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Collaborative Teaching and Digital Visualization in an Art History Classroom

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Abstract

Instructors wishing to utilize digital technologies in undergraduate classrooms to address humanities research questions may face a number of challenges. These include identifying appropriate digital methods; learning and supporting digital technologies; integrating the digital and subject area components; or designing scalable learning outcomes. In the Wired! Lab for Digital Art History & Visual Culture at Duke University, we have developed a pedagogical structure that combines collaborative teaching with project-based, digitally-informed learning experiences. The essay that follows examines the capacity we have built through the example of an art history survey course that utilized the interactive qualitative visualization tool Neatline.

Keywords

Digital pedagogy, collaboration, visualization, digital humanities, digital art history

Author Bio & Acknowledgements

Hannah Jacobs provides instruction and conducts research in digital concepts and tools for Wired! courses and projects. She leads tutorials and workshops, collaborates with faculty to develop and implement digital humanities projects in the classroom, consults on faculty research, offers advising on digital tools for undergraduate and Master's student theses, provides technical support for lab projects, and liaises with other digital humanities staff at Duke. Hannah holds an M.A. in Digital Humanities from King's College London (2013) and a B.A. in English/Theatre from Warren Wilson College (2011). She volunteers as the Communications Officer for the Alliance of Digital Humanities Organizations. She is interested in potentials of visual interactive storytelling for scholarly communications, public outreach, and education.

Introduction[1]

From leveraging social platforms for class discussions to visualizing historical data to curating online exhibitions, humanities instructors are finding numerous points of entry for bringing digital technologies into the classroom. In the Wired! Lab for Digital Art History & Visual Culture at Duke University (dukewired.org), we harness a variety of visualization methods as teaching tools. Students attending Wired! courses not only study art history and visual culture but also gain skills in research and computing by using digital methods to analyze historical materials and present scholarly arguments. Digital, research, and historical lessons are taught in parallel through combinations of lecture, seminar, and project-based work that bring together two realms of critical thinking and doing to shape students' education.

The Wired! Lab faculty and staff recognize that to construct such learning experiences we must combine our variant expertise and adjust our teaching practices while operating within the existing curriculum. Accordingly, we have developed a teaching model founded upon collaborative teaching and project-based learning as scaffolding for conducting digital visualization. Tanya Clement writes that "Like pedagogy intended to teach students to read more critically, project-based learning in digital humanities demonstrates that when students learn how to study digital media, they are learning how to study knowledge production as it is represented in symbolic constructs that circulate within information systems that are themselves a form of knowledge production."[2] One aim in the design of Wired! courses is to encourage students to critically consider the digital media with which they engage every day and to empower them as responsible digital knowledge producers. Unlike the task of explicating a written work, the task of analyzing digital content often involves responsive interaction and visual interpretation. In order to fully understand a digital creation, we cannot be only passive readers but must be also active authors. We must examine a digital work, poke around under the hood, produce our own scholarship using the same concepts and tools, and analyze our work in comparison with the original work.

This process is an iterative one of critical thinking—akin to critical reading—and critical digital making. This concept draws on Matt Ratto's "critical making", which he boils down to "furthering critical knowledge through joint material production."[3] While Ratto focuses on the creation of *material* objects and the lab is concerned primarily with *digital* objects, his theory applies equally well to digital visualization. Ratto sees the making process as equally important to scholarship as, if not more important than, the object produced. For him that making process is comprised of both *thinking* and *doing*, two inseparable activities that feed each other in a potentially continuous loop. As this essay's case study will argue, digital pedagogy can—and should—employ a critical making approach.

Of course, carrying out critical digital making in the classroom can present logistical challenges to many humanities instructors who, as expected, do not possess that trifecta of historical, visual, and digital knowledge. In digital humanities research, scholars have gravitated toward collaboration as a method for advancing knowledge production in ways that are impossible without multiple proficiencies. Lisa Spiro articulates this shift, noting that "By bringing together people from diverse expertise, collaboration opens up new approaches to tackling a problem."[4] If collaboration works for digital scholarship, then surely it can also work for teaching.[5]

This kind of thought was behind the lab's inception in 2009, and it was behind the collaborative redevelopment of the spring 2015 iteration of ARTHIST 101, Introduction to Art History. This course offers valuable insight into the opportunities afforded by a project-based, collaboratively-taught, digitally-inflected undergraduate course. Our combined subject, research, and digital expertise enabled us to redevelop the survey in a way that drew students beyond rote memorization toward an enriched understanding of both art history and digital media through critical digital making. This undertaking was, however, only possible through the Wired! Lab's support structure devised to accommodate collaborative digital pedagogy.

Building Capacity: Wired! as Humanities Lab

The Wired! Lab's current formation comprises a group of art history and visual studies faculty, librarians, curators, technology professionals, postdoctoral fellows, and students from a range of humanities and science disciplines. Together we analyze histories of urban spaces and lives of cultural objects through digital visualization. Our lab's model for research and teaching follows a formula for digital humanities laboratories not dissimilar to that described by Amy Earhart as a "physical space designed to support scholarly inquiry," a community engaged in "high-performance computing and collaboration, and…necessarily interested in adopting models of scholarly production that support such inquiry," yet still "deeply enmeshed with the humanities."[6] On a practical level, our activities take place primarily in a physical space furnished with a seminar table, AV system, and a collection of desktop computers, and is supported on a daily basis by an IT specialist, administrative staff, and a digital humanities specialist. Our research and teaching is rooted in art history and visual studies questions but relies on computation and collaboration. We conduct faculty-led research projects for which both graduate and undergraduate students serve as research assistants.

We also design and implement project-based art history and visual studies courses that integrate 3D modeling, mapping, web development, and database structuring. These courses are taught within the Art, Art History & Visual Studies department's existing undergraduate curriculum. They are designed for both majors and non-majors, foregrounding specific art history and visual studies topics. Example course titles include "Art in Renaissance Italy," "Gothic Cathedrals," or "The Medieval Castle in Britain." Yet digital interventions are nonetheless central to their instruction as they teach students to critically engage with history and visual culture through visualization.

Students in Wired! courses create 3D representational models informed by archival materials. These models and the modeling process are instruments for addressing questions such as: How might a building's structure have supported contemporary governments' political aims? or How is social identity linked to individual experiences of architectural space? Students create maps that show spatial and temporal relationships, asking: How did medieval trade of a particular material develop? How did geography influence a specific craft's rise in popularity? Students combine historical media with their own argumentation in multilayered visual narratives. They curate digital archives that make publicly accessible rich historical materials previously hidden away in library archives. Through these making processes, facilitated by collaborative instruction, students may discover for themselves the significance of an object, an event, a person, a movement, or a style, within larger historical, cultural, and political contexts.

Over the past six years, the lab has built this capacity for digital pedagogy by cultivating working relationships with a subject librarian and visual resources curator; providing research, project management, and teaching opportunities for graduate students and postdoctoral fellows; creating courses and fellowships for undergraduates across disciplines; and procuring institutional support for a digital humanities specialist. This last role is unique in its location and function within the humanities at Duke University. [7] The position straddles an academic department (Art, Art History & Visual Studies) and operational unit (Trinity Technology Services) and is dedicated to the Wired! Lab, an auxiliary initiative within Art, Art History & Visual Studies. This specialist supports both research and teaching. In the classroom, she operates as the primary support for the project-based visualization methodologies injected into new and modified subject-specific courses. It was this position that joined forces with a scholar, a graduate student, and a librarian to teach Introduction to Art History in spring 2015.[8]

Designing A Wired! Course

Several months prior to the semester's start, the teaching team began meeting to plan the course, choosing together the topics the course would cover among the vast possibilities presented by pre-modern art and envisioning how critical digital making might inform a project-based learning approach to those topics. Together, we revised the survey's syllabus to make room for the research and technology workshops needed to buttress visualization projects. We compared the art historical topics to possible digital interventions and concluded that the course would emphasize the origins and provenance of cultural objects and materials through interactive spatiotemporal visual narratives.

We chose to orient students' learning processes toward objects' relationships to space, time, and culture explored, analyzed, and presented through maps, timelines, and other visual media combined with textual explications. By approaching art history using this kind of interactive dynamic visualization, students could ask such questions as: Where did an object's materials originate? How did raw materials connect or divide coinciding societies? How did economic, temporal, and geographic movement shape or a transform an object?

Based on these disciplinary and methodological decisions, we considered possible visualization tools. We decided that Neatline, "a geotemporal exhibit-builder that allows you to create beautiful, complex maps, image annotations, and narrative sequences…and to connect your maps and narratives with timelines that are more-than-usually sensitive to ambiguity and nuance,"[9] would best suit the course. Practically, Neatline proved a good choice because of its low cost, its ability to represent qualitative information, and its low learning barrier. Pedagogically, it offered a scalable way to engage students in critical digital making through visualization that could be multidimensional, interactive, and qualitative—all appropriate characteristics for digital humanities projects.

Apart from the importance of critical digital making to our pedagogy, and our lab's emphasis on visualization technologies, it may not yet be apparent as to why visualization was our digital method of choice. In 2003, David J. Staley published *Computers, Visualization, and History: How New Technology Will Transform Our Understanding of the Past*. In the book, Staley writes, "Visualization allows the information designer to represent simultaneity, multidimensionality, pattern, and nonlinearity with a speed and efficiency that prose cannot capture."[10] Staley argues not

that visualization is "superior" to written communication, but that visualization offers a different form of communication entirely. In this and other Wired! courses, our students study not only change over time but also coinciding and recurring events; they invest in research questions that require both temporal and spatial analysis.

Neatline embodies the kind of visualization that Staley envisions as humanities scholarship by offering both readers and authors the chance to see both the big picture and the many parts, to examine an issue from multiple perspectives, and to create individualized experiences of content that must be sought out within the visualization through interaction and nonlinear movement. This engagement requires critical skills developed not only through reading white papers, but also through interfacing with digital media. It requires a combination of critical thinking and critical doing to fully understand.

Ratto describes three stages of critical making that offer a schematic framework for the course: review and analysis of literature and concepts; design of a prototype; and an iterative process of critique and renewed development.[11] Students in Introduction to Art History first engaged with art history topics and digital media as readers through a series of lectures, presented by the art historians, paired with a syllabus visualized in Neatline (Fig. 1). Instructors presented relevant content through the syllabus during each class, and students were encouraged to use it as part of their exam preparations. Later, students became authors—Staley's "information designer"—of their own Neatline narratives, basing their critical making on earlier critical thinking conducted around Neatline's interface, content structure, and design functionalities. They first created prototypes, midterm projects focusing on learning the digital tool while drawing from the same provided research materials, before developing final projects that demanded original research and digital making in concert. Through these phases of critical digital making, students transitioned from passive to active readers and knowledge producers.

A Visual, Interactive Syllabus

The digital syllabus remixes information provided in a white paper syllabus to transform students' experiences of course content by visualizing each unit and lecture topic spatially and temporally with additional embedded media. The teaching team worked together to find and organize content and to design the narrative's overall interactive structure. The resulting spatiotemporal representation of the pre-modern cultural landscape presents art history as multiple layered, interconnected narratives rather than as a sequential list of discrete civilizations.
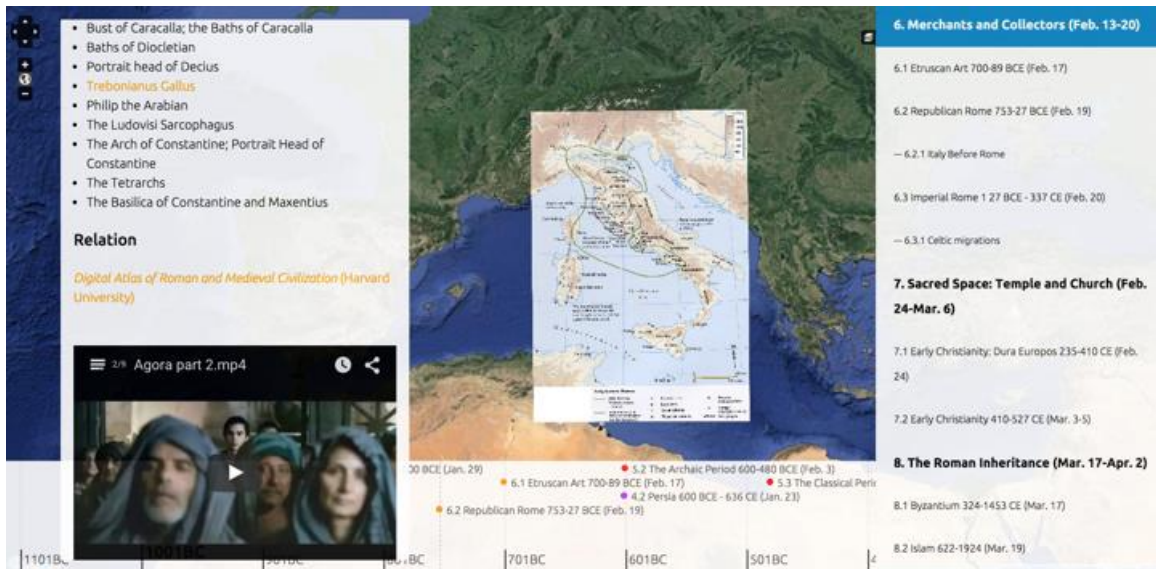
Figure 1: Screenshot of the interactive Neatline syllabus for Introduction to Art History.

Neatline's multifaceted interface supports this kind of multidimensional, synchronous narrative by highlighting the shared spaces and times in which raw materials gained cultural significance, objects were shaped from these materials, and cultural exchange occurred through the transmission of objects. The syllabus interface (Fig. 1) is divided into four sections: map, timeline, outline, and information window. Units and lectures are listed in an outline (at right), that resembles an outline found in a white paper syllabus. Clicking on a unit or lecture reveals a popup window (at left) with specific information about that item, including topics, regions, and time periods covered; class meeting dates and homework assignments; links to significant objects' museum webpages; lecture slides; georeferenced map layers; and relevant videos and images. Units and lectures are connected to specific points on the timeline (at bottom) and to points, polygons, and/or map layers shown on the satellite view (at center). Units are color-coded on the timeline to highlight the simultaneity or distance of the different civilizations; the temporal movement of the lectures backwards and forwards in time as it jumps spatially from place to place.
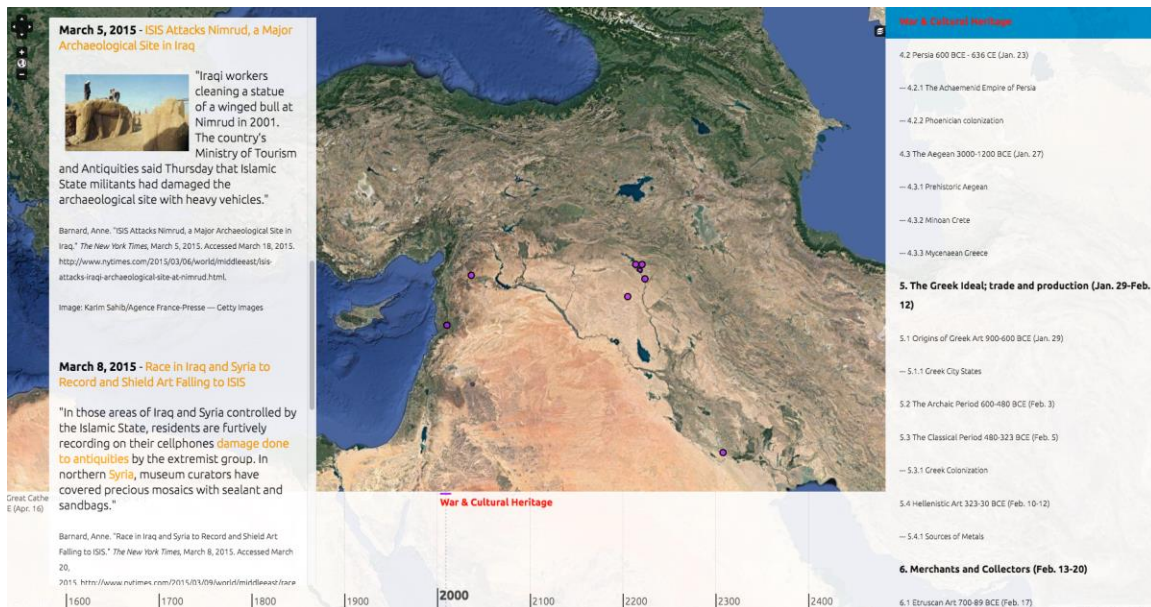
Figure 2: Real-time mapping of sites destroyed by or under threat from political violence in spring 2015.

It is possible to navigate via the unit/lecture outline, chronologically by scrolling along the timeline, or spatially by panning and zooming on the map to click on points and polygons. Supplemental information, added to the syllabus as the semester progressed, is hidden within specific time spans on the map. One such example includes a mapping of cultural heritage sites under threat from ongoing political violence. Its information window features links to relevant journalism. These links and points on the maps were added as sites and objects surfaced in the news that spring. Adding such content, as events unfolded, created an important mental bridge between current world events and the continued significance of the ancient objects and sites discussed during each lecture.

As a tool for critical thinking about digital media, the syllabus encouraged students to delve into the temporal and spatial facets of objects and civilizations through pan, scroll, and zoom interactions. Many features visualized on the map were hidden within the narrative and revealed only when readers scrolled to a certain time span. Other features were hidden by zoom level and could only be found through interaction with the outline—in which case clicking on an item in the timeline zooms to a specific area on the map—or through active exploration in the map. Students could also consider how content was organized: should all points for threatened cultural heritage sites be mapped in "War & Cultural Heritage," or should they be mapped separately, giving them separate information windows, but keeping them linked by point color? These were only a few of the syllabus' affordances addressed through both lectures and workshops.

Student-Authored Visual Historical Narratives

After the students had become familiar with the digital syllabus, the instructional team began to alternate art history lectures with workshops in research skills and digital methods. The visualization workshops, facilitated by the digital humanities specialist, gradually introduced the students to the practical and theoretical aspects of using Neatline to visualize art historical arguments. We began with the foundation of Omeka, the

content management system in which Neatline operates. We then moved to Neatline, introducing first its basic functionalities and then delving into the critical skills needed to utilize Neatline's functionalities to present a cohesive visual narrative. We presented step-by-step exercises and discussed together how and why to use Omeka and Neatline, considering not only the digital syllabus but also examples created by other students and scholars.
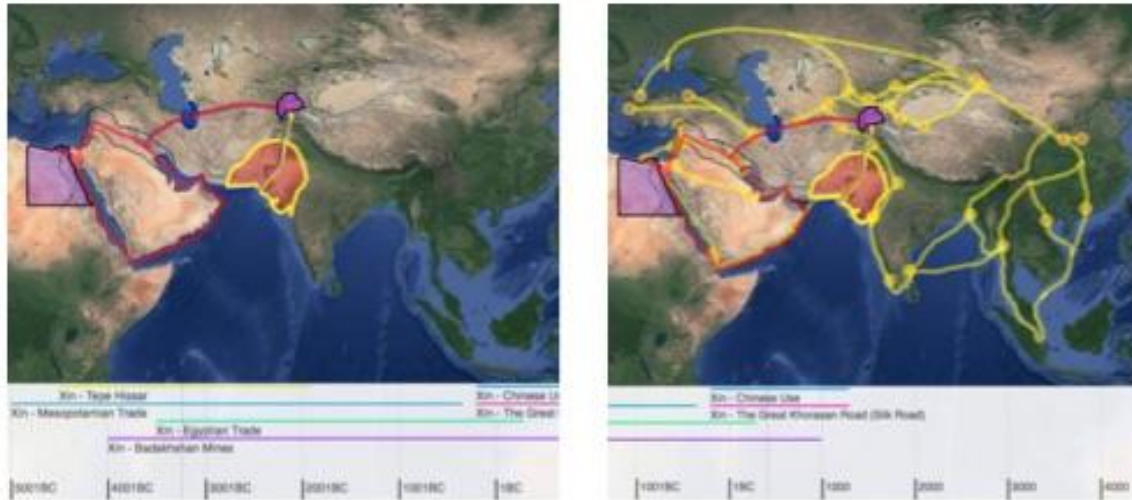
Figure 3: Revealing content with timeline movement. Fiona Xin, "The History and Movement of Lapis Lazuli." View the project at http://arthist101.dukewired.net/neatline/neatline/fullscreen/xin-history-and-movement-of-lapis-lazuli.

The students then stepped into their roles as authors, creating a prototype Neatline narrative as a midterm project. All students were assigned Sarah M. Guerin's "Avorio d'ogni ragione: the supply of elephant ivory to northern Europe in the Gothic era" (2010). These Neatline narratives had to present one aspect of Guerin's article, which addresses the existence of multiple ivory trade routes between Africa and medieval Europe, using Neatline's visualization tools to support or refute Guerin's argument. By imposing strict constraints on the art historical content used in the prototype, students could focus specifically on the critical digital making process. Despite the same content, instructors found that each student approached their narrative differently. Some students traced the connections between the ivory and alum trades, while others looked to the economic relationships in the East. Some students began their narrative with the raw material in southern Africa and ended with the finished product found in France. Others constructed their narrative in the opposite way. Some students chose to represent their narrative spatially with only points and lines while others used polygons and color categorization.

While these projects in many ways were simplistic explorations of Neatline, they provided the building blocks for students to critique their work and advance their critical digital making at the final stage. In addition to presenting their midterm projects, students were encouraged to compare and critique each other's work, learning not only from their

own practice but also from that of their peers. The students received collective feedback from the instructors on both art historical content and digital product.

For the second, final project, students created Neatline narratives based on their own individually chosen topics. This assignment, representing 25 percent of their overall grade, built upon their previous work by asking them to conduct original research in addition to developing more advanced interactive visual arguments. In preparation for this project, the teaching team's librarian led a workshop on finding and choosing primary sources, both visual and textual. The students were also encouraged to meet with individual members of the teaching team to discuss their topics, troubleshoot research and technological issues, and critique their work in progress. The students presented their final project to the class and an invited audience of the Duke community.

Many of the students' reconfigured projects, built upon historical, research, and digital knowledge gained throughout the semester, presented innovative analyses of a variety of research questions. They demonstrated their understanding of critical digital making through their use of Neatline's stylistic and interactive functionalities to manipulate historical content to the advantage of their narrative. One particular practice that emerged was the use of Neatline's mapping and timeline functions to explore a topic at multiple scales and to situate them within larger contexts. One student showed the significance of lapis lazuli—its origins in Afghanistan, its popularity in Egypt, its movement among economic powers, and its transformation into cultural object—to the larger historical narrative of the Silk Road. In this example, readers experience a "big reveal" (Fig. 3) at the end of the lapis lazuli narrative when they reach a certain date in the timeline, and the Silk Road network, hidden until this moment, appears in relation to the lapis lazuli trade route.
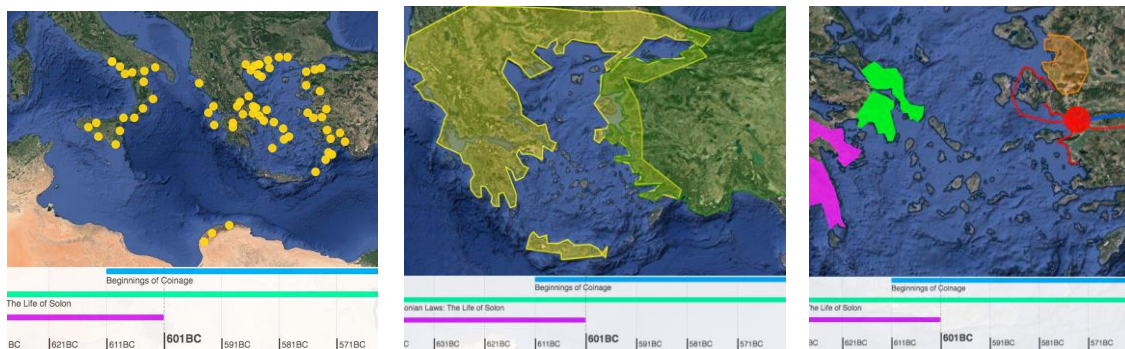
Figure 4: Revealing scaled content through zoom level. Alexandra Wisner, "Coinage: Origins and Spread in Archaic Greece." View the project at http://arthist101.dukewired.net/neatline/neatline/fullscreen/wisner-history-and-development-of-coinage-in-the-mediterranean.

Another student mapped the creation of coinage in the ancient Mediterranean (Fig. 4), showing the material's origins alongside its political and economic uses from both regional and local points of view. This student manipulated the zoom level visibility feature to choose which information readers see based on their zoom level. This student recognized that intentionally restricting which information appears at which zoom level would enable her audience to compare three different spatial, political, and economic scales of argumentation separately.

In both of these examples, the ability to manipulate opacity, date, and zoom settings to choose how and when information is visualized in Neatline proved key. The careful decisions made by these students when designing their interactive Neatline narratives could only have come about by intentional, staged instruction in critical digital making, which promoted their own exploration of Neatline's structures and functionalities. The digital syllabus, prototype, and final project each played a significant role in transforming students from passive readers of digital media into critically engaged readers and authors of digital media. The instructional team's commitment to a collaboration that benefitted from each member's expertise created the opportunity for such a course to be envisioned and implemented.

Conclusion

Collaborative teaching, critical digital making, and visualization methods have been central to the Wired! Lab's development of digital pedagogy. The inclusion of a variety of scholars and professionals in the lab's activities, the promotion of visualization as scholarly communication, and the employment of concepts such as critical making were all contributing factors in the development of the spring 2015 iteration of Introduction to Art History. The lab's carefully constructed infrastructure supports this kind of endeavor through the research community and technological resources it fosters.

Of course, this teaching method is not without its challenges—be they logistical, pedagogical, or critical. The Wired! Lab exists within a private American research university. Those individuals invested in digital humanities pedagogy and research have carved out a niche within this prosperous setting to conduct their experiments. Nonetheless, each member of the team commits significant time and energy, seeing sometimes only small returns in investment. Often, projects prove to be more challenging than anticipated. This is certainly the case with Introduction to Art History, for which the digital syllabus' creation—locating, structuring, and styling content—proved to be the biggest challenge the instructional team faced. Its design turned out to be overly time consuming due to the amount of content and specific limitations in Neatline's functionality for showing and hiding certain map layers.

Still, the syllabus itself continues to be a useful resource for research and teaching. Its construction process provided vital learning experiences for the instructional team. Similarly, the students' making processes and the multidisciplinary knowledge gained from the course may in fact be the most important product of this kind of digital pedagogy. Students exited the class with foundational knowledge not only in art history but also in research and critical digital making. They will be able to analyze a sculpture and analyze a visualization. They may be inspired to continue their engagement with one or both of these areas as they continue their education. In fact, some students even chose to join a long term Wired! research project team because of their experience in the course.

Collaboratively-taught, project-based digital pedagogy is offering students important opportunities to engage with a range of topics and skills through practices of critical thinking and doing. Teaching visualization technologies is challenging students to expand their understanding of digital media by developing and analyzing scholarly arguments expressed through combinations of text and imagery. These methods promote

the core of humanities education through multidimensional theory and practice: seeking a deeply nuanced understanding of the (digital) world in which we live.

Notes

[1] This essay draws on ideas the author has expressed in two presentations. The first, "Neatline: Visualizing Time[2] in a Syllabus," was presented by Professor Caroline Bruzelius and the author at the College Art Association in February 2016. A description of the session can be found at http://artjournal.collegeart.org/?p=6631. The second, "Wired!: Collaborative Teaching & Critical Digital Making in an Art History Classroom", was presented by the author at Digital Humanities 2016. The abstract is published at http://dh2016.adho.org/abstracts/45.

[2] Tanya Clement, "Multiliteracies in the Undergraduate Humanities Curriculum: Skills, Principles, and Habits of Mind," in *Digital Humanities Pedagogy: Practices, Principles and Politics*, ed. Brett D. Hirsch. (Open Book Publishers, 2014), 367.

[3] Matt Ratto, "Critical Making: Conceptual and Material Studies in Technology and Social Life," *Information Society* 27 (2011): 252, *Academic Search Complete*, EBSCO*host*, accessed August 5, 2016.

[4] Lisa Spiro, "'This Is Why We Fight': Defining the Values of the Digital Humanities," in *Debates in the Digital Humanities*, ed. Matthew K. Gold, (Minneapolis, MN: University of Minnesota Press, 2012), 25.

[5] But do not take our word for it. See also the pedagogy under way at the University of Kansas as documented in Rosenblum, Brian, Frances Devlin, Tami Albin, and Wade Garrison, "Collaboration and CoTeaching: Librarians Teaching Digital Humanities in the Classroom," in *Digital Humanities in the Library: Challenges and Opportunities for Subject Specialists*, ed. Arianne Hartsell-Gundy, Laura Braunstein, and Liorah Golomb, 151-176. The Association of College & Research Libraries, 2015.

[6] Amy E. Earhart, "The Digital Humanities As A Laboratory," in *Between the Humanities and the Digital*, eds. Patrik Svensson et al. (MIT Press, 2015), 391-4.

[7] This essay's author is Duke University's digital humanities specialist. In the American higher education system, digital humanities specialists who engage directly in pedagogy are often found in libraries, as is the case at the University of Virginia's Scholars' Lab, or in extra-departmental units, an example of which can be found at Michigan State University's Lab for the Education and Advancement in Digital Research. At Duke, however, the Wired! Lab Multimedia Analyst chiefly works with the faculty and students directly connected to the lab, which does not provide service functions to the university community at large.

[8] Respectively: Hannah L. Jacobs, Multimedia Analyst, Wired! Lab (digital humanities specialist); Caroline Bruzelius, Anne M. Cogan Professor of Art History; Joseph Williams, doctoral candidate in the History of Art; and Lee Sorensen, Librarian for Visual Studies and Dance, Lilly Library.

[9] Neatline. "About." Accessed August 5, 2016. http://neatline.org/about/.

[10] David J. Staley, *Computers, Visualization, and History: How New Technology Will Transform Our Understanding of the Past* (New York: M.E. Sharpe, 2003), 36-7.

[11] Ratto, "Critical Making: Conceptual and Material Studies in Technology and Social Life," 253.

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