachers know this. Exercises for developing effective analytical writing skills, for example, or researching arguments and advancing them in a logically compelling order, are highly valuable, yet no teacher—at least none I know of—asks their students if they would enjoy writing a paper, or whether they found the experience of writing a paper to be fun; it is simply beside the point. Finally, and this is a particularly important point, by no means does every student look forward to the idea of playing and critiquing a simulation game. Some find it highly intimidating; others prefer the lecture where they can more easily “check out” than in a simulation exercise. Certainly, simulation games can engage. They can hold attention, create intriguing and interesting situations, and provoke interesting questions and ideas. Where engagement is a desirable feature of a successful lesson, however, fun is not. Teachers who choose to use simulation games primarily because they are fun and expect to find all their students enthralled are both setting themselves up for disappointment and missing the point. Simulation games have compelling features as educational tools; whether they are fun is not at issue.

The Qualities of Effective Simulation Games

Despite the great potential of simulation games in history education, there is a significant caveat teachers must remember. Many of the most viable simulation games are commercial products designed to entertain, not teach, and this shapes their presentation of the past. [6] [#N61] Those that are not designed primarily for commercial purposes, on the other hand, may be particularly polemical in promoting their point of view. The teacher considering a game for classroom use needs to consider the characteristics that qualify a historically themed game as a simulation before using a game in class. Ultimately, though, the teacher must table the thornier theoretical issues of what features constitute a simulation and consider not whether a certain game is a simulation game, but *how effective a simulation game* it is.

By their very nature, simulation games will yield different outcomes each time they are played. Consequently, they should not be employed as static

descriptors of factual details about the past. Valid simulation games need not, and indeed cannot, represent each and every detail of the past accurately. There are better tools available for such a task. Text or image, for example, is often better suited to illustrating, say, how a specific Roman city looked at one specific moment in time. The simulation game offers, on the other hand, a more-or-less broad model of how that Roman city functioned. Choose the learning tool based on the desired learning outcome. One cannot expect a simulation of a war to yield the same outcome as the war itself or a city builder to limit urban plans only to those found in the past. Broadly speaking, for the outcome to be the same as that in the past, the causes, including the decisions made, must be the same. If a simulation game is to allow players choice at all, there must be the possibility for outcomes that did not occur in the past.

So if it is not an exact digital reconstruction of the past, which incidentally is a physical and philosophical impossibility, what exactly makes a video game valid for classroom use as a simulation? Primarily this: *its core gameplay must offer defensible explanations of historical causes and systems*. The idea of a defensible explanation is important when handling simulations. Arguments accepted by one historian or generation of historians are often rejected by the next. When it comes to the critical elements of history, why and how things happen, there are no facts, only conventions. Conventions, in turn, are nothing more than arguments that have held up to criticism due to the strength of their explanatory power and the strength of the supporting evidence. There is always room for a historical convention to be undermined; indeed it is a time-honored tradition in history to challenge conventions. If this is true of the best arguments of historians, it is equally true of the interpretations of the past embedded in video games. To be considered a historical simulation, then, a game does not need to offer an interpretation that is perfect, whatever that might mean, but one that is reasonably based on the available evidence. Focusing on defensible arguments rather than correct arguments promotes the idea so critical for training flexible, creative thinkers, that when it comes to humans interpreting and making meaning of the past, there are far more shades of gray and maybes than certainties. Students need to be encouraged, therefore, to consider which models in a simulation can and cannot be sustained by historical evidence. So long as a game has enough historical merit in its core explanations that students will be challenged to critique its validity, it is worth consideration for classroom use. Indeed, inaccuracies in the game serve a useful function: they give students an opportunity to challenge, just as the accuracies give them a chance to support.

Once a game is selected for class that has the core defensible models, the next step is to begin considering the historical problems posed by the

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game in order to anticipate the types of resources and support students will need to analyze the game. These fall into two categories. The first category encompasses the historical issues modeled by gameplay itself. These are the problems agents in the past faced that are part of the simulation's core play. They correspond to the content of a history course. The most important of these is generally how to assess and make trade-offs. A trade-off exists whenever there are multiple decisions the player can make, the decisions cannot all be satisfied simultaneously, and there is no clear-cut correct priority, but rather a variety of priorities that can shift depending on the goals of the player. Simulation games tend to revolve around this mechanic.

The second kind of problem is one of interpretation. These are the meta-level problems that must be considered when using simulation games effectively. If students are not asked to reflect on the accuracy of the models in the simulations they play, the teacher has simply replaced one authoritarian source of truth, whether a textbook, film, primary source, or the teacher, with another: the game. This will not do. The great strength of a foundation in history is that it imparts the skills to critique and question claims to the truth, not to accept others' claims without substantiation. Hence, teachers should encourage students to consider the problems of interpretation in a game, not just the problems of content.

Identifying a game's interpretation of the past is no more a natural exercise for most students than unearthing the bias of a primary source or the underlying assumptions of a modern author. Concrete guidelines, therefore, are needed to scaffold students as they examine a simulation's interpretation. The following questions are at the core of uncovering any simulation's point of view:

- What is the role of the player in the game world and what are the challenges the game world presents to the player?
- What actions can the player take or not take to overcome the challenges? What resources does the player have with which to overcome challenges?

- What are the trade-offs in the game when it comes to actions and the spending of resources?
- What strategies or actions lead to success or failure and how are success and failure measured in the game?

A game reveals its designer's vision of the past by expressing success and failure in certain terms—a number of votes, an amount of money, a certain population size—and dictating the types of actions the player's historical persona can take.

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From Theory to Practice: A Classroom Case Study

Now that the theoretical value of simulation games as interpretations has been surveyed, it is time to demonstrate the theory by illustrating the practical steps needed to design and implement simulation-based lessons. In particular, the essential steps can be reduced to six:

1. Select a game with defensible core gameplay.
2. Select resources and design supplemental lessons that correspond to the historical problems posed by the game.
3. Allocate time to train students to play.
4. Arrange students and structure time to allow for observation notes.
5. Provide opportunities for analytical exercises involving the game.
6. Cap the experience with opportunities for reflection and for critique of the simulation.

The success of these steps requires that the teacher serves as an expert guide, actively monitoring students' progress, posing questions, and offering assistance as needed. [7] [#N71]

The steps outlined above will be illustrated through reference to current practice in

a 2010 unit on Roman history studied by two ninth-grade classes from Cincinnati Country Day School. As noted at the beginning of this chapter, the practices currently employed in these classes have emerged from several years of design, implementation, a mixture of successes and failures, and refinement. The steps are reasonably well tested and provide an effective starting structure for lessons involving simulations. The particular games will change, but the basic structure will remain serviceable for some time. Still, these steps are by no means the last word on the subject; more effective strategies will emerge in response to further classroom practice.

The year 2010 marked the fifth year implementing simulation-based lessons for the ninth-grade Roman history unit. The goal of this iteration was to build on smaller-scale past simulation game experiences and develop a more substantial implementation. Previous simulation game exercises in the class had served as supplemental critical thinking exercises. The students played the Battle of the Trebia in the game *Rome: Total War*, for example, read the accounts of the battle passed on by the ancient historians Polybius and Livy, and wrote critiques of the accuracy of the game based on these sources. By 2009 this had developed to the point where students could choose to play either *Rome: Total War* or *CivCity: Rome* and research and write a critical essay. While these were worthwhile exercises in historical methodology, they seemed to be only loosely connected to the rest of the unit on Roman

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history. The Hannibalic Wars were referenced in the class but, due to time constraints, not studied in any depth; the same could be said for Roman warfare and Roman city life. Essentially, students were exercising their skills as historians but not focusing on a topic that was in any way integral to this particular unit on Roman history. The goal of the 2010 implementation, then, was to integrate the simulations more completely into the unit. In other words, the unit was redesigned so that the topics in the simulation games were made central. This way the advantages of simulations to teach systems would be integral to the unit of study. There are many games available on Roman history, but not a great breadth of topics. Essentially, there are games that focus on Roman warfare and imperialism, and games that focus on Roman cities and the economy. Out of these, two games in particular were selected to serve as the core classroom simulations: *Rome: Total War* and *CivCity: Rome*.

Were these legitimate to use as classroom simulations? To determine this requires considering the core gameplay of each, the first step in designing any lesson based on simulation games. The Creative Assembly's *Rome: Total War* is a hybrid turn-based and real-time strategy game that runs on Windows-based PCs. [8] [#N81] In the turn-based campaign mode, the player assumes leadership over one of three aristocratic Roman factions: the Brutii, Julii, or Scipii—it is possible to play non-Roman factions, but this option was not extended to students for the class exercise. Each faction starts in control of two Italian cities. The player must manage the cities under her control, constructing buildings that add to the economy, happiness, and growth of the settlement. Additional buildings determine the types of military units that can be levied in the city. Using these cities as bases, the player conducts diplomacy with, and campaigns against, any number of ancient powers as she chooses. Campaigns are carried out on a stylized topographical map of the ancient Mediterranean world, where armies, spies, and diplomats are each represented as individual figures. The Senate of Rome, a faction controlled by the computer, also issues missions to the player; these missions consist of military actions, ranging from blockading ports to sacking enemy cities. When the player successfully completes missions in the time allotted, her family's reputation within the Senate increases and family members can win key political offices. If the player ignores or fails to complete the Senate's missions, she may be branded a rebel and forced into civil war against the Roman Senate.

When an army attempts to enter a space occupied by an enemy army or city, a battle ensues. These are conducted in real-time mode. In a pitched battle, the player begins by deploying his troops on one side of a battlefield with terrain ranging from deserts to trees and mountains. In a siege the

deployment takes place around a settlement. Either way, the player knows nothing about the placements of the enemy army except that they will be deployed somewhere on the opposite side of the map. After deployment, the positions of the units in both armies are revealed, and the battle begins. Using his mouse, the player issues orders to individual units of infantry, cavalry, missile troops, and skirmishers. Units may march, wheel, change the depth and facing of their formations, attack, and retreat. Orders are not carried out instantaneously; for a unit to change formation, for example, the individual soldier models in the unit (ranging from 40 to 240 models per unit) must shuffle from their current positions into the new

positions. Individual units will fight so long as their level of morale remains high enough. If subjected to enough casualties, harassment, or danger—real or perceived—a unit will rout and flee the field. Once all of the player's or computer's units are destroyed or in flight, the battle is over and the army with units remaining on the field is the winner.

There are certainly problems with the game's accuracy, but this is true of all simulation games: being too simplistic in places, incorporating inaccurate details, and allowing the player an extreme level of control that a real Roman general would have traded his favorite warhorse to possess. [9] [#N9] Yet many of the core mechanics in the game, while not flawless, are historically defensible. The campaign mode illustrates in broad brushstrokes the historical constraints on Roman imperialism. Communication and travel are slow, too slow given the length of game time encompassed in each turn. The important part is that travel clearly takes time in the game as it should in the preindustrial world, particularly when the terrain is rough. Diplomats must journey to the cities of the player's rivals to negotiate deals, or vice versa, reinforcing the idea that, in the ancient world, communication took place at the speed a human or animal walked. Playing the campaign mode, one gets the sense that a fair amount of financial management and planning was necessary to support Roman military campaigns—complementary to the historical reality that armies were expensive and required the flow of tax money.

The game also has a solid model of ancient battle. The unit types available are generally historically accurate, consisting of various forms of infantry, cavalry, and missile troops. The formations of light infantry and heavy infantry differ, as do those of light and heavy cavalry. As an added touch of realism, units move as groups of individuals, and it takes a fair amount of shuffling for a unit, once commanded, to change formation. The inclusion of morale as a critical factor on the battlefield is an especially nice touch. Each unit has a morale level and is rendered inoperative when that level dips too low. The idea that morale, not casualties, was the most critical factor in

the outcome of ancient battles is an important component of understanding ancient war.

CivCity: Rome complements the military and imperial focus of *Rome: Total War* by concentrating on managing and supporting the lives of Roman city-dwellers. *CivCity: Rome* is a game of systems. [10] [#N10] As governor and city planner, the player manages and develops a Roman city. Food production, trade, water supplies, entertainment, defense, taxation, and a number of other aspects of urban life must be carefully managed to build a profitable, growing city. Essentially, the key task is to create a net revenue stream through trade and property taxes. Both require a sizeable and happy population, which in turn requires desirable housing within walking distance of a variety of goods and services. Houses begin as shacks and can evolve into villas when their inhabitants have nearby access to necessities and luxuries ranging from water and meat, to clothing, education, and entertainment. Access to water is provided by constructing a nearby well or cistern. All other products are provided by shops, each selling one type of good. As a house evolves it provides greater tax revenues.

The underlying economy of the game functions using what is sometimes called a daisy chain model: two or more buildings work in conjunction to produce a finished food product or item from raw materials. So, for example, wheat is grown on a wheat farm, ground into flour by a mill, and baked into bread. The digital inhabitants of houses within walking distance of the bakery will get their food there; access to the bakery, in turn, is one of the lower-level requirements for desirable housing. Surplus bread is stored in the city's granaries and becomes part of the general food supply for the city. Trees from forests, to give a second example, are turned into lumber by lumber camps. Bed makers and cabinet makers construct their respective products from the lumber and sell them to the populace. Surplus goods of this sort are stored in the city's warehouses. Trade occurs when the player constructs the necessary building chains to create, store, and trade goods abroad through a trade center or dockyard.

None of these endeavors will succeed, however, if the general population is not kept happy, a separate issue from catering to the desires of individual property dwellers. Measured on a scale from -100 to 100, the happiness of the population increases when enough inhabitants have access to sufficient food, housing, jobs, services, and amenities. Conversely, a lack of these lowers happiness. When the level of happiness is positive, the city will attract immigrants; negative happiness causes citizens to abandon the city.

CivCity has its share of flaws. [11] [#N11] The most egregious of these is the command

economy. As one might expect from a city-building game, the player has the ultimate decisions about what is constructed, what is produced, and

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what is sold. Certainly, emperors and governors worked to secure grain supplies, provide entertainment, and maintain infrastructures for urban populations, but there was a sizeable market element at work in the economics of ancient cities. A second problem, though one more easily overlooked, is that buildings are constructed instantaneously without labor or supplies, though they do cost money. On a more general level, though, the core models are defensible. The idea, for example, that Roman cities were filled with consumers whose needs had to be satisfied to a certain level in order for the city to thrive is reasonable.

The general supply models are also reasonable. The principle that inhabitants in a city walked or used animals to transport goods is well reflected. Resources must be provided within walking distance of a house for the house's inhabitants to benefit from it. Roads speed travel, making it easier for traders and consumers to obtain more goods more quickly. Furthermore, the principle that all products undergo a set of steps from raw material to finished good is also well represented. Overall, the illustration that the needs and wants of Roman urbanites had to be met for a city to be peaceful and prosperous is sound.

Both of these games contain some defensible explanations of human activity and, thus, were essentially suitable for the ninth-grade class. This all sounds very good on paper, but some educators examining these games might reasonably object that the criteria applied here are too forgiving. In a sense, one might concede, *CivCity: Rome* has a defensible economic model in that consumers' needs are met by businesses that gain their products from manufacturers who extract raw materials from the environment, but only in a sense. This is a general model at best, some will say, and outweighed by the sense of a command economy presented by the game. Or, one might object, *Rome: Total War* has a reasonable battlefield model, but the fact that players can create hodgepodge armies composed of troop types from the republic fighting alongside troop types of the empire and players can personally govern cities as a family faction leader, not an agent of the government, is taking too many liberties.

Two considerations are critical in the rationale for using games such as these. First, history itself is not a static, perfected representation of the past. It is a set of meaningful and defensible interpretations. History students, therefore, are taught best when they are taught the skills and methods of the historian, not saturated with a list of events, causes, and effects already established by the authorities. The flaws in a game cannot be overlooked. Quite the contrary: large-scale flaws in a game provide excellent opportunities for students to practice their skills of criticism. If the only flaws in a game are subtle minutiae, students will not have any reasonable opportunity to offer

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critiques, the core of the historian's practice. Better still, one person's flaw is another person's accurate portrayal. So, for example, while one student analyzing the game concluded that the command economy in *CivCity: Rome* is a fundamentally flawed model for the early empire, another focusing on the late third century noted that Diocletian fixed prices and even mandated that sons follow their fathers in the same professions. Second, the teacher must serve as the core resource and facilitator to make sure that the necessary kinds of criticism take place. If students do not, on their own, notice the command economy in the game or the unhistorical units, the teacher must pose questions and provide opportunities for students to engage in the necessary critiques.

Having established that these simulation games were suitable for classroom use, the next step was to determine the sorts of problems they pose. This would dictate the kinds of documentary evidence, support materials, and related learning activities that needed to be arranged. Problems of content in *Rome: Total War* include:

- how to overcome challenges posed by geography, limited resources, and personnel to develop a lasting empire;
- how to weigh economic, political, and military alternatives in the development of an empire and choose between competing goals;
- how to deploy and employ different troop types in battle to take advantage of terrain, maximize morale, and achieve military victories.

CivCity: Rome presents its own set of historical problems, including:

- how to organize city development so that city inhabitants receive the necessary supplies and materials to carry out their lives and professions;
- how to satisfy the subsistence needs, and higher-level desires of city inhabitants in economically effective ways;
- how to foster an effective manufacturing, trade, and supply network using preindustrial forms of production, transport, and communication.

As far as the problems of interpretation, they are nearly limitless. Any element of the games can be subjected to scrutiny.

To support the study of these content problems, a set of supplemental lectures, core readings, and other supporting media should be prepared corresponding to the key content areas in the simulations. In the case of these two simulations the lecture topics selected were an overview of Roman history, the constitution of the republic, the alliance system, aristocratic competition, urban planning, and daily life in cities. Excerpts of modern

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secondary source readings provided additional detail on each of these topics. In addition, a set of relevant ancient primary and secondary source excerpts was collected: the writings of Polybius and Livy, the letters of the governor Pliny, epitaphs for working women in cities, and the like. It is beyond the scope of this chapter to go into the details of gathering these resources, but it is worth noting that the Internet contains many if not all the original source materials needed for anything short of a professional-level analysis of these topics. Above all, students need to engage a variety of rich sources of evidence as they play. Although a chapter like this understandably focuses on the games, the time that should be spent studying these sources of evidence is a critical part of any simulation lesson.

With the content problems and supporting resources relatively set, the remaining learning objectives needed to be determined and the appropriate lessons designed to achieve those objectives. In the case of the Roman history unit, these learning

objectives focused on several core skills critical to the discipline of history and, in some cases, future professional success in the world:

- practicing collaboration to solve problems;
- developing writing fluency through regular practice of written expression;
- forming meaningful historical questions about Roman history; thinking about the world of the Romans and how they behaved in it;
- conducting research based on the historical questions posed;
- composing a formal essay evaluating the accuracy of the interpretations in the simulations; checking the information in multiple sources against each other.

These are far from the only things of value students can learn while studying historical simulations, but they are a core set of highly important skills.

Learning objectives established, the next step was to plan for productive play and observation sessions that would lay the foundation for later research exercises. There are several basic steps in planning effective simulation experiences. The first, already mentioned, is selecting rich sources of evidence and supplemental resources. The others are:

- training students to play the game;
- forming play and observation teams;
- promoting and facilitating observation;
- fostering reflection and analysis.

It is important to trace the progression of experiments and reasoning that led to these steps, particularly the imperative to begin by training students well

to play the game. Since the ultimate goal of history teachers is to get students to analyze, synthesize, and evaluate, it can be very tempting to rush students learning a game and move them quickly into analysis. While I assumed, in my first uses of simulation games in the classroom, that students would need some time to become familiar with the game, I greatly underestimated the actual amount of time needed and tried to jump quickly into analysis—say, after forty-five minutes of exposure to the game. Time has demonstrated that rushing students through this training can undermine the effectiveness of the whole lesson. Resisting the temptation to hurry on to the analysis is critical. Students must be taught to play the game and given sufficient opportunity to do so before they are asked to analyze and evaluate the game's models. The overall quality of the learning experience can be diminished greatly by shortchanging the time spent learning to play the simulation. It is all too often assumed that students under the age of, say, 25 are naturally disposed to playing video games. This is a suspect assumption at best, but certainly not the case with historical strategy games, the core genre for simulations. Some students simply do not play video games, and skill manipulating a cell phone, navigating a webpage, or communicating through *Facebook* is not the same thing. Many do play video games, but they are console games like *Left 4 Dead* and *Modern Warfare*, which emphasize fast reflexes, superior hand-eye coordination, and quick tactics rather than the slower-paced, managerial and strategic skills required by a historical strategy game.

Perhaps most importantly, it is decidedly not the case that students will be categorically so overjoyed to play a simulation game that they will throw themselves wholeheartedly into the task of learning to play. This will be true of some students at least. Some students would simply rather not play a simulation—though the same could be said about writing a paper. They find the experience offers unsettling challenges, requiring them to exercise a level of independence and problem solving to which they are unaccustomed, all the while concerned about how this activity translates into the grades they will earn in class. This is most often the case with the strongest traditional learners. Many, though hardly all, would rather sit through a traditional lecture because they know how to score well on tests and papers in that environment; conversely, a simulation game would challenge them to think in different ways. This is a major reason why they should play simulation games: to learn to think flexibly. Indeed, one of the values of a history education is to learn to challenge assumptions—others' and one's own; that includes assumptions about what forms of media can be subjected to historical analysis. Expect, however, that not all students will be enthusiastic. Under ordinary circumstances, though, how regularly does or even should a teacher ask for the consensus of the class on every

single topic of study and

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assessment? Simulation games are well worth including in the classroom. If they are incorporated primarily for entertainment reasons, however, rather than for their relevant strengths as learning tools, the teacher is in for a disappointment.

Since the potential appeal of simulations does not guarantee students will wholeheartedly and easily learn to play, like any other skill in a class, playing a particular game must be taught. Although some video games have excellent built-in tutorials, it is sometimes more effective to bypass the tutorials and devote one or two classes to training students how to play directly. The scope of the tutorial relative to the gameplay the teacher wants to emphasize, the available class time, and the motivation of students to learn are the key factors when deciding whether to go with a game's preexisting tutorials or to create a more tailored training experience. The tutorial in *Rome: Total War*, for example, spends a great deal of time focusing on the particulars of commanding armies in battles. If the emphasis in class will be on the higher strategic level of play, the tutorial may effectively be replaced by the teacher's instruction. If the focus is on battlefield dynamics, on the other hand, the tutorial is a great tool to help learn the game. The basic principles of *CivCity: Rome*, on the other hand, can probably be relayed more efficiently by a teacher than by the game's own tutorial. The bottom line, though, is that students need to learn the game fairly well to be able to critique it.

This principle has developed from the experiences of numerous classroom implementations, including the most recent lessons using *Rome: Total War* and *CivCity: Rome*. For various reasons—as I recall, the last-minute disappearance of a projector that would allow me to lead students by example through the early stages of the game—the students learned to play *Rome: Total War* through the tutorial. A number became bogged down by the battlefield component. Since they were not able to save their progress in the middle of the battle tutorial, these students effectively had to spend more than one class completing what ideally might have been a forty-five-minute tutorial. Ultimately, I had to provide a fair amount of additional support to help students become comfortable with playing the game, support that might well have been unnecessary had I directly trained students. In contrast, students received direct training in *CivCity: Rome* and were clearly far more comfortable with that game. There were assuredly other factors at work—there always are—but erring on

the side of providing formal training, while not always essential, will tend to produce the most consistent results.

What does formal training look like in practice? The number of students, their ages, their abilities, and their levels of motivation will determine the feel of the classroom. It is best, however, to err on the side of creating a highly structured training environment; this will help keep more rambunctious

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students on task while also providing extra support for those who need reassurance. First, run the game on a computer that has a projected display. Start the game on the easiest setting and provide explicit instructions for playing the game. While it can be helpful to have students observe the game and take notes before playing along, most will not begin to learn how to play until they actually have to do so themselves. This can be accomplished in a structured fashion by having students follow along on their own computers and carry out the instructions executed by the teacher.

These instructions will vary from game to game and class to class, but there are some common elements. First, introduce students to the basic goals of the game. In *Rome: Total War*, the general goal is to complete the missions assigned by the Senate and, in general, expand one's empire by capturing enemy territories. In *CivCity: Rome*, on the other hand, the general mission is to build a city that generates a positive revenue stream. It is not always immediately apparent to students what they should be doing in a game. Providing general goals keeps students focused on gameplay and enables them to play more independently. Second, instruct students in basic game mechanics and provide simple strategies for a successful start to the game. In *Rome: Total War* this means surveying the basics of building up cities, recruiting soldiers, maneuvering armies, and conducting sieges. In *CivCity: Rome* this means training students to identify and create the various daisy chains that support the economy and provide necessities to developing residential areas. Third, provide students with general problem-solving strategies and resources. These include their peers, web forums devoted to the game, and the game manual. If available, it can be particularly helpful to set up an online discussion forum using Moodle or some other online content management system so that students can ask and answer questions in a format that the whole class can see. Depending on the motivation of students, it does not hurt to incentivize or explicitly

require posting questions and answers on the forum. The amount of time devoted to training will vary. With games of moderate complexity like *Rome: Total War* and *CivCity: Rome*, plan for about two hours of training. This can be portioned in different amounts of class and out-of-class time, as time and resources allow.

After students learn the basics of the game, they should shift into the observation phase. The goal of this phase is to create a lab-like environment in which students can observe how the simulation works and make notes accordingly. To this end, it is often a good idea to form teams of three for the observation phase rather than have students play the game individually, at least when play takes place during class time. In this kind of grouping one student plays the game while the other two take observation notes; after a certain amount of playtime, the team members exchange tasks. This kind

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of setup encourages the taking of effective notes and prevents an individual from getting too engrossed in the play to reflect; it is the method that was used most often in the Roman history unit. With most students, it is a good idea to stop classroom gameplay every twenty to thirty minutes and spend five minutes catching up on notes. Children and adults alike can easily get too engrossed in a game to stop and make notes without prompting. The point of the whole simulation exercise, however, is not for students to be entertained; it is for them to learn.

Providing guidelines can enhance the quality of observations. Sometimes this is just a matter of introducing the leading topics students should use to focus their notes. Some general examples suited for most simulation games include:

- the role of the player in the game world and the challenges the game world presents;
- the actions the player takes to overcome the challenges;
- the trade-offs in the game between competing actions and the spending of finite resources;
- the strategies and actions that lead to success or failure and the measurement of

success and failure in the game.

Certain games, especially short web-based games, lend themselves to a system where the player records the choices she makes every turn, rationales for each choice, and the results of the choices. *Rome: Total War* and *CivCity: Rome* are complex enough, however, to justify taking regular pauses from the game even though students were generally arranged in trios of one player and two note takers. These pauses emphasize the need to observe and record the play experience.

After logging sufficient observations, more analytical tasks can be introduced. These can include problem-based learning style exercises inspired by student questions, explicit teacher instructions, or both. When analyzing *Rome: Total War*, for example, some students attempted to determine how far Roman armies could travel in a six-month game turn. They needed to develop problem-solving strategies to do so. With a bit of Socratic questioning on the teacher's part, students began looking at online maps, making rough calculations of distances and times, and comparing them to historical data on troop marches. Other students were concerned with how winter affected the Roman army. They engaged in a series of experiments, looking at the supply costs for the armies in spring and in winter. These experiments all arose from students' primary research questions and so only the students researching travel, for example, ran travel experiments in the game.

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Encouraged by the sight of students conducting experiments with *Rome: Total War*, however, inspired me to assign to the whole class some explicit analytical tasks concerning the game models in *CivCity: Rome*. For example:

- Diagram three food supply systems and product supply systems. Include each step in the chain.
- During play, you receive the message, "Sir, your granary is empty." What does this mean? What steps must you take to thoroughly diagnose the problem? Draw a flow chart to indicate the potential problems and solutions.

The ability of simulation games to serve as foundations for problem-based learning (PBL) exercises is one of the more promising areas in need of development.

Excellent PBL sessions can be created by posing inquiry tasks that require students to develop problem-solving plans. In future uses of these games, for example, students could be charged to:

- determine the scale of the city map in *CivCity: Rome* and based on this scale compare and evaluate the amount of farmland compared to the amount of civic space;
- determine the ratio of farms to people in the game and compare this to historical evidence for peasant societies;
- determine the scale of armies in RTW and, based on this scale, determine the accuracy of the map and the speed at which armies can travel in the game.

Exercises like these can hone problem-solving skills, increase students' familiarity with game models, and generate some insights into the past at the same time.

Throughout the observation and analysis phases, students should study historical evidence and reflect regularly on their experiences in the game. The Country Day students used a blog to record observation notes, enter reflections on their gaming experiences, and pose questions about the interpretations of the games. The advantage of the blog system is it promoted the idea that the students are a learning community and that they can share and learn from one another. [\[12\]](#) [\[#N12\]](#)

Once the observation, analysis, and reflection components are completed, the historical resources studied, and lectures heard, it was time to undertake some form of formal research and written critique. In accordance with the great importance of developing students' critical writing skills, my ninth-graders were tasked to research and write a formal critical essay

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about some aspect of the game. This was an exercise in forming meaningful questions, understanding how the game answers the questions, studying evidence, and constructing a formal analysis. First, students posted two or three historical questions raised by the game and discussed these in class. The questions ran an impressive gamut. For *Rome: Total War*:

- How did the Romans treat captured cities?
- What were the strengths and weaknesses of the Roman alliance system in Italy?
- How did distance and geography affect communications between the Senate and armies in the field? How did these factors affect diplomacy with other peoples?
- Did the Romans acquire an empire in self-defense or through active aggression?
- How were sieges conducted?
- What was the role of morale in battlefield victories and how did the Romans raise and maintain morale?

CivCity: Rome evoked these questions:

- How extensive was trade between private citizens in the Empire as opposed to government-sponsored trade?
- To what extent was the economy of the city controlled by the government?
- How important were public gardens, fountains, and other amenities to the happiness of an ancient city's inhabitants?
- To what extent was the happiness of Roman citizens really a high priority for government officials?
- Where and how did Romans obtain their supplies for constructing cities, especially when suitable resources were not nearby?
- How critical a problem was fire in ancient cities and how did the Romans deal with firefighting?

Interestingly enough, one of the most common sources of frustration and most common historical questions raised by the game concerned the distances the inhabitants of *CivCity: Rome* were willing to walk to satisfy their needs. Many felt

the radius the digital inhabitants were willing to travel was simply too limited and raised the question: how far could or would inhabitants of a Roman city have to travel to obtain the goods and services they wanted and needed?

The significance of these questions should not be underestimated. The students essentially came up with their own meaningful, high-level historical

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questions. Perhaps most striking, all of these questions have been the subjects of research and writing by professional historians; when presented with a game, these students were able to pose the kinds of questions that experts in the field do. ^[13] _[#N13] Rather than be assigned a research question, every student was able to formulate a meaningful question for research.

The students then presented the questions in class that they wanted to investigate for their papers. I offered suggestions, as necessary, for avenues of investigation and sources of evidence. To promote the legitimacy of their authentic historical questions and encourage a spirit of collaboration, students were able to switch questions and pursue different lines of inquiry if a classmate presented a question they found more intriguing. Subsequently, they researched and wrote persuasive, evidence-based essays arguing how accurately the simulation portrayed the issues they chose to investigate. *Google Books* was the assigned research tool, though students were also encouraged to use primary and secondary source excerpts from their class readings. *Google Books* offers considerable advantages as a tool for teaching basic research. While the system does reduce the need to pore through library stacks, arguably that is not the core of research anyway. With large numbers of book excerpts available, students can pursue virtually any topic raised by the simulation. Nor are the students' obligations to read and consider the evidence negated by the search tool. Any search can return large numbers of texts. This means students must practice scanning works to find those that are actually useful for the argument they are making—a core research skill. This also requires them to make sure they understand enough of the context surrounding the evidence, to avoid misrepresenting evidence.

These papers served as the primary form of assessment for the simulation units. The effectiveness of the exercise can only be demonstrated anecdotally, but several

aspects of the papers the students wrote stood out from the typical ninth-grade persuasive essay assignments I have assigned over the decade. First, as noted earlier, the great variety of high-quality topics that the students pursued was impressive. This was both a function of the simulations' ability to raise a variety of questions and the flexibility of the available research tools. For most of us, getting students to explore authentic, high-quality questions and construct formal answers based on historical research is a difficult task, indeed. One common solution is to get students to form their own questions. Asking students to form their own questions without sufficient grounding in the possibilities, however, can sometimes lead to the writing of reports rather than arguments, or the tackling of questions too large or too general to be appropriate for a class paper. Assigning a single question to the whole class, on the other hand, can ensure that the task students undertake is viable. But this kind of standardization has its

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costs; it removes the opportunity for students to form their own questions and pursue their own lines of inquiry. This has certainly been my experience over the years. These simulation papers were something different from the norm. They were varied and original. Indeed, some students chose to pursue the same question, but conducted their research and argumentation in strikingly different ways. In short, these papers were excellent models of the kind of work historians and history teachers should value.

At no point should it be understood that the use of simulation games in the classroom has reached anything approaching a pinnacle of effectiveness. There are many areas where further experimentation, in addition to formal research, is needed. The goal of using simulation games as a tool for studying, researching, and critiquing historical models was generally successful in this most recent implementation. Still there are important areas to expand on in the future. Two in particular stand out. First, exercises should be developed that require students to explore and learn the general content of the games more closely. It is critical to the use of historical simulation games to take them as interpretations and thus in need of corroboration from historical sources. For practical purposes, however, there are areas of well-established historical convention within these and other simulation games that the teacher can identify for students to learn while still maintaining the standard that the games are interpretations, not sources of truth. For example, it is reasonable for students to review, record, and be assessed on elements of content

contained in the games such as, for example:

- What were the key components of a Roman army and their equipment?
- What were the different types of housing in a Roman city and how can each be accurately characterized?
- What are the geographic locations of the Romans, Greeks, Macedonians, Gauls, Carthaginians, and the like? What are the main topographical features of the regions each culture occupied?
- What were primary forms of entertainment in a Roman city?

Obtaining purely factual knowledge by itself, as opposed to honing higher-order analysis and evaluation skills, is an insufficient reason to justify the time and potential expense of a simulation. It does not follow, however, that teachers should pass up obvious opportunities to get students to learn core information as they engage in the simulation. Of course, care must be taken by the teacher to make sure that students are guided through the more and less accurate aspects of game content.

The second area for expansion is to discuss in more quantifiable terms with students the core mechanics that are at work in the games themselves.

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Theorists on the role of games in learning and popular culture increasingly stress the importance of procedural literacy: that those who wish to treat simulation games critically must be aware of the procedures—the algorithms and routines—that underlie them. [\[14\]](#) [\[#N14\]](#) The implementation outlined above treated the games as texts, which they certainly are, and focused on discussing the interpretations of these texts. The discussions, however, did not really address the fact that the games have quite precise, although sometimes simplistic, mathematical models underlying them and those models themselves are inherently subject to human bias, let alone miscalculation. Introducing the idea that these games contain quantifiable models that are, despite their quantification, far from perfectly accurate, is an important step along the way to learning to treat technology as a tool, not a deity. Topics like

this could readily be addressed through general discussions of variables and their relations at a level reasonable for those with a basic knowledge of algebra. So, for example, students could outline what the main variables likely are in the battlefield model of *Rome: Total War* and how those variables likely interrelate, or something similar for the determination of property values in *CivCity: Rome*.

In closing, it is worth considering once again why many teachers, even those who have kept reading up to this point, still feel uncomfortable or outright skeptical of the idea of experimenting with simulations. This is probably particularly the case for those who teach public school curricula dictated by school boards, state standards, and high-stakes tests. Educators in these situations—and there are many—may rightly feel that they have little room to improvise, innovate, and experiment, little room to deviate in any significant way from traditional methods of instruction and the prescribed curriculum. To be fair, teaching in an independent school has provided me, like so many independent school teachers, with greater discretion in setting classroom curricula and pedagogical approaches than teachers have in many schools. Still, there are ways for teachers with less flexible curricula to incorporate simulation games effectively in the classroom. The options for simulations extend far beyond *Rome: Total War* and *CivCity: Rome*. There are simulations addressing a wide variety of topics and periods. There are also a host of freely available web-based simulations that address contemporary issues and require no more than a half hour to play. Those who cannot spend days away from a mandated curriculum can use these smaller-scale games to engage in more economically chunked critical-thinking exercises.

With so many options, large and small, let's turn this primary objection on its head. The real question is, what are we teaching our students if we never improvise, innovate, and experiment; never deviate in any significant way from traditional methods of instruction and the prescribed curriculum?

How can history teachers effectively prepare their students for the twenty-first century by suggesting that teachers are the sole source of authority; that learning is something that is received through oral and written texts alone; that historical interpretations can only be captured in letters, never in image and code? Simulation games can play an integral role in teaching history as a twenty-first-century discipline, when they are treated as some of the many forms of interpretation of the

past, with special properties for representing the world, but no particular claim to truth. In practice this requires allowing simulations to pose problems and inspire authentic questions about the past that students can tackle.

A final thought: certainly, adopting this stance and pedagogy does require teachers with some confidence and skill in the methodologies of a historian. When a class shifts from the transmission of information to open-ended problem solving, there will be many times when the teacher simply does not have an answer on hand. This is the point; students need to learn, over time of course, to function as independent historians, not simply to rely on the closest source of authority for answers. Adopting this principle has the potential to open up a teacher's history classes to engage in something far closer to the true inquiry of the professionals. There is much to be gained. In a world with so many competing claims to the truth, where vocal figures in politics, the media, entertainment, and religion offer versions of reality that are often in conflict and in need of critique, an educated person must be able to judge the validity not only of discrete facts, but of competing claims to historical truth. Students who are taught more than the chronology, or even the story of history, and learn to do history have the opportunity to acquire crucial skills of critique, analysis, and interpretation of human events. Students who learn that interpretations are not only ensconced in writing, but are embedded in videos, podcasts, mash-ups, and, yes, video games, can gain valuable tools for negotiating the modern world.

Notes

1. The seminal work in the field comes from James Paul Gee, and readers interested in learning about general games and learning theory should start with his books, *What Video Games Have to Teach Us about Learning and Literacy* (New York: Palgrave Macmillan, 2003) and *Good Video Games and Good Learning* (New York: Peter Lang, 2007). See also David Williamson Shaffer, *How Computer Games Help Children Learn* (New York: Palgrave Macmillan, 2006). Important work has been done in the journals, and the following articles offer good points of introduction to the field: Rosemary Garris, Robert Ahlers, and James E. Driskell, "Games, Motivation, and Learning: A Research and Practice Model," *Simulation & Gaming* 33 (2002): 441–67; Harold F. O'Neil, Richard Wainess, and Eva L. Baker, "Classification of Learning

Outcomes: Evidence from the Computer Games Literature,” *The Curriculum Journal* 16 (2005): 455–74; Kurt Squire et al., “Design Principles of Next-Generation Digital Gaming for Education,” *Educational Technology* 43 (2003): 17–23; Susan McLester, “Game Plan,” *Technology and Learning* 26 (2005): 18–26; S. Tobias and J. Fletcher, “What Research Has to Say about Designing Computer Games for Learning,” *Educational Technology* 47 (2007): 20–29. For a counterpoint to these studies, see R. Clark, “Learning from Serious Games? Arguments, Evidence, and Research Suggestions,” *Educational Technology* 47 (2007): 56–59. Be sure to read Squire’s response to Clark in K. Squire, “Games, Learning, and Society: Building a Field,” *Educational Technology* 47 (2007): 51–55.

♣ [\[#N1l-ptr1\]](#)

2. For some definitions, see S. Tobias and J. Fletcher, “What Research Has to Say about Designing Computer Games for Learning,” *Educational Technology* 47 (2007): 20–29; Christian Elverdam and Espen Aarseth, “Game Classification and Game Design: Construction through Critical Analysis,” *Games and Culture* 2 (2007): 3–22, accessed October 12, 2010, <http://gac.sagepub.com/cgi/reprint/2/1/3> [<http://gac.sagepub.com/cgi/reprint/2/1/3>]; Katie Salen and Eric Zimmerman, *Rules of Play: Game Design Fundamentals* (Cambridge, Mass.: MIT Press, 2003), 422–58.♣

[\[#N2l-ptr1\]](#)

3. Salen and Zimmerman, 80.♣ [\[#N3l-ptr1\]](#)

4. This can be compared to the established use of micro-worlds in science and mathematics education. On micro-worlds, see John Bransford et al., eds., *How People Learn* (Washington D.C.: National Academy Press, 1999); Shaffer, 67–71; James M. Monaghan and John Clement, “Algorithms, Visualization, and Mental Models: High School Students’ Interactions with a Relative Motion Simulation,” *Journal of Science Education and Technology* 9 (2006): 311–25; Barbara White and John R. Frederiksen, “Inquiry, Modeling, and Metacognition: Making Science Accessible to All Students,” *Cognition and Instruction* 16 (1998): 3–118; Leslie P. Steffe and Heide G. Wiegel, “Cognitive Play and Mathematical Learning in Computer Microworlds,” *Educational Studies in Mathematics* 26 (1994): 111–34; Roxana Moreno et al., “The Case for Social Agency in Computer-Based Teaching: Do Students Learn More Deeply When They Interact with Animated Pedagogical Agents?” *Cognition and Instruction* 19 (2001): 177–213; Maria Kordaki, “The Effect of Tools of a Computer Microworld on Students’ Strategies Regarding the Concept of Conservation of Area,” *Educational Studies in Mathematics* 52 (2003): 177–209.♣

[#N4l-ptr1]

5. Samuel S. Wineburg, *Historical Thinking and Other Unnatural Acts* (Philadelphia: Temple University Press, 2001), 63–88, details a seminal experiment in the difference between how students and professional historians read texts.♣

[#N5l-ptr1]

6. As recently as his interview for Kotaku Talk Radio on May 5, 2010, mp3 interview file, accessed July 31, 2012, <http://kotaku.com/5531995/an-hour-of-sid-meier-brilliance-including-his-surprise-guitar-hero-regret> [<http://kotaku.com/5531995/an-%C2%ADhour-%C2%ADof-%C2%ADsid-%C2%ADmeier-%C2%ADbrilliance-%C2%ADincluding-%C2%ADhis-%C2%ADsurprise-%C2%ADguitar-%C2%ADhero-%C2%ADregret>]. Sid Meier, the creator of the *Civilization* series, noted once again that he and his design teams focused on making an entertaining and engaging game first and added the historical research after the fact.♣[#N6l-ptr1]

7. Richard E. Mayer, “Should There Be a Three-Strikes Rule against Pure Discovery Learning?” *American Psychologist* 59 (2004): 14–19, is an excellent study suggesting that inquiry learning is most effective when the teacher remains an active presence in the activity.♣[#N7l-ptr1]

8. Currently available through the online services *Steam* (store.steampowered.com), and *Direct2Drive*, accessed July 31, 2012, www.Direct2Drive.com [<http://www.Direct2Drive.com>]; Amazon.com is an excellent source for hard copies.♣[#N8l-ptr1]

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9. These are not particularly controversial points in the field, but for some support of the general outlines here, one could examine John Rich and Graham Shipley, *War and Society in the Roman World* (London: Routledge, 1993); William V. Harris, *War and Imperialism in Republican Rome 327–70 B.C.* (New York: Oxford University Press, 1979); Jeremiah McCall, *The Cavalry of the Roman Republic* (New York: Routledge, 2001); Adrian K. Goldsworthy, *The Roman Army at War, 100 BC–AD 200* (Oxford: Clarendon, 1996).♣[#N9l-ptr1]

10. Also available through the online services *Steam* (store.steampowered.com [<http://store.steampowered.com>]) and *Direct2Drive* (www.Direct2Drive.com)

[<http://www.Direct2Drive.com>]; Amazon.com is an excellent source for hard copies. †
 [#N10l-ptr1]

11. The reader might turn to the following books to start when considering the issues involving Roman cities: John E. Stambaugh, *The Ancient Roman City* (Baltimore: Johns Hopkins University Press, 1988); Pierre Grimal, *Roman Cities*, trans. G. Michael Woloch (Madison: University of Wisconsin Press, 1983); Patricia Crone, *Pre-Industrial Societies* (Oxford: Basil Blackwell, 1989). † [#N11l-ptr1]

12. We used *Ning*, which has recently ended its free hosting of social networks. Interested teachers will need to do some online research to find acceptable substitutes. † [#N12l-ptr1]

13. Entries in Rich and Shipley cover most of these subjects. The groundbreaking works on communications between the Senate and field commanders and the motives for imperialism, respectively, are Arthur M. Eckstein, *Senate and General: Individual Decision Making and Roman Foreign Relations 264–194 B.C.* (Berkeley: University of California Press, 1987), and Harris. † [#N13l-ptr1]

14. See, for example, Ian Bogost, *Persuasive Games: The Expressive Power of Videogames* (Cambridge, Mass.: MIT Press, 2007). † [#N14l-ptr1]

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