All Fall Down: Simulating the Spread of the Black Plague in the High School History Classroom

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THE BLACK PLAGUE, as it came to be known, is a source of fascination in many world history courses. It is at once phenomenal in its destructive magnitude and it represents a rough demarcation between Medieval and Renaissance Europe with its impact on the manorial system. It is important to note that the Bubonic Plague has a storied history, one that long precedes the Medieval outbreaks, dating back more than 3,000 years from the present.[1] For much of the disease's history, outbreaks were local and had limited transmission, but as trade burgeoned across the Mediterranean region, so too did recurring plague epidemics between 541 CE and 767 CE, subsiding as trade in the region retreated. The plague, most commonly referred to as the "Great Mortality," is the fourteenth-century outbreak that leveled Europe (1346-1352).[2] This particular plague pandemic, which appears to have originated in the highlands of Tibet, decimated the populations of Europe, and very possibly those within Asia and eastern Africa over the course of centuries, not just across the few years in which it hit Europe the hardest.[3]

Although the exact conduits of the global spread of the Black Plague continue to be debated, and even controversial, the likeliest

route into Europe appears to have originated from the port city of Caffa in the Crimea in 1346, corresponding to the Mongol invasion into the region.[4] Conventional knowledge holds that the main vector of the spread of the disease were the black rats (*Rattus rattus*) or, more accurately, the fleas that inhabited their bodies. However, the knowledge that scores of mammalian species are known to have contracted or carried plague, and that plague could be transmitted person-to-person, also complicates the picture in how we determine which other vectors may have contributed to the spread of the disease.[5] Nevertheless, it remains evident that populations that had greater exposure to rats were also more susceptible to the contagion.[6]

As disease swept through Europe, it began to dawn on people that the disease was a more formidable opponent than was initially realized. As poorer residents began to die in droves, the gentry started to get their affairs in order—religious processions, fasts, flagellation, and pilgrimages had no effect. And in the case of the latter, humans actually may have exacerbated the spread of the disease; the same can be said of fleeing denizens, who sometimes brought plague with them.[7] Pogroms began, as suspicion was cast upon the Jews and fear released the old hatreds of vengeful Christians. Thus, Europe's Jewish population was doubly victimized by the arrival of the plague.[8] Some individuals who had the means and wherewithal to do so managed to isolate themselves effectively. Cities, too, attempted this strategy, closing off the town to outsiders; Gloucester's efforts failed, but Milan succeeded, perhaps because they also walled off the homes of the infected, thereby preventing further spread of the disease.[9]

From Chronicle to Classroom

Although the Bubonic Plague has long run its course as a pandemic as a result of natural immunities that have built up over centuries, greatly improved sanitation, and the advent of antibiotics in the twentieth century, it is alive and well in Parag Joshi's classroom. Joshi uses a simulation, of his own design, to teach about the spread of the Black Plague in the fourteenth century. Students often struggle to understand or connect to history, especially with topics as complicated and emotionally fraught as was this tumultuous time. Our students have grown up in an era where many of them

are shielded from experiencing epidemics or even seeing those that do exist, especially in the developing world where people have much less access to healthcare. It is one of the privileges of living in a wealthy Western nation. Because plague carried with it fear, confusion, and helplessness in the same way the recent outbreak of Ebola did, the plague simulation, created by Parag Joshi, provides an excellent example of how these emotions can be harnessed to enrich student learning on the topic.

What is a Simulation?

In the social studies, the term "simulation" refers to classroom activities that reflect real-life events, processes, or dynamics in a true and limited fashion. More precisely, we argue in this paper that a simulation is a simplified enactment of a dynamic process, in which the outcome is not pre-determined (i.e., the events unfold naturally within the confines of the simulation's structure). In such a process, the consequences of a decision or condition of one agent are dependent on the actions or conditions of other agents.[10] Examples of dynamic social processes that are excellent candidates for simulations are markets, elections, and negotiations, as well as diseases. These processes can be historical or contemporary. Pedagogically, simulations work because they draw on "hot cognition" to help to facilitate students' internalization of ideas and to fortify their learning and memory;[11] they require students to do situational analysis;[12] they challenge students to consider how they work together or at odds with one another;[13] and they can be leveraged to more effectively teach the content knowledge behind the simulation.[14]

Simulations in the History Classroom

Simulations are beginning to receive increased attention after languishing between the 1980s and mid-2000s in the minds of scholars. This renewed interest has led recently to insights about how simulations are used, and the impacts that social studies simulations can have on students. As William Robinson has pointed out, "in the Age of Assessment," the concern for outcomes is often focused around whether a student's participation in a simulation improves

their scores on tests and other assessments.[15] The research to date has been consistent in its findings that simulations on their own do little to increase test scores.[16] Recent research, however, has demonstrated that simulations—when incorporated into more comprehensive units that use the simulation as an anchoring activity for related content—can lead to higher scores when compared to instruction without these well-integrated simulations.[17] History as a discipline has long been a bastion of traditional pedagogy, but there is a growing recognition that pedagogical approaches to history that engage multimodal approaches to learning content and concepts are more effective than traditional transmission processes.[18] Advocates of content coverage presume that historical content is intrinsically engaging, but for high school students, this simply appears not to be the case, particularly at the secondary level.[19] In light of the pedagogical innovations in history education in recent years, games and simulations represent a set of approaches to history that opens up promising possibilities for students learning and engaging with history.[20]

Conceptual Framing of the Plague Simulation

What we seek to emphasize is that simulations also have the power to encourage historical empathy that may help to impact learning by helping students to care for a history so long in the past. Keith Barton and Linda Levstik discuss historical empathy in two forms: Empathy as perspective recognition and empathy of care.[21] When using historical simulations, we want students to be able to recognize the "complex elements of individual viewpoints" without implying that "we can 'take on' the perspectives of others."[22] At the same time, simulations provide teachers with the opportunity to address students' tendency to view the past through a presentist lens, and opportunity that can lead to deeper learning—a form of perspective recognition that Barton and Levstik hold has received little attention.[23] Although perspective recognition can be accomplished through any number of teaching strategies, simulations are particularly well-designed to help students engage in the kind of empathy they describe as caring, "caring about" the plague, "caring that" it happened, and "caring for" those involved, because they have lived out the plague, albeit in a limited and artificial way.[24]

Jeremiah McCall argues that "it is all too easy to divorce humans from their systemic contexts" in history classes. He argues further:

> If the study of the past is to help students better understand the limits and affordances, motivations, actions, and consequences of the past, it is critical to understand the role of these systemic contexts in helping explain human actions and events. Simulation games are potentially powerful in the role of studying historical systems because they are systems themselves.[25]

McCall is cautious to note, however, that simulations are not without their limitations. Two of these limitations should be of particular concern. First, simulations necessarily simplify the phenomenon they represent, and second, there is the potential for "significantly counterfactual outcomes" that can represent those that did not—or could not possibly have—arisen in the real world.[26] The counterfactual outcomes problem is one that is difficult for designers and teachers to anticipate fully because of the dynamic nature of the simulations actors—your students.

For example, in this simulation, students do not live within the religious milieu of the late medieval period, which was rife with superstition about the causes and consequences of catastrophe, deep suspicion of the other, and a special hatred for Jews. Further, they cannot cast away their knowledge about how disease is spread or cured. In this way, the simulation is limited to the dynamics of the spread of the disease and the anxiety of its approach, and does not pretend to transport them to the past. These limitations to the use of simulations require that teachers carefully attend to these issues in order to redress anachronistic extrapolation into the areas discussed above both as the simulation unfolds and when students are debriefed.

At the same time, simulation scholars regard such simplification as a positive pedagogical feature of these tools. Simplifying phenomena helps students to filter out the noise of the world such that they may focus on the core facets of the problem in question.[27] If a simulation attempts to approach reality too closely, it can actually undermine the pedagogical value of the activity.[28] The teacher thus plays a critical role in helping students to participate in simulations, while also supporting students "understanding of a historical phenomenon… But just as a secondary source interpretation of the past should not be accepted at face value," simulations are "never accepted passively."[29] These two limitations will be revisited later in this paper.

Why Teach About Plague?

Although teaching about the Bubonic Plague is part of the curricular frameworks of various schools across the United States, there are ancillary lessons, discussions, and skills that teaching about the plague can foster. First, teachers can use the Black Plague to attend to media literacy and current events: outbreaks of disease are a perennial concern and a persistent source of media fearmongering used to boost viewership.[30] An analysis of the plague may afford us the opportunity to discuss recent scares such as Ebola, H1N1, and SARS; we can compare the various media coverage versus scientific analysis of the contagion's impact. Second, teachers can make connections to scientific ideas such as *herd immunity* and discuss the recent, preventable outbreaks of measles. Finally, teachers can make connections between students' knowledge of the plague and other major outbreaks that have devastated world populations—such as Spanish Influenza, Cholera, Malaria, HIV/AIDS—to talk about how diseases are spread or prevented, how they impact communities, and how the spread of disease has changed in the age of air travel. Thus, teaching the plague has multiple historical and contemporary applications, for which Joshi's plague simulation acts as a curricular springboard.

Context

Joshi teaches in Connecticut, a state that has adopted the Common Core. Connecticut does not specify content that is to be used to illustrate the key concepts highlighted in the document, but instead, provides thematic strands that teachers should use to develop content to explore. This curricular context enables Joshi to structure his "Roots of Civilization" history course for high school freshmen thematically. In this way, he is able to "move beyond a disjointed presentation of world historical events in favor of an approach stressing not only the global linkages of the modern era, but also the patterns evident in the pre-modern world," as J. Lawrence Hare and Jack Wells have advocated in global history courses.[31] The historical content of the course runs from pre-history to 1492, and is designed to use broad themes such as Technology and Innovation, Social Roles and Stratifications, and Religion and Belief to help

students to develop meaningful historical understandings that span both time and geography. The plague simulation is situated within a unit titled "Cooperation and Conflict." The design of these units makes use of what Stéphane Lévesque refers to as *colligation*—the building of historical thinking across time and/or space through a thematic strand—and *synoptic judgment*—using distance from the past to reveal larger trends and interconnected events that may not have been obvious to historical actors.[32]

The curricular purpose of the plague simulation and the lessons that surround it is to better enable students to understand the often unintended consequences of trade networks. In this case, to recognize the human dimension and experiences connected to the spread of disease in an increasingly connected world. Such an approach prizes the exploration of historical concepts and constructs in concert with historical facts. It is our belief that simulations are an excellent vehicle for students to engage with and make meaning out of such concepts and constructs.

Students begin the unit by examining why trade occurs, and what kinds of elements contribute to create a trade economy, such as roads, watercraft technology, markets, money, and trade networks. Joshi spends several lessons on the development of money as a technology that allowed the economic system of a locality to expand. Students then study one of a number of ancient trade systems to study in more detail, including the Silk Road, Phonetician trade, and the Trans-Saharan gold trade, among others. Students use primary sources and maps in these projects to understand the geographical and historical contexts of the patterns of trade they are researching. Following this project, Joshi introduces the plague in a lesson that incorporates the origination, dissemination, and consequences of the disease, as well as reactions to the plague, contemporary understandings of the world and of disease, and the limitations this placed on people's ability to act to ameliorate its effects. Following this lesson, he implements the simulation. After the simulation, Joshi's students spend time debriefing what happened and why they reacted in the ways that they did to the spread of plague in their classroom. Joshi is careful to manage students' conflation of modern understandings and reactions by discussing the ways in which their experiences may have reflected and differed from those living in the fourteenth century. As a final step, he connects the spread of the plague in the

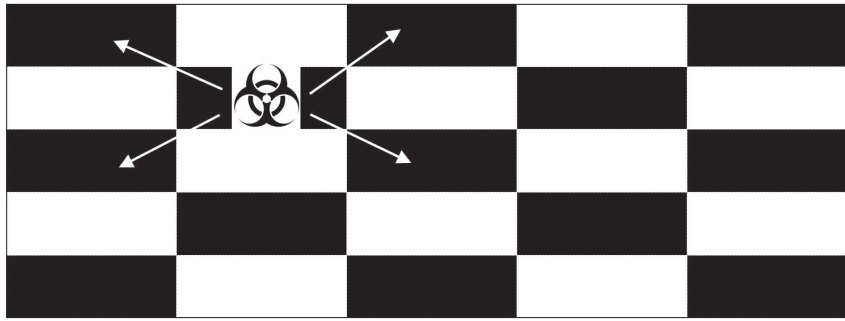

Figure 1: *Checkerboard pattern for student seating arrangement.*

medieval world and its effects with more contemporary outbreaks such as that of avian flu, H1N1, and Ebola. This serves to forge a past-present connection for students[33] and transition into the next course unit, "Technology and Innovation."

The Simulation

The Set-Up

The arrangement of the class is straightforward: Joshi places students' seats in a checkerboard pattern at the center of his room (see **Figure 1**) and asks students to pick their seats. When students are seated, he explains the simulation and how the mechanics of the game work (i.e., how the disease will spread throughout the classroom).

The Spread

The spread of the plague occurs as a function of probability, facilitated by a number generator (set from 0 to 99). There are a variety of ways that this can be accomplished. The ideal is to have students share phones onto which they have already downloaded a random number generator, but this can also be accomplished centrally by the teacher using one of the many free online tools.

The first infected student is chosen at random. Joshi uses the nearest birthday to determine who this student is; Wright-Maley has also placed a flashcard under a random chair to do so. The person who is infected stands up; people on their diagonals are then

"exposed" to the disease (see **Figure 1**). Using their phones, students who were seated at a diagonal to the infected person stand up and generate their "exposure number." This number is subjected to the infection rate, which is set at 70%. With a 70% infection rate, if their randomly generated number falls between 0 and 69, then they, too, are infected, and remain standing. If their number is between 70 and 90, then they were exposed, but not infected. And if their number is higher than 90, then they were exposed, but became immune. Those who were not infected or immunized sit back down. Those who were infected then expose people on their respective diagonals, standing up to repeat the infection iteration, and the spread continues this way until the plague can spread no more. A student may be continually exposed to plague unless they roll immunity.

Before the above procedure proceeds to the next round of exposures, the students who are the infected persons generate a second number, which is subjected to a survival rate set at 20%. With only 20% predicted to survive, most will perish (0-80), but some may recover (81-99). If a student perishes, they go to a designated part of the classroom called the graveyard. After the infected person has either recovered or has "died," the plague continues its spread. Students at times struggle with the idea that they can be infected, survive, and still not be immune. For example, a student asked Joshi if a person can be re-infected. When he replied "yes they can," the students' neighbor looked up incredulously. "What? They can get infected again?" At this point, Joshi—as you likely will—explained that if he was sick and gave it to someone else, he could get it again if any genes had mutated or if he had not built up sufficient antibodies to fight off exposure to the disease again. The student, not realizing his insight, said with exasperation, "Well then it will just go around and around until everyone is dead or immune!" You can see the twinkle in Joshi's eye as he exclaims, "Yeah, now you've got it!"

The Aftermath

After the plague has run its course, Joshi always asks his students (some of whom remain sitting in the village—either because they were not infected, recovered, or were immune—while others are standing in the graveyard) to make some initial observations about the spread of the plague during the simulation. Students are often

quick to notice that those in the center of the "village" were the most frequently exposed, and that those in outlying areas seemed to be less affected. At this point, Joshi asks the students who perished early on in the first round to pick a new seat; they usually sit somewhere on the edge of the village. Sometimes, particularly savvy students will also tuck themselves behind a person with immunity. It is important at this point to ask students why they chose to sit where they did. This helps to reveal students' thinking to you and the class. It is also revealing in that students sometimes cannot articulate why they chose their seat (even though it might have been a good choice). Joshi then runs the simulation again a second and a third time (time permitting) to help demonstrate the effects of immunity that builds up in communities over time.

In the debrief of the simulation, Joshi has students answer prompts such as "What are the chances that any random person will die of Plague?" "How predictable is the path of the Plague?" "What comments did you hear yourself and others make as the Plague spread around you?" "What factors might explain why the Plague eventually had very little effect on Eurasian populations over time?" And, "What does it mean that the death rates varied in each of the rounds we played the Plague simulation?" The aim of these prompts and the discussion that follows is two-fold: for students to understand the factors that would make an epidemic spread at various quickly or slowly and lead to varying mortality rates and for students to make an emotional connection to the fear and disorientation people, institutions, and whole communities had during the time of Plague. Indeed, the Plague was a consequential cause of Feudalism's decline in Western Europe.

The Power of Suspended Disbelief

What is both amazing and baffling is that even under these very artificial circumstances, students appear to fall under the spell of the activity, suspending their disbelief. Students frequently comment on how anxious they felt as the plague approached them. Some react quite strongly to the threat of even a fake death. As I (Wright-Maley) sat in Joshi's room to observe this simulation, I was surprised to find that this anxiety manifested itself palpably in multiple classes. In one class, a student removed a chair from the village grid to

reduce the number of people that could possibly infect him.[34] In another example, a student sat at Joshi's desk and balked when Joshi asked him to sit down in the village. After some coaxing, the student said, "but I don't want to die!" before slumping off to take his seat in the village. In a third class, the plague began right at the center seat in the grid. The student behind him stood up and yelled with surprising anguish, "NO------!" She sat down, chagrinned, after another student snapped at her, "Susan, sit down!" Thus, in a very tangible way, students are able to lose themselves and their context—if only momentarily—to connect with, even embody, a history that has long since passed. In this way, simulations may help to stimulate and facilitate students' care about the topic in ways that allow teachers to leverage their students' engagement to deeper kinds of learning about the kinds of contextualized "human actions and events" McCall points to.[35]

Verisimilitude with the Plague

The mortality rate of the Bubonic Plague in Europe, in the estimation of Philip Ziegler, "cannot have been lower than 34 per cent or so—say a third to avoid any false impression of exactitude."[36] Ziegler notes that a wide variance existed between towns, regions, and even between towns and the countryside. He argues, however, that some scholars have estimated that mortality rates as high as 40-60% may have been possible.[37] For dramatic effect, Parag has chosen the upper end of this range to demonstrate both the destructive and emotionally stressful elements of the plague's spread. To get the mortality rate, you can take the simulation's infection rate (0.7—i.e., 70% of students exposed will be infected) and multiply it by the death rate of infected persons (0.8—i.e., 80% of students infected will die). Taken together, Parag's version of the mortality rate is 56%. These rates can be adjusted to illustrate rates that serve your own pedagogical purposes. A lower rate can have a more appreciable visual effect in a larger classroom than in a classroom with relatively few students such as Joshi's. To adjust this rate, you can adjust the numbers related to infection and death. For example, you could reduce the infection rate to 0.55 and the death rate to 0.65 to get a mortality rate of 36%, which is closer to the continental average. However, the rate of exposure can be quite limited in many villages,

which may bring the overall mortality rate down. As an illustrative example, during the calculations, a student spontaneously declared that "22% of my population died." Parag asked her what the percentage of people exposed who died were. She recalculated and came up with 57%. Thus, the higher numbers Parag uses may be in line with more historically conservative estimates, although he did not ask the class to conduct this calculation during my observations.

As a thought experiment, Parag ran the plague simulation as a paper-based activity on the day following the simulation described above. The paper version lacked the vigorous engagement and personal connectivity offered by the simulation, and should not be seen as a replacement. As a supplemental activity, however, it provided an opportunity for Joshi and his class to create an aggregate model of their multiple villages to see how the mortality rates compared to the plague itself. Students were asked to use random number generators to calculate the rates of infection and death for their villages, just as they had during the active simulation, and then to calculate the percentage of their population that died.

When students finished, Joshi asked students to calculate how many people on their sheets that were exposed to plague died from the disease, and explained, "Let's see if you can figure it out mathematically…looking at this chart [of probabilities], what do you think the chances are?" He coached students through the calculations, ensuring that students had documented their totals correctly, before polling them. As students reported their results, he noted the totals on the white board. These results varied dramatically from 7% to 85%, but these extremes were aberrant. For most, their villages experienced rates of mortality in the mid-forties and fifties: 59%, 57%, 44%, etc. The vast majority fell within this high mortality range Joshi was targeting, and so too did the aggregate mortality rate.

What Students are Learning about History

This simulation, or any simulation of the kind described in this paper, is unlikely to model a single historical or contemporary result. The idea is not to re-create history, nor to bring students back to it as though the simulation were a time machine. On the contrary, the simulation helps to reveal the mechanics underlying

complex social processes that may lead to variable consequences. Echoing the research by Walter Parker and his associates' that revealed the importance of embedding simulations within a larger curricular framework, this simulation is sandwiched between direct instruction on the plague—both during preparation and debriefing for the simulation—as well as analyses of primary and secondary documents on the plague and its historical consequences.

To this end, students completed a document-based question (DBQ) about the plague in which they analyzed primary and secondary documents that offered them a view of what actually happened in the European Middle Ages experience. The two experiences were designed by Joshi to complement one another. Joshi hoped that "experiencing" the plague would allow students to have empathy toward people in the past as they vainly attempted to explain and combat the spread of the plague. Because of the simulation, many students, though not all, were able to sidestep the common novice misconception that people in the past were less intelligent than the people of today.[38] The variability of the results supported students' views of the variability in how much impact the plague had in various locales historically. Joshi then explored modern epidemics and how they are tracked and contained. Contemporary issues such as drug-resistant diseases and herd immunity were also taken-up in class.

Historical Limitations

All simulations are oversimplified models of real social processes. In this case, the requirements that peasants not be able to move from their hut during the simulation, even as it was seen to spread around a given player, was unrealistic. Although the people of the fourteenth century would not have known germ theory, evidence suggests that they would have known enough to stay away from sickly people—although they may already have been exposed to the plague or in contact with the fleas that transmitted it by the time they recognized this.[39] It is also the case that a peasant would have visited people other than their immediate neighbors. These aren't fatal problems for the simulation, since people would have interacted in other settings such as markets, churches, funerals, festivals, and so on. More problematic is the inevitable trappings of students' bias to the present, and potential for levity in situations of imaginative

historical participation. This problem remains an issue for the discipline writ large as it seeks to initiate novices into the practices of historical thinking. Lévesque advises that in working with students, we seek ways to harness historical imagination while shepherding students away from the presentist trap.[40] It is important that teachers play a role in counteracting the limitations of simulations and address the counter-historical lessons students may draw from their participation in simulations. As McCall points out, teachers are "critical conductors of this whole process of inquiry, analysis, and evaluation. If students are to approach historical simulation games critically, teachers must play active roles in guiding them through the process."[41] This is why debriefing when using simulations is so important. During the discussions that follow, teachers are better able to identify what students took away, to know when those understandings are correct or need to be nuanced further—or redirected altogether.

Next Steps in Developing this Simulation

In recent years, Joshi has begun to use a variant of the simulation described in this article. Namely, he has replaced geographic proximity with social proximity. He was influenced to consider the importance of social networks by the work of Nicholas Christakis,[42] who makes the case that scholarship on large-scale, face-to-face social networks can predict the transmission of disease. To prepare this plague simulation variant, Joshi asks students to write the names of two friends in class on the day before the simulation. He then creates a map of the social connections in the class, with arrows pointing from each person to each of their friends. As might be expected, many students have as many as five arrows pointing to them (in a class of twenty to twenty-five). These become the "central nodes" in the social network. When the plague simulation is run, he selects a random student to be patient zero. The central nodes are quickly exposed in repeated runs of the simulation, highlighting the fact that, while having many social contacts can be a great benefit in many ways (e.g., receiving information), there is a great cost in terms of disease transmission. A future challenge for educators to play with would be to merge the two variants to represent an even more complex model of disease transmission.

Conclusion

Joshi's Black Plague simulation illustrates the difficulty that any given peasant had in avoiding the Plague through choice—the spread of the Plague was largely circumstantial (though variable), since germ theory would not be formulated until centuries later. As in other simulations, student emotion informed their actions and reactions to the dynamic circumstances presented to them during the activity. The activation of their fear, anxiety, and the feeling of "death"—as inexplicable as this reaction may be—helped enable students to accept what amounted to an absurd premise that they were participants in a Plague epidemic. It might be enough to suggest that this emotional component inspires student engagement that will, in turn, result in greater learning. But teachers must be wary of this aim as a pedagogical aim unto itself. In their recent study, Hillary Dack, Stephanie van Hover, and David Hicks conducted an extensive study of history teachers' classroom practices in Virginia, finding that although the majority of their fourteen participants used simulation-like activities, only two appeared to have a pedagogical aim beyond engagement. As a result, the authors of this study were highly skeptical that they contributed anything to student learning, and were deeply concerned by the historical misconceptions they seemed to promote.[43] Instead, scholars have pointed out that engagement is an important activator of interest that can be leveraged into learning.[44] Such simulations can greatly enhance students feeling of empathy, enjoyment of social studies, and historical content knowledge (when situated within larger units). This is, in part, why this simulation is powerful. It is purposeful, it reveals the mechanisms of historical processes through student participation as mediated by the teacher, and it is housed within a larger unit for which it serves a specific pedagogical purpose.

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27. Jean Baudrillard, *Simulcra and Simulation*, trans. Sheila Faria Glaser (Ann Arbor, MI: The University of Michigan Press, 1994), 107. Clark Aldrich, "9 Paradoxes of Educational Simulations: A New Way to View a World that is Not that Tidy," *Training & Development* 60, no. 5 (May 2006): 49. Also see Wright-Maley, "Beyond the 'Babel Problem.'"

28. See Wright-Maley, "Beyond the 'Babel Problem.'"

29. McCall, 19.

30. John Horgan, "Ebola 'Fear Mongering' Critiqued by Medical Anthropologist," *Scientific American*, 3 September 2014, <https://blogs.scientificamerican.com/cross-check/ebola-8220-fear-mongering-8221-critiqued-by-medical-anthropologist/>.

31. J. Lawrence Hare and Jack Wells "Promising the World: Surveys, Curricula, and the Challenge of Global History," *The History Teacher* 48, no. 2 (February 2015): 371-388.

32. Lévesque, 70-85.

33. See Peter Sexias and Tom Morton, *The Big Six Historical Thinking Concepts* (Toronto, Canada: Nelson Education, 2013) in their discussion of historical significance.

34. There is an interesting historical connection here to Milan's municipal strategy of walling of the homes of the infected. For more, see Robert S. Gottfried,

The Black Death—Natural and Human Disaster in Medieval Europe (New York: The Free Press, 1983).

35. McCall, 13.

36. Philip Ziegler, *The Black Death*, second ed. (New York: HarperCollins, 2009).

37. Ibid.

38. Lévesque, 151.

39. Benedictow, 49.

40. Lévesque, 142-144.

41. McCall, 23.

42. Nicholas Christakis, "The Hidden Influence of Social Networks," TED Talks, 20:59, February 2010, <https://www.ted.com/talks/nicholas_christakis_the_hidden_influence_of_social_networks>.

43. Hillary Dack, Stephanie van Hover, and David Hicks, "'Try Not to Giggle if You Can Help It': The Implementation of Experiential Instructional Techniques in Social Studies Classrooms," *The Journal of Social Studies Research* 40, no. 1 (January 2016): 39-52.

44. Parker et al., 533-559.