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

Kalani Craig

*Indiana University - Bloomington, craigkl@indiana.edu*

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Kalani Craig

Department of History, Indiana University Bloomington, Bloomington, IN 47405, USA

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Digital humanities is often presented as a 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 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 classroom praxis that are largely anecdotal or advocacy-oriented.

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, lecture, lab), while the mediating artifacts for the professional historians comprised of disciplinary knowledge that has been appropriated as a psychological tool (contextualizing historical data). The elements of this tacit disciplinary knowledge—the practice of taking more visible in service of making good pedagogical choices. To that end, I will first use activity theory to break a general historical-thinking activity into the individual features that combine to shape the activity: classroom environment, the activity’s content and the available tools. I will then apply that general process more specifically to three single-session activities using three different digital-history methodologies in service of a discussion of the value of single-value sessions and analog tools in general. 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 objectives of students’ activity and the tools they use to mediate the lesson they are learning (Figure 1). Figure 1 also includes the object mediating artifacts a professional historian might have for a historical-inquiry activity, which helps clarify the changes we might make elsewhere.

The three digital methodologies I explore below—spatial history, text mining, and mapping exercises—describe. Student groups were therefore asked to identify basic information about the geospatial environment Ibn Shaddad. This same attention to the mediating tools and the instructor’s objective for their own reflection helps students develop their own understanding of how rules of the activity are organized.

Activity theory then highlights the kinds of decoding practices and perspectives identified by the “decoding the disciplines” framework, showing us where and how we might systematically transform a physical mediating artifact present in the classroom—a primary source as a collection of pages to read—into an activity artifact: a primary source as something to make sense of and use in an argument (Engeström, 1991). Arranging the classroom infrastructure more systemically helps us see how the appropriation of and use of these more conceptual tools by students can help them engage more meaningfully with the historical tasks in which we want them to engage.

Specifically, historians often focus on the memorization of facts as the learning objective, while professional historians view the creation of a historical argument as their primary objective (Grim, Pace, & Shopkow, 2004). In more specific terms, historians often struggle helping students come to terms with the mix of familiar and unfamiliar in historical primary sources (Wineburg, 2001). The acknowledgement of this disconnect makes it more apparent that students see their goal as drawing facts from the texts they have been assigned, while historians see individual pieces of evidence from the texts as the mediating tool that helps construct an argument.

I used an extended activity-theory triangle to add several additional elements that interact with the object of the lesson and the mediating tools in use [Figure 2]. These elements make it easier to isolate each of the classroom features in order to better see how they interact.

Figure 2

Figure 3
assumption that their learning objective is to memorize names, dates, and places, but the goal for each map shift was to guide the students to think about the text and how it related to the map. The goal was to help students understand the relationship between the primary source and the map, and to understand the perspectives of the author and the audience. The maps were used to illustrate different aspects of the text, such as the geography, the timeline, and the political events. The maps were also used to help students understand the role of maps in the context of the text, and to help them develop their own maps to understand the text better. This approach was found to be effective in helping students develop their critical thinking skills and to become more engaged with the text.
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 a chalkboard).

Students were introduced to Wordle (a web-based word-cloud generator) with the text of the first chapter of the Iliad so they could see the scale, 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 in a short 2 sentence overview of their word cloud to their peers in other groups. The students presenting book 6 focused 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 summary 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).

The students focused on book 7 highlighted a similar human struggle: the tension between life and death (Figure 13). They noted that in comparison with chapter 6, that focus was less on day-to-day life and more on the value of the physical realm vs the importance of the metaphysical afterlife. As with the struggle between warrior culture and familial loyalty, however, the gods played a role in balancing (or unbalancing) that tension.

Finally, the students working through book 8 highlighted the very high-level conceptual struggle that exists when we see hierarchies of power clashing (Figure 14), fate and its inscrutable invisible hand overwhelmed even the gods in book 8.

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 6 then 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. This is important as an intervention of historical social norms as much for their emotional attachment as for their indication that familial lineage is important for inheritance and social stability, but that the emotional connections created by familial relationships are not subject to destruction by fate in the same way as social stability. This shift toward integrating an audiences’ social and cultural norms about class and familial organization, audience reception of the Iliad and Homer’s authorial purpose is very much in line with a professional historian’s analysis of audience makeup as part of understanding authorial purpose. It is also very hard to accomplish in a single class session, and the adoption of text mining to break authorial structures into smaller pieces and then display those pieces visually contributed to students’ ability to engage with this particular historical task.

To demonstrate both the value of, and the pitfalls of, this approach to text mining, we wrapped up class with an example of what each book would look like had it been written by a different group than by a group of humans. Book 6 is shown below (Figure 15) as an example (using text from http://classics.mit.edu/Homer/iliad.6.4.html).

In this discussion, students immediately highlighted the more granular nature of the computer generated word cloud. For instance, “son” and “wife” are separate rather than combined into “family.” Students also pointed out the value of an algorithmic presentation, though “nested mining” against the meaning of “lineage” the underlying conceals that tie family values to guest-friendship in the student-generated word-cloud for book 6. Book 6 is far more visible in the computer generated word cloud than the human-generated word cloud.

From a digital-literacy perspective, seeing their own topical word cloud juxtaposed with the computer-generated version helped students see both where their own thinking was more sophisticated than in the human-generated word cloud. The cloud juxtaposed with the computer-generated version helped students see both where their own thinking was more sophisticated than in the human-generated word cloud.

Lesson Plan

Each group was instructed to examine one aspect of a social network. Students assigned to study the assortative nature of the network focused on the appearance of highly clustered sub-networks; students who were looking at balanced networks focused on the appearance of multiple edges for each node; and students looking at the destructibility of a network focused on the appearance of highly-connected nodes in an individual subnetwork acting as edges to highly-connected nodes in other sub-networks. Rather than simply represent their findings using their images, the students were asked first to discuss whether they thought the Iliad’s network met the qualifications of their assigned feature.

Their goal was to represent the results of their discussion as an argument in visual form. To support that, we again discussed basic principles of good data visualization: spacing to represent conceptual distance, color to represent categorical grouping, and size to represent frequency or some other consistent metric.

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— or any character-related or friendly generally—but on whether the Iliad network was created real and, if so, how. This particular approach generated a series of questions about what constituted a conversation, a discussion that the easily-destructible group overheard and subsequently used in their argument formulation. The balanced network group analyzed the conversations, counted the descriptions of conversations, and just quoted dialogue, counted, and that there were enough of those discussions to constitute a balanced network. They represented this balance by creating a highly clustered visual diagram, color-coded by relationship group, and divided into two to demonstrate where the triadic relationships were most prevalent.

Like the students in the assortative group, students in the easily-destructible group (Figure 17) settled on an argument, and an argument strategy, fairly quickly. They decided the Iliad was mostly easily destructible, but they took a very different visual argumentative strategy. They emphasized edge weight, or frequency of connection between two nodes, by drawing thinner or thicker lines

Figure 16

Figure 17

Figure 15

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 an important lesson of historical social norms related to interaction, social etiquette and familial devotion. This interactional 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. Pidraigue McCarron & Ralph Kenna examined the networks in Thel Iliad, Beowulf and the book 6, are far more visible in the computer-generated word cloud.

The authors in this network theory approach generated a series of questions about what constituted a conversation, a discussion that the easily-destructible group overheard and subsequently used in their argument formulation. The balanced network group analyzed the conversations, counted the descriptions of conversations, and just quoted dialogue, counted, and that there were enough of those discussions to constitute a balanced network. They represented this balance by creating a highly clustered visual diagram, color-coded by relationship group, and divided into two to demonstrate where the triadic relationships were most prevalent. Like the students in the assortative group, students in the easily-destructible group settled on an argument, and an argument strategy, fairly quickly. They decided the Iliad was mostly easily destructible, but they took a very different visual argumentative strategy. They emphasized edge weight, or frequency of connection between two nodes, by drawing thinner or thicker lines.
to demonstrate that Hector, Priam, Achilles and Agamemnon held the mortal world together, with Zeus acting as an intermediary between the mortal world and the gods.

Each of the networks is impressive in its own way, and the students in each group were thoughtful in visual expression of their argument. In these examples, I prioritize bridging the gap between the activity's rules, explicit community, and division of labor a more manageable task.

Activity theory analysis also points to several advantages in using analog technology to teach digital methodology. First, 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 of the digital tools and conceptually useful analog tools like blackboards can help bridge that gap.

Finally, activity theory suggests some overarching guiding principles that make understanding or a tool (or lack thereof) that supports a learning experience with heart and soul a more straightforward view of how the digital tools and conceptually useful analog tools like blackboards can help bridge that gap.

The broader examination of activity that began this study addresses several general historical concerns about activity. First, the activity theory analysis of digital methodology in incremental terms. A single-session activity is less likely to have any long-term negative effects, but instructors will still be able to capitalize on the positive effects of an activity change, making a single session very low-risk instructional-ly. In-class variety keeps students active and emphasizes the different effects of each methodology's mediation. Using multiple methodologies in a single session, these sessions to scaffold students' experience with digital methodology by moving students from the familiar methodology of mapping to the less familiar network analysis, which can help students' acceptance of the tools. Finally, if a single session is successful, it is easy to expand the next time an instructor uses the methodology; by comparison, a longer multiple-session plan is harder to condense down into a single session.

While the study here is presented in mostly anecdotal terms, the activity theory analysis of digital methodology in incremental terms. A single-session activity is less likely to have any long-term negative effects, but instructors will still be able to capitalize on the positive effects of an activity change, making a single session very low-risk instructional-ly. In-class variety keeps students active and emphasizes the different effects of each methodology's mediation. Using multiple methodologies in a single session, these sessions to scaffold students' experience with digital methodology by moving students from the familiar methodology of mapping to the less familiar network analysis, which can help students' acceptance of the tools. Finally, if a single session is successful, it is easy to expand the next time an instructor uses the methodology; by comparison, a longer multiple-session plan is harder to condense down into a single session.

Finally, activity theory provides clear solutions to the structural limitations of digital methodology. First, one of the tricks of systematically using the activity triangle is to prioritize one element in an activity. In these examples, I prioritize bridging the gap between the activity's rules, explicit community, and division of labor a more manageable task.

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the Classroom. The New Yorker.


