Analog Tools in Digital History Classrooms: An Activity-Theory Case Study of Learning Opportunities in Digital Humanities

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Analog Tools in Digital History Classrooms: An Activity-Theory Case Study of Learning Opportunities in Digital Humanities

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Digital humanities is often presented as classroom savior, a narrative that competes against the idea that technology virtually guarantees student distraction. However, these arguments are often based on advocacy and anecdote, so we lack systematic research that explores the effect of digital-humanities tools and techniques such as text mining, Geographical Information Systems (GIS) and network analysis have on learning outcomes. This study applies activity theory in a case study of a history classroom in order to understand how introducing digital-history methodology using analog tools like posters and whiteboards can improve student appropriation of history-specific disciplinary skills. The end goal is to provide clear direction for humanities instructors with varied access to technology as they seek to understand how digital humanities tools might still fit within the larger pedagogical practices of higher education classrooms and within the push toward digital methodologies in traditional humanities classrooms.

INTRODUCTION

“Ban all technology in classrooms!”, one article reads (Rockmore, 2014). Another says, “Students are welcome to shop online during my lectures.” (von Schlichten, 2015) Yet another praises the active use of digital environments for supporting collaborative learning and promoting good citizenship (Marcinek, 2010). Digital humanities as a classroom savior that integrates big-data analysis techniques for text, mapping and social interaction competes against the idea that technology virtually guarantees student distraction on the other. That division results in discussions of digital-humanities pedagogy that mediate participants’ engagement with the other classroom variables.

The focus on advocacy has considerable value. Anecdotal stories suggest that student engagement improves when students encounter humanities challenges mediated by digital methodologies like GIS or other big data techniques like text mining and network theory (Dougherty & Nawrotzki, 2013; Kelly, 2013). However, these anecdotal results are generally produced in classrooms run by instructors with advanced skills in the technology they are teaching and in classrooms well-equipped for technology-based inquiry. Such settings are rare and difficult to duplicate, and many instructional technologies go unadopted because instructors lack the resources or motivation to make major changes to their teaching practice (Blin & Munro, 2008). As a consequence, it’s difficult to imagine, much less study and produce quantitatively significant learning outcomes for, a digital-humanities-based activity that can be widely distributed to campuses with varying institutional support for classroom technology.

Activity Theory

One approach to bridge the gap between systematic activity design and systematic learning-outcome study for the digital humanities is activity theory. Activity theory situates learning in a sociocultural environment, and particularly in the shared collective exercises that are at the core of digital-humanities pedagogy (Engeström, 1987; Greeno, 2006; Vygotsky, 1978). The fluidity of group organization, technology interface, and classroom resources makes it difficult to assess the role technology, or indeed any one variable, has in any learning outcome (Danish, 2013). Activity theory helps untangle individual components (the learning objective itself, classroom norms, lesson-plan rules, the division of labor, the participants), situate these components in their socially constructed context, and make it easier to individually examine the role of any tools that mediate participants’ engagement with the other classroom variables.

This study applies activity theory to the design of a series of activities in a history classroom in order to explore how introducing digital-history methodology, which generally narrow the use of GIS, big-data text-mining techniques and social-network analysis to research on historical perspective and context (Seefeldt, D., and Thomas, 2009), might change student learning outcomes. In the examples that follow, activity theory is used to systematically trace the effects of decisions about the length, scope, and structure of a digital-humanities activity on students in a 25-person undergraduate introductory history course. The 200-level course contained a writing intensive component and drew from the student body of a large Midwestern university. Students were age 18-25, representing 14 different majors (including undeclared students) from all undergraduate levels. The current study also acts as a roadmap for a larger quantitative study that will examine some of the changes that new mediating artifacts and rules might have on the community and division of labor in a larger lecture classroom.

Applying activity theory to an undergraduate humanities classroom makes several contributions to both educational research and humanities pedagogical practices. Although some work has been done on the value of using activity theory to structure writing and composition courses and on the overlap between composition and entry-level survey history courses (Adler-Kassner, Majewski, & Koshnick, 2012; Russell, 1997, 2013), activity theory is rarely applied to humanities pedagogy broadly or history pedagogy on a narrower basis. A demonstration of its value in humanities classroom-activity planning broadens the reach of this valuable theoretical approach to SoTL audiences in humanities at large. More importantly, activity theory provides a systematic approach to evaluating the learning outcomes that are supported by modern data analytics techniques, a perspective that expands the use of technology in history learning beyond simulations and games (Morgan, 2013; Robison, 2013) and counters media narratives that mitigate the wide media swing between technology as a classroom
Activity theory helps us isolate the physical, psychological and cultural artifacts that mediate one’s actions. In this case, the mediating artifacts for students are classroom tools (textbook, lectures, etc.) while the mediating artifacts for historians are the tools of their trade (GIS, spatial history, etc.). Activity theory also highlights the kinds of decoding practices historians might use in the classroom (Middendorf, Díaz, Pace, & Shopkow, 2012). By examining three different methodologies together, we can see how the rules, object, and division of labor vary or overlap for a specific instructional goal. The three activities together also demonstrate the broader value digital methodology offers as instructors bridge the gap between their expertise as historians and the barriers students often face as they tackle the practice of historical thinking. The simplest version of an activity triangle represents the subjects in the classroom—students—along with the objective shifts from facts to interpretation. I asked small student groups to identify basic themes, historical figures and emotional highlights of the biography to non-computerized display (or poster paper and markers). These in-class limitations also shaped the advance-reading directive. The activity requires multiple maps, which in turn requires different information about the geospatial environment Ibn Shaddad describes. Student groups were therefore asked to identify basic themes, historical figures and emotional highlights of the biography to non-computerized display (or poster paper and markers). These in-class limitations also shaped the advance-reading directive. The activity requires multiple maps, which in turn requires different information about the geospatial environment Ibn Shaddad describes. 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assumption that their learning objective is to memorize names, dates and places, but the goal for each map shifted memorization to the tool category in order to serve my learning objective: an argumentation exercise that communicated geographic significance based on the focus of their cartogram. Additionally, the integration of the three representations into a single classroom activity addresses the digital-literacy issue of maps as malleable objects that can be altered to make arguments, rather than maps as static representations of “true space.” Finally, the lesson allowed students to make use of digital tools like Google Maps, Stanford’s ORBIS (which provides travel-time calculations using ancient travel methods), and Wikipedia on their smartphones, while asking for an explicitly analog output: a poster-paper sized hand-drawn map.

Lesson Plan
Introducing students to cartograms as a branch of GIS and map-making required particular attention to the idea of maps as malleable argumentative representations. That meant a short introduction using 2012 Presidential Election electoral maps to demonstrate a spectrum of cartogram alternatives to GIS maps (Gastner, Shalizi, Newman, 2005; Newman, 2012). Students were first shown a geographically accurate map of the US and its electoral outcome, with states sending electoral votes to the Republican candidate in red and states sending electoral votes to the Democrat candidate in blue [Figure 4, where red is light gray and blue is dark gray]. They were then shown an electoral cartogram in which the representation of geographic size was mitigated by population density [Figure 5]. The final cartogram used the same population-density alteration of geographic space, but instead of red/blue, only the map represented a spectrum of percentage Democratic Republican split, represented by shades ranging from red to purple to blue [Figure 6, and here the subtle gray shades demonstrate how well distributed the popular vote was geographically between the two candidates].

Outcomes
As we moved through each map, students were asked to describe that map’s argument about the political distance between Republican and Democrat and the percentage of the country that subscribed to Republican or Democrat value systems. We used Republican and Democrat and the percentage of the country that described that map’s argument about the political distance between the two candidates. Figure 5

Visual arguments.

Figure 5

Figure 6

Figure 4-6 © 2012 M. E. J. Newman

Student groups were then asked to use the basic visual principles in the electoral cartograms—color as a representation of difference, size as a representation of importance, and distance as a representative of both geographic distance and conceptual distance—to create an argumentative map of their own. This instructor prompt focused on a particular kind of historical perspective-taking for each type of mapping exercise, providing extra questions to guide the students as they thought about what their argument would be [Figure 7].

Outcome
The primary shift each student group made in both small-group map construction and in whole-class discussion was to reduce their perception of Jerusalem’s importance in Ibn Shaddad’s narrative. That small shift in geographic emphasis is a major shift in perspective, in line with the goals of the activity as I laid it out in my activity triangle during the lesson design. In his narrative, Ibn Shaddad focuses on Acre, but students often ignore his focus even in close reading or Socratic-method discussion. Their very unfamiliar perspective of the Middle East centers on conflict over holy sites in Jerusalem. By giving students the tools to explicitly rebuild Ibn Shaddad’s narrative, their perspective shifts to a twelfth-century view of the Middle East, a perspective they can then use to understand Ibn Shaddad’s very different geopolitical context.

In whole-class discussion, two students, one from the frequency cartogram group [Figure 9] and one from the experience cartogram group [Figure 10], described a shift in their reaction to the geography in Rare and Excellent History. Prior to reading the text, they assumed that Jerusalem would figure heavily in the Third Crusade. As they were reading the text, the students said, they began to revise their assumptions and give Jerusalem slightly less weight, but it still held a place of honor. Given media emphasis on Jerusalem in coverage of the Israeli/Palestinian conflict, this is hardly surprising, since students tend to import familiar knowledge into their historical understanding of events, taking place in geographies with which they have little personal experience.

After the mapping exercise, however, both students described their surprise that Jerusalem was far less dominant than Acre, a tiny, four-times more accurately distributed of red on the coast, which figured far more heavily in Ibn Shaddad’s narrative about the unstructured reading and notes suggested. At this point, a student from the GIS/travel map [Figure 8] added his voice, shifting away from Jerusalem by pointing out that Acre was the only city connected to two separate travel routes that figured highly in Ibn Shaddad’s narrative.

From a digital-literacy perspective, seeing the distorted, but still recognizable, geographic space of the Middle East helped students to understand the tension between a static “truthful” set of driving directions and the constantly shifting geographic space that is the historical past. Mapping distortion is possible with GIS technology, but displaying distorted mapping layers with geographically accurate mapping layers on a single screen would be nearly impossible in a standard classroom with one screen at the front of a classroom. Using poster paper actually extended the GIS technology on which students were basing their maps in productive ways. The distortion coupled with simultaneous display fostered very fruitful discussion that brought student understanding of the Middle East into far better alignment with Ibn Shaddad’s experience in the Middle East.

Additionally, the individual discussion and initial shifts in response to the actual information in the primary source—as compared to student assumptions about what would be in the primary source based on their knowledge of the modern Middle East—were fostered by each individual mapping exercise but only firmly cemented by whole-class discussion of all of the maps together. The initial division of labor suggested by an activity theoretical breakdown of the classroom emphasized the value of a wrap-up comparison, and the affordances of the analog tools that also came out of an activity theory analysis made that comparative discussion more productive. One of the major advantages of digital methodology performed with analog tools is its escape of the limitation of a single classroom screen display. This exercise allowed students to simultaneously see all of the map-making products, and it supported two groups’ choice to distort the geography of the Middle East in order to make an argumentative point.

Text Mining
As with the mapping exercise, this text mining exercise focused on aligning student objectives about memorization with instructor objectives more focused on argumentation. In this case, however, the goal was to shift student understanding of authorial purpose. Synthesizing documents both competing or confirming narratives, for corroborative purposes or to understand ongoing thematic focus, is a significant historical-thinking skill set, particularly in a very large text like the Iliad, the subject of this example. Breaking large confusing uninformative narratives into very small, familiar, easy-to-digest pieces and then reassembling them can help students find thematic and corroborative structure in ways that instructors struggle to do with open-ended discussion alone, especially focused on chapters 6, 7, and 8 of the Iliad, in which (respectively), Homer explores Hector’s familial connections, the role of honor and the gods in war, and the role of fate. As an instructor, my goal was to help students understand Homer’s literary purpose in connecting the audience to Hector
emotionally so they had a stake in his battle with Achilles and then his death, but also to understand the historical artifact of the text's emphasis on honor and familial connection even in the face of certain death.

Figure 9

Figure 10

I introduced the activity by suggesting that an author has very specific goals for communicating to an audience when they structure a narrative. With authorial purpose as our object on the right side of the activity theory triangle (Figure 11), and a rule that requires the instructor to break the text into smaller pieces, the remainder of the activity triangle focuses on how to organize students to see authorial purpose as it changes across different chunks of the text. Word clouds provide a simple, but effective, approach to the kind of analytical partitioning that text mining encourages. Activity theory analysis coupled with previous experience with the mapping exercise again suggested that the most learning gains would come from combined whole-class discussion after diverse small-group tasks. It can be difficult to produce even a simple text-mining artifact like a word cloud with limited experience, so students in three smaller groups were given specific instructions about how to identify characters and themes of interest in their section of the reading—one chapter of the Iliad—and then track those themes. As with the mapping exercise, not all students had laptops, so artifacts needed to be analog (in this case white boards instead of poster paper, although poster paper works equally well if the classroom is equipped with only one chalkboard).

Figure 11

Figure 12

Lesson Plan

Students were introduced to Wordle (a web-based word-cloud generator) with the text of the first chapter of the Iliad so they had an example of what their text-mining word cloud should look like. We also used Wordle cloud to discuss the importance of size, color and distance as elements of argumentation. Each of these elements emphasize values differently in visual argumentation, so this discussion was designed to bring an element of data-visualization to bear in the production section of the exercise. Unlike the mapping exercise, the background on word clouds was otherwise minimal, since each student group had a laptop and the groups could experiment with their thematic and character weighting easily to best fit their argument about what was important in their chapter.

In the exercise itself, students in each group negotiated the themes and characters they had tracked individually, manually assigned frequency values to each of the characters and themes the group deemed important and then used one computer to enter those values and themes into Wordle, assigning manual weights using Wordle's advanced settings (http://www.wordle.net/advanced).

Students were then asked to produce a word cloud on the white board arguing for their ranking of thematic and character importance, using Wordle and their understanding of the simple argumentative strategies introduced at the beginning of class to guide their color, size and placement choice. As with the spatial-history exercise, the whiteboard acted as a mediating tool and was divided into three sections, so that the end result was a simultaneous display of all three word clouds for chapters 6, 7, and 8 of the Iliad, in that order.

Outcome

The first shift in perspective was visible when students began to negotiate thematic frequency. In the process of a seemingly quantitative discussion about thematic frequency, students began to make qualitative judgments about the generic themes they had tracked on an individual basis (“family”, “battle”, “war”). These themes narrowed very quickly as a consequence of discussion, replaced by themes rooted in authorial language like “guest-friendship” or “tides of battle” begin to emerge. This process indicated an advantage to small-group work, which promoted a more complex understanding of and deeper engagement with the author’s purpose. Students then tracked the frequency of these more complex themes, which also required each student to re-engage with and partially re-read the text, which as a practical matter is a victory of its own.

When the groups finished their word clouds, each group then presented a short 2 sentence overview of their word cloud to their peers in other groups. The students presenting book 6 focused their verbal description on the very mundane day-to-day interplay between warrior culture and family culture, and the role the gods had in encouraging or discouraging the balance between those two poles (Figure 12).

Figure 13

In the whole-class discussion that followed, students working on book 6 noted an initial reaction of surprise as the themes emerged for books 7 and 8. They were dismayed that the close-knit family Homer presents in visions of Hector playing with his young son is destroyed in book 7 and devalued in book 8. Students working on book 7 picked up on the implicit emotional attachment book 6 develops between the reader and Hector, and suggested that the destruction we see in books 7 and 8 would seem unimportant and distant without the connection to the worldly values of war and family in book 6. Finally, the students in group 8 noted that even the gods were subject to fate’s will in book 8 with Zeus unable to save his own son Sarpedon, and that perhaps this structure was Homer’s way of creating a parallel between the human nature of the gods and the short-lived relationships that humans create. One student in group 8 even argued that the tie between Homer and his son and Zeus and his son is as much about a noble lineage ending as it is about emotional attachment, despite the fact that Zeus displays far less personal affinity for Sarpedon. This student’s tie between social status and family ties marked a shift in the discussion from narrative to historical evidence. As with the mapping exercise, students made the biggest conceptual leap after engaging first in a very deep encounter with a smaller subset...
of information and then comparing and discussing their conclusions in the context of the other groups' artifacts. In this case, students focused on the shift from human agency in chapter 6 to divine agency in chapter 7 and finally to the overwhelming sense of fate that reduced both sets of agents to pawns in chapter 8.

Their goal was to represent the results of their discussion as an argument in visual form. To support that, we again discussed how the nodes with only dyadic connections would actually take up more space, distance and color as with the text mining exercise. To help students reflect their understanding of each network feature as a way of reconstructing their historical understanding of the text. Students used their experience of character frequency in the text-mining exercise, which preceded this class session, as a foundation for creating the relationship patterns that grounded their network. They were instructed to think about whether their network did or did not meet the specific requirements of their assigned network feature. They were asked first to discuss whether they thought the Iliad's social network met the qualifications of their assigned feature, however, to highly-connected nodes in other sub-networks. Rather than simply noticing connections and mapping and text mining again suggested that the most learning gains would result when students pursued a local object of activity at the group level and were then able to explore and contrast that local object in the context of a larger whole-class framework. While it was valuable for students to see patterns within their group, the whole class discussion helped them to see how persistent and robust their own patterns were.

Lesson Plan

Each group was instructed to examine one aspect of a social network. Students working on the balanced network [Figure 18] had the most difficulty formulating an argument, in part because they chose to base their network shape not on co-occurrence—

Figure 16

Figure 17

Outcome

From a digital-literacy perspective, seeing their own topic word cloud juxtaposed with the computer-generated version helped students see both where their own thinking was more sophisticated and where their analysis was had gaps. This opened the door for a conversation on the ways in which natural-language processing and customization act as a filter, for good or bad, when we use Google repeatedly to search for information about the world around us.

Network Analysis

Understanding context—social norms, cultural values, historical events—provides students in history courses with the information they need to craft an argument. In this case, our goal was to help students see the fictional description of a set of social ties as containing important information on roles and interaction, social etiquette and familial devotion. This informational focus also provides a digital-literacy lesson in social networks and their role in shaping contemporary relationships.

The background of this lesson comes from an existing scholarly exploration of social networks in epic poetry. Pidrag Mac Carron & Ralph Kenna examined the networks in The Iliad, Beowulf and the Wallachian epic Táin Bó Cuailnge & Ralph Kenna examined the networks in

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to demonstrate that Hector, Priam, Achilles and Agamemnon hold the mortal world and the gods.

CONCLUSION

The broader examination of activity that began this study addresses some general issues. First, designing for technology tools requires students from memorization of facts to use of evidence, context, perspective, and corroboration in a historical argument. Each of the three digital-methodology activities begins with a focus on the object of study (or object that supports the careful selection of the tool) across the walls of the classroom and make it more likely that students digital tools to teach digital methodology. First, because there is a lack of institutional technology support. If the mediating artifacts cannot be technology because it is simply not present, but technology as a mediating artifact presents the best tool for a particular learning outcome, then adapting the methodology to analog tools like blackboards can help bridge that gap.

Activity theory analysis also points to several advantages in using analog technology to teach digital methodology: first, because there is less to learn from a software perspective (fewer mediating artifacts), the object is easier to achieve. It also has the added benefit of stripping away the speed of a computer and emphasizing the mediation angle of a digital tool; as such, this activity pushes students to think about the affordances of digital methods because the mediating artifacts support the idea that the digital and analog are different methods.

There are, of course, disadvantages. Computer-mediated activities are faster, providing the learning curve of the software is low. Additionally, computer-mediated activities can strip out human confirmation bias, as is that as possible. If too much time passes between a student’s initial contact with the theory and then re-use of the theory combined with a fully digital tool: networks, E (Sxepy, Letters), 99(3), 28002, and taking a critical stance toward the product and perspective it provides.

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Adler-Kassner, L., Majewski, J., & Koshnick, D. (2012). The value of tools in teaching student needs some initial ideas are quite promising. The lesson plans here allow students to engage in a growing field of research without worries about the digital divide, without significant time investment on the part of instructors whose lives are not centered on digital tools. Both of these factors allow for a systematic approach to activity planning that helps instructors craft thoughtful, flexible activities that are likely to succeed the first time.


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