Interactive Mapping for Transparent Redistricting

Rebecca Theobald*
University of Colorado Colorado Springs

Anita Palmer
Critical Think Inc./GISetc.

Saskia van de Gevel
Appalachian State University

* Corresponding Author: rtheobal@uccs.edu

Abstract

GeoCivics contributes to the civic education of students and community members by making available knowledge and skills about civil society and government systems. Taking an early active role in the governing process suggests that students will be more likely to continue their participation in community discussions, which is key to a successful democratic republic (Joris and Agirdag, 2019). In support of NCRGE's Transformative Research Grant, a research group created interdisciplinary approaches to engage the public in redistricting through hands-on and online mapping tools. This project, piloted in over ten states, determined that while students and teachers have access to a variety of instructional materials about U.S. Congressional apportionment and redistricting (CivXNow Coalition, 2019), using interactive giant maps, examining 2010 census data and redistricting criteria, and drawing online congressional district maps using county boundaries successfully connects participants to the situation in their states. "Seeing the problem as something unsatisfactory is meant to affect and challenge learners, motivating them to see solutions" (Weiss, 2017, 207). GeoCivics addresses the third research question in the *Road Map* (2013, 44), "What supports or promotes the development of geographic knowledge, skills, and practices?" Funding from the National Center for Research in Geographic Education (NCRGE) supported research group meetings, funded stipends for a research fellow and an online geospatial technology educational expert, provided travel resources to test the materials in multiple locations, and identified effective ways to distribute this instructional sequence to improve understanding of the role geography plays in the U.S. election process. Lesson plans, discussion guides, and assessments are hosted on the University of Colorado Colorado Springs website. In collaboration with political geographers, sessions about redistricting

were organized for the American Association of Geographers (AAG) meeting in Washington DC in April of 2019. Following analysis of content delivery and resource use, the research group engaged with the geography and civics education communities to promote development of geographic techniques by making these materials available to educators and community members, both in the United States and across the globe, in anticipation of the 2020 Census and subsequent redistricting processes.

Keywords: geography, geospatial technology, GIS, redistricting, gerrymandering, civics, government

Introduction

Few activities are more fundamental to the functioning of a democratic republic than voting. However, if community members perceive that their votes do not count, or that the voting process has been manipulated in some way, the system starts to break down, leading to apathy, corruption, and dysfunction. In the United States, elected officials represent a particular geographic area, weaving together economic, social, political, and physical geography characteristics. At the beginning of the 21st century, many voters question whether their ballots count as much as those of some of their neighbors. Geographers need to be at the forefront of this discussion, crossing multiple disciplines and designing "compelling questions to support inquiries" (Maddox et al, 2018, 256). Our research group explored: (1) who among academic geographers are engaging in questions about redistricting and gerrymandering, (2) what geographic concepts and skills are essential when educating about these topics, and (3) whether the activities devised meet the goals of the people employing them. We expect these materials to be used broadly, across disciplines and grade levels, reflecting the need to reach as many people as possible. As Stoltman wrote in his preface to *Spatial Citizenship Education*, "citizenship education is a right of all students and a responsibility of all teachers" (2019, xii).

The community of academic political geographers studying electoral issues in the United States is relatively small when compared with those in the legal and political science disciplines, with the number of geographers participating in public discourse even fewer. There were 792,500 lawyers, 7300 political scientists, and 1500 geographers in the United States in 2016, according to the Bureau of Labor Statistics (BLS, 2019). Mathematicians also study gerrymandering, with measures such as the efficiency gap (Stephanopoulos and McGhee, 2014) and Markov chains (Chikina et al, 2017). However, they have recently been at the forefront of the discussion, capturing attention in articles such as "The Mathematicians who want to Save Democracy" (Arnold, 2017).

Development of geospatial technology was a primary reason mathematicians were able to access more accurate data and conduct their analyses.

What would be the best approach to teaching geographic content and skills about apportionment and redistricting? As geographers interested in supporting preparation of pre-service teachers, professional development for in-service teachers, and outreach to community members, we recognized that the topic of drawing electoral districts could be a gateway for discussing not only geography, demographics, and political systems, but also an opportunity to introduce more students and teachers to the importance of geospatial technology, or geographic information systems (GIS). In considering GIS in the context of citizenship education, Bednarz and Bednarz inquire, "How does working with geographic tools and perspectives contribute to the development of young people as citizens?" (2019, 71). This project contributes to that discussion with quantitative data that supports grounding conversations about elections in a geographic context. We engaged with the National Humanities Center to extend the geographic perspective and considered what might be the most effective approach to guiding people to an understanding of how the electoral process in the United States has developed over the last fifty years. With the upcoming 2020 Census, and subsequent reapportionment and redistricting processes on the horizon, we wanted everyone across the country to be able to ask questions of the people who would be responsible for drawing the district lines, be they concerned with federal, state, county, or municipal boundary areas.

While encouraging community organizations and advocacy groups to use these materials, we determined that structuring activities for use in the classroom would be most effective to achieve our goal of having this be an educational – rather than an advocacy or awareness – program, while recognizing that "[I]n the United States, inconsistent curricular requirements across the states currently limit opportunities for students of all demographic backgrounds to study geography and learn with geospatial technology in K-12 schools" (AP GIS&T Study Group, 2018, 166). The various modules of the lesson should be readily available, easy to use, and transferable into existing classroom syllabi. While we recognized that a university class on American electoral politics could occupy an entire semester, most secondary school and introductory college classes only have a short amount of time to spend on apportionment and redistricting. Acknowledging that the geography education community is relatively small, and that standalone geography classes in high school are few, we created materials with the intention of their being used in classes devoted to civics, government, history, political science, geospatial technology, and mathematics at secondary and post-secondary levels. "Although GIS is still not a major instructional technology in K-12 education, it has a promising future through effective and practical professional development" (Hong and Melville, 2019, 241). Our pilot project has demonstrated these electoral geography education materials have a

broad reach, serving as a foundation for further discussions, as appropriate for the audience and situation.

The potential for expanding this project rests in the hands of geographers and educators who can envision a variety of times, places, and methods for incorporating these materials into classrooms and community gatherings. The purpose of GeoCivics is to provide participants with tools and knowledge for exploring redistricting issues where they live, and to consider what additional information they need to make informed decisions. Just as putting a pocket copy of the United States Constitution into a fifth grader's hands does not make a Constitutional scholar (Mckean, 2019), we know that enabling everyone to draw their own congressional district map does not make a redistricting expert. Yet, we hope these activities address what Schmidt terms "the unevenness of civic participation" (2019, 43). Exposure may lead people to the realization that online interactive mapping tools are powerful and that they should know enough about how they work to engage with whomever is in charge of the redistricting process in their states. The transformative potential of this project is evidenced by the interest of academic geographers in the topic and in the enthusiasm of educators and students in using the materials. The next steps will be broadening the reach of the project through multiple networks and analyzing subsequent results of redistricting at multiple scales.

Literature Review

Instruction in the processes and functions of government is something that is basic to most public education systems (Standish and Stoltman, 2009; Faulks, 2006, Shibata, 2004; Stoera and Magalhães, 2004; Caplan, 1998). In Colorado, "Satisfactory completion of a course on the civil government of the United States and the state of Colorado" is the only class required by state statute (Colorado General Assembly, 2016, 3). However, the act of passing a secondary school civics class and understanding details about the three branches of the federal government and how they affect individuals and communities are not necessarily equated, as the most recent average National Assessment of Educational Progress civics score was 24 points below proficient (2014). While the inhabitants of the United States have never attained Jefferson's idealized vision of the citizen-farmer (1781), we agree that individuals need to take responsibility for understanding how government works. Voting, which is the basic indicator of participation in governance, reached its zenith at 82.6 percent of the voter-eligible population in the United States in 1876, and in 2018 was at 50.3 percent (McDonald 2019). In its annual Constitution Day survey in 2018, the Annenburg Center found that just one third of respondents were able to name the three branches of government. "'High-quality civics education is not a luxury,' Jamieson added. 'One is unlikely to appreciate or defend constitutional

prerogatives or rights one does not understand'" (Annenburg Constitution Day Civics Survey 2019, 1). A basic understanding of the apportionment and redistricting process must be integrated with an understanding of the purpose and timing of the decennial census, the geography of the United States, and the functioning of legislative bodies. The evidence above indicates as a country that we still have some way to go in assuring that an informed electorate will be prepared to participate in the governing process.

The topic of elections is usually just one among many in a government or political science class. While asking about apportionment and redistricting usually elicits blank stares, the term "gerrymandering" often prompts concern and more engagement. However, before one can assess the "peculiarities" (Gerry-Mander 1812, 1) of an electoral district, one must understand the process for drawing electoral district lines. Other countries address the issue of ensuring that each person's vote counts equally by methods including having more-populated districts elect more than one person, mandating that politically-neutral bodies draw districts, prescribing how district boundaries can be drawn, and limiting legal challenges. "… most countries … simply don't face the kinds of political manipulations and greatly distorted district lines endemic in the United States" (Grofman and Feierherd 2017, 1). Redistricting following the 2010 census in the United States was demonstrably more unfair than in previous elections, although as the famous Massachusetts cartoon demonstrates, manipulation has been going on for over two centuries. "Though many plans continue to be fair, the problem of gerrymandering has never been worse in modern American history. The efficiency gaps of today's most egregious plans dwarf those of their predecessors in earlier cycles" (Stephanopolous and McGhee, 2014, 5). Apportionment – the dividing of the 435 representatives among each of the 50 states – must be accomplished prior to April 1 in the year following the census. Once the information about how many representatives a state will have is in place, then it is up to each state to draw Congressional, state house and senate, and local electoral district boundaries. Without an understanding of apportionment and redistricting, arguments about the ills of gerrymandering remain theoretical.

Civics educators and groups should use geospatial skills for interpreting maps because the foundation for an electoral district is a state, county, or municipality map (Hanus and Havelková, 2019; Kidman and Chang, 2019; Collins, 2018). The advent of geospatial technology has enabled cartographers to create finely drawn electoral maps for particular purposes; whoever has the information about what data the maps contain and how to draw the maps has the power (Snoot, 2019). The influence of geography on politics in the United States is not a new phenomenon. "Throughout the first years of the new nation's existence, geographic considerations and local issues often played a significant role in determining party allegiances and political preferences" (Swain, 2019, 1). Electoral analysis maps provide insight into how people and places interact.

"Such data maps are routine today. But this one stunned nineteenth-century Americans by showing them a nation organized not according to railroads and towns, or mountains and rivers, but Democrats and Republicans" (Schulten, 2014, 1). How we organize and display the data and how we draw the lines leads to particular interpretations. Field offers multiple Presidential election results maps using one data set (2018, 1): "Thinking about the story you want to tell alongside the benefits and drawbacks of different techniques will give you a way to make a better choice and to make a smarter map". Cartographers who will plunge into drawing Congressional districts in 2021 will be looking both forward and backward. The difference between the process following the 2010 Census and the 2020 Census is that potentially more people have access to the data, and, in some cases, to relatively sophisticated redistricting software. The question is whether people will be able and encouraged to use this access to create, or encourage others to create, transparent maps. We continue to face challenges regarding who is included and who is ignored in the mapmaking process.

      Interactive online mapping using geospatial technology tools is not routinely taught in elementary, secondary, or university settings, despite geographers having promoted these resources for the last three decades (Fitzpatrick 1990, Lemberg and Stoltman, 1999, Kerski, 2008). Geospatial technology was first developed almost 60 years ago, and entered academic classrooms a couple decades later, just as politicians were beginning to take advantage of computer programming to create electoral districts (Brae, 2004). However, until the recent movement of geographic information systems resources to the cloud, "enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources" (Mell and Grance, 2011, 2), use of GIS was limited to skilled cartographers and technologists. A variety of open source GIS software is available (gisgeograph@gmail.com, 2018). Although many programs still require a great deal of time to learn in order to create maps and analyze geographic data, there are more options for individuals to undertake online mapping at a grassroots level (Ferreira and Silva, 2015). Open Street Map began in 2004 as a way to share maps without breaking copyright licenses, and now hosts resources from hiking and biking trails to dangerous locations for humanitarian workers (Bennett, 2010). Around 2008, Esri, Inc., one of the leading GIS software companies with over 40 percent of the market, began to introduce ArcGIS Online as part of its suite of platforms (Esri 2008). Esri, Inc. had already proved itself a strong partner with educational institutions, devoting staff and materials to conducting outreach to elementary and secondary schools. However, working with ArcGIS Desktop was still complicated, requiring at least basic training in using GIS as well as informational technology skills to install the program. It was not until 2014, when the first GeoInquiries were introduced (Baker 2019), that instructors could put something in the hands of teachers that they could use the next day in the classroom and be sure that the level of

frustration would be relatively low. While teachers and professors who have not had experience with GIS may still express confusion at using mapping programs, for the most part students are able to follow the directions and enter into assessment and creation of geographic material. The benefits of students using GIS are well-documented. "While [participatory GIS] is not the only way to teach students geography in the field, it offers one of the most flexible and scalable options of enabling students to work with communities (Sinha et al, 2017,168). With new resources continually in development, the challenge returns to how to introduce GIS systematically to teachers and, ultimately, to students.

While several studies have been undertaken about the limited reach of GIS with teachers (AP GIS&T Study Group, 2017; Millsaps and Harrington, 2017; Hong and Melville, 2018; Osborne et al., 2019), our research group knew that if we were going to leap beyond existing barriers, we would need a process for capturing people's interest in the apportionment and redistricting process from multiple directions. Although in the news, the topic of drawing district boundaries remains relatively tedious, and is, for the most part, not an interactive activity. Doing, rather than observing, reinforces understanding and keeps people's attention. National Geographic developed giant continental floor maps around 2008, making them available to schools and community organizations. "These maps allow people to interact with a map kinesthetically, experiencing scale and direction as physical sensation" (Edelson, 2011, 1). Initial research on the use of National Geographic Giant Maps indicates that they have the potential to go beyond student engagement to increase learning and retention of specific skills (Anthamatten et al, 2018; Fleming and Mitchell, 2017; Kranitz, 2018), leading us to include giant maps in the GeoCivics project.

Benefits of active, rather than passive, learning apply to working out concepts in multiple areas (Buckley et al, 2004; Delaney, 1991; Knight, 1979). In considering discussions in social studies classes, Hess observed, "it is a particular approach to constructing knowledge. The approach is based most fundamentally on the idea that something positive can occur when people are expressing their ideas on a topic and listening to others express theirs" (Hess, 1994, 152). Discussion is particularly appropriate to current events and provides a link for participants to understand the multiple challenges surrounding the actual process of drawing districts using a computerized map. "The ability to follow and participate in public debates is essential to full and equal participation in society and its conversations about itself, and without this ability young people lack power" (Maude 2016, 75). While there are valuable lessons to be learned from using simulations – evidenced by the successful launch, landing, and return of Apollo 11 after much practice on Earth – when possible, using real data and constraints helps students understand actual situations. The challenges of real-world mapping and messy data should begin early; attempting to redistrict one's

state demonstrates the concerns of competing constituencies and objectives in a democracy.

The elimination of the National Assessment of Educational Progress test in geography questions the value placed on this discipline, with the executive director of the Council of Great City Schools identifying the subject as "ancillary" (Sparks, 2019, 1). Teachers of geography, prepared with strong knowledge, can guide students through an understanding of ideas and content (Lambert 2017a). Maude (2016, 70) suggests about powerful geography that "The aim is to make the concept sufficiently concrete for teachers to recognize that some of what they already teach is powerful knowledge, or to identify opportunities in the curriculum to engage students with concepts in ways they might not previously have considered". By preparing materials that geographers and non-geographers can incorporate into their course offerings, there is an opportunity not only to support geographers with relevant and timely activities, but also to invite teachers in other subjects to use these resources. At the secondary level, few people are teaching geography courses exclusively, so these materials could also be employed in civics and history classes.

Geographic approaches to community problems provide strong foundations for students as they seek answers to these challenges (Lambert, 2017b; Egiebor and Foster, 2019). "Our focus was on illustrating how spatial thinking and geospatial technologies provide a means to engage students with community challenges that they care about through [project-based learning] and citizen mapping. The aim was to provide them with the methods and tools to prepare them to be active, engaged citizens" (Schlemper et al, 2019, 26). Personal geographies evolve throughout life, so it is valuable to have confidence in using and developing this knowledge (Roberts 2017), especially as residents in the United States increasingly sort themselves into more similar residential and employment locations (Romen, 2018), leading to increased polarization.

Development

This project has multiple dynamic parts. While the ideas sprang from classroom interaction and observation, the impending 2020 Census followed by the state redistricting process suggested that people beyond students in a civics class would be interested in the exercises and activities. Multiple groups across the country were in the process of developing citizen engagement programs to involve people in conversations about independent commissions and gerrymandering (Draw the Lines PA, 2019; Voters not Politicians, 2019). Based on limited exposure in educational institutions, we know that the majority of people in the United States are not familiar with geospatial technology, which would be the primary method of drawing electoral districts in 2021 (Leadbeater, 2017). Just a quarter of students on the NAEP exams report using technology in

social studies classes (2014). Historical and geographical knowledge is not strong in the United States (Mahnken, 2019; NAEP, 2014) so we needed to provide foundational material before people could begin to participate in the redistricting process. Identifying several building blocks to engage people in the conversation, we decided to use a geographic lens to teach about apportionment and redistricting, refining the materials and testing them in multiple locations. Recognizing that people have different learning styles, and are captured by different types of information, we developed three distinct approaches to drawing people into the subject: interactive hands-on mapping activities, PowerPoint presentations, guided discussions about redistricting criteria, and online geographic information systems applications.

Geography educators reviewed existing instruments on spatial thinking concepts and geographic knowledge in relation to the decennial census, apportionment, redistricting, gerrymandering, and elections. The Civics Research Fellow considered intersections between civics concepts and geographic approaches related to civics skills including patterns, relationships, and hierarchy. The research group refined the instructional package to include: (a) an activity on population movement over three historical periods using large-format maps with alternative approaches using tabletop paper maps; (b) background material on apportionment, redistricting, gerrymandering, government, and geographic information technology; (c) online redistricting ArcGIS Online mapping exercises using existing census data for all states with more than one congressional district; (d) links to redistricting resources that create electoral districts at a scale finer than that of the county; and (e) assessment and discussion questions for teachers and community organizers. Educator partners in secondary schools, higher education institutions, and community organizations validated and piloted the materials in multiple situations.

In 2016, the National Geographic Education Foundation provided each state and the District of Columbia, through the National Geographic Network of Alliances for Geographic Education, with a large vinyl floor map of its respective state, up to 17 by 21 feet. Geography educators were expected to share this resource with students and teachers in their states, develop lessons for use on the maps, and report to National Geographic about use of this resource.   No comprehensive analysis of how the giant map program affected opportunities to incorporate geography instruction into classrooms is available from National Geographic (Hines, personal communication, 2019). However, the best evidence of whether the maps are useful can be found in the number of maps continuing to be purchased by schools, districts, and communities; in Colorado over fifty maps are in use in classrooms across the state.

While National Geographic initially focused its development efforts for the Giant State Maps on upper elementary school students, as state history is often taught in fourth grade, after visiting small, usually rural school districts in

Colorado, it became clear that the Giant Maps could be useful in a variety of situations. "I found the floor map INCREDIBLY helpful. Being a very visual and bodily person that is a way we can use relations and movement to remember" (Student, 2019). Bringing the Giant Map to schools outside the populated centers of the Front Range meant that it was important to have activities for all students. The content for the historical population lessons reflects the intent of the powerful geography concept of Solem and Boehm, who suggest orienting "teachers on powerful disciplinary knowledge at the state level" (2018, 195). When working with high school students about the migration patterns in the state, we discussed the relationship of population to electoral districts. Teachers built on this opportunity to link history, geography, and civics through the "On the Move" lesson. "The 'giant map' used in our classroom was beneficial to do before this activity because I was familiar with where counties were and had prior knowledge to where most of the population in VA is" (Teacher, 2019). The material evolved into participants dividing their state into electoral districts using plastic chains or rope, as well as an alternative approach using paper maps and plastic blocks.

In March of 2018, we tested the sequence of materials in several social studies classes in schools in Colorado, North Carolina, and Texas. We wanted to know whether our intervention made a difference in the understanding of the participants, so we implemented a pre- and post-assessment. However, neither students in government classes nor community members with long voting records were able to answer what we perceived to be basic questions about apportionment, redistricting, and local congressional districts without significant consternation. While some respondents were able to describe redistricting as something along the lines of "The process of apportionment and redistricting is done by determining the size of the eligible voting population in the area, place down borders that will make the different districts balanced and place a representative in each district" (Student, March 2018), many others reflected this sentiment, "Pfft.... I don't dogging know" (Student, March 2018). This lack of knowledge had the effect of dampening the interest in the subsequent learning activities, so we abandoned the pre- and post-assessment and created an online survey using the Survey123 application that would capture some information, but after the fact. We determined that classroom teachers would have to take the lead in assessing students rather than incorporating an assessment in the project. The limited survey results did not provide comprehensive data that demonstrated after engaging with GeoCivics resources, participants understood the concepts about apportionment and redistricting and could articulate them, moving the project from one about knowledge acquisition to one of exposure and expansion. However, pre- and post-assessment could be undertaken in individual classrooms using the assessment questions on the GeoCivics website.

While these activities can be demonstrated for teachers and community leaders, constructive dialogue will most often happen when those familiar with

the local context and situation facilitate the conversation. Although the words "civics" and "civility" start with the same letters, their origins (citizen and courtesy) are not related, and at this divisive time in the United States, civic discourse is often not conducted with civility (Herbst, 2010). "Many principals report that the contentious tone and corrosive discourse of national politics has negatively re-shaped the norms of student interaction" (Rogers, 2019, 9). By incorporating materials such as flashcards outlining choices communities must make when redistricting (drawthelinespa.org, 2019), participants can practice conversation about difficult topics in a structured setting, such as a classroom or nonprofit gathering. Just as learning about GIS requires investigation and repetition, so does developing the capacity to defend one's point of view, to resolve conflicts, and to practice participation in political and community activities. Geography educators regularly take advantage of current events to leverage student knowledge of spatial thinking and geographic content.

The critical-thinking component of the activity was the interactive online mapping application, designed as a reflection of the Esri GeoInquiries (www.esri.com/geoinquiries). Baker, Curtis, and Millsaps describe these types of endeavors as "geo-enabled instructional materials" (2019, 124), which provide an accessible entry into GIS use. After experimenting with redistricting software, our research team determined that participants would be discouraged from trying to create electoral districts at the scale of the precinct or census block. The purpose of the interactive mapping activity is not to propose a congressional district map, although programs such as Esri Redistricting Online and Districtr are available to support that effort. Rather, our intent was to provide a process whereby students or community members could begin to understand how the census data and guidelines for redistricting intersected on the map of their state. We chose to develop an application using Esri ArcGIS Online, allowing participants to group areas by county, and displaying a limited number of demographic variables: population in 2010, population per square mile, ethnicity, and median age. These details enabled users to gain a sense of the challenges of creating districts with equal population that were contiguous and respected the Voting Rights Act and other redistricting criteria. No special program or sign-up process is required to access these materials. The mapping applications are hosted on the Colorado Geography Education Esri organizational account through the University of Colorado Colorado Springs. Anyone with an Esri account who would like to use this material as a starting point for a more sophisticated mapping activity could copy the exercise into their own organization account and create additional approaches to redistricting.

This approach packaged instructional materials following geographic practices (Bednarz, Heffron, and Huynh, 2013, 25) to acquire spatial knowledge and the ability to ask questions about how Congressional districts are drawn through participants' exploration of online redistricting mapping tools. Rigorous

materials incorporating geographic skills and concepts learned through experiences on large-format maps and with online mapping programs have the potential to provide a foundation for understanding best practices in civics and geography education across multiple states. We constructed an instructional materials package teaching apportionment and redistricting in a state context, provided these materials online, and demonstrated them in person. We leveraged interest in the 2020 Census at regional AAG meetings to engage geographers in thinking about how online mapping impacts electoral districts, and framed assessments of geographic knowledge in relation to the functions and systems of government. By analyzing use of and interest in the materials, the research team determined that this project was valued by participants. "I found this map very helpful and insightful. At times, when just figuring it out, the program can have its challenges but once you play around with it, it's easy to use. I liked being able to see the population breakdown and see a representation of the population size per county. I found this fascinating" (Teacher, 2019). Middle school students were interested in exploring the racial and ethnic make-up of their counties and neighboring counties through the data tables on the online redistricting exercise. Hands-on activities reinforce new geographical concepts and geospatial thinking. Using large format maps, historical and current census data, and GIS population-spatial data, our research built on tangible map skills to engage students and community members in online redistricting data and spatial analysis activities. "I could see myself using this activity in a civics or government lesson about redistricting and about political connections to redistricting. I think that this would be a good hands-on activity that would allow students to see the process behind re-districting and what role political parties may play in that" (Teacher, 2019).

We implemented our ideas, practiced the presentation in schools and with community members, and improved the content and technical aspects of the instructions. Although the materials were freely available online, they needed to be shared. The NCRGE grant enabled team members to travel to a variety of locations with different situations and audiences to test further the materials and to gauge interest in the project, as well as to develop the website and share details about the project with academic geographers. A UCCS graduate student developed instructions for redistricting at the census block level, Appalachian State students supported video production, and an undergraduate summer intern from Middlebury College assisted with research and presentations. Information about the types of activities undertaken during 2019-2018 and the outcomes of the interactions are detailed in the following section.

Testing and Results

GeoCivics gives participants powerful opportunities to connect their knowledge with their expertise about the local community, respecting what they

already know and valuing what they can contribute to electoral decision making. Academic geographers received a call for proposals (see Note) in the fall of 2018 inviting papers for a session on "Current and Future Directions of Geography's Role in Redistricting and Gerrymandering Studies". The research team, in collaboration with Ryan Weichelt of the University of Wisconsin Eau Claire, organized this session at the 2019 American Association of Geographers' Conference, which attracted a full room for papers on topics ranging from "Congressional Districts: How 'Equal' Are They?" to "Algorithmetic Democracy: Mathematical and Supercomputer Approaches to Gerrymandering" (AAG, 2019, 203). One of the presenters was a graduate student at the University of Northern Iowa. Seven other sessions at the annual meeting touched on the census, elections, or redistricting, including a keynote address from former Attorney General, Eric Holder, and a panel session on "Redistricting, Geography and Democracy". Conversations among political geographers on this topic have continued and plans are under way for a pre-conference on redistricting and gerrymandering to be held in Colorado Springs prior to the AAG annual meeting in Denver 2020 (https://www.uccs.edu/geocivics/conference), with a subsequent conference following the reporting of the 2020 Census data, in part to support geographers interested in engaging in their communities.

Grounding concepts in a research framework, we extended our networks through a snowball sample, and appraised the results obtained through Survey123, which was a partial evaluation and record of participants. We have had over 2662 contacts in 28 states. More formally, GeoCivics was introduced through ninety conversations and conference presentations in 19 states, the District of Columbia, Canada, and Costa Rica. Over 600 map users from over thirty schools (figure 2) responded to the questionnaire addressing online mapping and support materials while the state online mapping exercises have been viewed over 5000 times. Educators practiced the activities during professional development workshops. Community members learned about the project in backyards, offices, places of worship, and a brewery. A Story Map providing details of locations and activities is available at [http://arcg.is/1W0Wyj]. A TEDx talk on GeoCivics was presented in Mashpee, Massachusetts on April 26, 2019 (https://www.youtube.com/watch?v=mx9uDXsesg8). Dissemination about the project also takes place through individual email communications, access to the website, and webinars, such as the National Humanities Center "The Ethics of Gerrymandering" webinar on May 16th attended by 200 teachers [https://www.youtube.com/watch?v=9uBEgP5Ilmo]. Responses to the resources reflect these positive communications: "Thank you again for this wonderful material. We will plan to use it for GIS Day! … Incorporating this content in reference to the Louisiana Giant Traveling Map will be a very important and relevant addition to this year's event!" (Harvey, personal communication, 2019). "I like how this program is easy to access. Being able to access quickly gives

students more of an opportunity for hands on and guided practice" (Teacher, 2019). Once they have been introduced to the concepts, geography educators and community organizers begin to envision ways to engage their students and constituents in the project.

An easy-to-use web presence is essential to fostering use of the materials (Miller et al, 2018); we provide links to related resources, without attempting to be all encompassing on the topic of redistricting. The GeoCivics website received an increasing number of visits each month during the school year, with 4,996 unique page views from August 2018 through June 2019 (Figure 1). An undergraduate student, funded by the Center for Careers and Internships at Middlebury College, worked during summer 2019 to update the website and materials.
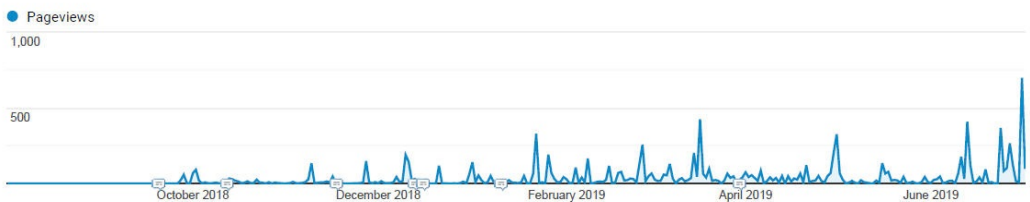

Figure 1. GeoCivics Website Hits from September 2018 – July 2019

In order to understand who was using the GeoCivics resources, particularly the geospatial technology exercises, we analyzed the Survey123 data, which collected information about location, participant role, and perceptions about the project. The majority, 98 percent, of respondents identified as being in the United States (Figure 2) and most indicated that they were students and were participating in the activity as part of a class, either at a secondary school or university (Figure 3). Just two percent of respondents identified as nonprofit organizers or community members, indicating that, at this time, most of the engagement with GeoCivics has been with educators. Respondents were asked to list five key pieces of information needed to draw maps as part of the redistricting process. As is indicated in the word cloud (Figure 4), population was identified as central to the discussion.
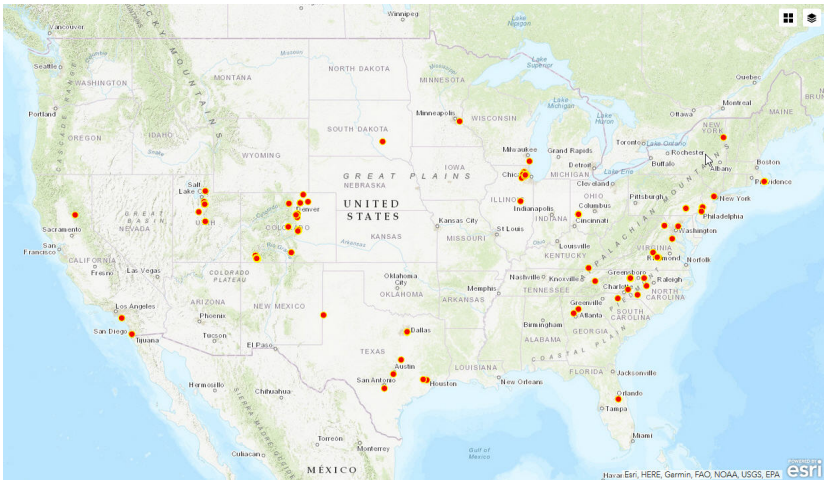
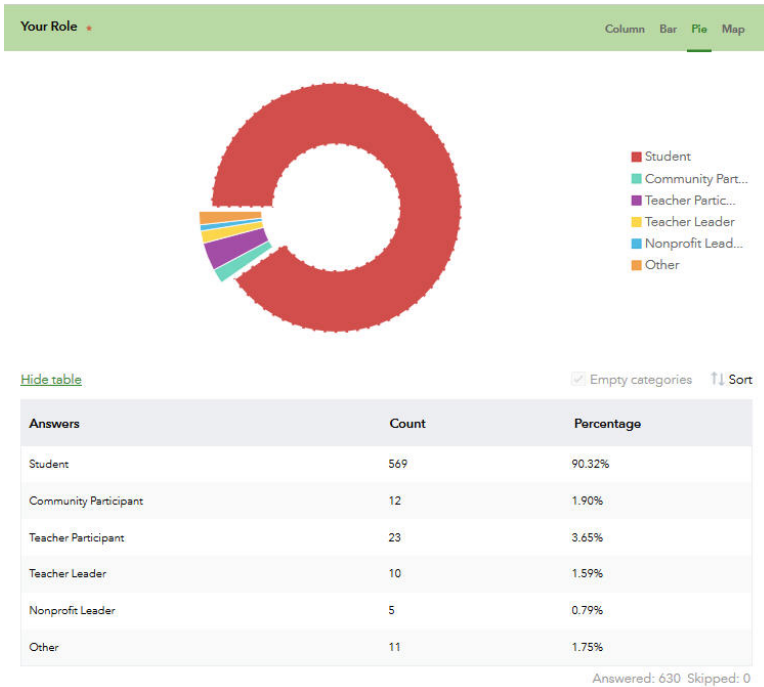**Figure 2.** Survey123 Map of Participants in the Contiguous United States

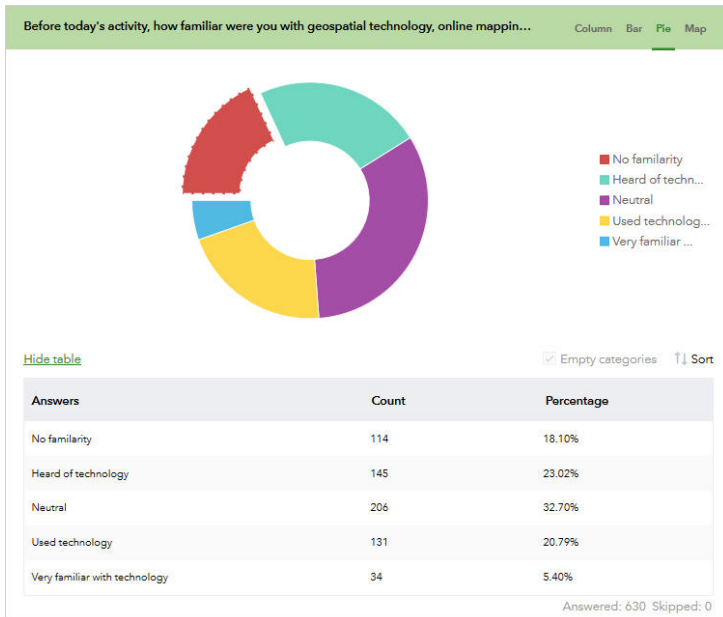**Figure 3.** Participant Role in GeoCivics Activity

Figure 4. Response to Question: List up to five pieces of information cartographers need to draw maps as part of the redistricting process.

One of the main objectives of this project was to expand the audience for using geospatial technology, so we inquired "How familiar were you with GIS prior to this activity?" Just over a quarter had "used" or were "very familiar" with the technology (figure 5). By integrating GIS into an activity about apportionment and redistricting, students and community members begin to undertake the same tasks that will face cartographers supporting legislatures and independent commissions around the country as they create electoral districts in 2021. This was confirmed by 88 percent of respondents, who indicated they felt "more prepared" or "a bit more prepared" to discuss these topics (figure 6). In some ways, the most surprising response to the survey came to this question: "What action do you plan to take as a result of participating in this activity?" As the majority of the respondents were students, we expected that they would answer, "Successfully complete assessments about civics and government", which 26 percent did. However, the most common answer among all respondents was "Share the information I learned with people I know", 46 percent (figure 7). These responses indicate that not only did most participants learn something, but that they were sufficiently inspired to share this knowledge with others.

Before today's activity, how familiar were you with geospatial technology, online mappin...   Column Bar **Pie** Map

Legend:
- No familarity
- Heard of techn...
- Neutral
- Used technolog...
- Very familiar ...

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No familarity	114	18.10%
Heard of technology	145	23.02%
Neutral	206	32.70%
Used technology	131	20.79%
Very familiar with technology	34	5.40%
		Answered: 630 Skipped: 0

Figure 5. Self-Reported Familiarity with Geospatial Technology

Following this activity, do you feel more prepared to participate in a discussion about dra...   **Column** Bar Pie Map

Hide table   ☑ Empty categories   ↑↓ Sort

Answers	Count	Percentage
No more prepared than when I began the activity	75	11.90%
A bit more prepared	375	59.52%
More prepared	179	28.41%

Figure 6. Self-Reported Feeling of Preparedness to Participate in Conversation about Redistricting
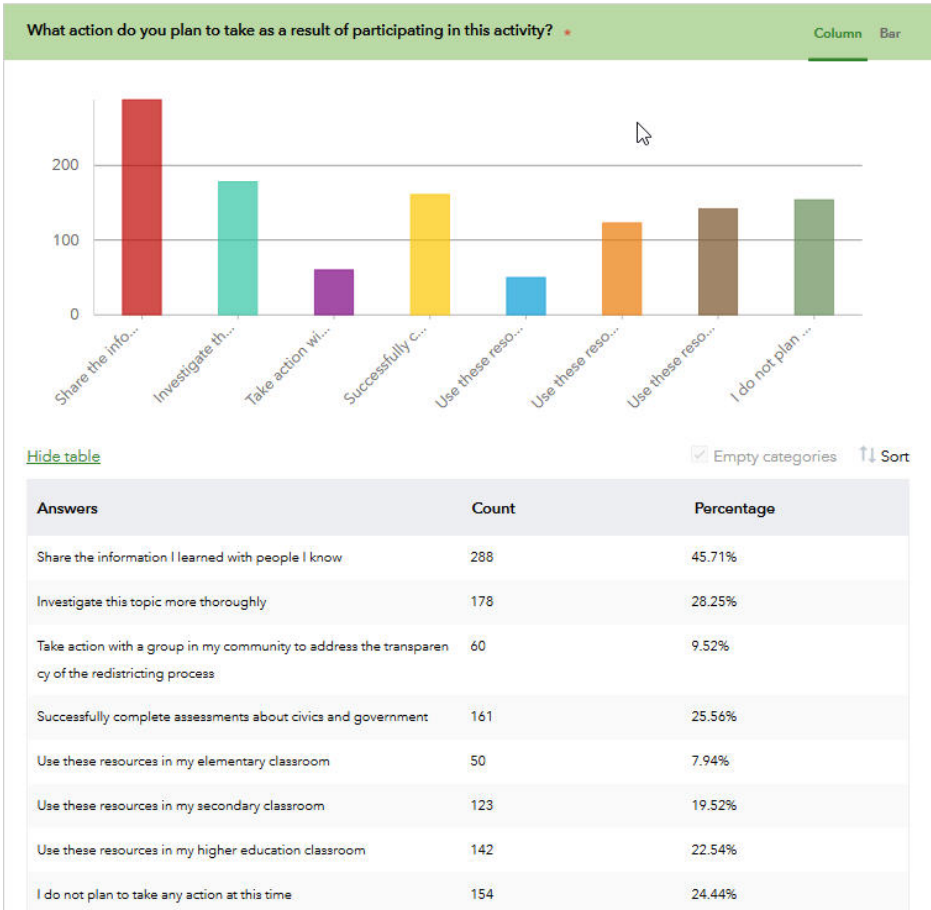
Figure 7. Intention to Take Action following the Discussion

Activities took a variety of forms. Geographic Alliance staff in Des Moines, Iowa incorporated the materials into a teacher professional development workshop on political geography and gerrymandering. Geography teachers at Oak Canyon Junior High School in Linden, Utah demonstrated how students with existing ArcGIS accounts could print or share their district maps and submit them as part of an assignment. Social studies teachers at Escalante Middle School in Durango, Colorado confirmed that middle school students are able to complete the project and that the system was able to handle over fifty people at one time on the application. Geography teachers in Elgin, Illinois demonstrated that the materials worked with all levels of students, from introductory to advanced

placement. Geography faculty at Sinclair Community College in Dayton, Ohio used the concept as a starting point for engaging with the library staff, community members, and STEM curriculum developers, successfully writing a grant to create more lessons with the Giant Map of Ohio and providing a framework for outreach to minority communities. A high school senior in Mashpee, Massachusetts used the resources as part of her senior project on Voter Registration Education. The League of Women Voters in Denver, Colorado purchased a National Geographic Giant Map to use as an educational tool with communities across the state. A college sophomore from Middlebury, Vermont contextualized the population mapping exercise for educators engaging with the 2020 Census. An AP Human Geography teacher in Roselle, Illinois used the materials as part of a summer school activity. The research group analyzed results of interactions, communicated results through conference presentations, and identified resources required to extend the project to cover all fifty states. The next challenge is to scale the pilot project beyond the initial states to national and international audiences, balancing personal connections with broad distribution.

Transformative Research

We need continuing communication among academics who are developing strong questions and robust research agendas. They should be connecting to elementary and secondary educators, and to individuals active on these topics in their communities. We need examples and reinforcement for these types of efforts to encourage more academics to share their expertise. In describing his project on bringing social justice conversations into the classroom, Kenreich observes,

> By democratizing geospatial information, digital geography offers unprecedented public access to geospatial data and increasingly user-friendly mapping tools so that even students can design a map that looks, in the words of one student, "legit." With the authority that maps convey, the students of the Baltimore mapping project began to develop a sense of empowerment as spatial citizens who can marshal evidence to persuade an audience. (2019, 84)

While advocating for geography education, academic and professional geographers should also be reaching out to educators in multiple disciplines, as well as to librarians, community leaders, and reporters. GIS is a tool for participatory learning (Egiebor and Foster, 2019; Hong and Melville, 2018) and an entry point into the work that will be done by redistricting professionals, providing students and community participants with a sense of agency.

Geographers in the community can offer to help groups answer spatial questions, while being good researchers, educators, and advocates for the discipline.

Conclusion

If citizens and residents care about democracy and the health of the United States of America, we need to demonstrate that we understand how the government functions, including the electoral system. This geography education project transforms critical thinking about gerrymandering into individual and community-level lessons related to spatial and demographic patterns. These resources examine a small slice of the governance system, describing the sequence of activities leading to redistricting. Teachers appreciate being introduced to these technologies and want to guide their students in asking good questions about social, political, and civil institutions and about citizens' rights and responsibilities. Does it matter that people participate in their government? If so, how can geography support this work? Let us assume the answer to the first question is yes. Shin and Bednarz advocate for "a focused, concerted, systematic framework to guide … a research agenda focused on the intersection of civic education and spatial citizenship" (2019, 7). This project provides a vehicle for undertaking that research by implanting geography more directly into the social studies curriculum.

Acknowledgements

Note
Current and Future Directions of Geography's Role in Redistricting and Gerrymandering Studies For the most part, the electoral redistricting process is inherently a spatial question. Geographic compactness and equal population of districts are key components of the evaluation criteria used in the legal review process of districting fairness. Yet research on the topic is generally devoid of geographers, leaving political scientists, mathematicians, and lawyers as the go-to experts on the topic. With recent court cases in Wisconsin, Pennsylvania, and North Carolina engaging new audiences regarding the topic, perhaps it is time geographers step forth and take a larger role in directing the narratives on redistricting in the United States.

The following session is tasked with exploring research avenues focusing on the broader issues of the redistricting process. This session asks why aren't geographers part of the national discussion of redistricting? How can geography gain greater acceptance as experts regarding redistricting? What does geography offer to the study of redistricting? We welcome papers from all avenues of geographic thought regarding redistricting. Interested presenters are asked to submit abstracts for consideration to Ryan Weichelt weicherd@uwec.edu.

References

American Association of Geographers. (2019). Annual Meeting Program. Washington DC. April 3-7, 2019.

Annenberg Constitution Day Civics Survey. (2019). Civics knowledge predicts willingness to protect Supreme Court. The Annenberg Public Policy Center of the University of Pennsylvania. Retrieved from https://www.annenbergpublicpolicycenter.org/civics-knowledge-survey-willingness-protect-supreme-court/

AP GIS&T Study Group. (2017). Bridging High School and Introdcutory Undergraduate courses in Geographic Information Science and Technology. *Journal of Geography,* 117(4), 165-173.

Arnold, C. (2017). The mathematicians who want to save democracy. Nature. Retrieved from https://www.nature.com/news/the-mathematicians-who-want-to-save-democracy-1.22113. Last accessed 18 July 2019.

Baker, T. (2019). Esri GeoInquiries for Schools. *GeoInquiries*. Esri, Inc. Retrieved from https://www.arcgis.com/home/group.html?id=39505ed571d646c8b66ecccadbc386e4#overview

Baker, T., Curtis, M., & Millsaps, L. (2019). Geospatial technologies and the spatial citizen. In E.E. Shin and S.W. Bednarz (Eds.), *Spatial Citizenship Education: Citizenship through Geography* (pp. 117-131). New York: Routledge.

Bednarz, S.W. & Bednarz, R.S. (2019). Citizenship education in a spatially enhanced world. In E.E. Shin and S.W. Bednarz (Eds.), *Spatial Citizenship Education: Citizenship through Geography* (pp. 59-71). New York: Routledge.

Bednarz, S.W., Heffron, S., & Huynh, N. T. (Eds.). (2013). *A road map for 21st century geography education: Geography education research* (A report from the Geography Education Research Committee of the Road Map for 21st Century Geography Education Project). Washington, DC: Association of American Geographers.

Bennett, J. (2010). *Open street map: be your own cartographer.* Birmingham, UK: Packt Publishing.

Brace, K.W. (2004). *A personal perspective on the use of technology in redistricting over the past thirty years*. Election Data Services, Inc. The Brookings Institute Conference on Congressional Redistricting. April 16, 2004, Washington DC.

Buckley, G. L. Bain, N.R., Luginbuhl, A.M. & Dyer, M.L. (2004). Adding an "active learning" component to a large lecture course. *Journal of Geography,* 103(6), 231-237.

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Geographers, Retrieved from https://www.bls.gov/ooh/life-physical-and-social-science/geographers.htm Last accessed 3 July 2019.

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Lawyers, Retrieved from https://www.bls.gov/ooh/legal/lawyers.htm Last accessed 11 July 2019.

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Political Scientists, Retrieved from https://www.bls.gov/ooh/life-physical-and-social-science/political-scientists.htm Last accessed 3 July 2019.

Caplan, G. (1998). *Good schools, good citizens: A discussion.* Third National Forum of Education: Education and Life – Transition. Council of Ministers of Education, St. John's, Newfoundland, Canada. May 28-30 1998. Retrieved from: http://www.cmed.ca/nafored/english/ctf.stm. Last accessed 29 August 2001.

Chikina, M., Frieze, A., & Pegden, W. (2017). Assessing significance in a Markov chain without mixing. *Proceedings of the National Academy of Sciences of the United States of America,* 114(11), 2860-2864 https://doi.org/10.1073/pnas.1617540114

CivXNow. (2019). Retrieved from https://civxnow.org/coalition

Collins, L. (2018). The impact of paper versus digital map technology on students' spatial thinking skill acquisition. *Journal of Geography,* 117(4), 137-152.

Colorado General Assembly (2016). Colorado Revised Statutes Title 22 Education § 22-1-104 Teaching of history, culture, and civil government. Retrieved from https://leg.colorado.gov/sites/default/files/images/olls/crs2016-title-22.pdf

DeSilver, D. (2018). *U.S. trails most developed countries in voter turnout.* Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2018/05/21/u-s-voter-turnout-trails-most-developed-countries/. Last accessed 18 July 2019.

Delaney, E. (1991). Applying Geography in the Classroom through Structured Discussion. *Journal of Geography,* 90(3),129-133.

Doherty, C. (2019). *Key findings on Americans' views of the U.S. political system and democracy*. Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2018/04/26/key-findings-on-americans-views-of-the-u-s-political-system-and-democracy/

Draw the Lines PA. (2019). Nonpartisan resource for Pennsylvanians who want to end gerrymandering. Retrieved from https://drawthelinespa.org. Last accessed 18 July 2019.

Edelson, D.C. (2011). Scaling up classroom maps. *ArcNews*. Spring 2011. Esri, Inc. Retrieved from https://www.esri.com/news/arcnews/spring11articles/scaling-up-classroom-maps.html

Egiebor, E.E. & Foster, E.J. (2019). Students' perceptions of their engagement using GIS-story maps. *Journal of Geography,* 118(2), 51-65.

Esri. (2008). ArcGIS Online Services—The Foundation of Web GIS. *ArcNews Online*. Retrieved from https://www.esri.com/news/arcnews/fall08articles/arcgis-online-services.html

Faulks, K. (2006). Educating citizens: Developing rights, responsibilities and participation. *Journal of Educational Policy,* 21(3), 389-392. DOI: 10/1080/02680930600600671

Ferreria, E. & Silva, M.J. (2015). Spatial citizenship: Potentialities of participatory geospatial web. Conference: X CONGRESSO DA GEOGRAFIA PORTUGUESA Os Valores da Geografia, Lisboa, 9 a 12 de setembro de 2015.

Field, K. (2018). When a single map isn't enough… *ArcGIS Blog.* Retrieved from https://www.esri.com/arcgis-blog/products/arcgis-pro/mapping/when-a-single-map-isnt-enough/

Fitzpatrick, C. (1990). Computers in geography instruction. *Journal of Geography,* 89(4), 148-149.

Fleming, J. & Mitchell, J. (2017). Effects of giant traveling map use on student spatial thinking. *Geographical Bulletin,* 85(2), 67–77.

Salem Gazette. The gerry-mander or Essex South District formed into a monster. April 2, 1813. Salem, Massachusetts, page 1. Retrieved from https://americanhistory.si.edu/collections/search/object/nmah_509530. Last accessed 18 July 2019.

gisgeograph@gmail.com. 2018. 13 Free GIS software options: Map the world in open source. GISGeography.com. March 4, 2018. Retrieved from https://gisgeography.com/free-gis-software/

Grofman, B. & Feierherd, G. (2017, August 7). The US could be free of gerrymandering. Here's how other countries do redistricting. *The Washington Post.*

Hanus, M. & Havelkovà, L. (2019). Teachers' concepts of map-skill development. *Journal of Geography,* 118(3), 101-116.

Harvey, F. (2019). Email. Personal communication. July 25, 2019.

Herbst, S. (2010). *Rude democracy: Civility and incivility in American politics*. Philadelphia: Temple University Press.

Hess, D.E. (1994). Discussion in social studies: Is it worth the trouble? *Social Education,* 68(2), 151-155.

Hines, C. (2019) Email. National Geographic Activity Analysis. April 10, 2019.

Hong, J.E. & Melville, A. (2018). Training social studies teachers to develop inquiry-based GIS lessons. *Journal of Geography,* 117(6), 229-244.

Jefferson, T. (1781). *Notes on the state of Virginia*. Philadelphia: Prichard and Hall, M.DCC.LXXXVIII.

Joris, M. & Agirdag, O. (2019). In search of good citizenship education: A normative analysis of the International Civic and Citizenship Education Study (ICCS). *European Journal of Education, Research, and Development Policy* 54(2), 287-298. https://doi.org/10.1111/ejed.12331

Kenreich, T.W. (2019). Rediscovering the local: collaborative, community maps for civic awareness. In E.E. Shin and S.W. Bednarz (Eds.), *Spatial Citizenship Education: Citizenship through Geography* (pp. 72-87). New York: Routledge.

Kerski, J.J. (2008). The role of GIS in Digital Earth education. *International Journal of Digital Earth* 1(4), 326-346. https://doi.org/10.1080/17538940802420879

Kidman, G. & Chang, C.H. (2019). Maps and apps – a reflection on learning to read a paper map in an age of internet mapping technologies. *International Research in Geographical and Environmental Education*, 28(2), 85-88. DOI: 10.1080/10382046.2019.1583841

Kranitz, R.A. (2018). The effect of the state giant traveling map of Montana on the geographic literacy of fourth graders in western Montana. *Graduate Student Theses, Dissertations, & Professional Papers*. 11100. Retrieved from: https://scholarworks.umt.edu/etd/11100

Knight, D. B. (1979). Role playing, decision making and perception of place: The use of discussion groups for an introductory cultural geography course. *Journal of Geography in Higher Education,* 3(1), 38-44. https://doi.org/10.1080/03098267908708694

Lambert, D.M. (2017a). Who thinks what in geography classrooms? Powerful disciplinary knowledge and curriculum futures. *The New Geography*, 65(3).

Lambert, D.M. (2017b). The relevance of geography for citizenship education. In L. Leite, L. Dourado, A. Afonso, and S. Morgado (eds.) *Contextualizing teaching to improve learning: The case of science and geography*. New York: Nova Science Publishers.

Leadbeater, R. (2017). Open redistricting and rebuilding trust. govloop. December 18, 2017. Retrieved from https://www.govloop.com/community/blog/open-redistricting-rebuilding-trust/

Lemberg, D. & Stoltman. J.P. (1999). Geography teaching and the new technologies: Opportunities and challenges. *Journal of Education*, 181(3), 63-76.

Maddox, L.E., Howell, J.B. & Saye, J.W. (2018). Designing geographic inquiry: Preparing secondary students for citizenship. *Journal of Geography,* 117(6), 254-268.

Mahnken, K. (2019). Can civics education allow schools to rediscover their democratic purpose – and help rescue America from decline. *T74 Newsletter*. Retrieved from https://www.the74million.org/article/can-civics-education-allow-schools-to-rediscover-their-democratic-purpose-and-help-rescue-america-from-decline/. Last accessed 18 July 2019.

Maude, A. (2016). What might powerful geographical knowledge look like? *Geography*, 101(2), 70-76.

McDonald, M. (2019). National general election VEP turnout rates, 1789-present. United States Election Project. Retrieved from http://www.electproject.org/national-1789-present. Last accessed 18 July 2019.

Mckean, A. (2019). Liberty Lives Forever. Retrieved from http://www.libertylivesforever.org/ Last accessed 18 July 2019.

Mell, P. & Grance, T. (2011). The NIST definition of cloud computing. *NIST Special Publication 800-145.* National Institute of Standards and Technology, U.S. Department of Commerce, Gaithersburg, MD.

Miller, P., Kimbrough, S. & Schacht, J. (2018). Simulating redistricting in the classroom: A binding arbitration decision game using Louisiana census data. *PS: Political Science & Politics* 51(3), 664-668.

Millsaps, L.T. & Harrington Jr., J.A. (2017). A time-sensitive framework for including geographic information systems (GIS) in professional development activities for classroom teachers. *The Geography Teacher* 116(4), 152-164.

National Association for Educational Progress (NAEP). (2019) 2014 civics assessment. The Nation's Report Card. 2014. Retrieved from https://www.nationsreportcard.gov/hgc_2014/#civics/scores Last accessed 18 July 2019.

Osborne, Z.M., van de Gevel, S.L., Eck, M.A. & Sugg, M. (2019). An assessment of geospatial technology integration in K–12 education. *Journal of Geography*, 119(1), 12-21.

Petzold, D., & Heppen, J. (2005). A service-learning project for geography: Designing a painted playground map of the United States for elementary schools. *Journal of Geography,* 104(5), 203-210.

Roberts, M. (2017). Geographical education is powerful if... *Teaching Geography*, 42(1), 6-9. Retrieved from https://search.proquest.com/openview/024efdcc41742189a5b25d89c92b9954/1?pq-origsite=gscholar&cbl=28686

Rogers, J. (2019). *School and society in the age of Trump*. UCLA Institute for Democracy, Education, and Access.

Romem, I. (2018) *Characteristics of Domestic Cross-Metropolitan Migrants*. BUILDZOOM. Retrieved from https://www.buildzoom.com/blog/characteristics-of-domestic-cross-metropolitan-migrants

Schlemper, M.B., Athreya, B., Czajkowski, K., Stewart, V.C., & Shetty, S. (2019). Teaching spatial thinking and geospatial technologies through citizen mapping and problem-based inquiry in grades 7-12. *Journal of Geography,* 118(1), 21-34.

Schmidt, S.J. (2019). The spatial production and navigation of vulnerable citizens. In E.E. Shin and S.W. Bednarz (Eds.), *Spatial Citizenship Education: Citizenship through Geography* (pp. 41-58). New York: Routledge.

Schulten, S. (2014). The story behind the ancient map that invented red and blue states. *The New Republic*. Retrieved from https://newrepublic.com/article/119018/19th-century-map-shows-uss-politicial-polarization

Shibata, M. (2004). Controlling national identity and reshaping the role of education: The vision of state formation in Meiji Japan and the German Kaiserreich. *History of Education,* 33(1), 75-85.

Shin E.E. and Bednarz, S.W. (2019) Conceptualizing spatial citizenship. In E.E. Shin and S.W. Bednarz (Eds.), *Spatial Citizenship Education: Citizenship through Geography* (pp. 1-9). New York: Routledge.

Short, J. R. (2018). 4 reasons gerrymandering is getting worse. *The Conversation*. October 29, 2018. Retrieved from http://theconversation.com/4-reasons-gerrymandering-is-getting-worse-105182 Last accessed 18 July 2019.

Sinha, G., Smucker, T.A., Lovell, E.J., Velempini, K., Miller, S.A., Weiner, D. & Wangui, E.E. (2017). The pedagogical benefits of participatory GIS for geographic education. *Journal of Geography,* 116(4), 165-179.

Smoot, R. (2019). A look into the past, present and future of partisan gerrymandering in N.C. Retrieved from https://www.dailytarheel.com/article/2019/01/gerrymandering-history-future-0128

Solem, M. & Boehm, R.G. (2018). Research in geography education: Moving from declarations and road maps to actions. *International Research in Geographical and Environmental Education*, 27(3), 191-198, DOI: 10.1080/10382046.2018.1493896

Sparks, S.D. (2019). Nation's report card to get trimmed, four subjects dropped. Education Week. July 24, 2019. Retrieved from https://www.edweek.org/ew/articles/2019/07/24/nations-report-card-to-get-trimmed-four.html Last accessed 25 July 2019.

Standish, A. & Stoltman, J. (2009). Geography education and citizenship: The Pan American view. In R. Boehm and O. Muñiz-Solari (Eds.) *Geography Education: Pan American Perspectives*. San Marcos, TX: Grosvenor Center for Geographic Education.

Stephanopoulos, N. & McGhee, E. (2014). Partisan gerrymandering and the efficiency gap. *Public Law and Legal Theory Working Paper Series*, The Law School, The University of Chicago Retrieved from http://www.law.uchicago.edu/academics/publiclaw/index.html

Stoera, S.R. & Magalhães, A.M. (2004). Education, knowledge and the network society. *Globalisation, Societies and Education,* 2(3), 319-335.

Stoltman, J.P. (2019). Preface. In E.E. Shin and S.W. Bednarz (Eds.), *Spatial Citizenship Education: Citizenship through Geography* (pp vii-xv). New York: Routledge.

Swain, G. (2019). Maryland's political geography in the early republic. *Mapping Early American Elections*. Retrieved from http://earlyamericanelections.org/essays/06-swain-geography-of-politics.html

Voters not Politicians. (2019). Strengthening democracy by engaging citizens. Website. Retrieved from https://votersnotpoliticians.com/

Weiss, G. (2017). Problem-oriented learning in geography education: construction of motivating problems. *Journal of Geography,* 116(5), 206-216.

Rebecca Theobald holds an appointment as Assistant Research Professor in the Department of Geography and Environmental Studies at the University of Colorado Colorado Springs and edits *The Geography Teacher*. She explores the challenges of providing public services across diverse geographic locations. She is a member of the American Association of Geographers and the National Council for Geographic Education and a fellow of the Salzburg Seminar.

Anita Palmer is a geospatial education consultant and CEO of Critical Think Inc./GISetc. She provides professional development for educators in integrating geospatial technologies across the curriculum and also writes geospatial curriculum. She is a 2019 National Geographic Fellow and on the consulting staff of the Esri Teachers Teaching Teachers GIS (T3G). She is a member of the National Council for Geographic Education and Texas Council for the Social Studies.

Saskia van de Gevel is a Professor in the Department of Geography and Planning at Appalachian State University. She is also the North Carolina Geography Steward through the National Geographic Society. Saskia is a member of the American Association of Geographers.