

the academy, and the posts are relevant to discussions beyond the ivory tower. The site that the editors, writers, and contributors have created succeeds in showing that “that the personal is historical.” *Nursing Clio* also demonstrates that the historical is personal; its mission feels more relevant now than ever.

Meghan Crnic
University of Pennsylvania
Philadelphia, Pennsylvania

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The Open Digital Archaeology Textbook, <https://o-date.github.io/draft/book/>. Created and maintained by Shawn Graham, Neha Gupta, Jolene Smith, Andreas Angourakis, Andrew Reinhard, Kate Ellenberger, Zack Batist, Joel Rivard, Ben Marwick, Michael Carter, Beth Compton, Rob Blades, Cristina Wood, and Gary Nobles. Reviewed Oct. 2019–Feb. 2020.

Archaeology has a history of working with computation and digital technology that stretches back more than sixty years. While there are several examples from the late 1960s, including George L. Cowgill’s “Computer Applications in Archaeology” (in *Computers and the Humanities*, Sept. 1967, pp. 17–23), one of the best known comes courtesy of James Deetz’s seminal work on Arikara ceramics carried out earlier in the decade. Deetz, who is widely considered to be a father of historical archaeology, wrote a program for the MIT Computational Psycholinguistics Laboratory’s IBM 704 mainframe to analyze over two thousand rim sherds from the Medicine Crow site in South Dakota to discover “stylistic coherence.” (James Deetz, *Dynamics of Stylistic Change*, 1965). While Deetz’s research focused on the effect of social change on ceramic production, his computational work, and the work of those who followed him, such as Cowgill, Maria Asher, and Robert Asher, foreshadowed modern archaeological informatics and data science. Despite its pioneering nature, much of this early digital archaeology work faced significant hurdles: (1) despite the claims of major computer manufacturers, hardware and software were barely adequate

for dealing with archaeological information; (2) facilities to support these sorts of undertakings were exceedingly rare; and (3) no consensus existed among archaeologists as to what types of data should be stored and how that data should be collected.

As both hardware and software evolved, projects such as the British Museum Association Information Retrieval Group of the Museum Association, the Smithsonian Institution Information Retrieval System, and the Museum Computer Network’s General Retrieval and Information Processor for Humanities Oriented Studies (GRIPHOS) highlighted the important role that heritage institutions played in storing, preserving, and providing access to digital archaeological data. Of particular note was the Arkansas Archaeological Survey (AAS), which, in 1972, was awarded a National Science Foundation grant to determine the problems and possibilities, including time factors and costs, of recording large quantities of archaeological data. The project used the GRIPHOS system to provide an infrastructure for storage, search, and retrieval of the AAS site files, the Mark Raymond Harrington Collection (housed in the National Museum of the American Indian), the AAS faunal collection and human skeletal collection. While technical issues with software and hardware were a concern, the project’s greatest challenges were disciplinary. Enormous theoretical and methodological problems (such as data standards, usage best practices, and lack of training infrastructure) had to be solved before digital data repositories could be effectively leveraged in everyday archaeological practice.

Since these early days, the deployment of digital methods and computational approaches in archaeology has grown exponentially. No area of the discipline—teaching, public engagement, management, research, stewardship, and preservation—is untouched by digital technology and computation. The problem, unfortunately, is that expertise in digital archaeology is the domain of a small number of skilled specialists. One might easily argue that specialization is the nature of methodology in archaeology. Ceramicists, zooarchaeologists, and geophysical remote sensing experts, for example, all practice a highly specialized set of skills, as part of the collaborative and mul-

tidisciplinary nature of the field. Increasingly, however, archaeologists who have not traditionally characterized themselves as particularly digitally inclined or who simply do not have the necessary grounding in digital skills are increasingly being required to engage professionally with issues, methods, models, and practices that are uniquely digital.

The takeaway is that a desperate need for the democratization of digital and computational skills exists within the discipline. In many ways, this is the *raison d'être* for *The Open Digital Archaeology Textbook*. Edited by Shawn Graham (of Carleton University) and funded by a grant from eCampusOntario, the textbook is likely to be unrecognizable to many students and scholars. While the term *textbook* figures prominently in the title, the work is unlike any traditional textbook. Instead, it is a dizzying hybrid of instructional material and an interactive learning lab. Its nontraditional (I use that term in the most complimentary way) form makes *The Open Digital Archaeology Textbook* difficult to describe. Important to understand first is that the textbook has two primary moving parts. The first of these is the “book,” divided into six main sections: “Going Digital,” “Making Data Useful,” “Finding and Communicating the Compelling Story,” “Eliding the Digital and the Physical,” “Digital Archaeology’s Place in the World,” and “On the Horizons: Where Digital Archaeology Might Go Next.” Think of these as the book’s chapters. Each section has subsections that tackle particular technical topics—such as version control with *GitHub*, cleaning data, or Web mapping. Each of the sections are written by a contributing author (or authors), all well known and respected in the digital archaeology community. All of the book-like content in *The Open Digital Archaeology Textbook* is written and organized for easy integration into a course (either as individual sections or as a whole).

The second part of the textbook is an online computational environment that is a hands-on, interactive learning lab; at this point the content begins to diverge from the traditional idea of a textbook. This part offers a series of built-in tools that provide students with a computational environment in which they can experiment with the code, data, and

software discussed in each section of the book. The computational environment of *The Open Digital Archaeology Textbook* comprises a series of Jupyter notebooks that allow students to engage in hands-on learning with specific technical skills or processes. These notebooks are all launched directly from the browser using a service called Binder; students only have to click on the “launch binder” button in each section of the textbook to open the notebook. *Jupyter Notebook* is an open-source Web application used to create and share documents containing live code (that can be run and rerun), equations, visualizations, and text. Jupyter notebooks have become particularly popular in the open-science community because they allow for reproducibility of computational scientific processes. In *The Open Digital Archaeology Textbook*, each Jupyter notebook is a small, self-contained environment with all of the code and tools the student needs for that particular section of the textbook: an instant interactive learning lab. The textbook’s notebooks also provide a healthy and supportive environment that encourages students to “fail productively,” a core mantra for the project.

A critical characteristic of *The Open Digital Archaeology Textbook* is how it embraces openness. The textbook content itself is stored in a *GitHub* repository and then transformed into something “book-like” using *Bookdown*. All of the Jupyter notebooks that compose the interactive lab portion of the textbook are also published on *GitHub*. All of the textbook’s content is made available under a liberal Creative Commons license: anyone can remix, modify, and republish the content to their heart’s content (as long as they provide the necessary attribution required by that license).

The Open Digital Archaeology Textbook also embraces collaboration in its composition and construction. While Graham is the titular editor, the textbook was written (and in many ways, given life) by a constellation of collaborators from the world of digital archaeology and heritage. Beyond this, the very fabric of the textbook encourages anyone to contribute changes. Just “fork” the book’s repository via *GitHub*, make changes (from minor edits to adding entirely new sections), and initiate a pull request (asking to fold those edits into the

main version of the textbook). The idea behind this is that as time goes on, and more people make contributions, *The Open Digital Archaeology Textbook* will become a true community project. This also means that instructors can take a copy of the underlying repository, and re-edit or recombine in the way that best serves their learning goals. The textbook does include a detailed guide on how to add and suggest changes using *Github*. *The Open Digital Archaeology Textbook* is made even more collaborative by the inclusion of text annotation using *Hypothesis*. Readers can add public annotations, visible to anyone, or private annotations that are only visible to them. Public annotations, all referenced with a stable URL, can become threaded conversations between users that further enhance the text and inform others' reading experiences.

The open and collaborative nature of the textbook means that it is never "finished." It will always be changing, with new collaborators suggesting edits or additions and readers enhancing the text with annotations. This state of "perpetual beta" was always part of the project's design. Instead of being static upon release and quickly becoming out of date, *The Open Digital Archaeology Textbook* is a living publication designed to change, evolve, ex-

pand, and adapt as the landscape of digital archaeology does so. This alone makes the textbook a completely unique enterprise.

The Open Digital Archaeology Textbook is important and valuable for several reasons. First, it is a wonderful resource for those interested in teaching or learning about digital archaeology. It is thoughtfully and practically written by a list of respected scholars in the field. Its *Jupyter Notebook*-based interactive learning labs provide a place for students to experiment with the skills taught without the burden of needing to install and maintain a complex stack of software and services. As such, it is appropriate for individual use or for use within a classroom. More importantly, however, the textbook makes a clear and unambiguous statement about the future of digital archaeology. In its very fabric, *The Open Digital Archaeology Textbook* argues for a digital archaeology that is open—open source, open science, open access, open data—and that embodies generosity, collaboration, experimentation, play, and productive failure.

Ethan Watrall
Michigan State University
East Lansing, Michigan

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