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Creative Practice and Spatial Storytelling in the Cartographic Classroom

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Creative methods and spatial storytelling are essential elements of geographical knowledge production. Yet, these alternative approaches to geographical practice are less commonly engaged in cartographic curricula. We draw inspiration from a recent framework on creative methods in geography and apply art-based inquiry to an advanced cartography course on "spatial storytelling" at Syracuse University. We begin by outlining this framework: making space and time for creative cartographic practices, re-imagining mapping tools and conventional mapping practice, and prioritizing iteration and process over final outputs. We then apply this framework to the cartographic classroom, illustrating pedagogic strategies for expanding cartographic practice. In sum, we argue for the inclusion of art practice and spatial storytelling in the cartographic and GIScience curricula, more broadly.

KEYWORDS: Creative methods; art practice; spatial storytelling; cartography; pedagogy

1. INTRODUCTION

Art practice, creative methods, and spatial storytelling are essential elements of geographical knowledge production. Creative art-based practice expands the tools, methods, and approaches—as well as the materialities and understandings—of what "counts" as geographical inquiry (Mogel and Bhagat 2007, Hawkins 2015, Hawkins 2019, kollektiv orangotango+ 2018, Kelly et al. 2023, Duggan and Gutiérrez-Ujaque 2025). Newer texts, such as von Benzon et al.'s *Creative Methods for Human Geography* (2021) and journals like *GeoHumanities* (specifically the Practices and Curations section) embrace alternative geographical methods and re-envision geographical outputs. Long-running journals like *you are here: the journal of creative geography* explore geographical thought through a range of expressive forms including, but not limited to, "poetry, creative writing, maps, photographs, visual and sound art, film, performance, and other imaginable genres." Further, spatial storytelling complements and extends art and creative practice by centering narrative in geographical undertakings (Ryan et al. 2016, Pearce 2008, Roth 2021). Despite their resurgence, these alternative approaches to geographical inquiry and practice are less commonly engaged in cartographic curricula.

In what follows, we discuss how we centered art practice while redeveloping a spatial storytelling course at Syracuse University, by adapting Kelly et al.'s (2023) framework for engaging with art as geographical inquiry to the cartographic classroom: making space and time for creative cartographic practice, reimagining mapping tools and conventions, and centering iterative or repetitive design and experimentation within cartographic processes. We give an overview of the course and connect its structure and pedagogic strategies to Kelly et al.'s (2023) framework, before illustrating with examples. We conclude by

offering these pedagogic strategies for expanding art practice in cartographic curricula, more broadly.

Importantly, our work reflects a collaboration between an instructor and graduate students previously enrolled in the course, and we offer the results of our collaboration as a pedagogic resource for cartography and GIScience instructors. We approach this paper not as pedagogical experts but as early career, multi-disciplinary researchers and educators engaging in art practice and creative mapping methods in the classroom. As such, our intervention is not geared towards those with extensive pedagogic training. Instead, following Elwood's (2007) call for creativity and integrated research and teaching, we bring academic geographic theory and methods into practice in the cartographic classroom.

2. CREATIVITY AND ART PRACTICE AS GEOGRAPHICAL RESEARCH

In their 2023 work, Kelly et al. reflect on the influence of art practice in their geographical research through a series of vignettes. Their reflections differ given their artistic backgrounds, life experiences, and theoretical influences, yet three thread lines emerge into what we refer to as a "framework" throughout this article. Here, we briefly introduce and discuss this framework in three parts: making *space* and *time* for creative work, re-imagining how we engage *tools*, and centering *experimentation* and creative *process*. Art-based inquiry into geographical questions requires alternative visions of both *space* and *time*. For the former, Hawkins (2013) reconceptualizes the "field" in creative art practice by moving beyond "the spaces of the museum, the gallery and the studio with a closer attention . . . towards art's relationship with 'site.'" Drawing from Hawkins (2015), Kelly et al. (2023) reflect on conventional research spaces like an individual's office, the field (whether another location or an archive), a laboratory full of scientific equipment, or the typical lecture-based classroom, and how they might be "appropriated, occupied, reconfigured, misused, and so on, giving way to more interventionary practices" (Kelly et al. 2023, 383). They rethink normalized research spaces, introducing new ways of engaging with space through art practice. For example, one vignette reappropriates a scientific laboratory as an art studio, bringing "artistic and scientific experimentation" into conversation with one another by reimagining how the space is utilized and engaged. Of relevance to this paper, another vignette examines the classroom as a site for feminist resistance and collective art-based practice.

Art-based practice further invites a reconsideration of time in addition to space. Like Kelly et al. (2023), we acknowledge the tensions and (often) incongruence between time and geographic research, given the pressures of graduate school, dwindling funding, and tenure timelines and metrics. Yet, art demands "making time for creativity to happen" (Kelly et al. 2023, 383). Sometimes this means metaphorically slowing down or speeding up time and being open to time that would conventionally be considered "not well spent" (i.e., not producing anything). We call on geographers to not only carve out space and time for creative practice but to rethink how we engage with both space and time.

There is no "one size fits all" approach to *tools* and how they are used in art-based practice. For example, Barad (2007) examines tools like mapping platforms or scientific apparatus as more than just instruments, but as practices that materially (re)configure the world. Similarly, Kelly et al. (2023) decenter tools throughout their reflections, recognizing the power and influence of tools on knowledge production. Subtly (or not so subtly), tools are imbued with inherent politics. See Rose-Redwood et al. (2020), Benjamin (2019), and Jefferson (2017) to better understand digital tools and their ramifications on everyday life. For example, geospatial tools like GPS and, more specifically, Esri products (e.g., "industry standard" mapping platforms) have explicit ties to US military activities and the carceral state. In response, abolitionist efforts, including the "Beyond Esri Resource Guide" (Making Abolition in Geography Collective 2024), call attention to these relations and provide a series of alternative tools (Henderson and Montange 2022).

Form matters, and tools shape our understanding of geographic phenomena. Kelly et al. (2023) approach tools agnostically, selecting their tools—or even creating new ones—according to their specific needs, rather than based on what is familiar to them. In other words, tool selection is not pre-determined. In one reflection, for example, one of the authors chose QGIS, an open-source mapping tool, to produce one map while opting for hand-drawn tracing to create another. Sometimes new tools are needed: Lally

(2022a) has developed *shaping*, a web-based mapping tool allowing users to map relational geographies that "sculpt, cut, expand, and contract" space (1), techniques not possible in conventional mapping tools. Elsewhere, Bergmann and Lally (2021) re-envision conventional geographic information systems (GIS) as "geographical *imagination* systems" (emphasis added) to respond to calls for a reexamination of what GIS can do (Lally 2022b). Similarly, Rodó-Zárate (2014, 2023) has developed *Relief Maps* as a mapping tool grounded in feminist thought, meant to visualize intersectional experiences. While different approaches are taken, Kelly et al. (2023) decenter tools in their art-based practice and embrace the opportunities, tensions, and limits inherent within each tool. Instead, they select tools—and, at times, develop new tools—that best fit their mapping context.

Art practice as geographical research emerges materially or as something tangible (Barad 2007, Paglen 2009). For Drucker (2020), art (and maps) actively produce geographical knowledge. Both art practice and geographical knowledge production are non-linear and sometimes messy, iterative *processes*. Kelly et al. (2023) invite geographers to *experiment*, *play*, and *engage* with the materiality or physicality of art practice to better understand geographic phenomena. This approach prioritizes process over product in the production of space. Following Paglen (2009), they utilize art practice and experimentation to continually make and remake geographic space. Kelly et al. (2023) cite Barad (2007) to examine "the apparatuses through which we engage the world—which might include computational media, pencils and paper, social science surveys, or geographical information systems (GIS)—brings that world forth differently" (381). For example, in one reflection, they grapple with power relations and local contexts imbued within map iconography (e.g., the commonly used bathroom icon's reinforcement of heteronormative assumptions and binary gender) and ask participants in a workshop to iteratively redesign map icons through a feminist lens. Instead of offering a single replacement for each icon to be redesigned, participants produced a range of alternative maps documenting their power relations and context. Thus, by grappling at the material level, the authors (Kelly et al. 2023, Kelly 2026) were able to not only critique, but also provide alternatives to, map icons following prior calls to "care for the subject" (Schuurman 2002) at the material level.

Kelly et al. (2023) conclude by reflecting upon existing pedagogical practices and how we might bring art practice into the classroom (Knowles 2000). Here, we accept their invitation and explore cartographic pedagogy—past, present, and future—and how we might complement and extend these practices through artistic and creative practice.

3. CREATIVITY AND ART PRACTICE AS CARTOGRAPHIC PEDAGOGY

Conventional cartographic curricula have centered on training students in accepted principles, procedures, and conventions in cartography, using what Hermansen (2010) identifies as "the standard textbooks," such as Robinson (1952), Dent (1999), and Slocum et al. (2005). Yet shifts in the broader discipline since the 2000s have driven alternatives to this kind of cartographic pedagogy. In the 1990s, the rise of desktop GIS threatened to disrupt or replace cartography courses (Dymon 1996, Fryman 1996). An ever-expanding catalog of computer-based tools (including GIS) has forced updates to the materials and techniques students learn, while raising questions about whether to prioritize general principles or software-specific technical skills in the classroom (Fairbairn 2014, Howarth 2015). At the same time, critical interventions within cartographic theory have prompted instructors to introduce students to a broader set of questions surrounding representation, subjectivity, and ethics in mapping, challenging prescriptive design conventions and opening the door to alternative cartographies (Foster 2014, Seemann 2022).

In addition to exploring new questions, instructors have also been expanding the classroom. A turn toward experiential or active learning has shifted the locales and scope of the geographic and cartographic classrooms (Elwood 2004, Roth 2016), promoting hands-on learning frequently through community collaboration. Mathews and Wikle (2019) have documented this trend, surveying geographic information science and technology (GIS&T) instructors and finding a move from passive approaches and controlled activities toward active approaches and independent and collaborative activities. Other models have introduced "community care" as pedagogical practice, further reworking contemporary cartographic learning spaces (CLEAR Lab 2021, Rosenfeld 2023). The CLEAR Lab,

for example, utilizes storytelling to create guidelines for a supportive community and inclusive learning environments, including both lecture and lab. Rosenfeld (2023) embraced frequent and iterative peer and instructor feedback, self-evaluation, and mini-conferences, shifting the focus of the classroom away from high-stakes assignments and grading towards community in the classroom. These trends blur the traditional boundaries between conceptual lectures and separate hands-on lab periods, producing new spaces that are conducive to creative cartographic practice.

These alternative structures can require new pedagogical approaches. Knowles (2000), Sack (2023), and Magner (2022) all reference the need to intentionally make space and time for art practice in the cartographic classroom, as many students begin a mapping course with significant anxiety about creative assignments. Together, they suggest strategies for lowering the stakes of practicing creativity in the cartographic classroom. For example, Knowles (2000) softens students' inhibitions by using humor and demonstrating imperfect creative outputs as the instructor.

Though the technologies used to make maps have evolved, cartographic curricula have long emphasized building students' technical competencies. A typical cartography course might incorporate the use of graphic software (e.g., Adobe Illustrator), GIS software (e.g., ArcGIS Pro), or a mix of both. Yet, even when building technical skillsets is the focus of a course, instructors can struggle to highlight the limits and implications of different tools. As one example, Esri Story Maps has been widely adopted in recent years to incorporate storytelling and narrative into cartographic curricula (Lowry and Korson 2023, Slayton and Benner 2020, Treves et al. 2021). Yet, Dickinson and Telford (2020, 454) push the technique further, describing Esri Story Maps as offering "valuable pedagogical opportunities to reflect on how knowledge is generated, framed and presented" through different methods and technologies. The goal is not only to build students' proficiency in using the tool but also prompt critical reflection about its limits and the politics of representation more broadly. Others argue for the value of decentering or remaining agnostic towards specific tools in the curriculum in order to focus on process and cartographic principles. Howarth (2015) contends that for cartography students, "software proficiency is not enough," and instead advocates for a "pattern language" approach focused on general principles rather than technical specifics. Fairbairn et al. (2014) balance some of these approaches in arguing that cartographic pedagogy should both "fill buckets" (impart specific technical skills to students) *and* "light candles" (develop students' general process and problem-solving skills).

Pánek et al. (2018) used a similar approach in a field course where students performed kite mapping. Rather than simply teaching the technique, they utilized the students' experiences of collecting imagery while in the landscape themselves to prompt them to consider "the links between the technology, the researcher, and the world, and in doing so … think more critically about scientific practice" (Pánek et al. 2018, 331). Other instructors de-prioritize the use of computer-based techniques in favor of manual sketch mapping. Knowles (2000) purposefully eschews immediately using software in favor of asking students to first use physical mylar sheets and sketch spatial information themselves. Magner (2022, 403) similarly asks students to sketch places in a "messy mapping" assignment, which encourages students "to acknowledge the limitations and erasures of positivist maps, while trying to capture relationships between emotion and place." In this way, different pedagogical strategies can prompt students to critically reflect on the limitations, opportunities, and politics of different tools and techniques, even while developing new technical competencies. The technological landscape in cartographic curricula, particularly web-based mapping platforms, has evolved at an exceptional pace, generating new challenges for keeping curricula up to date (Roth et al. 2015, Nepp 2019). Moving forward, it has become increasingly important to teach concepts over technology, given the pace of technological change (Roth 2016).

In courses focused solely on training students in cartographic conventions and building technical competencies, reflection and experimenting with process may be skipped. Yet there is value in "pressing pause" to consider power and position, question traditional workflows and conventions, and make time to reflect during mapmaking (Kelly and Bosse 2022). Many authors have discussed pedagogical strategies to engage critical cartography and its emphasis on power and reflection across the cartographic curriculum, allowing students to experiment with bending and breaking cartographic norms within their own map production (Foster 2014, Elwood and Wilson 2017, Briwa and Wetherholt 2020, Seemann 2022). For example, Magner (2022, 412) notes that students felt "liberated

when they realized that they could include emotions and personal reflections into their [sketch map] assignments."

This sort of experimentation and deep consideration can be encouraged by alternative approaches to instruction and assessment. Sack (2023, 73), for example, prompts students to produce many experimental maps rather than a few polished, final maps, to encourage a "lack of insecurity regarding experimentation and greater opportunity to learn from their mistakes." This provides a low-risk opportunity for students to try out a number of different prompts and techniques, while receiving instructor feedback. Huffman (2018) similarly honors the iterative creative process in their courses, allowing students to revise and resubmit work after incorporating interim feedback. Inspired by their professional work producing maps for clients, this process "not only allows but encourages students to learn from their mistakes" (Huffman 2018, 83). Rosenfeld (2023) extends these considerations to course assessments by prioritizing "ungrading," which emphasizes cartographic learning through formative feedback. Such an approach promotes lower-stakes assessments and "reparative culture," allotting more time for cartographic experimentation and iteration (Rosenfeld 2023, 60).

In sum, geography and cartography instructors alike have engaged with elements of creative art practice in their courses by (1) making space and time for creative cartographic practice, (2) reimagining mapping tools and conventions, and (3) centering iteration and experimentation. In what follows, we discuss the application of this framework in the development of a mapping-based spatial storytelling course at Syracuse University. Importantly, the three elements of creative practice presented in the preceding sections are not isolated from one another. They are, in fact, heavily interrelated, and can be cross-referenced, much like the classroom examples we highlight in the following section. We first introduce the course.

4. SPATIAL STORYTELLING AND CREATIVE ART PRACTICE IN THE CARTOGRAPHIC CLASSROOM

Spatial Storytelling is an advanced cartography course at Syracuse University in the Department of Geography and the Environment. It enrolls graduate and undergraduate students from across the university with a twenty-person enrollment cap. There are no pre-requisites for the course. In the spring of 2024, seventeen students enrolled: eight undergraduate and nine graduate students.

The course draws from the humanities, social sciences, and physical sciences to examine the power of maps as narrative and storytelling devices. More specifically, it explores the theory and practice of expressing stories and creating narrative from a variety of perspectives, ranging from narrative mapping and qualitative GIS in the geohumanities to the data-driven storytelling employed in cartography, journalism, and data science. In the course's first weeks, students select a topic aligned with their research or personal interests and iteratively visualize their stories using a series of interdisciplinary narrative and storytelling mapping techniques throughout the semester. Their work culminates in a portfolio (i.e., a website or PDF) showcasing their maps, mapping processes, and reflections on their work. Table 1 outlines the course structure by week.

In terms of course development, the instructor drew inspiration from Kelly et al.'s (2023) framework for creative methods and art practice in geography. The instructor piloted the course structure in a funded workshop series at Durham University (United Kingdom) on narrative and spatial storytelling where interdisciplinary scholars, including a team of Ukrainian historians, expert mappers, and geographers, gathered for a two-day workshop to map stories of Russia's invasion of Ukraine.

4.1 BUILDING SPACE AND TIME FOR CREATIVE CARTOGRAPHIC PRACTICE

Space and time are essential for creative art practice (Kelly et al. 2023) and, by extension, making room for creativity in the cartographic classroom is also vital. *Spatial Storytelling* met twice a week for fifteen weeks and was split between discussion sections on Mondays and hands-on mapping activities on Wednesdays. While the university designated a space for the course, it was important for this work to have the *right* space. We wished for a flexible studio space that could be used for seminar-style discussions but also computer-based mapping activities and large tables for low/no technology mapping activities. While not ideal, we booked three different rooms depending on pedagogic needs, which was quite a feat (and privilege) given space constraints across campus. This required advanced planning and clear communication on where to meet for

Week	Theme and Activities
Weeks 1–4	Foundations • Course introduction and community building activities • Introduction to story and narrative in geography and mapping • Creativity and creative methods in geography and mapping • The power of maps, storytelling, and storytellers *Students select a story topic and explore varying angles and datasets (e.g., oral histories, interview transcripts, census data, etc.) associated with that topic through a series of structured activities (e.g., writing a story intro and creating a story wheel, sketch maps, and collage related to their story).*
Weeks 5–11	Mapping Techniques and Mapping Activities • Stories and cartographic language (Mapping Activity #1: Reference or thematic map) • Multimedia story maps and scrollytelling (Mapping Activity #2: Multimedia story map) • Geohumanities and humanistic storytelling (Mapping Activity #3: Mapping linear and multi-dimensional stories) • Topology and relational stories (Mapping Activity #4: Mapping relational stories) • Maps, emotion, and data visceralization (Mapping Activity #5: Mapping emotional stories) • Maps, stories, and extraordinary politics (Mapping Activity #6: Mapping power structures and stories of resistance) *On Mondays, students read, discuss, and deconstruct an existing mapping technique. On Wednesdays, students experiment with and apply the weekly mapping technique to their story context. These "mapping activities" are completed weekly. Students then select 4–5 mapping techniques to complete as final map products.*
Weeks 12–13	Spatial Storytelling and Mapping Technique Presentations and Blog Post *Students select and research a mapping technique not covered in class (e.g., cinematic cartography, cosmology, pictorial mapping, etc.). They present on their mapping techniques in class and receive formative feedback before writing a blog post overviewing their spatial storytelling mapping techniques. Students can opt to utilize their mapping technique as one of their completed maps.*
Weeks 14–16	Portfolio Work Time *Students create an online digital portfolio to showcase their maps and creative work. Portfolios are scaffolded throughout the semester.*

Table 1. Course schedule and outline of mapping activities.

each class period. Further, if multiple rooms were utilized at the same time (i.e., some students in a computer lab and other students in a nearby space with large tables), the instructor circulated between the two as much as possible.

In terms of time, spatial storytelling is a three-credit course requiring two and a half hours of face-to-face contact with the instructor and approximately five hours of assigned work outside of class each week. Reserving Wednesdays for hands-on mapping activities demonstrated the importance of making time both in- and outside the classroom for creative work. Time-based exercises became an increasingly important factor in class assignments. Assigned mapping activities included a time limit (e.g., 30–60 minutes) for each informal activity to ensure low-stakes and equitable creative engagement. Further, map assignments were also assessed based on time, not

completion or perfected practice. More details on timed assessments are provided in Section 4.3.

Beyond the logistics of classroom spaces and time allocations, creating a community space that is open and supportive of art-based practice was critical. The course syllabus included a welcome letter, along with an inclusion and engagement statement to set a welcoming and supportive tone for the course. Additionally, the mapping activity for the second week of class centered on community. Following the **Civic Laboratory for Environmental Action Research** (CLEAR), we embraced storytelling to identify community values, best practices, and guidelines for how we wanted to engage as a classroom community. Students divided into small groups to share stories of when they felt most supported in a classroom and were able to fully engage. Students took notes while listening to one another and collectively identified common threads, strategies, and core values at the center of their stories (Figure 1). Each small group reported back to the larger class. Throughout the semester, we made time for these conversations, revisiting our values and strategies and adjusting the space as needed. For example, students collectively decided to move classroom spaces after a series of false active shooter alerts to help support the comfort and safety of classroom community members.

Citational practice also serves as a site to "press pause" (Kelly and Bosse 2022) and support creative cartographic practice in both research and teaching. The instructor prioritized "conscientious engagement of politics of citation" to ensure the inclusion of diverse voices, ideas, and world views in course readings and mapping examples (Mott and Cockayne 2017, 3). Following Gieseking (2020, 41) who draws from Oswin (2020), the instructor aimed to rethink "everyday physical academic spaces" like the classroom through course readings that strategically focused on epistemologies and researchers minoritized within the broader field of GIScience. These citational decisions, while imperfect and ever-evolving, sparked more inclusive cartographic work and important discussions. One student, for example, highlighted the need for cultural specificity and inclusivity in their map, titled *Huertos en Cada Esquina: Imaginando un mosaico agroecológico en Puerto Rico* (Figure 2) by including both Spanish and English on the map itself. Further, citational practices came to the forefront during our Week 11 discussion on Elwood's (2022) "extraordinary politics" and a fourth wave of critical GIS that focuses explicitly on politically engaged work led by "Black, Indigenous, Latinx and queer studies scholars" to rethink and "create other worlds and relations" (437). Critical questions emerged while discussing the importance of mapping Black experience and stories in Alderman and Inwood's "The Living Black Atlas" (2023) and the positionality of its authors. This discussion highlighted the need to continuously engage in citational politics and practice "solidarities across modes of differences" (Gieseking 2020) in the classroom. Further, this discussion prompted early conversation on the writing of this manuscript and the need to support early career and minoritized scholars through co-authorship.

It was important to intentionally normalize creativity and free-form engagement with course content throughout the semester. Each week, students were invited to read and reflect on selected readings (i.e., articles or blogs) or viewings (i.e., maps and other visuals). Inspired by Knowles (2000) and Brice (2023), students used *sketchbooks* to

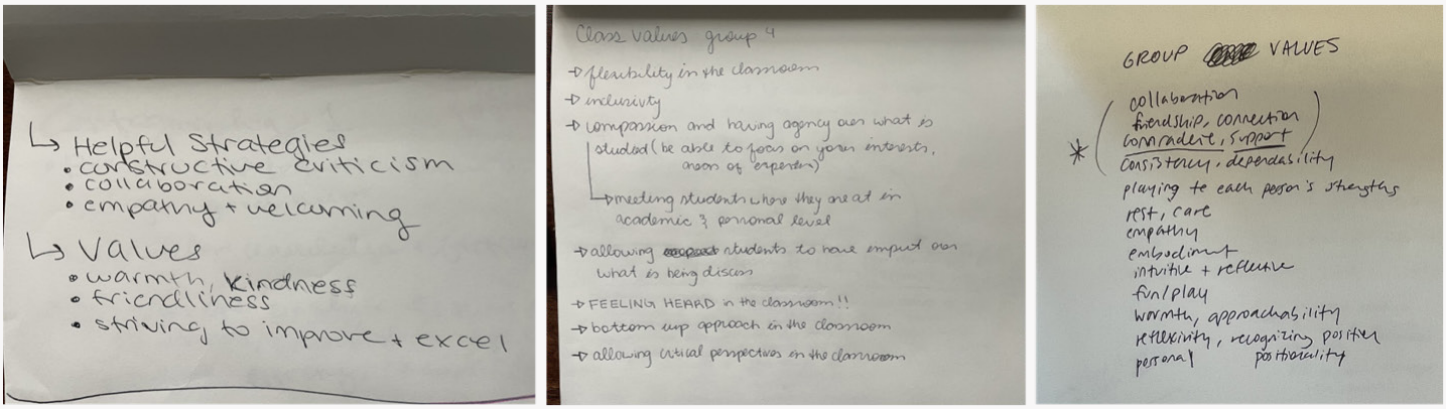


Figure 1. Community values and strategies collated from an in-class storytelling activity designed to develop an inclusive mapping space.

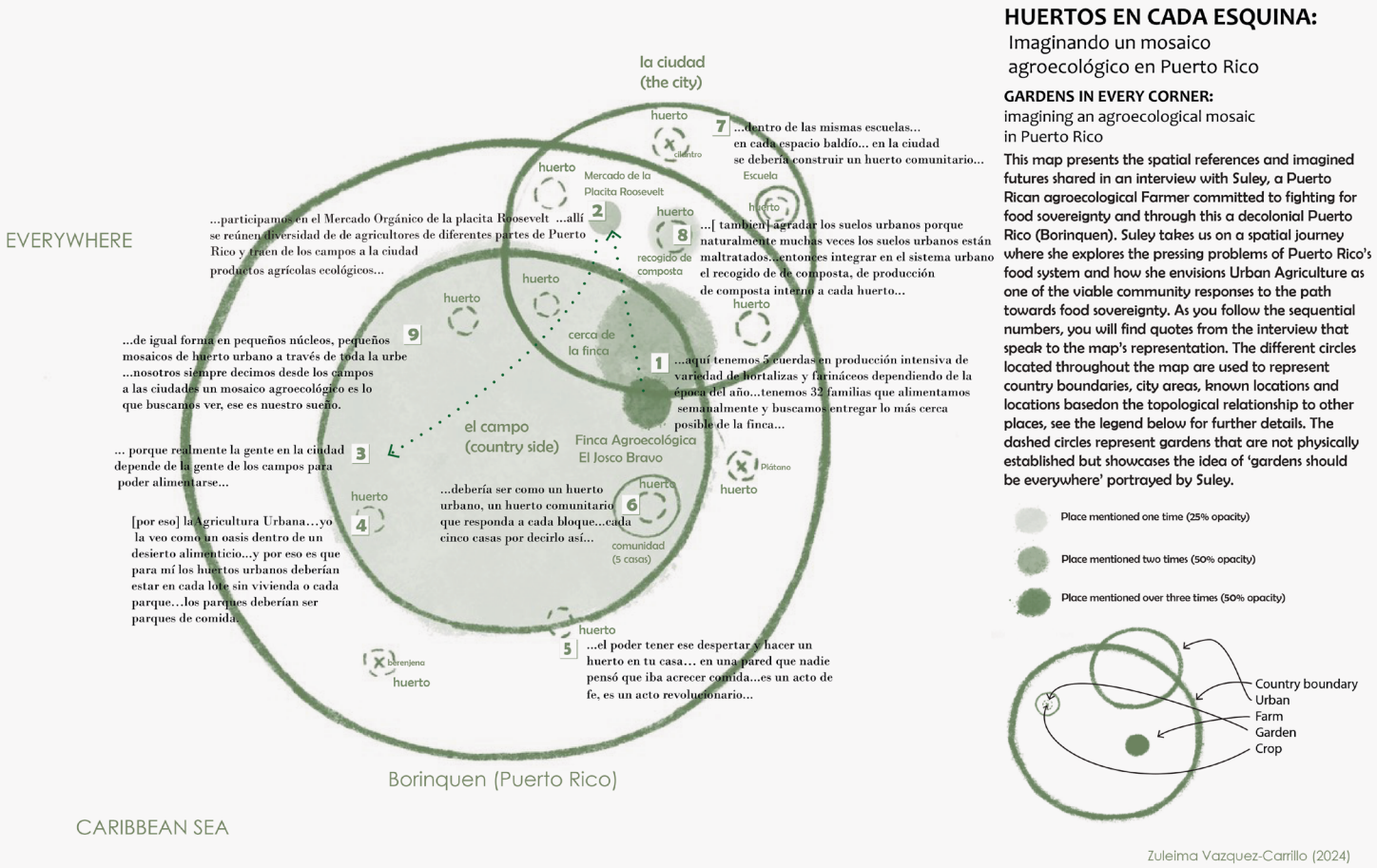


Figure 2. A student's map documenting the relational geographies of an agroecological farmer speaking of urban agriculture in Puerto Rico. This map draws inspiration from Westerveld and Knowles (2021).

engage with course material by compiling hand-written notes, sketches, scribbles, mental maps, diagrams, collaged elements, etc. instead of conventional typed reflections (Figure 3). Reflection guidelines provided scaffolding and prioritized engagement, understanding, critical reflection, and learning of course concepts as well as personal and reflexive responses to course materials. Additionally, sketchbooks were used weekly for hands-on mapping activities. Students were provided preparatory material for each mapping activity and then worked on the mapping activity during class time on Wednesdays. Sketchbooks were periodically collected and assessed for course credit. Sketchbooks provided both space and time for creativity and embodied reflexive practice. For most students, creative expression was not a familiar course modality, and some students initially resisted the sketchbooks and timed assessments. When students completed "timed" mapping activities or map assignments early, the instructor encouraged students to explore new directions and alternative approaches to "fill" the required time for creative practice with peer and instructor feedback, iterative drafts, or

Figure 3. Students utilized their sketchbooks throughout the semester to engage and reflect on course concepts and their process of mapping stories. In this example, the sketchbook served as a space for a student to brainstorm "angles" to their story. These story angles were then referenced throughout the semester.

exploration with a new tool. In the end, sketchbooks provided alternative and creative modes of engaging, thinking, and making differently, and students embraced them. Lastly, the sketchbooks documented the messy process of spatial storytelling, mapping, and geographic knowledge production in ways that challenge conventional norms.

Together, the variable classroom spaces, community values established for the class, citational and inclusive practices, and sketchbooks helped students select a topic or story to map and critically engage with throughout the semester. Their wide-ranging stories included post-*Dobbs* abortion geographies in the US, cultural food practices and community gardens in Puerto Rico, the impacts of tourism on more-than-human actors, climate change and wildfire impacts in Australia, racial segregation and displacement in New York, water access and international development in India, and surveillance in Kashmir (to name a few; see Appendix for examples). Early in the semester, students were asked to narrow their story to a few words and write and circle their story phrase in the middle of a sketchbook page (Figure 3). From there, drawing on journalistic practices (Tierney 2020), students added "spokes" or "story angles" around their circled phrase both individually and collectively in groups. This activity allowed students to creatively brainstorm story possibilities (i.e., no ideas were turned away). The following week, students explored the types of data (i.e., quantitative, qualitative, and everything in between) needed to map each story angle and turned to this story wheel throughout the semester. In sum, building space and time was imperative in allowing students to dive deeply and vulnerably into their stories within the first few weeks of the semester.

4.2 REIMAGINING MAPPING TOOLS AND CONVENTIONS IN THE CARTOGRAPHIC CLASSROOM

Most students did not have prior mapping, GIS, or design experience. Following Kelly et al. (2023), we decentered tools and step-by-step introductions to technologies like GIS and mapping platforms, resulting in a software-agnostic course. This was advantageous for two reasons. First, Kelly et al. (2023) point out that tools too often over-prescribe map form and the expression of spatial stories. For example, conventional GIS platforms rely on Cartesian coordinate systems to pinpoint points, lines, and polygons on a map. Yet, elements within a spatial story might not have a precise location, and by default, could not be displayed using GIS. Instead, students selected and independently explored mapping tools, software, or materials that best suited their needs to complete hands-on mapping activities.

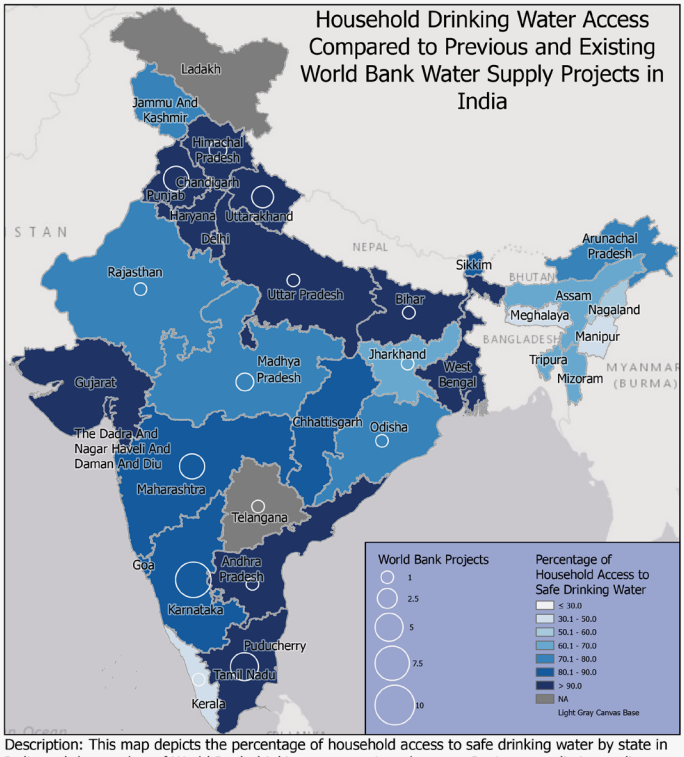
Software agnosticism—not being strictly tied to one mapping tool or platform (e.g., ArcPro, QGIS, etc.)—was also advantageous given the range of student levels, backgrounds, and mapping experiences. Because there were no prerequisites for the course, students ranged from first-year undergraduates in their second semester to advanced Ph.D. students taking their last courses. Further, over half of the students had never taken a GIS and/or cartography course. To account for varying backgrounds and technical abilities, each mapping activity offered options for using tools that were either low technology, mid-tier, or advanced. For example, Mapping Activity 1 introduced students to cartographic language and the building blocks for understanding spatial data (e.g., dimensionality), spatial relationships (e.g., level of measurement), and visualization choices (e.g., visual variables). Students first selected the story angle that they wanted to map, identified data sets, and conceptually thought through the intellectual hierarchy of a reference or

Mapping Activity Examples	Low Technology	Medium Technology	Advanced Technology
Mapping Activity 1: A reference map	Pen, paper, and tracing	Felt Maps	Mapping software like QGIS, ArcGIS Pro, MAPublisher
Mapping Activity 2: A multimedia story map	Exporting an HTML file for the web from a Word document	ArcGIS StoryMaps with ArcGIS Online, or Felt Maps	StoryMapsJS
Mapping Activity 3: Mapping linear and multidimensional stories	Pen, paper, and tracing	Digital tracing using tools like Adobe Spark, Adobe Illustrator, Adobe Photoshop, Canva, or Miro	Mapping software like Felt Maps, ArcGIS Online, QGIS, ArcGIS Pro, MAPublisher

Table 2. A scaffolded technology approach applied to three software-agnostic mapping activities.

thematic map *before* touching tools or technology. From there, students created their map using pen, paper, or digital tracing; Felt Maps (a digital mapping tool with a low barrier to entry); and then more advanced tools like QGIS, ArcGIS Pro, and/or MAPublisher. A summary of these options for three mapping activities is outlined in Table 2.

In Weeks 5–11 (Table 1), students were introduced to a series of mapping techniques. We discussed the theoretical underpinnings and deconstructed the nuts and bolts of each mapping technique on Mondays, and on Wednesdays students explored each mapping technique through their story. As described above, Mapping Activity 1 introduced cartographic language, and more specifically, the concepts of reference and thematic mapping as storytelling techniques commonly used for mapping across the humanistic-social sciences and physical sciences. Students selected one "story angle" from their brainstormed "story wheel" (Figure 3) and expressed it utilizing conventional map symbolization. Students relied on a range of technologies to create their maps. For example, one student created a choropleth and proportional symbol map using ArcGIS Pro in order to examine the overlap between household drinking water access and World Bank water supply projects by state in India, uncovering the gaps in international development projects (Figure 4). Another student utilized watercolor paints to create a reference map of Adirondack State Park in New York that provided a backdrop to tourism geographies and showcased the intersections of human and more-than-human actors (Figure 5). Other students relied on interactive mapping platforms like Felt (e.g., to map community gardens in Puerto Rico) or opted to draw by hand digitally, or to trace their geographies on paper using projectors. While students worked independently with differing tools, they collectively engaged with core concepts (e.g., cartographic language, dimensionality, level of measurement, and visual variables for Mapping Activity 1) introduced through readings and class discussions on Mondays. Students could utilize familiar and analog tools, allowing them to focus on concepts. Alternatively, students with conceptual backgrounds in cartography or GIScience



Description: This map depicts the percentage of household access to safe drinking water by state in India and the number of World Bank drinking water projects by state. It gives a preliminary glimpse into the difference of safe drinking water access between states and how the presence of World Bank projects related to this issue do not necessarily mean an increase in the percentage of access. However, it also demonstrates a lack of knowledge about related factors such as what other projects are occurring in states with high water percentages and how might project type, age, and location in the state factor into percentage of access.
Data disclaimer: Percentage of Household Access to Safe Drinking Water is based on 2011 census information released by the Census of India. World Bank Projects reflect the number of active or completed projects related to drinking water access.

Figure 4. A student's bivariate thematic map of water access and World Bank projects in India. The juxtaposition of these data sets raises questions about, and foregrounds a critique of, World Bank project locations and goals. The map demonstrates how difficult it can be to appraise project location, success, and intention.

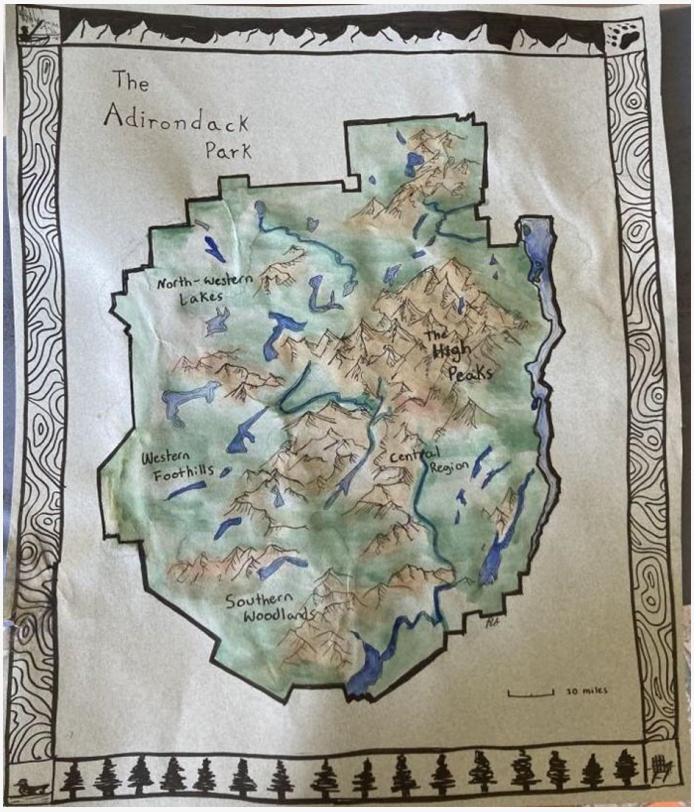


Figure 5. A student's reference map of Adirondack Park in New York.

could explore "new-to-them" advanced tools. Regardless, conceptual workflows remained the same across tools.

In sum, by decentering tools, students recentered concepts and processes over products. Further, offering a scaffolded approach to technology allowed students to select tools that best supported their stories and prior mapping experiences. Each choice of tool offers an alternative means of engagement, generating a different—and often new—understanding of a given story.

4.3 CENTERING ITERATION AND EXPERIMENTATION IN THE CARTOGRAPHIC CLASSROOM

The course was designed to promote iteration and experimentation for creative and art-based expression (Kelly et al. 2023). As mentioned, students were introduced to a series of narrative and spatial storytelling techniques in Weeks 5–11 on Mondays, and then experimented with each technique on Wednesdays. Before class each Wednesday, students identified an angle to their story and appropriate dataset(s), and grappled with the nuts and bolts of the technique as applied to their story. This iterative process allowed students to explore each mapping technique in a low-stakes manner. Here and in Table 1, we provide a brief synopsis of each mapping activity.

- *Mapping Activity 1* (discussed above) focused on cartographic language and introduced reference and thematic mapping as devices for storytelling.

- *Mapping Activity 2* introduced multimedia story maps and scrollytelling experiences in the context of data journalism, specifically drawing from the work of Roth (2020) and his examination of narrative storytelling arcs, genres, and design tropes; along with Oesch et al. (2022) and their work on stories designed for mobile devices with scrolling capabilities.

- *Mapping Activity 3* shifted from data journalism to the geohumanities and focused on narrative mapping. More specifically, students engaged with Pearce (2008) and Pearce and Hermann's (2010) work on mapping place-based linear and multi-dimensional spatial stories. For example, Pearce (2008) maps diary entries and daily experiences of a French fur trader's journey using several narrative techniques: "day frames," experiential color palettes, and typography to emphasize place and narrative (to name a few).

- *Mapping Activity 4* expanded our conversations on humanistic approaches within critical GIS to examine topology and relational stories. Students were introduced to Westerveld and Knowles's (2018, 2021) work mapping the experiences of place recorded in Holocaust testimonies, using a series of hand-drawn and relationally placed circles. Further, students experimented with alternative "geographic *imagination* systems" (Bergmann and Lally 2021) like *shaping* (Lally 2022a) that expand the possibilities of GIS and

Figure 6. A student's map from Mapping Activity 6 mobilizes what McKittrick (2020) and later Elwood (2022) describe as "extraordinary politics," by using hair braiding to represent a winding river or escape trail. This cartographic choice gestures toward fugitive mapping practices historically used by enslaved people, where geographic knowledge was embedded in embodied, cultural forms rather than fixed, empirical coordinates. As a counter-mapping practice, the activity resists dominant White cartographic logics that privilege objectivity, scale, and neutrality, instead centering Black experiential knowledge and storytelling. The map underscores that Black and Indigenous communities have long produced spatial knowledge systems foregrounding relational and embodied ways of knowing space. In this way, Black mapping emerges as a site of alternative geographic knowledge production—one grounded in culture, kinship, memory, and survival.

mapping by freeing stories from the Cartesian grid.

- *Mapping Activity 5* prioritized feminist thought in mapping emotional stories, from both data science and cartography perspectives. Students questioned objective and rational data science practices and instead called attention to situated and emotional practices like "data *viscer-alization*" (D'Ignazio and Klein 2020, emphasis added). Further, students explored feminist mapping principles like emotion and embodiment, as seen in Kelly's (2019) mapping of Syrian refugee border stories.

- *Mapping Activity 6* prioritized "extraordinary politics" (Elwood 2022, drawing from McKittrick 2020 and others) and mapping stories of resistance from minoritized perspectives. While there were no specific mapping techniques tied to this activity, students were introduced to a series of mapping projects that have centered and challenged power structures (e.g., **Mapping Black Futures**, **Anti-Eviction Mapping Project**, **Palestine Open Maps**). For example, one student engaged with Alderman and Inwood (2023) and "The Living Black Atlas" to map Black experiences of rebellion and resistance using community-based hair braiding as their counter-mapping method (Figure 6).

Iterative practice and exploration of each mapping technique gave students new ways to engage with their story. As an example, Figure 7 depicts one student's iterative process, including brainstorming activities, written

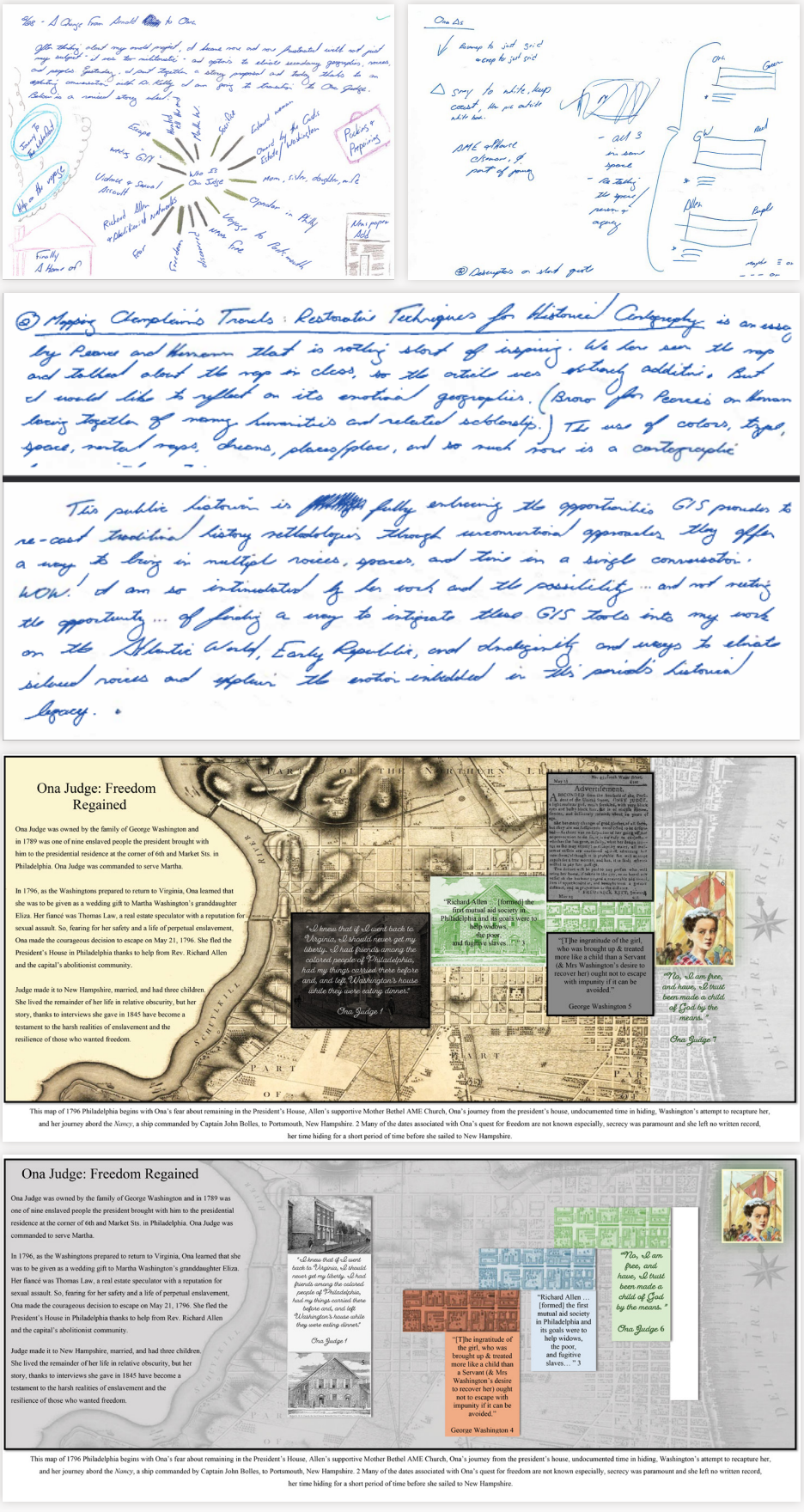


Figure 7. Examples of a student's iterative mapping process, moving from brainstormed story angles to a final map.

reflections, sketch maps, and map drafts for Mapping Activity 3, where they adapted Pearce and Hermann's (2010) multi-dimensional mapping technique to share the story of Ona Judge, a formerly enslaved woman who escaped George Washington's family. The Appendix contains additional examples.

After several weeks of completing various mapping activities, undergraduate and graduate students selected four or five mapping techniques, respectively, to complete as summative map submissions. This gave students an opportunity to explore specific mapping techniques in greater depth. Given the range of student backgrounds and skillsets, technologies used, and the stories being mapped, the maps required alternative assessments that were time-based. Students were expected to spend a minimum of five hours on each map. These five hours were context dependent and looked very different for each student. Students submitted reflections alongside their maps to account for their varying processes and to aid assessment. More specifically, the reflections included documentation of their mapping processes, engagement with the theoretical frames and storytelling techniques presented in the class, evaluations of the mapping technique when applied to their story, and a reflection on power and their position throughout the mapping process. By emphasizing time, students focused on the process and not "polished" outputs. Instead, maps were assessed based on how students engaged with and incorporated the mapping technique discussed in class within the constraints of the mapping technologies or tools they used.

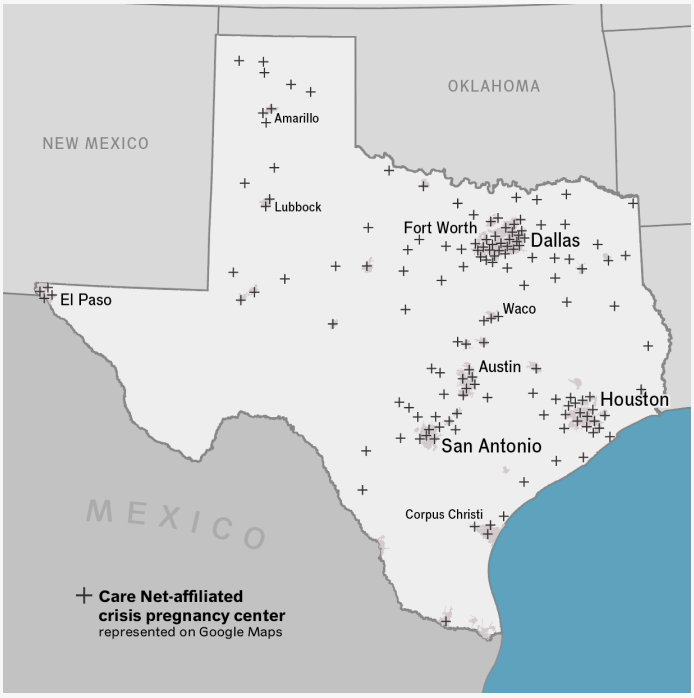
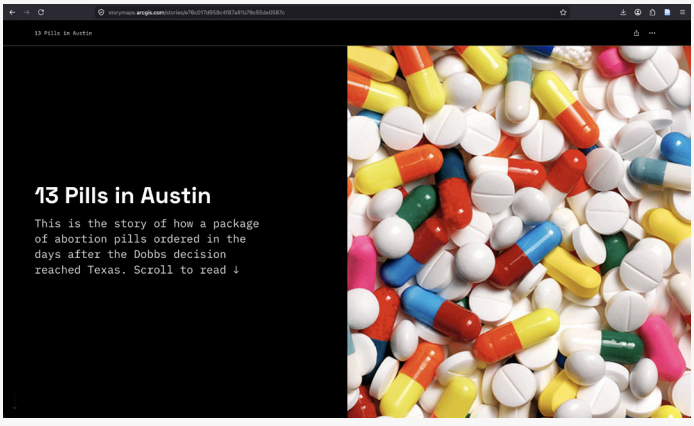


Figure 8. A student's reference map of crisis pregnancy centers in Texas that could be found through Google Maps.

Here, we highlight (Figures 8–12) and discuss one student's iterative and exploratory mapping process, as applied to US abortion geographies after the *Dobbs v. Jackson Women's Health Organization* decision and the fall of *Roe v. Wade* and reproductive rights. This student expanded Mapping Activity 1 and its focus on cartographic language into a reference map highlighting crisis pregnancy centers (CPCs), faith-based nonprofits that advertise free pregnancy testing, and other services that deliver anti-abortion counseling to people facing unexpected pregnancy. The reference map in Figure 8 documents the story of Care Net–affiliated CPCs, highlighting their spatial footprint in Texas. In their research, the student examined



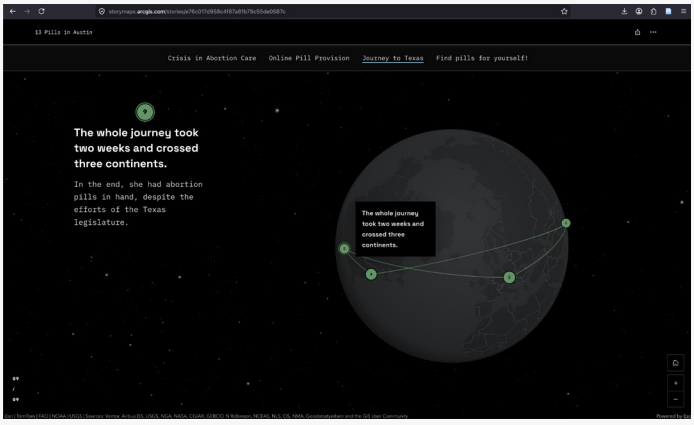


Figure 9. A student's scrollytelling and multimedia story map documented the global route taken by abortion pills ordered from Austin, Texas, after a leaked draft of the majority opinion in *Dobbs v. Jackson Women's Health Organization* revealed the Supreme Court was likely to overturn *Roe*.

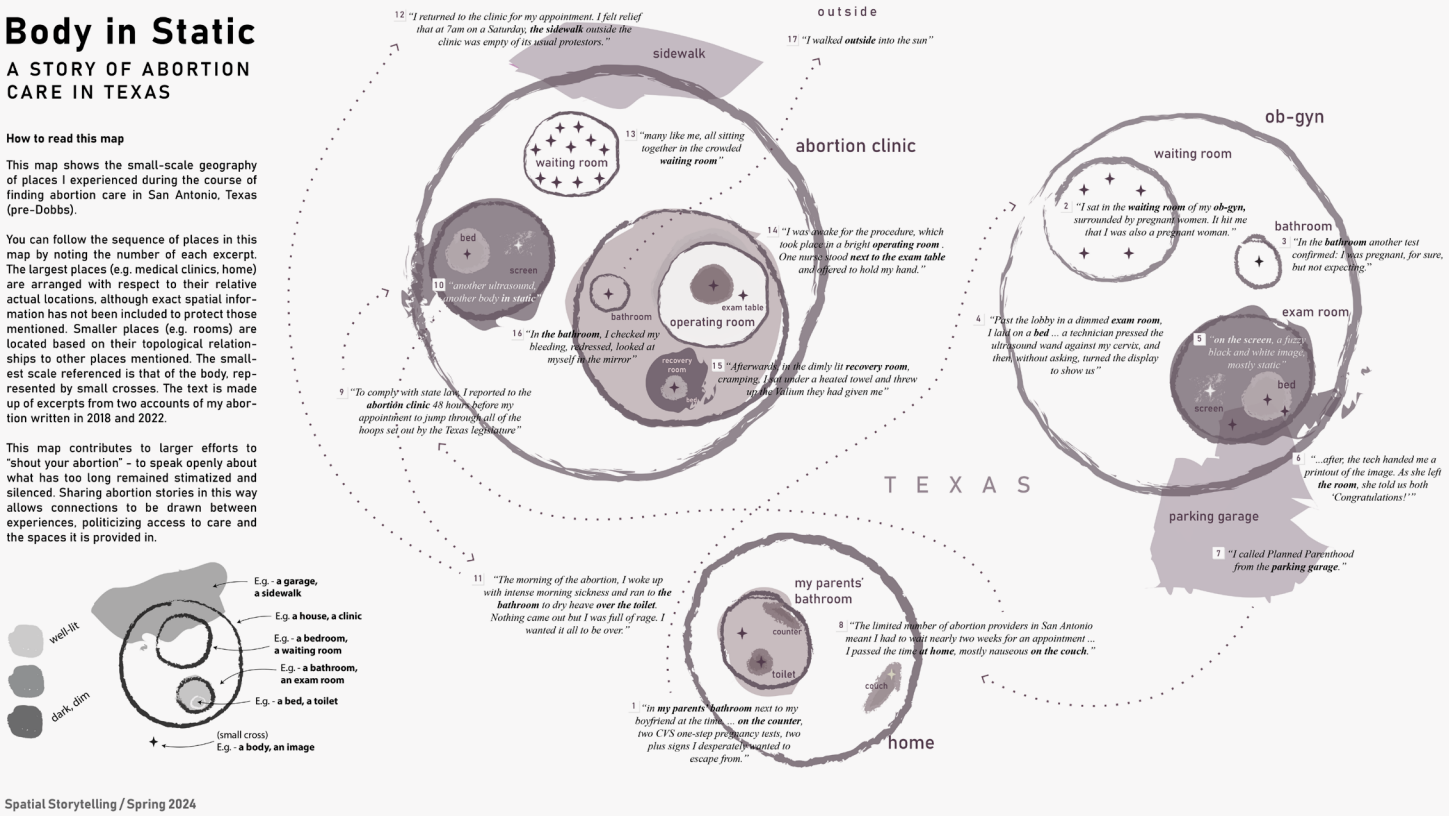


Figure 10. A student's topological map of their abortion care story in Texas, drawing inspiration from Westerveld and Knowles's (2021) mapping technique in *I Was There*.

the shifting spatial and digital strategies CPCs use to reach pregnant people through Google Maps business listings. In Figure 9, the student explored the utility of multimedia storytelling in tracing a shipment of abortion pills to Austin, Texas after the *Dobbs* decision was leaked. The student relied on a three-act narrative, linear scrolling, an interactive map, and an array of design tropes (Roth 2021) to carry the viewer through a moment of reproductive panic caused by the demise of *Roe v. Wade*, and the subsequent purchase of abortion pills shipped from abroad. The multimedia story highlights the benefits of online pill providers and follows the movement of the pills across two weeks and three continents through shipment tracking information. The story concludes by connecting individuals with reproductive access concerns to online resources, using the journey of one package of pills as a testimony of life post-*Roe*.

In Figures 10 and 11, the student shifts from conventional to more humanistic and alternative mapping techniques. The student employs the visual logic of relationally located places from Westerveld and Knowles (2018, 2021) in *I Was There* to map a story of abortion care at a Planned Parenthood pre-*Dobbs* (Figure 10). The student maps places (both locatable and not locatable) ranging from a house, clinic, or exam room to a bed, exam table, or screen. These locations are labeled and placed on the map not by their geographic coordinates, but according to relationality and in topological proximity to one another (e.g., the exam table, exam room, and clinic are placed in concentric circles). The circles are annotated with a first-person account of this experience. Diverging from the original technique used by Westerveld and Knowles, in which the circles grow darker according to the prominence of the place, the student adapted this technique to instead show light and darkness in each place. The recovery room, for example, is expressed in darkness compared to a well-lit waiting room in the abortion clinic. This technique allowed the student to map all places within the story, including meaningful places and scales that are too often left off maps. The map's unconventional topology and lack of precise geographic location further provide anonymity and protection for this individual's story.

Figure 11 further explores this topic by re-conceptualizing borders (both traditional and non-traditional) as sites of storytelling. The student adapts Kelly's (2019) feminist mapping techniques to visualize all borders, ranging

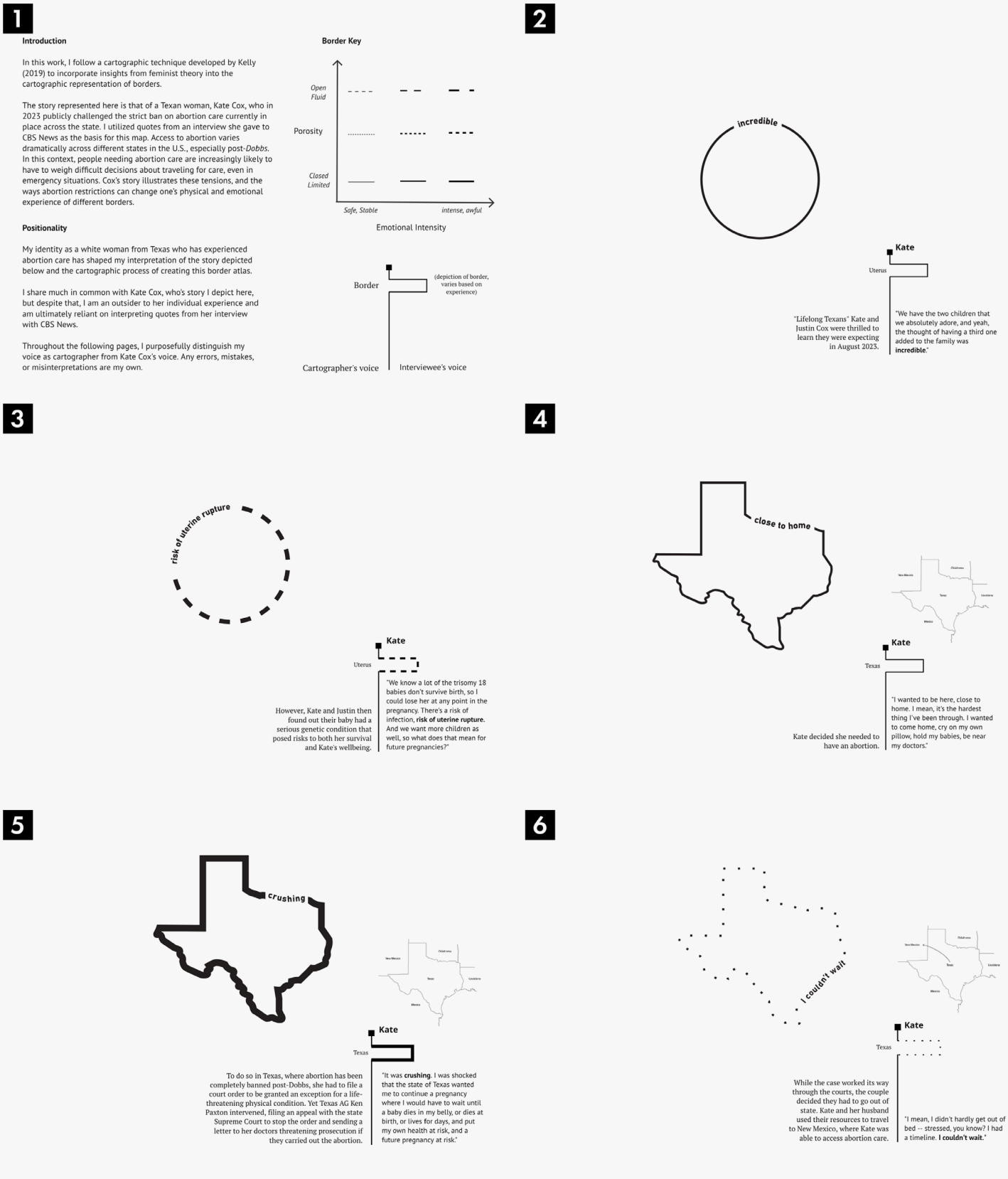


Figure 11. A student's map of emotions, as well as formal and informal border crossings, in Kate Cox's abortion story, drawing inspiration from Kelly's (2019) feminist mapping techniques.

from the boundaries of the uterus to state boundaries, publicly shared in **Kate Cox's story** of abortion injustice post-*Dobbs* in Texas. Each border is then symbolized according to its porosity and the intensity of Cox's experience of that border. In other words, dashed, thick borders express heavily experienced borders that are porous or can be transgressed, whereas thin, solid lines are less emotionally intense, yet not easily traversable. Each border is then labeled according to Cox's experience of the border, and text annotations are included in the bottom-right corner to pace the viewer through the story, filling in storied gaps.

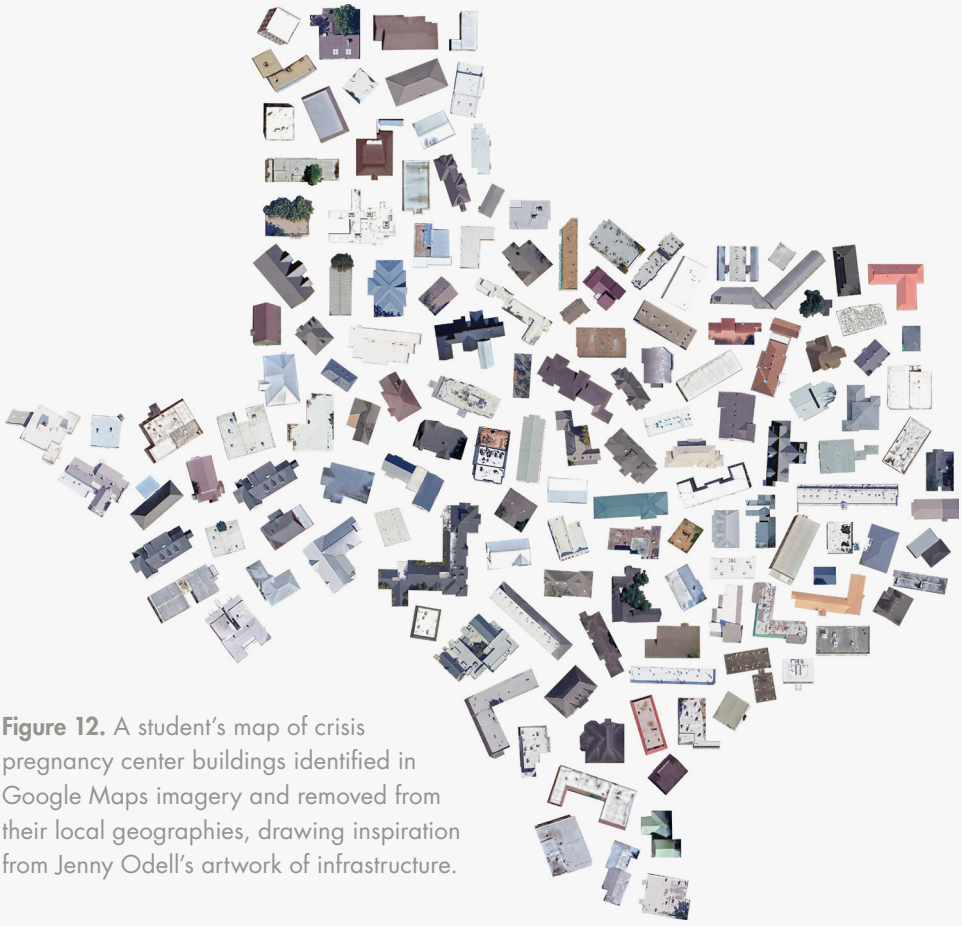


Figure 12. A student's map of crisis pregnancy center buildings identified in Google Maps imagery and removed from their local geographies, drawing inspiration from Jenny Odell's artwork of infrastructure.

In the final weeks of the course (Weeks 12–13 in Table 1), students selected, researched, and presented a range of spatial storytelling mapping techniques not covered in class. The particular student discussed here chose to harness the work of artist **Jenny Odell**, which embraces close observation of everyday life—including mundane stories—within Google Maps. Odell relies on satellite-derived viewpoints to find, isolate, and collage landscape features like the "all of the people" or "all manmade features" (such as landmarks, center-pivot irrigation, and cargo ships) in Google Earth or Google Maps. The student adapted Odell's technique to crisis pregnancy centers in Texas by iteratively zooming to each location to take a screenshot and then removing the background elements within the image. The student combined the crisis pregnancy center buildings into a collage to share the mundane geographies and everyday spaces of anti-abortion stories (Figure 12).

In sum, this student, as well as the course writ large, embraced iteration and exploration throughout informal yet frequent mapping activities, along with the more formal mapping assignments presented in Figures 7–12. Similar to the creative works in *you are here*, these art-based practices enhanced the creative possibilities of each map in the cartographic classroom. Each student completed the course with a series of sketchbook mapping experiments as well as a digital portfolio showcasing the range of techniques available to map stories, along with reflections that prioritize the process behind each map as opposed to its output.

5. CONCLUSION

Creative methods and spatial storytelling are essential elements of geographical knowledge production. Yet, these alternative approaches to geographical practice are not commonly included in cartographic curricula. Within this context, we drew inspiration from recent work on creative mapping methods in geography in order to apply art-based inquiry to an advanced cartography course. More specifically, we adapted Kelly et al.'s (2023) framework for creative art practice to cartographic pedagogy as part of the redevelopment of a spatial storytelling

mapping course at Syracuse University. We began by outlining the structure of the course before discussing and illustrating their framework in practice. We documented how we made space and time for creative cartographic practices by securing flexible classroom spaces, developing community guidelines for the space, and making time and space for creative practice in the use of sketchbooks. The course was designed to be software agnostic, allowing us to reimagine mapping tools and conventional mapping practice. To do this, the instructor provided a scaffolded approach of low, medium, and high technology options for each mapping activity and assignment. Further, through low-stakes and informal mapping activities alongside summative map assignments, students were encouraged to iterate and experiment with cartographic processes—generating a sketchbook and portfolio of maps that evoke creative, art-based practices. In sum, we argue for the inclusion of art practice and spatial storytelling in the cartographic classroom and offer pedagogic strategies and examples for expanding art practice in cartographic curricula more broadly.

EPILOGUE

Since we began writing this paper, I (Meghan Kelly, the course instructor) have taught the course a second time, making pedagogical alterations based on student feedback. Here are brief updates and reflections. Students, particularly those with limited mapping experience, requested additional technical support with mapping tools, despite the goal of software agnosticism in the course. In response, I added a week on the politics and practice of mapping tools, including a range of readings (Gieseking 2017, Henderson and Montange 2022, Making Abolition in Geography Collective 2024) and hands-on mapping activities introducing students to Adobe Illustrator and Felt, which were new tools for most students. This early exposure to mapping tools helped alleviate some student concern but admittedly, software agnosticism was still new to, and challenging for, some students. Hand-drawn sketchbooks also introduced accessibility concerns for students with motor skills challenges. As such, I worked with some students to develop alternative plans. For example, one student opted to utilize a digital sketchbook using Figma (a digital tool for web design) and another relied on an iPad with a digital pen. Students in the first rendition of the course noted that the course was "back heavy," so I redistributed map assignment deadlines and removed the blog post assignment. Students in the second iteration of the course still felt this end-of-the-semester crunch as they completed their portfolios. In the future, I plan to have students begin building their portfolios earlier in the semester.

I presented a version of this paper at the North American Cartographic Information Society (NACIS) 2025 Annual Meeting in a session on cartographic education. The need for creative practice in cartographic curricula became quickly apparent in the question-and-answer portion of the session. We collectively discussed and brainstormed how to implement such practices in classroom environments that have largely relied on the traditional division of lectures and labs, and a set of high-stakes, software-dependent, tutorial-based assignments. For example, to paraphrase one of the first questions asked: on a practical level, how do you *actually* grade these types of assignments? This question signaled interest, along with a possible hesitancy in implementation, especially when many of our institutions (and students) still rely on conventional approaches. I further explained my use of time-based assessments, the guidelines I provided for written process-based reflections, and grading schema (e.g., more-than-satisfactory, satisfactory, and less-than-satisfactory), stressing the need to clearly communicate these expectations. Admittedly, some students still struggled to accept this alternative approach. Having now taught the course multiple times, I have built up a repository of examples to illustrate these practices, enhancing students' understanding of expectations. A second question proposed the possibility of treating the course as a three-hour seminar, increasing time for creative engagement or even expanding the credit hours (e.g., six credits) to mimic longer-term dedicated studio time in other disciplines like art, design, and architecture. While not immediately probable at my current institution (while pre-tenure), this collective brainstorm highlighted interest in rethinking how we, as mapping instructors, conceptualize and use both space and time in cartographic and GIScience curricula. The NACIS session and subsequent discussion highlighted enthusiasm for alternative pedagogical approaches to the cartographic classroom.

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