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Learning the Local Political Landscape with Geographic Information Systems (GIS)

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The focus of the paper is on the transformative effect on student learning and engagement that results from using contemporary Geographic Information Systems (GIS) tools and directed reflection to engage in spatial learning about the politics (literally) surrounding the student. I report on the pedagogical advantages of using spatial analysis (especially embedded in GIS maps) and reflection to foster student engagement with, and learning of, the multidisciplinary foundations of local political conflicts. I present a community politics course that employs GIS (emphasizing goals and learning methods), discuss new developments in GIS tools that enable projects such as the one evaluated here, describe the neighborhood analysis project used in the course and present a detailed, multi-semester assessment of student projects that employs both qualitative data based on student reflections and a more quantitative review of their work. This paper provides a discussion and assessment of applying (GIS) technology to student self-awareness of, and engagement with, political issues in their own hometown.

Keywords civic engagement, community politics, Geographic Information Systems (GIS), reflection

Introduction

I report herein on the pedagogical advantages of using spatial analysis (especially embedded in maps) and reflection to foster student engagement with, and learning of, the multidisciplinary foundations of local political conflicts. My focus is on the transformative effect on student learning and engagement that results from using contemporary geographic information systems (GIS) tools and directed reflection to engage in spatial learning about the politics (literally) surrounding the student in their own hometown. To illustrate the usefulness of GIS tools for teaching politics, I present an example project from four years of experimentation and the accumulation of student research and reflective feedback in my Politics of Community Change course. This course draws upon political science, history, demography, sociology, and geography to demonstrate how changing conditions in a community alter the nature of local political life and public policy. This is not done in an abstract manner, but in response to two major problem-based learning assignments; one in which students study their own hometown (covered in detail in the present paper) and a second (community-based research) project in the area surrounding the College of New Jersey.

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In the sections that follow I discuss a spatial approach to learning the sources of community politics, discuss new developments in GIS tools that enable projects such as the one evaluated here by greatly lowering the investment traditionally required for GIS in the classroom, present the course, primarily in terms of its goals and learning methods, describe the neighborhood analysis project used in the course and present a detailed, multi-semester assessment of student projects. Key elements and methods used in the course are suitable for employment in a wide range of other courses.

A Spatial Approach to Engaged and Multidisciplinary Learning about Community Politics

Thinking about issues spatially, and using contemporary tools of spatial analysis in the form of electronically generated maps, provides students an effective framework for seeing connections among disciplinary perspectives and local issues, providing a critical backbone for organizing new knowledge. This is important because, as Melcher observed, students come in with a fair bit of knowledge about an area but are missing “a systematic way of interpreting and integrating the isolated beliefs and bits of information they possess” (1999, 77). Creating maps to locate political issues and their driving forces in spatial relationship to each other provides a powerful means of integrating and interpreting the multidisciplinary perspectives on community politics presented in *Politics of Community Change*. Without maps, key spatial relationships that develop over time in politics are hard to grasp. Typical tools of political analysts, historical narratives and the statistical analysis of data, do not provide the vital visual framework for understanding spatial relationships that is possible only through mapping.

The spatial perspective to studying local politics, predominant in the project evaluated in this study, is structured on three of the four traditions of geography identified by Pattison (1964) and later reinforced by Robinson (1976): spatial analysis, generally embedded in maps; area studies, the concept that a place can be characterized by distinctive attributes (of course, political scientists most typically do this using political boundaries), and human-land interaction. The final tradition, earth science, is not a significant component of the course.

Taking a spatial approach to the course does more than sustain the first tradition of geography, spatial analysis. It also powerfully enables the incorporation of “place,” the second tradition. While course materials equip students with location-independent perspectives on why local political conflict occurs, they are asked to apply these perspectives to the distinctive characteristics of the places they study—neighborhoods, municipalities, and other forms of local communities. The explicit incorporation of place into the work done in the course sets the stage for engaged learning. Students need to review the archives of small newspapers, get out into the field to conduct interviews and observe how the built environment of the place connects to its political issues (the human-land interaction tradition of geography).

While a spatial approach to studying community politics is vital, it is ultimately a means to an end, a tool to reach learning outcomes. The course reviewed here seeks two major outcomes for student learning: greater civic engagement and an appreciation of a multidisciplinary spatial approach to practical research. In the present case “civic engagement” means interest in these issues as practical political problems

about which the student will have to make personal decisions in their life after college. Civic engagement is not a goal of student activism, or of mastering academic knowledge, but rather of creating an interested and informed citizenry.

The first step to enable engaged learning with a place-based, spatial approach is to ask students to start with a place they presume to both know and to care something about, in this case their hometown. Melcher (1999) argues that this is an effective way of building both student interest and student confidence in involvement with the subject matter. Unfortunately it is not often realized in our field. Local politics, especially the treatment of individual smaller municipalities, does not receive a great deal of attention in political science education. This despite the fact that, as Macedo and Karpowitz argue, "American politics has always had a distinctively localist bent, and decentralization continues to spur citizen engagement in politics" (2006, 59). Commenting on the recommendations of the American Political Science Association's Task Force on Inequality they conclude that political scientists need to give more attention to "urban, suburban, metropolitan, and regional institutions and politics," particularly as a means of understanding inequality (2006, 59).

As noted above, engaged learning about place, specifically about the student's own neighborhood and community, is a key method in *Politics of Community Change*. However, without care, that process could merely reinforce preexisting and unexamined presumptions and stereotypes. What is needed as an important ancillary to using engaged learning in the form of spatial analysis to reach the outcome of civic engagement is a substantial dose of structured reflection.

At heart, reflection is a rather simple thing. Yet as Harrison, Short, and Roberts note, "because reflection is part of the thought process, there is a potential danger that academics and educators assume that all students are automatically reflective learners" (2003, 137). Asking students to explicitly reflect on their learning generally presents them with a disorienting and unfamiliar task, it puts them in the position of exhibiting their thinking rather than simply defending their knowledge (Clinchy 1995, 100). As a result, reflection can produce unique educational outcomes. Thompson, Pilgrim, and Oliver found that reflective self-assessment of learning by students boosted student confidence in their independent learning skills in geography (2005, 416). A survey of geography educators by Harrison, Short, and Roberts similarly found that an explicit reflective requirement "helps students become self-directed, self-aware, self-evaluative and good independent learners" (2003, 143). Beyond its benefits for student learning, an explicit reflection requirement also provides evidence of the learning experience (or lack thereof) to the instructor, helping to assess the assignment. As a result, *Politics of Community Change* requires students to engage in structured reflection throughout. The course as a whole also employs a simple journaling component, where students are asked to bring a couple of written reflections on the readings, course discussion, or assignments to each session. Park (2003) has found journaling to be an effective tool to create the environment for reflective learning in geography courses.

The second major outcome sought for student learning in the course is an appreciation by students of the value of bringing an array of disciplinary perspectives to bear on a practical research problem. I consider this a multidisciplinary, rather than interdisciplinary, goal. That is, it makes use of contributions from multiple disciplines without attempting some synthesis among them. The course makes use of perspectives from political science, history, demography, sociology, and geography. For example, students have examined how the aging of a population

(driven by demographic imperative) initially lowers municipal costs in the form of schools but ultimately leads to demands for funding senior centers and related services. Discrete perspectives from different disciplines are brought in as appropriate to study the problems with which the students are presented. Such a wide array of perspectives could easily lead to chaos and ineffectiveness without some unifying thread, especially in what is essentially an introductory course. The key enabling method in achieving a multidisciplinary study is to organize these perspectives through spatial analysis, more specifically, through the use of mapping. Although *Politics of Community Change* is strongly multidisciplinary, the disciplines are united during class sessions through discussing historical development (change over time) and, especially, a spatial perspective (change over space).

The two outcomes for student learning in the course, civic engagement and multidisciplinary practical research, are certainly not unrelated. Reflective inquiry that challenges students' preconceptions about their hometowns is greatly aided by the explicit incorporation of differing perspectives from relevant disciplines. Likewise, the wide variety of disciplinary perspectives is kept manageable and made useful by conducting clearly focused spatial analysis in an engaged manner.

Geographic Mapping Tools

Before examining the specific project in *Politics of Community Change* and its analysis, a brief discussion of recent trends in GIS tools is appropriate. The mapping assignments asked of students in *Politics of Community Change* would not have been possible prior to the era of computer-generated mapping and would still have been unrealistic until very recently. The GIS industry has experienced rapid and disruptive change during the past few years, greatly expanding, and making easier, the pedagogical possibilities for employing mapping. Yet new tools almost never entirely replace old, and it is thus worthwhile to characterize the advantages and disadvantages of both the traditional and emerging approach to GIS. Both the traditional and the emerging approaches to GIS have advantages and drawbacks; although I argue the latter is becoming much more appropriate for most undergraduate education uses.

The Traditional Approach: Desktop-Based Mapping with ArcGIS

ArcGIS, by ESRI (<http://www.esri.com/>), has come to dominate the market for GIS software. ArcGIS provides a comprehensive set of tools for incorporating data, building maps, and formatting the final output. Although it has many online and server-based extensions, ArcGIS is used primarily as an application (ArcView) installed on a local desktop computer. For many years the ArcGIS "shapefile" format has been the core of a standard data archive and exchange process for GIS users, much like Adobe's PDF format for exchanging completed documents. Many inventories of maps and data have been built to this standard, and other formats such as the U.S. census data can be imported into it with some effort.

The primary issue with ArcGIS is that, as a comprehensive professional tool, it has a steep learning curve, making it significantly harder to learn than Microsoft Office, and more on par with mastery of a statistical package like SAS or SPSS in the sense that it requires substantial expert content knowledge to use effectively. For example, building quality maps from scratch in ArcGIS requires knowledge

of geographic projection systems as well as data interchange formats. Using and sharing maps publicly requires knowledge of metadata standards. Of course it is possible to create a map in ArcGIS using data layers created by someone else without this knowledge, but here a little knowledge can be a dangerous thing, much like running analysis in SPSS without knowing anything about statistics.

In the first two years of the Politics of Community Change ArcGIS was used for the major projects in the course. The first year the students undertook a significant self-paced tutorial and I reviewed their completed work before they used ArcGIS in class projects. This worked well but obviously consumed considerable time by them that could have been applied to other tasks. In the second year of the course, in order to make time for newly-emerging mapping technology, I tried a two-day “crash course” in ArcGIS, which had some value but was, predictably, less effective.

While ArcGIS represents a substantial commitment to employ, it is not without its advantages. Again, like familiarity with a statistical package, having it as a skill on one’s resume is very valuable. One of the students from the first class was offered a full-time position on the spot when he mentioned during a visit to his county’s planning office that he was familiar with ArcGIS. Given that ArcGIS skills are in high demand, developing even introductory skills in its use opens the door to a community of professionals that currently rules geographic data centers virtually everywhere, controlling access to data and maps.

ArcGIS has been used effectively in some learning environments with extensive support. Smoller (2002) and, more recently, Ono (2005) describe a variety of uses for ArcGIS-based GIS mapping in political science education. An excellent example of a traditional implementation of GIS in a political science course is provided by Been and Gutierrez (2006), who had students analyze and map projected trends in Latino voters in Texas counties for their impact on representation. Been, a GIS specialist with the library, worked with Gutierrez, a political science professor, to develop the data and tools for the assignment. This type of project is heavily customized to a particular predetermined assignment definition and obviously requires considerable preparatory investment by the instructor as well as technical support. Despite the steep learning curve and substantial resource investment it requires, ArcGIS remains the dominant professional GIS tool and is the best route for highly customized work where one needs complete control over the final output.

The Emerging Approach: Combining Online Mapping Tools

In the past few years an alternative approach to using ArcGIS has become increasingly viable; although it also has its disadvantages. Like many other industries GIS has increasingly adopted the Web as a primary medium. Innovative and increasingly sophisticated applications have emerged online, allowing end users to create maps over the Web without the learning curve required for ArcGIS. In these cases users are spared data preparation, formatting, and archiving tasks. The more controlled and automated environment also reduces the likelihood of fundamental errors by novices. I’ll briefly review three such tools used in my class before summarizing how they can be used together as well as the overall advantages and disadvantages of this approach.

1. Google Earth (<http://earth.google.com/>) is probably the most well known and most initially appealing. A free download, Google Earth uses a slick interface to

provide both photo imagery and traditional map access to physical features. The first time someone zooms in on a close-up photo of their house from orbit, they are enthusiastic about the application. Although it started with few usable features, Google Earth is becoming an increasingly powerful tool for spatial analysis. Being directly linked to the rest of Google, it excels at plotting retail establishments and major landmarks. It also now permits address matching of user-entered data. It has a large user community creating and sharing data archives. As a result the Google Earth data file format, KML, is rapidly becoming a second standard among GIS users for data interchange. Yet while Google Earth is likely to challenge ArcGIS as the primary GIS tool in the long run, by itself it still lacks essential layers of data at present for even introductory analysis with GIS, such as census data.

2. American FactFinder, a tool on the U.S. Census Bureau Web site (<http://www.census.gov/>) is an extremely powerful and easy-to-use tool. The user can obtain data and custom maps for geographies from the nation down to individual census blocks. As the Census adds more cities to its annual American Community Survey the data are becoming increasingly fresh and relevant. Census data contain a large number of details about population, race, income and class, education, economic activity, health, and physical infrastructure. Although not as visually striking as Google Earth, the underlying analytical power of American FactFinder data, combined with the ease of use of its mapping tools, have made it the primary GIS tool for the project described in this paper.
3. i-MapNJ (<http://www.state.nj.us/dep/gis/depsplash.htm>), a product of New Jersey's Department of Environmental Protection, is a good example of a more specialized online GIS application. Many states (and even some large municipalities) offer similar interactive online mapping services (e.g., Oregon, Missouri, New York, Philadelphia). i-MapNJ has an interface similar to FactFinder; although it is more difficult to use effectively. It provides custom maps and data on New Jersey's environment, public policy designations of environmental regions, and the ability to plot hazardous waste sites from both state and federal databases. With sufficient effort invested in understanding the implications of what i-MapNJ contains, it is a tool of impressive depth in its field.

These are the major new GIS tools used in the course to date, yet there are many other specialized possibilities emerging. For example, the tool from Zillow (<http://www.zillow.com/>) overlays market values of properties and other data useful in real-estate on aerial-photo-based maps.

While all of these tools are easy to use compared to ArcGIS, none of them give the user complete control over the data sources or composition and formatting of the final map. At present it is not possible to import the contents of one map into another in order to produce a single map that plots layers from all data sources, which is the norm for ArcGIS users. Indeed using them together is a bit of what has become known as a "mashup" (using unconnected material together without fully integrating it) that harkens back to the days of noncomputerized GIS where different mapping layers were drawing on transparent sheets and physically overlaid. Thus integrative use of these tools currently requires printing multiple maps with approximately the same geographic coverage and flipping through them to see only

approximate spatial relationships between layers. While this approach is suitable to the course project as an introductory assignment in defined geographical units, it obviously would not be suitable in other situations. Yet signs are growing that many of these online tools are converging on the KML standard for mapping data. If this occurs, the primary disadvantage of using this approach to GIS, the lack of a unified mapping interface, will be greatly attenuated as it will be possible to import data layers from a variety of key sources into a single final map.

For the Politics of Community Change course, the emerging approach using online tools has come to predominate. It allows students to start using GIS and to see results immediately. Even in the one class session I devote to introducing the three major tools we still have time to work with them using student queries to begin to learn about their communities. On more than one occasion student beliefs about their own hometown and neighborhoods have been productively challenged in this initial session. The awkwardness and imprecision of using maps generated by multiple applications is worth it to have rapid results in student mastery and to be able to invest more student time on substantive content. I continue to use ArcGIS only in more extended projects than the one described here, and then only when necessary.

Politics of Community Change and the Neighborhood Analysis Project

Politics of Community Change is an evolved version of a traditional urban politics course. Although it incorporates many traditional themes, such as the building of American cities through waves of immigration, machine politics, and progressive reforms, and the decline of urban political power in the face of the rise of suburbs, it adds several new components. The first is a metropolitan focus, giving primary emphasis to neither the urban core nor outlying suburbs but rather considering both as part of a larger system. The second is the spatial approach to engaged and multidisciplinary learning about community politics previously described. Students are assigned two problem-based projects in the course. In the first (described at length in this paper) students discover and analyze policy issues in their hometown as a midterm “neighborhood analysis” assignment. In the second project students conduct a more extensive field research project in the area surrounding the college as defined by a community partner organization who will receive and act on the results of the research.

The Neighborhood Analysis Project

In the neighborhood analysis project students are first asked to draw, in class, a map of their hometown and their neighborhood in it. They are asked, to the best of their ability, to indicate major landmarks, commercial, educational, and cultural institutions, to draw the general layout of the town including major residential areas defined by differences in race and class, and to plot the location of conflicts and issues facing their town. The last request is most difficult for them but it begins the process of thinking spatially about causes and effects in local politics. Many of the students also have the opportunity to exhibit their finished maps to the rest of the class as a prompt to discussion about how issues compare across different communities, beginning the reflective component of the project.

The project is started with this mental-mapping exercise within the first week of the semester and without prior announcement to the students. This type of mental-mapping exercise has been widely used to make explicit native knowledge

of communities (Broderick 2003) and, more appropriate to this assignment, to make explicit the biases in how individuals view their communities (Matei, Ball-Rokeach, & Qiu 2001). The initial mental-mapping exercise helps the students get started with connecting multidisciplinary perspectives through spatial analysis. More importantly, it is critical to setting the stage for effective reflection in the project. The students base many of their reflections on the similarities and differences between the initial mental map they draw in class to the series of final maps they present at the end of the project.

Over the next several weeks they are given a complex set of individual rather simple tasks to complete the project. They are asked to produce a paper of about eight pages (excluding maps) that includes:

- A data-rich description of their city (and, if possible, their neighborhood), including: its size (area and population), physical layout, population makeup (including ethnicity and age distribution), income levels, major employers, educational and cultural institutions, and the structure of local government (including its major bodies and related committees and organizations).
- A discussion of changes in the above characteristics in recent decades and how they have impacted local public policy.
- Identification of major public policy issues and controversies currently facing the city.
- Two to four maps illustrating the spatial distribution of described characteristics and the spatial relationships between changing characteristics and policy issues.
- A substantial reflective component, including discussion of the role of their own neighborhood in the issues identified and the differences between their initial “mental” map and final, research-based, maps.

To complete these research tasks students are asked to employ a wide array of relatively simple information sources. They draw upon public reference sources of demographic, environmental, economical, and governmental data. They conduct a “mapping mashup” using the emerging approach discussed earlier, producing several maps of the same geography using online tools and comparing across them. They are also asked to make use of first-hand local perspectives in two forms: local newspapers and personal interviews. For many of them, searching the archives of their (often) small-town newspaper is a new experience. Even more unique is the expectation that they will interview a couple of long-term residents of the town about changes and issues.

The reflective component of the project is enhanced by a requirement that they will address the role of their neighborhood and family in the trends and issues covered in their paper. For example, they are asked about their neighborhood:

- How does it compare to the city as a whole in terms of the descriptive information?
- What are the major community organizations at work in your neighborhood?
- Is your neighborhood part of the problem or part of the solution to the issues you have identified?

The neighborhood analysis project presents an excellent opportunity to include a substantial, explicitly reflective component because students are being asked to study their hometown; a place with which they assume themselves to be quite familiar yet also a place where they almost always have much to discover.

Assessing Learning in the Neighborhood Analysis Project

Ideally, it would be possible to test the effectiveness of the neighborhood analysis project in meeting the learning outcomes for the course in an experimental fashion. However, this is not realistic for two reasons. First, the outcome of truly increased civic engagement is not likely to be manifest until years after the course, when these traditionally aged college students have settled into a community of their choosing. Employment of multidisciplinary perspectives, at least in a very short-term fashion, is easier to capture and is covered in the analysis that follows. Second, the course itself is an evolving entity from offering to offering, making data collection in experimentally controlled conditions for comparison across small sections impossible. Yet it is still possible to assess in a systematic fashion the degree to which the neighborhood analysis project has met four interim goals derived from the desired learning outcomes of civic engagement and multidisciplinary perspectives in practical research of the course as a whole. These are:

1. *To see the connections among social scientific disciplines.* The project is designed to connect multidisciplinary perspectives using spatial analysis. Evidence of meeting this goal is provided by papers that draw upon concepts from among politics/law, history, demography, sociology, and geography in accounting for changing demands on the local public policy system in their spatial context.
2. *To gain introductory experience in evaluating different forms of evidence in primary research.* Evidence of meeting this goal is an effective and appropriate use of data on demography, the environment, the economy, government and first-hand reports, and opinions from newspapers and interviews.
3. *To gain introductory experience in GIS and spatial analysis.* Rather than focus on specific and deep skills in GIS mapping, such as those required for ArcGIS mastery, this goal is met by demonstrating the ability to spatially locate issues and to correlate them with descriptive data in a more informal matter. Students are asked to create maps with Google Earth, Factfinder, i-MapNJ, or other sources and then to hand annotate them with missing information as necessary to illustrate how changes in a community result in pressures on the local political system.
4. *To become a more self-aware learner.* Evidence of effective reflection is demonstrated by student comments on how new knowledge supported or challenged their prior beliefs, enhancement of their ability to map issues in their communities, the attachment of personal valuation to issues (e.g., “this policy will be good/bad for my town”), and identification of a personal stake in the issues presented.

In order to explore the effectiveness of the neighborhood learning project in meeting its goals, I retained the 51 completed student papers from the past three offerings of the course and scored them by evidence of meeting each goal. I also constructed a table of issues discussed in the papers and compiled a list of student reflection comments. The scoring/compiling process was conducted separately and much later than the grading of the papers without reference to the paper’s author or grade received. Given the inherent subjectivity of the process, papers were scored mostly on the simple presence or absence of evidence for an outcome; although some averages were scored where appropriate. Table 1 summarizes the paper scoring.

Table 1. Analysis of student papers ($N=51$)

Item	Papers employing, (%)	Average in each paper
Concepts connecting disciplines to demands on govt.		
Politics/Law	51 (100)	
History	25 (49)	
Demography	36 (71)	
Sociology	24 (47)	
Geography (human-land interaction only)	13 (26)	
Number of disciplines represented		2.88
Data & mapping tools used		
Census demography data	51 (100)	
Census demography maps	49 (96)	
Environmental data	20 (39)	
Environmental maps	17 (33)	
Economic/Commercial data	40 (78)	
Economic/Commercial maps	26 (51)	
Locally generated sources		
Reference	51 (100)	
Newspaper articles	48 (94)	2.26
Interviews	42 (82)	1.88
Reflective elements		
Findings supporting prior beliefs	34 (67)	
Findings challenging prior beliefs	30 (58)	
Issues identified in initial map		0.86
Issues identified in final map		2.80
Valuation of issues	36 (71)	
Connection of issue to neighborhood/ household role	42 (82)	

The first set of scores evaluate the first course outcome by marking papers on the inclusion of concepts from different disciplines linked to policy demands on local government. On average each paper included concepts from just under three of the five disciplines introduced in the course.

In the case of politics/law concepts included in a paper could be issues of political corruption, the distribution of partisan alliances, and taxes and spending. For example, one student tied the call for increased sharing of services with surrounding towns to the statement by one of its councilmen that “the township has two full-time fire departments to cover a 7.4 square mile radius and less than one fire call per year.” Given the heavy emphasis on politics in the course, it is not surprising that all of the papers in some way made use of political concepts in accounting for policy demands. Demography, meaning here policy demands that appear to originate in the shift over time in populations (primarily shifts in size, location, or age distribution), provided another set of concepts that were frequently employed in the papers, appearing in 70% of them.

The other three disciplinary perspectives in the course were somewhat less emphasized but still appeared in many of the papers. History was scored if

the student discussed a major historical event or individual that had an impact on the town that in turn led to a current policy issue. Like history, sociological concepts appeared in about half of the papers. In the case of sociology, students would draw upon tensions such as class or racial conflict, the activities of powerful social organizations, or less formalized social groupings and distinctions to account for the presence of policy demands. Use of sociological concepts produced some of the most striking reflective statements in the papers. For example, one student noted:

In the initial map I created in January, I note that I didn't include the Staten Island Expressway. This shows my former ignorance of the great divide between the island's two halves. The Northern half of my map had little detail, except for the Staten Island Dump. This shows that I rarely went to the North. And why should I? As a Southerner, many people here think I should consider myself their "better."

Race was the predominant sociological concept that appeared in reflections. One student expressed shock at learning that his city of 18,000 only included 0.5% African Americans, according to census data. Another objected emphatically in class that the census data showing his town to have a relatively average African American population of 13% must be wrong. By the time he finished his paper he was ready to consider why his perception might have been skewed: "I assumed that my town was predominantly young, being a student, and far more diverse, perhaps because I was a student in public schools." An African American student was surprised to discover that her section of Trenton was about half white, not nearly all black as she had believed. More poignant reflections were provided by a student who, commenting on the very tiny African American population (mostly descendents of servants) of his old seaside resort town commented that "at an early age, the white children in my school made it clear that my part of town was off limits to them and their's to me," while another student observed the passing of ethnic discrimination from one generation to another via her own family: "[T]hrough an interview with my father the process of different ethnicities 'pushing' others out of certain areas was made clear to me. His family, being Italian and present in the area since the early 1900s, witnessed this first hand."

Since the whole course is unified by a spatial perspective, for the purposes of this exercise, geographical concepts were scored very narrowly, to include instances where the physical geography of the city (such as being on the shore) or fundamental built infrastructure (such as rail lines or major highways as barriers) created policy issues. This categorization is based on the human-land interaction tradition of geography. Geographical concepts appeared in about a quarter of the papers.

The second set of scores in Table 1 concerns the second and third goals of the project—the appropriate use of multiple forms of primary evidence, and GIS mapping with the primary tools introduced. Essentially all of the papers included copious facts from the census data and maps created from Factfinder. Environmental data and maps were employed in only about a third of the papers. The lower relative use of environmental concepts is unlikely to be due to a shortage of environmental issues in New Jersey. Perhaps i-MapNJ is just hard enough to use effectively that students shied away from it, but it is also probably due to the relatively less emphasis placed in the rest of the course on environmental issues compared to others. Students did make frequent use of the economical and commercial data available from the census and the retail-oriented data available in Google Earth,

with three-quarters using the former and about half the latter. Not surprisingly, all of the papers made extensive use of reference data on their hometowns. Virtually all of the papers made appropriate use of some newspaper and interview evidence. About two articles were used on average and about two interviews were conducted.

The final set of scores concerns the reflective elements of the project. Papers were scored on student reflections that supported the beliefs they held about their hometown prior to the project and those that challenged them. There is considerable overlap in these scores. Some students were positive about their hometowns from the start, one commenting that "when I drew my map of Florence in class, I had forgotten how much I loved my home town." However most found some preconceptions confirmed while others were challenged. The cases where students reflected on how their preconceived beliefs about their hometowns were challenged by their research (58% of the papers) are especially indicative of an effective learning experience.

The multiple facets of the project are united by spatial analysis. An important part of this learning outcome is the ability by students to locate policy issues on their maps in relation to differences in other characteristics that may give rise to them. Students were asked to reflect on the differences between their initial and final maps, especially with regard to the issue-plotting task. As Table 1 shows, there was a very substantial difference between the ability to map issues between the two maps, with the final maps showing more than three times as many issues on average. Reflections on the issue-plotting task impressed the students with the unexpected salience of these issues in their hometowns. One commented "I was always under the impression that Hillsborough was not doing very much to preserve farmlands, but I learned and was surprised about the programs as well as the size of the farms that still exist." Another remarked: "I never knew how big the issues in my town regarding growth were. After all the research I have done, I have become very aware and very compassionate on the issues involving my town. To add 33,000 housing units to the community will destroy it."

Reflection was also evident in cases where the student considered how their valuation of policy issues may not match the views of others, which occurred in 71% of the papers. One student revealed: "I never realized the controversy surrounding the growth of New Egypt. Living on Main Street I generally assumed that most residents would be supportive of more development. However many people living on the edges of town were attracted to New Egypt by its small town appeal and 'countryside' environment."

The final entry in Table 1 examines the component of the assignment that asked students to consider the role of their neighborhood in the issues they identify. For many this quickly extended to the role of their own households. Eighty-two percent of the papers included reflection on this component. An example: "I feel that my neighborhood is part of the problem with the overcrowding of the high school as many of my high school friends live in my neighborhood and more kids are moving in with their parents every day."

Table 2 presents the issue areas identified in at least two student papers. Although they are ranked by frequency, this ranking needs to be interpreted very cautiously since the categories were constructed post hoc, they overlap, and vary in breadth.

Table 2 illustrates the considerable variety in issue areas discussed in the student papers. In some ways the topics and their frequency probably reflect the situation of most middle- and upper-middle-class, high-achieving college students; for example,

Table 2. Frequently mentioned issue areas in student papers ($N = 127$)

Issue area	Frequency	% of Papers
School resource needs	16	31.4
Redevelopment planning (including Brown Field redevelopment)	14	27.5
Transportation management and safety	11	21.6
Property taxes	10	19.6
Open space preservation in face of sprawl pressure	9	17.6
Gentrification and lack of affordable housing	7	13.7
Racial segregation and inequality	6	11.8
Restoring environmentally damaged sites	6	11.8
Ethics in local government	6	11.8
Services not matching changing population (e.g., senior centers)	6	11.8
Nontransportation infrastructure issues	5	9.8
Economic class segregation/inequality	5	9.8
Violence and crime	5	9.8
Poor school performance	4	7.8
Recent loss of employers	4	7.8
Overly decentralized emergency and other services	4	7.8
Poor economic management or planning by local government	3	5.9
Weak local government organization	3	5.9
Neighborhood disruption caused by construction	3	5.9

in the students' emphasis on demands for school resources, sprawl-related issues, and property taxes over concerns about violence and crime and inequality. Yet the same evidence supports the "starting with something you think you know" basis of the project. In each offering of the course the project has prompted an extended discussion of the irony of both local demands for greater school resources and demands for reducing the property taxes that support schools. This dilemma, fairly familiar to students, has branched into deeper discussions about its relationship to low-density growth, segregation and inequality, the disadvantages of local power, and both New Jersey's history of corrupt politics and its "Multiple Municipal Madness" of small and powerful municipalities (Karcher 1999).

With respect to the student reflection component of the project, the most compelling were those reflections that demonstrated a growing awareness not only of the issues but the unmet need for a more active civic life in their town and their own potential to become community leaders, hinting that the course outcome of civic engagement would be achieved. Reflections from three different students of this type follow:

Being a recent immigrant, [this assignment] allowed me to view the town in terms of an outsider and therefore this research assignment allowed me to surpass the initial precepts that I have made, coming here five years ago. That being said, the information I have learned is not known to other residents of the town. When asking several townsmen of the issues

I have previously discussed, they were at a loss. This conveys that there is a large gap of knowledge among the people.

At the time, I had no idea of the problems that the town faced. My best guess was that there was an issue of whether or not to expand the middle school in the town. I was right about that but had no idea of the other issues that the town faced. Most of them came as a shock to me. . . . The scariest thing is that if I do not know, how many other people do not know?

In interviewing Councilwoman Taule I learned what steps were being taken to save Skyline Lake, the very lake I grew up on. I saw visual representations of the segregation I knew to exist in Ringwood. Indeed, were it not for this analysis, I would still think of Ringwood in simple geographic terms. . . . I learned just how bad the environmental and social issues centered around the Ford Superfund Site and Ringwood's lakes really are. The Ramapough Indians are suffering terribly and Ringwood's lakes face their obliteration. Were it not for this paper, I would not have known as much about the two most important issues in my town. In fact, through writing the paper I became impassioned and outraged, and plan to speak out at public meetings regarding town problems.

The assessment of the student papers provides ample encouragement to keep using and refining the use of the neighborhood analysis project as a spatial-analysis-based learning tool for accomplishing a complex set of tasks in a very limited assignment: introducing spatial analysis of multiple forms of data from a variety of disciplinary perspectives in a way that is both personally relevant to the student and promotes engagement and self-aware learning through reflection.

Future Directions and Applications to Other Settings

Politics of Community Change is a constantly evolving course. In particular, each offering culminates in a different community-based research project and the neighborhood analysis project needs to continue to develop in order to prepare students to undertake that project as well as to achieve its own goals. The emerging Web-based GIS tools are being rapidly adopted in Participatory GIS (PGIS), a field that encourages local community organizations and activist groups to incorporate GIS into their work (Kingston 2007). As Web-based GIS tools become more common throughout society, literacy with these tools will play an increasingly prominent role in the spatial analysis undertaken in the course. Students will find themselves working with community partners with exposure to spatial analysis tools similar to what they have developed in the course, making true partnership more likely. As these new tools mature to the point that they can be used for more professional projects, students can not only use them in their work with community partners, after graduation they take these skills with them to share as they become leaders in their own communities.

A course like Politics of Community Change is not a typical part of the undergraduate political science curriculum. Yet principles and techniques employed in the course can be easily fit into other settings. Using spatial analysis to bring perspectives from multiples disciplines to bear on political issues has wide applicability.

The newly emerging tools for GIS in particular offer four key characteristics enabling application in other settings:

1. *High interactivity.* Unlike the traditional approach to GIS, it is possible to easily generate complete maps on the fly with tools like Google Earth and American Factfinder with just a Web browser. This makes them every bit as suitable for use as part of an interactive lecture as they are useful for student assignments. Presenting students with maps generated in real time as they raise questions for inquiry is a valuable addition to classroom technique.
2. *Flexible investment of time and effort.* As discussed above, the new tools for mapping have a low learning curve. Thus a single map can be created from one source in just a moment. Yet these tools can also be taken much further. The kind of custom development of deep analysis using a traditional tool such as ArcGIS is growing more realistic as Google Earth slowly supplants it as the de facto standard.
3. *A wide variety of data sources.* In addition to those mentioned in this article, online mapping projects can draw upon extensive databases of environmental, public health, crime, education, transportation, and other types of data. This leads to applications in a variety of courses in public policy that could benefit from a spatial approach.
4. *Scale independence.* While the course described in this paper is focused on community-level politics, the approach and tools used are not inherently specific to that level. Analysis at the state, regional, and national levels can be conducted with the same tools and data sources. Using a somewhat different set, cross-national comparisons can also be made.

Beyond facility with the specific tools employed, the ability to situate an individual or region in its spatial relationship to others in terms of demographic, economic, political, and other variables is a powerful learning tool when combined with structured reflection. While change over time in communities (at any scale), and its impact on the policy system, can be conveyed in the narrative style of traditional lecture courses (i.e., as history), the inherently spatial aspects of political change cannot be effectively learned in this format. The traditional statistical tools of political science leave little room for spatial analysis or attaching value to concepts of “place” as arranged geographically. Fortunately, the ability to generate custom maps through contemporary GIS technology provides a superior means for examining the key spatial relationships that develop over time in politics. It adds an entirely new dimension for student learning, transforming the linear narrative of history or the mathematical accounting of statistics into a visual field where spatial relationships and the importance of place are clear.

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