Coloring Inside (and Sometimes Outside) the Lines:
Teaching a Course on Gerrymandering and Redistricting

Abstract

This article presents an overview of the development and teaching of a course on gerrymandering and redistricting at Fairfield University in the Spring 2022 and Spring 2023 semesters. The course objectives include understanding the redistricting process, exploring mathematical approaches, and examining the influence of race, gender, and class on redistricting. The course structure and outline, which incorporates documentaries, simulations, guest speakers, and active learning activities, are discussed in detail. The students engage in map portfolio projects and act as consulting groups for state legislatures, gaining practical experience in redrawing maps and analyzing their impact. The article includes feedback from student surveys, highlighting their increased knowledge and interest in gerrymandering, as well as suggestions for improvement. Overall, this article underscores the significance of the course in fostering a deeper understanding of redistricting processes, their impact on democracy and public policy, and innovative ways to get students engaged in their learning through the learning of what can be a niche and esoteric topic.

Introduction

As an undergraduate student at Sacred Heart University majoring in political science and mathematics, my fascination with gerrymandering and redistricting was intense. It was a too-good-to-be-true blend of both majors. I began to see the inherent and profound interplay between math and political science while matriculating in each discipline's graduate programs. Once I became a professor of mathematics at Fairfield University, teaching a course on this topic as a professor felt like a natural fit but out of

reach. There is an overabundance of service courses, and more senior faculty created and taught electives. However, when the Honors Program asked for interdisciplinary course ideas, I jumped at the chance. With the enthusiastic support of my department chair and a leap of faith from the honors co-directors, my course on gerrymandering and redistricting was on the schedule for Spring 2022. The Spring 2022 section had twenty-one students. I taught another section of the course in Spring 2023 with nine students.

To prepare, I contacted someone with experience teaching a gerrymandering course. Dr. Kyle Evans, an Assistant Professor in the Mathematics Department at Trinity College and undergraduate classmate, has taught redistricting and gerrymandering to undergraduates for several years. He graciously met with me several times. Dr. Evans provided suggested texts, topic outlines, and sample homework assignments. He had framed his course so that I could take his course shell and incorporate some of my ideas and readings to launch successfully.

Course Objectives

Setting course goals and objectives is critical to success in the college classroom. Beginning with the course goals and objectives and working backward to create the course outline, assignments, and assessments is a tried-and-true method of creating a course (Fink 2013). This course's objectives include qualitative and quantitative data

gathering and manipulation, as well as content around court cases, the U.S. Census, and how race, gender, and class can affect redistricting. The course goals were: to describe in detail the decennial redistricting and reapportionment process in the United States at the federal and state levels; to understand how different states draw various political maps and who is in charge of these tasks in each state; to understand the different mathematical approaches used to analyze maps; to learn about court cases involving redistricting and the role of mathematics in law; to appreciate and understand the role of race, gender, and class in the decennial redistricting and reapportionment process; to gain skills of data and statistical analysis through the U.S. Census and election data; to understand how policy shapes the way that people live; to gain a first-hand understanding of the processes of redistricting in Connecticut; to engage in the drawing of district maps with authentic data and technology; and to absorb and apply real-time information on redistricting news happening across our country during the semester.

Figure 1 - MapMaker: The Board Game

Teaching the Course

The course starts with an overview of gerrymandering by viewing *Gerrymandering: The Documentary* (Reichert 2010) and a broad, albeit somewhat biased, John Oliver clip (Oliver 2017). Students then go through a simplified

redistricting simulation by playing *MapMaker: The Board Game* (2019). This game is a great way to start thinking about the decisions mapmakers have to contemplate. Following a broad introduction to redistricting and gerrymandering, we dive deeper into each aspect of its components. Class sessions include the U.S. Census and apportionment, state redistricting processes, population deviation, racial gerrymandering, prison gerrymandering, compactness, the efficiency gap, partisan gerrymandering, "fair" districts, Monte Carlo and Markov Chain methods, and how we can make redistricting better. Each class session includes active learning, simulations, and case studies. I attempt to keep students engaged in their education as much as possible. Activities follow mini-lectures where students applied what they learned. Additionally, several "Mapping Days" were interspersed throughout the semester, where students could work in their project groups during class time and consult with the instructor.

There are several quantitative and qualitative homework assignments throughout the semester. Quantitatively, for example, students practice finding the efficiency gap in a plan or calculating the Reock score of a particular district. Qualitative homework examples include students researching court cases that affect gerrymandering in different states or reading the Amicus Brief of Mathematicians in *Rucho v. Common Cause* to analyze its arguments. The homework assignments reinforce the course content and build foundational skills for students to use in future projects.

Whenever I teach a course with political science attributes, I work hard to bring in guest speakers. During the Spring 2022 semester, my class was joined by four incredible speakers. Connecticut Speaker of the House Matt Ritter (D-Hartford) and Connecticut House Democrats Legislative Process Manager Jeff Greenfield joined us to

speak about being in the "room where it happens." The Speaker served on the Connecticut Redistricting Commission in 2021 and explained in great detail the particulars that go into drawing each and every line. The Connecticut League of Women Voters Redistricting Director, Joan Twiggs, also joined us to discuss what it is like to advocate for redistricting reform from the interest group perspective. And finally, our Congressman, Jim Himes (D-CT), joined us to describe his views on gerrymandering and how it affects the type of colleagues he works with daily.

In Spring 2023, Jeff Greenfield again joined us for an interactive class session around thinking through redrawing the lines of the Connecticut State House of Representatives. We were also joined by Illinois State Senate President Don Harmon (D), who discussed what it is like to serve on a redistricting committee that must deal with the loss of a Congressional district. Senator Harmon also addressed the history of Illinois' infamous 4th Congressional District – the "earmuff" district – and what it meant for Black and Latino populations west of Chicago to elect representatives from their demographic groups.

A central theme from the guest speakers was that weird shapes do not equal gerrymandered districts. Illinois' 4th Congressional District was an odd shape, but it connected two geographically separated Latino areas and kept a Black area whole between its two branches. This allowed for the election of a Latino representative and a Black representative, whereas the combination of the 4th District with other surrounding districts would have made this outcome less likely. The guest speakers brought their real-life experiences of map drawing into the classroom and gave students actual questions to ask themselves when making new districts. Overall, the students in both semesters regarded the guest speaker portion of the course highly.

Throughout the course, we built toward two significant projects: a map portfolio and a final project. We utilize the free and genuinely superb internet-based Dave's Redistricting Application (DRA) at davesredistricting.org. This exceptional tool allows anyone to draw their own Congressional or state legislative maps. It also allows the drawing of super local districts down to the town level in any state. The class was broken down into teams of 2 – 3 students each. Each group produced a portfolio of different Congressional maps, including a partisan gerrymander, a map of maximally compact

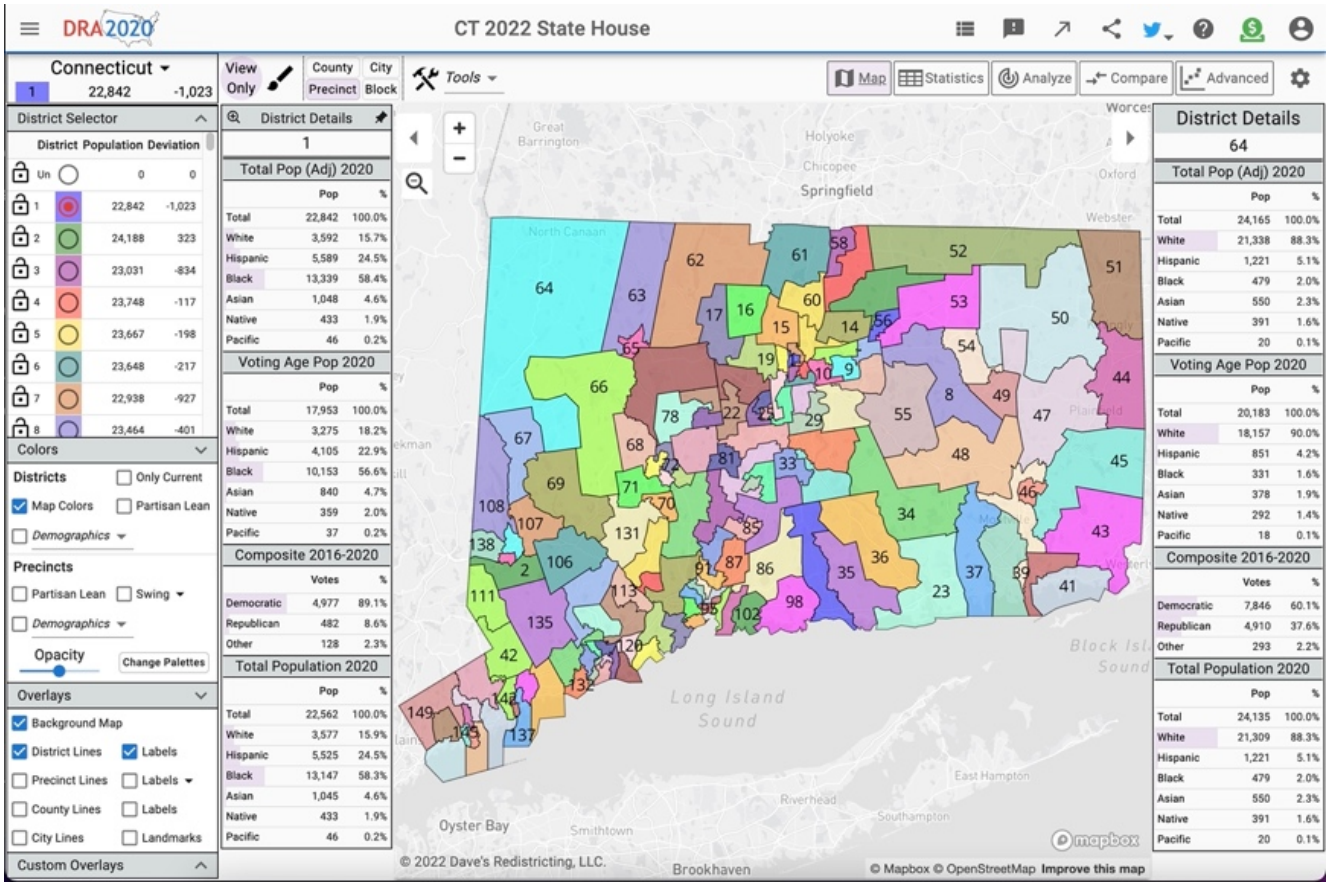

Figure 2 - A screenshot of Dave's Redistricting App.

districts, a "crazy" map, and a "fair" map – however each group defines fair – for a particular state assigned by the instructor. The states assigned for this project had between 8 – 13 Congressional districts. The groups answered questions such as: Why did you make the choices you did? What redistricting principles did you prioritize when

making each map? Explain and analyze each map's DRA statistics and analytics; how do they show that you have achieved your goals?

The class was then split into new teams for a final project. Each group was tasked with being an independent consulting group to a state legislature's redistricting committee. The instructor-assigned states for this project had 15 – 27 Congressional districts. Each group drew several maps, including a partisan gerrymander, a maximally compact map, and a "fair" map. The fair map was the map the group recommended to the state legislature for adoption as their 2022 – 2032 Congressional district map. In this project, groups had to answer all the questions that were asked in the Map Portfolios and other questions, including: What are the laws surrounding redistricting in your state? What does the State Constitution say about these laws? Look at the map adopted for your state and compare and contrast it to the fair map you proposed; what is different, and what is the same? Why do you think these similarities and differences exist? These comprehensive reports were presented to the class at the end of the semester. The students took to this project with sincere enthusiasm and showed how much they had genuinely learned in one short semester around what could be a remarkably obscure topic.

Student Feedback

After the Spring 2022 semester concluded, I solicited feedback from five students about the course. The survey was given in addition to the institution's normal evaluations. The instructor selected these students for their particularly heightened engagement during the semester. Students who responded during the Spring 2022 semester are labeled "A" in the survey responses below. After the Spring 2023 semester concluded, I solicited feedback from the entire class. Eight of nine students completed

the survey. Students who responded during the Spring 2023 semester are labeled "B" in the survey responses below. To keep anonymity, each student was assigned a number. Pairs of letters and numbers (e.g., 3A or 5B) signify the specific student and the semester in which they took the course.

Surveys were conducted using a Google form. For the Spring 2022 group, the surveys were conducted virtually after the semester concluded. The surveys were conducted for the Spring 2023 group as the last part of the in-class final exam. The quotations below have been edited for typographical and grammatical errors.

Question 1: Did you know anything about gerrymandering before our class?

	A Lot	Some	Nothing
Spring 2022	1	3	1
Spring 2023	1	1	6

Student 2A said, "Getting into the actual process of gerrymandering taught me more than I have ever learned in a politics class before."

Question 2: Knowing what you know now, would you retake the class?

	Yes	Maybe	No
Spring 2022	5	0	0
Spring 2023	6	1	1

The five yeses from Spring 2022 indicate selection bias since the students were explicitly chosen for this survey. However, the six yeses from Spring 2023 are encouraging. Student 3A said, "Redistricting and gerrymandering are not discussed enough for having such an outsized impact on our democracy." Student 5B said,

"Knowing what I know now, I think I would definitely retake the class. Although it was one of my most challenging courses, I think that the information I have learned is indispensable to me as an eligible voter and member of society." Student 4A said, "Each class, we learned how much goes into a process that seems very simple on the surface."

Question 3: What will you remember about our class in 10 years?

Student 1A discussed knowing how the U.S. Census works and its impact on how federal funds and so many other things are distributed based on this process that only happens once every ten years. Student 1A continued, "Gerrymandering affects our democracy in ways we cannot imagine." Student 5A felt the cliché 'you can't make everyone happy,' "There is no way to make everyone happy when a map is redrawn." Student 8B commented on the power of their vote, "[I'll remember] to vote in local elections because it can sway the power in the state and the power of who redistricts." Student 6B reflected on redistricting in her hometown, "I will be paying a lot of attention to the next census and redistricting because it affects so much. My mom always used to talk to me about how we were going to get redistricted to a different high school, and she was always so mad about it."

Question 4: Is there merit in doing an entire class on gerrymandering and redistricting?

Student 1A said, "Yes, but I believe that the focus should shift away from students redistricting as much as we did and focus more significance it has on society and how our political system currently looks." Student 1A further indicated that more recent research on gerrymandering would have added great context to the class. Student 3A said, "Include how other countries redistrict and compare to America – that would have been fascinating!"

All eight of the Spring 2023 survey respondents answered a form of "yes." Student 1B said, "Even if you don't specifically go into a social science field like gerrymandering, it is important to learn about today's political climate and what to look out for." Student 4B said, "I liked getting to learn so many details about something most classes cover in an hour." Student 7B said, "Yes, gerrymandering and redistricting are so complex, and there is so much information to learn about it. I feel that there is still so much more for me to learn about redistricting even though we spent a whole semester learning about it."

Question 5: What was your favorite part (or parts) of the class?

Student 2A said drawing the maps was their favorite part, "I started drawing maps for fun outside of the classroom because I thought the process was so fascinating!" Student 5A also enjoyed drawing their maps, "This made us put into practice everything that we had learned throughout the semester and forced us to make the same tough decisions that real map makers have to make."

Student 1B enjoyed the 'vibe,' "Definitely the overall environment of the class. I looked forward to coming to this class, which isn't something I can normally say as an engineering major." Student 7B, like student 2A, enjoyed the mapmaking best: "My favorite part of the class was playing around with DRA and drawing different district maps aimed at achieving different goals. It gave me a greater appreciation for those in charge of redistricting and allowed me to see how drawing a map in different ways can change a lot politically for that state."

Question 6: What was your least favorite part (or parts) of the class?

Student 1A said, "I felt the projects were repetitive. I strongly believe that one project would have sufficed, and we could have focused more on the social and political

consequences of gerrymandering." Students 2A and 3A emphasized that the mathematical aspects of the course were difficult to understand without some pertinent background in math and statistics. All eight students from Spring 2023 expressed frustration with varying degrees around the quantitative aspects of the course.

Reflection

Based on the survey results, the ability to teach the qualitative and quantitative aspects of gerrymandering and redistricting innovatively and engagingly can significantly enhance students' interest in the topic. Allen (2020) proposes and executes a "Gerrymandering Art Show" with great student survey results. We further know that active learning and authentic assessment are also imperative to student learning success (Kapoor and LeVan 2023). Survey results indicate that students enjoyed the lowest levels of Bloom's Taxonomy (remembering and recall) but also very much enjoyed the highest levels (creation) (Kapoor and LeVan 2023). A course is never done being made better. Moreover, honing ones crafting by improving pedagogy and becoming a better teacher in any classroom of the PK-20 curriculum is needed. Therefore, I take the critiques of the students, specifically around the difficulties in the quantitative sections of the course, and assign more current readings to heart and plan to continue tweaking and enhancing the course should I teach it again in the future.

Conclusion

Is teaching an entire course on redistricting and gerrymandering a wise use of time? Yes! This course supports so many things college is all about, including critical thinking, learning about nuanced topics, and being educated on issues that make students better citizens (Neem 2018). Additionally, it involved skills that employers seek, including working efficiently in teams, solving complex problems with several

variables, and being able to present effectively (Marciniec 2016). Outside of academia and the general populace every ten years, the process of gerrymandering and redistricting is a little talked about phenomenon in our government because it happens so infrequently and seems esoterically technical. However, it can significantly impact who we elect to our state legislatures and the U.S. House of Representatives and effecting several federal funding formulas. These election results have a direct impact on the public policy that is produced. This course allows students to learn about the theory of gerrymandering and to apply what they learned to create something new – a laudable goal for every college course.

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