



**Increasing Students' Social Engagement During COVID-19  
with Net.Create: Collaborative Social Network Analysis to  
Map Historical Pandemics During a Pandemic**

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# Increasing Students' Social Engagement During COVID-19 with Net.Create: Collaborative Social Network Analysis to Map Historical Pandemics During a Pandemic

## Intro and Background

What happens to student interactions and learning outcomes in a college classroom focused on the history of the Black Death when the students simultaneously experience another pandemic? This research explores changes in engagement and learning after a mid-semester syllabus redesign prompted by the sudden shift from in-person to remote learning during the 2020 COVID-19 pandemic. We focus on adapting a computer-supported collaborative and active learning course to work remotely. The redesign centered on using the Net.Create visualization tool (Craig and Danish, 2018) to help students connect with one another while exploring connections in historical content.

In Spring 2020, 93 students met twice weekly for 16 weeks in a survey course at a midwestern university that studied the history of cultural and social responses to outbreaks of bubonic plague. The course was structured in 5-week units around three bubonic-plague pandemics: the 6th-century Justinianic plague, the 14th-century Black Death, and an outbreak in the Pacific Rim circa 1900. The course's primary learning goal was for students to gain enough proficiency in their use of historical sources to develop their own argumentative framework of plague as a historical phenomenon (Bae et al., 2018; Monte-Sano, 2016). In the last unit of the semester, students were scheduled to read a secondary-source monograph describing the most recent outbreak of the bubonic plague in Honolulu in 1899-1900 (Mohr, 2005). Given the complexity of interactions between many people, places and institutions in this monograph, we planned to use a collaborative network visualization tool (Craig and Danish, 2018; Bae et al., 2019) to help students visualize and make sense of those connections as they read the text. When we shifted to an online format in response to COVID-19, we decided to extend our use of Net.Create to a full four weeks to capitalize on Net.Create's support of synchronous and asynchronous collaboration to visualize complex sets of data.

## Net.Create and student engagement with historical thinking

Net.Create was created for classroom-based face-to-face synchronous identification, and instantaneous visualization, of key ideas within historical texts using network analysis (Craig et al., 2020). This involves identifying "nodes" (historical actors such as individuals, institutions, or even movements) that relate to one another through "edges" (instructor-defined ways of interaction between nodes such as peaceful or adversarial relations). The goal was for students to build historical-thinking competence and gain basic network-science competence (Carrington,

Scott, and Wasserman, 2005), offering them network visualization that presented a multi-voiced interpretation of history that they could not have built alone.

The initial development and implementation of Net.Create drew on activity theory (Danish, 2013; Engeström, 1987) to leverage the benefits of computer-supported collaborative learning (CSCL) as a mediator for supporting students' collaborative engagement with history (Hmelo-Silver and Chinn, 2016). Collaboration can offer opportunities to engage deeply with disciplinary content because it requires students to reflect on their understanding to explain and justify their ideas to others (Gresalfi, 2009). Activity theory also highlights the importance of different divisions of labor (ways of organizing people's efforts) in shaping classroom activity. In this class, we encouraged the students to view learning tasks as a team effort, in which each student's contributions are respected (Sinha et al., 2015). This was facilitated in part by the shared representations, which further mediated these interactions by providing a focus for building and negotiating joint meaning (Jeong and Hmelo-Silver, 2016). Net.Create was designed to showcase collaborative effort, so that the nodes, edges, and notes that individual students entered are intrinsically connected to the contributions of peers. Figure 1 below represents the key mediators of activity we considered when implementing Net.Create. The research team visualized how the rules, tools, and division of labor were interconnected in this figure and used it to build and iteratively refine the elements of the Net.Create classroom activities.

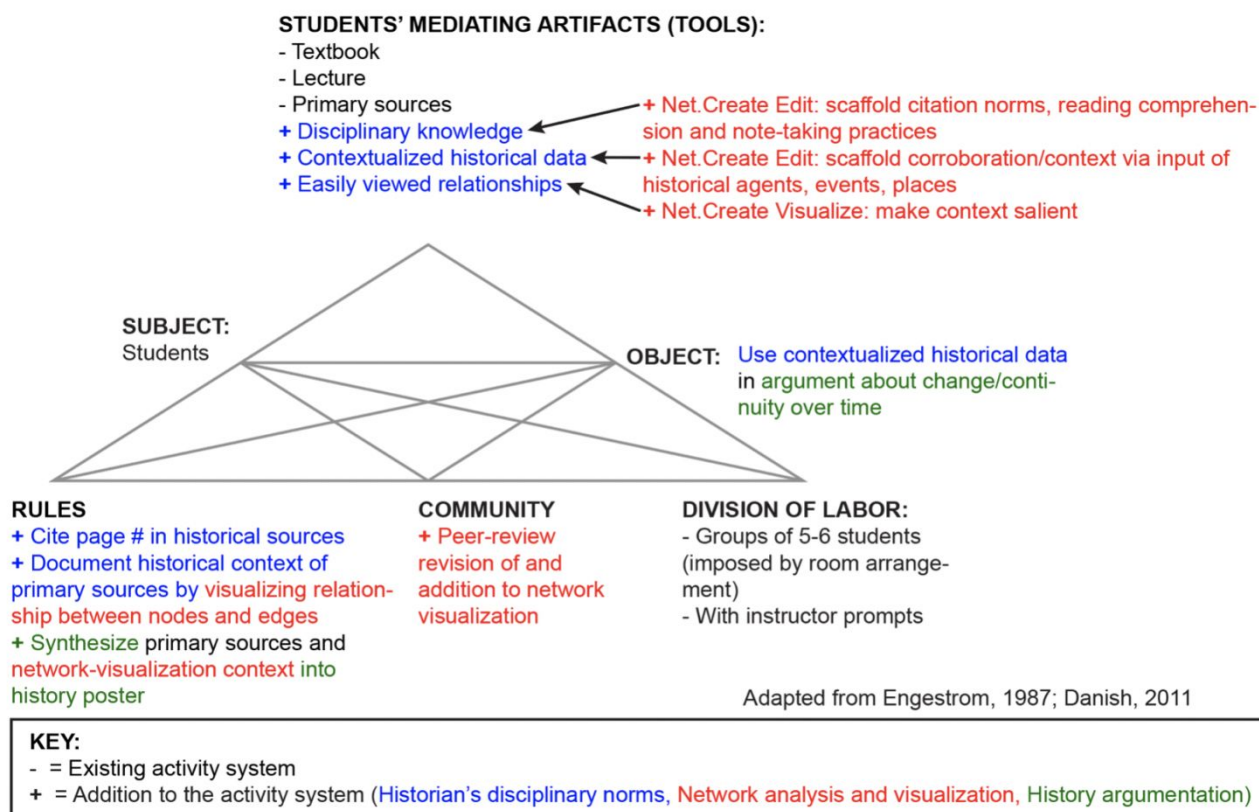


Figure 1. An activity triangle showing how we introduced new mediators to the activity system of a large lecture-hall history classroom in order to make new forms of collaborative activity possible.

The network graph at the heart of Net.Create (see Figure 2) is similar to popular concept mapping tools, which have consistently proven to support learning by engaging learners in identifying and exploring the relationships between key ideas in a domain (Schwendimann, 2015). Like earlier CSCL concept mapping tools that helped students connect evidence to aspects of their concept maps (Toth et al, ,2002), Net.Create supports students in linking each node to the course readings via a citation field. However, social network analysis (SNA) tools such as Net.Create are different from concept maps because the nature of the relationships is not metaphorical or based on similarity. They are formally pre-specified (by the researcher/instructor) and then measurements are calculated using this relational data (e.g., nodes are assigned a size based on the connections to them) showing relational features of both nodes and edges (Durland and Fredericks, 2005).

In prior research on Net.Create, students were most engaged when they revised nodes, edges, and comments previously added by their peers. We thus planned to begin the present study by providing students with a network already seeded with people, places, and events so they could focus attention on interpreting the ideas from the reading by adding edges to connect the nodes and describing the significance of both nodes and edges using attached comment fields (See Figure 2).

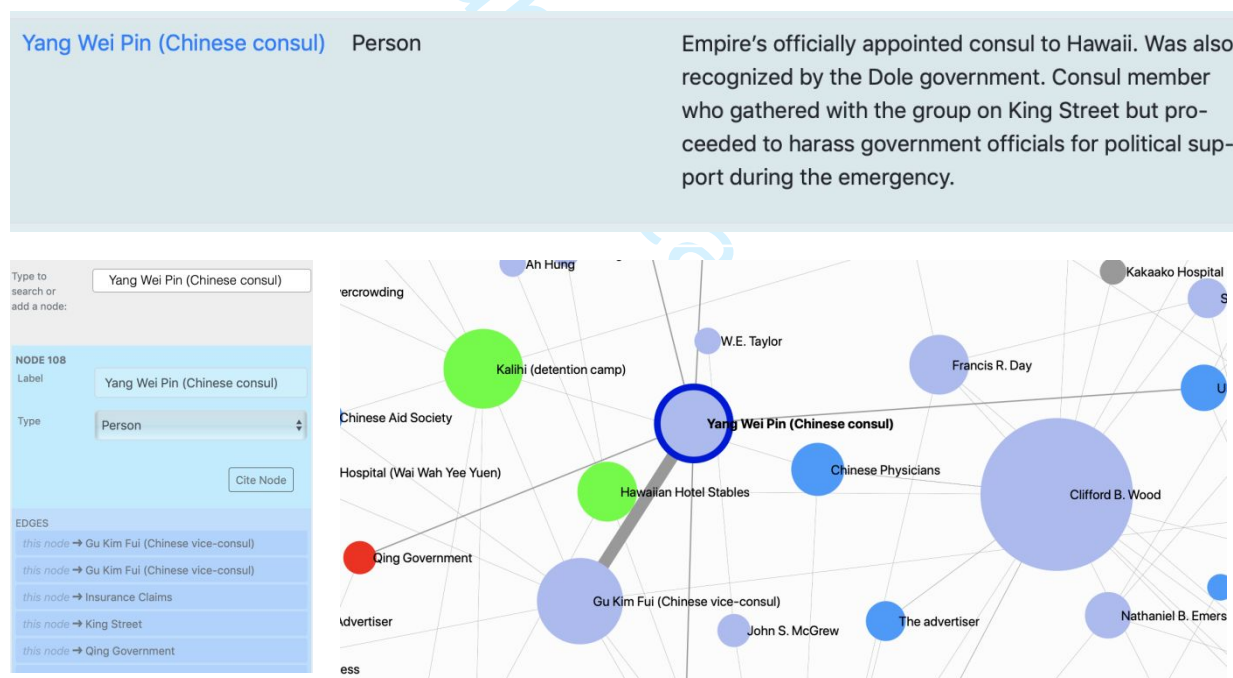


Figure 2. Snapshots of the information offered by the Net.Create interface, including a table of all nodes and their significance notes (top), a list of edges connected to a particular node (left), and a visualization of how nodes are connected to one another (right).

By offering students a collaboratively constructed “big picture” representation of the relationships between historical actors and events, we hypothesized we could improve undergraduate students’ engagement with historical texts, which students often experience as dense and difficult to understand (Craig, 2017; Reisman, 2012; Voss and Silfies, 1996; Wineburg, 1991). Students’ emotional engagement with history (e.g., empathy, curiosity,

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3 enjoyment) can also influence their interpretation of historical texts, identification with people  
4 and experiences from the past, and their creation of links between past and present events  
5 (Sakr et al, 2016). Net.Create is designed to support socio-emotional engagement with historical  
6 events through the relationships that students create between nodes, which students can  
7 annotate with labels (e.g., friends, confidants, rivals) to help them visualize the meaningful  
8 relationships between historical figures. These annotations often describe emotionally charged  
9 relationships in historical texts (e.g., secret lovers, betrayals, and political power struggles).  
10 Collaborating to create the network allows students to explore how these seemingly discrete  
11 interactions between historical actors combine to create the historical context in which key  
12 events unfold.  
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## 16 17 Design Goals

### 18 19 COVID Redesign: Preparing for remote learning

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21 In week nine of the semester, the university announced a temporary shift to remote learning  
22 following an extended spring break. When we realized remote learning would continue  
23 indefinitely, we developed two surveys to help us understand students' engagement before and  
24 after the remaining activities. One set (Survey 1,  $n = 44$ ) they completed in week 12 of the  
25 course, two weeks after the end of spring break and right before the first Net.Create  
26 assignment. The second set of questions (Survey 2,  $n = 49$ ) was given at the end of the  
27 semester (week 16), after they had submitted final projects. The surveys consisted of ranking  
28 scale questions regarding their perceptions of social connection to classmates, as well as free-  
29 response questions where they could offer detailed explanations of collaboration experiences  
30 both before and after engaging with Net.Create (See Appendix A).  
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### 34 35 Learning about a pandemic in a pandemic: Maintaining student engagement and 36 historical thinking

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38 Given that collaboration and socioemotional engagement with peers was a goal of the course,  
39 we wanted to maintain the group-centric design as we moved online. We used the activity  
40 triangle (see Figure 1) to structure our thinking around social engagement: we left students in  
41 their initial groups for the remainder of the semester, encouraging the use of virtual collaboration  
42 to preserve their small-group community. To support continued perspective sharing across  
43 groups in the online class, each student entered and revised data from a different set of 2–3  
44 pages from the text. We then gave each group their own editable version of the class-created  
45 network so they could collaborative sort edges into categories based on the type of relationships  
46 they identified (e.g., social, political, economic). This design was intended to re-mediate the  
47 division of labor so that students could bring the benefits of a whole class network collaboration  
48 into their established small-group collaborations.  
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53 We also intentionally re-designed course activities to build on the emotional resonance of  
54 learning about a historical pandemic during the unfolding of COVID-19. To further support our  
55 evaluation of student historical thinking, weekly writing prompts asked students to provide a  
56 specific example from each week's historical reading and describe how they saw specific  
57 historical details from that example echoed in contemporary coverage of COVID-19. This was  
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intended to support students in improving their developing historical thinking skills. We also hoped these similarities would offer them a more robust empathetic understanding of how people in the past reacted to a pandemic and the lessons for the present-day situation.

### Adapting the class and Net.Create to the new constraints

In previous Net.Create studies, our primary goal was to foster more complex historical thinking. While we retained this goal throughout the semester, the presence of COVID-19 in students' lives necessitated some rapid re-prioritization. Knowing the ongoing pandemic was taking a toll on students in a myriad of ways, our re-designed online course activities sought to draw out the synergies of these overlapping experiences for learning and highlight the upsides of taking a course about pandemics in a pandemic

We also made changes to the Net.Create software itself to help scaffold remote engagement and ease students' experience with the tool in isolation. A new category field supported students in collaboratively identifying patterns in how different nodes interacted with each other. Improving sort and find option and an added a citation feature helped students easily reference nodes and edges in the reading to encourage discussion and good citation practices. We also provided a local version so that students with limited internet access could work with the network offline and update it the next time they had a stable connection.

## Evaluation of Student Experiences

To understand how students' online class activities influenced their engagement with both the history and each other, we first analyzed students' quantitative rankings of collaboration experiences. We then inductively coded students' free-response surveys, looking for ideas about collaboration, experiences with Net.Create, and historical comparisons between COVID-19 and past pandemics (See Appendix B). Below, we discuss the most prevalent themes that emerged.

### Changes in Engagement

Across the final four course weeks, students ( $n = 49$ ) reported a statistically significant increase in their feelings of social engagement with peers ( $M = 6.94$ ,  $SD = 1.88$ ) to post ( $M = 7.63$ ,  $SD = 1.59$ ,  $t(48) = 3.01$ ,  $p < .01$ ).<sup>1</sup> Social engagement was defined by two Likert-scale items measuring how connected students felt to peers, as well as how much they felt they could learn from peers' ideas and perspectives. Given that many students (36) on Survey 1 reported concerns about online collaboration, this improvement in reported connectedness highlights that though students often find group work frustrating in typical classroom contexts, it can anchor social interaction in uncertain times.

Based on students' qualitative responses to Survey 2 ( $n = 49$ ), a key factor influencing increased social engagement was the sense of purpose and social responsibility that Net.Create assignments offered. Eight students reported feeling that each student in the class had something meaningful to contribute to the whole-class network, and six students reported

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<sup>1</sup> Missing pre-test scores were imputed using the group mean

increased motivation to participate in network creation because their own and their peers' final projects depended on detailed and accurate entries. Twenty-six students explicitly discussed learning historical details from connections and explanations of significance made by peers. Students also highlighted network features that supported peer learning: making connections between ideas more visible (24 students); revealing unexpected relationships between people and events (14); and uncovering key factors at play in important events' causes and effects (11). Data entry processes also likely encouraged group cohesion: seven of the 16 groups reported they independently chose to enter data via group Zoom calls.

### Changes in Historical Reasoning

Though our focus understandably shifted toward supporting positive student experiences, we also hoped these socio-emotional considerations would support student historical-thinking skills. To that end, we also scored the accuracy and historical significance of student work. In earlier studies, we negotiated interrater reliability on the complexity of students' attempts to recreate historical context in historical-significance entries in the network to 100% agreement. This measure (see Appendix C) positively correlated with how well students performed on their final historical-argumentation paper (Craig et al., 2020). The same two raters drew on that experience, and content expertise as instructors or previous instructors of this Black Death course, to divide coding responsibilities in this study. One rater coded how effective student historical thinking was in historical-significance entries in the Spring 2020 Plague and Fire network. The other coded weekly reading responses that compared historical readings to contemporary coverage of COVID-19. Ratings of 3 or above met the instructor's requirements for accurate identification of historical details.

Significance rating	Network Entries ( $n=546$ )	Reading responses ( $n=180$ )
5: clear, accurate historical detail plus clear, accurate historical causality described for novice reader	42% ( $n=232$ )	29% ( $n=52$ )
4: clear, accurate historical detail plus historical causality, in vague terms requiring pre-existing knowledge	27% (149)	21% (37)
3: accurate, but vague, historical detail and historical causality requiring pre-existing knowledge	20% (109)	22% (40)
2: accurate, but vague, historical detail only	7% (38)	28% (51)
1: inaccurate historical detail or too-general description	3% (18)	0

Notably, 90% of the Net.Create significance entries met historical-thinking requirements and nearly 70% exceeded requirements. By comparison, 50% of the weekly reading responses exceeded requirements. Although the reading responses prompt students to consider past-present connections, Net.Create's visualizations and data tables expose detail and context

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3 simultaneously, encouraging students to think more explicitly about connections and causality in  
4 the network entries.  
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7 The reading responses supported a more personal engagement with the historical dimensions  
8 of students' pandemic-remote-learning experience. In open-ended analysis of the 89 reading  
9 responses that exceeded instructor requirements, two patterns emerged: 12 students  
10 commented on specific racial or colonial issues that shaped past plague outbreaks and had  
11 COVID-19 parallels. Likewise, 30 responses pushed back against simple historical  
12 progressivism, reflecting that people today are not "better" than historical figures. One student  
13 notes, How could it be that a plague wipes out an entire population and that no one finds a  
14 cure? But now, I'm understanding how hard it is even ... with technology and the best scientists  
15 that it is still difficult to find these medicines and supplies." Six of the 89 responses included the  
16 emergence of both perspectives.  
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20 Experiencing quarantine as they read about historical pandemics also seemed to offer students  
21 a new emotional link to historical texts, facilitating student ease with the difficult task of  
22 understanding historical perspectives (Craig, Mahoney and Danish, 2017; Endacott and Brooks,  
23 2013). Students saw a variety of emotions in the reading, including fear, uncertainty, loneliness,  
24 and helplessness. Students also noted surprising similarities in past responses to bubonic  
25 plague and present responses to COVID-19 (S1: 14; S2: 9), including evidence of people  
26 avoiding contact with others out of fear (S1: 17; S2: 10) or ignoring quarantine restrictions (S1:  
27 7; S2: 4). They also noted broader societal patterns, including wide-reaching economic impacts  
28 (S1: 13; S2: 5) and the frustratingly similar ways in which people, both past and present,  
29 responded to pandemics with racism and xenophobia (S1: 3; S2: 21).  
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34 Based on students' reported experiences with Net.Create on Survey 2, several aspects of the  
35 software tool likely contributed to students' mutually beneficial reflections on their readings and  
36 personal experiences. Students reported that Net.Create helped to organize their initial ideas,  
37 and then to search for evidence as they constructed historical arguments for assignments (15  
38 students). The network also made it easier to understand events in the reading (6) and think  
39 deeply about the contexts surrounding these events (10). The network helped students to  
40 uncover and follow political, social, and economic patterns in the reading and facilitated student  
41 appreciation for those patterns in their present-day surroundings.  
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## 45 Redesign Implications

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47 We see three key takeaways for supporting hybrid and online learning. First, students benefit  
48 from personal connections to both content and peers as they explore historical content and  
49 contexts. This is well known, but rarely explicitly addressed in higher education (Díaz et al.,  
50 2012). In future classes, we will introduce students to each other using a team-building  
51 Net.Create activity that documents and visualizes social and cultural ties in the classroom. We  
52 hope this will support student connections between their experiences and subsequent historical  
53 network creation in Net.Create<sup>2</sup>. Second, focused practice on one tool reduces student burden  
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57 <sup>2</sup> This idea emerged in ongoing work with Dr. Rebecca Neri where we explore the potential use of  
58 Net.Create to help surface learners' Funds of Knowledge and Funds of Identity (Neri, 2020).  
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and allows the practice to support deeper reflection on the nature of the discipline. Although most students report finding Net.Create easy to use, we can support more fluid use of Net.Create by introducing it earlier in the semester and incorporating it in other activities. Finally, students appear to want more, not less, group interaction while working remotely, provided it is facilitated well. While we initially intended for students to use Net.Create individually, many groups self-organized a collaborative activity to discuss their ideas. We will capitalize on this trend by explicitly promoting it. In short, we have found it is possible to bring students closer together in these challenging times and avoid student frustrations with traditional “group work” by supporting collaborative learning using Net.Create and a mix of individual and group contributions.

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## 41 Appendix A: Survey 1 & Survey 2 Questions

### 42 *Pre-Post Likert-scale Items for Social Engagement*

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45 To what extent do you agree or disagree with the following statements about your experiences  
46 in this class? (1=Strongly Disagree, 5 = Strongly Agree)

- 47  
48 1. I feel connected to my classmates in [Class name]
- 49  
50 2. Class activities have helped me learn from my classmates' perspectives/interpretations  
51 of history

### 52 53 *Survey 1 (Week 12): Free-Response Questions*

- 54  
55 1. What connections do you see between the events of the black plague that you are  
56 learning about in class and the current COVID-19 pandemic?
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2. Has your work in class (either before spring break, after spring break, or both) impacted how you are thinking about the current pandemic and related events? If so, how?
3. Consider your interactions during the *in-person classes* before spring break. What was it like to collaborate with your peers during in-class activities? Did you feel that you could learn from your classmates' different perspectives on historical events? Why or why not?
4. Consider your interactions in the *online version of the class* since we have returned from spring break. What has it been like to collaborate with your peers during online activities? Do you feel that you can learn from your classmates' different perspectives on historical events? Why or why not?

*Survey 2 (Week 16): Free-Response Questions*

1. Think for a moment about the final network that your group created and the ways that you categorized nodes and edges. What big picture connections do you see between the events of the black plague that you learned about in class and the current COVID-19 pandemic?
2. Consider your interactions with your classmates while creating and revising networks. What was it like to collaborate with your peers during online activities? Did you feel that you could learn from your classmates' different perspectives on historical events through the process of adding and revising nodes and edges? Why or why not?
3. How did the network that the class created using the *Plague and Fire* text impact your thinking about the historical events of that time period?
4. Was entering data for two pages of the *Plague and Fire* text a manageable assignment for you, in the context of all the work you had to do for other classes? Did you feel motivated to participate in the network creation? Why or why not?
5. We know that having course assignments that are strongly related to current events such as a pandemic can be both interesting and upsetting for different people and at different times. If you feel comfortable discussing some of these emotional reactions, we would appreciate hearing your perspectives on the benefits and drawbacks of taking a course that resonates with the events of the moment.

If you are comfortable sharing, in what ways did current events surrounding COVID-19 impact how you felt about the *Plague and Fire* text that you read in class? In what ways did these feelings influence your work on class assignments and collaborations with your group?

If you are uncomfortable answering this question, you may leave it blank.

## Appendix B: Codes Generated During Inductive Coding of Survey 1 & 2 Free-Response Questions

<i>Code Name</i>	<i>Definition of Code</i>	<i>Example from survey responses</i>
<b>Reflections on Networks and Online Collaboration</b>		
Difficulty of Online Collaboration	Reported concerns about online collaboration being more difficult / less useful than in-person learning	“It is definitely a challenge to collaborate during this time of online learning. The feedback and communication is not as immediate or consistent, as being at home removes some of the responsibility of making sure schoolwork gets handled, and this is somewhat a byproduct of the times we are in now.”
Importance of Individual Network Entries	Discussion about how each student in the class had something meaningful to contribute to the whole-class network	“It was helpful to see how all of our nodes and edges connected and how we would piece things together. Each person had something important to add to each other's nodes.”
Contributing to Final Projects / Shared Notes	Student noted that their increased motivation to participate in network creation was due to the fact that they and their classmates needed a dependable and detailed network to succeed in class assignments	“I felt like I was contributing to something that would help not only myself but everyone in the class which definitely motivated me more to do the assignment.”
Learn from Peers	Discussion about how they could learn historical details from the connections their peers made in the network and the explanations of the significance of nodes made in peer annotations	“It was interesting to see what all my other classmates found significant within the book. Using Net.Create helped me see other points of view and how people reacted to the book or what key points they picked out. I feel like revising and adding nodes and edges helped me because I could see others thoughts.”

<p>Network made Connections Visible</p>	<p>Explanation of how the network helped make connections between ideas more visible</p>	<p>“It was really cool to see the network come together as one big network, I feel like it really helped me understand the connections between all of the moving parts in this story.”</p>
<p>Saw Unexpected Connections</p>	<p>Student mentioned that the network revealed unexpected relationships between people, events, and ideas they would not have thought of alone</p>	<p>“It was useful to use Net.Create to see how my peers found other events and people to have less or greater importance than I thought. I did feel like I could learn from my classmates because we all notice things that others do not, and helped to give a clearer picture of the state of the plague in Honolulu.”</p>
<p>Network Revealed Causes / Effects / Impacts</p>	<p>Discussion of how the network helped students uncover key factors at play in the causes and effects of important events</p>	<p>“It made me realize how chaotic everything can get during the time of plague. So much happened in such a little amount of time. The network was crowded with information and it was in the year 1900 that we were covering. So much happened in that year and the website helped me see that. It also played out the important parts of the events. The network made it clear what had happened and when it had happened. It was similar to a timeline that all connected in different ways.”</p>
<p>Network Helped Organize Ideas / Find Evidence</p>	<p>Student discussed how the network helped them to organize their ideas and later search for evidence when constructing historical arguments for assignments</p>	<p>“It was really beneficial to have the Net.Create to work with for the final project because it was organized and easy to find quotes and evidence for my thought processes.”</p>
<p>Network Helped Understand Reading</p>	<p>Student noted that the network made it easier to understand the events happening in the reading</p>	<p>“The network made the big picture stand out, and when having the big factors and big picture stand out, it is easier to understand and see clearly what was important to those living in Honolulu during the late 1890's.”</p>

<p>Network Helped Deeper Thinking about Context</p>	<p>Student mentioned that the network revealed aspects of historical context that made them reflect more deeply on events</p>	<p>“Well it did put into perspective how many factors really played into the plague outbreak in Honolulu. It went beyond the black plague and into politics and white privilege and I would say the network did highlight those elements well.”</p>
<p><b>Reflections on Pandemics (Black Death &amp; COVID-19)</b></p>		
<p>Emotional Reactions to Pandemic</p>	<p>Student discussed negative emotions that people in past or present experience, such as fear, uncertainty, loneliness, and helplessness</p>	<p>“Some similar events that I have noticed between the Black Plague and COVID-19 are largely focused on the psychological effects [...] the isolation and grief that comes from solitude and quarantine. Last, the uncertainty is a major trend I see between the two events. While today’s COVID-19 has much more information about the cause, spread, symptoms, treatments, etc. There is still the uncertainty factor of when the virus will peak/decline, whether you can get the virus again, what medicines help/harm, etc.”</p>
<p>Past and Present People React Similarly</p>	<p>Student notes how people’s past responses to bubonic plague and present responses to the COVID-19 pandemic appear similar</p>	<p>“I think the public responses are similar. I remember reading during the last unit about the array of responses from individuals during the Black Death--how some were terrified and became incredibly strict and vigilant, others were convinced it was the end-times and so lived excessively and without care, and how some were measured and logical. I can see just in my own experiences with my friends and acquaintances that all three of these attitudes exist today.”</p>
<p>Need for Social Distancing / Quarantine</p>	<p>Discussion of how people in a pandemic quarantine / social distance / avoid contact with others</p>	<p>“When researching for our last project the public health policies, I saw a lot of connections between how we are responding today and how</p>

		they began to respond back then. I read a lot about separating healthy and sick and slowing travel between cities, all of which are seen in our present day quarantine. They may not of had a name for it back then but they were practicing many different aspects of the quarantine we are now.”
Not Taking Pandemic Seriously	Discussion of people ignoring quarantine restrictions or otherwise not taking health recommendations seriously	“The key takeaway is that people ignore important information until it is too late. For example, there are currently social gatherings still occurring and people would continue their daily schedules during the Black Plague. As a result, the viruses spread more than they would if people put their lives on hold during the time of wide-spread disease.”
Economic Repercussions of Pandemic	Discussion of the wide-reaching economic impacts of pandemic, at the personal and/or societal levels	“I see a connection between what’s happening now economically, and the impact the black plague had on the economy back then. With many businesses being shut down and many people being laid off, it is difficult for a lot of people to pay the bills and get the necessary food and such to keep them safe and healthy.”
Racism / Xenophobia / Blaming Certain Groups for Virus	Student discussed the ways in which people in the past and/or present responded to outbreaks with racism and xenophobia towards particular groups of marginalized people	“I felt like really shook that people nowadays have really not learned anything and still were just as racist as they were 100 years ago. I cannot believe people call COVID-19 the Chinese virus the same way I could not believe that a group of physicians that had huge public support caused Chinatown to burn down during the Honolulu breakout.”
History Helps Understand COVID	Student mentions how reading about historical outbreaks helped them to understand what was	“I think that this course kind of hit home during this time. Although it was very good

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	happening in their communities during the COVID-19 outbreak	learning about the Plague of the past, learning how power was abused and bias allowed me to look at the current events from a different angle.”
COVID Experiences Help Understanding of History	Student mentions how their present experiences with COVID-19 made it easier to understand what had happened in the past	“The events surrounding COVID-19 impacted class reading and specifically Plague & Fire because it helped me understand them better. When we discuss quarantine, it helped me understand that people struggled because of not being able to go to work. We are seeing that now in current times and families are struggling because they are running out of resources. As well, we see discrimination against those in Chinatown. We see the same actions being done in the United States today.”
Taking COVID More Seriously Because of Class Learning	Student explicitly discusses how they are taking the COVID-19 outbreak more seriously as a result of class learning	“I think being in this class has helped me to recognize how real the current situation is. During spring break I didn't take it super seriously, but since beginning classes again, I have noticed the similarities between past plagues and this one, helping me to recognize the severity of it.”
Understand Importance of Safety Measures	Student notes that they now have a better understanding of the importance of pandemic safety measures such as quarantining, hand washing, etc.	“Yes, both work before and after spring break has impacted how I am thinking about the current pandemic. I am able to identify why things like social distancing is so important. It has also allowed me to identify these factors we are learning about such as religion, societal changes, the economy, etc,... and how they affect the pandemic and how they are affected by the pandemic.”

Note: these codes are a sub-set of the full set of inductive codes that were generated during analysis. Only the most frequently applied codes are reported here.



## Appendix C: Historical Significance Coding Scheme

<i>To what extent did the student accurately reconstruct historical context and significance?</i>	<i>Definition of Ranking</i>	<i>Example from network comment fields</i>
1 - Not at all	Inaccurate historical detail or too-general description	"Physician"
2 - Sort of	Accurate, but vague, historical detail only	"Removed restrictions on ships"
3 - Reasonable	Accurate, but vague, historical detail and historical causality requiring pre-existing knowledge	"Ensured nothing would impede the Board of Health's battle against the disease"
4 - Well done	Clear, accurate historical detail plus historical causality, in vague terms requiring pre-existing knowledge	"Mexican public health physicians employed site burning when the pandemic reached Mazatlan"
5 - Excellent	Clear, accurate historical detail plus clear, accurate historical causality described for novice reader	"San Francisco Board of health begins calling for burning of San Francisco's Chinatown. The Chinese immediately countered by hiring top American law firm to defend their rights successfully in court under the 14th Amendment"