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Jack Dougherty

Trinity College, jack.dougherty@trincoll.edu

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SmartChoices: A Geospatial Tool for Community Outreach and Educational Research

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[SmartChoices](#), a Web-based map and data sorting application, empowers parents to navigate and compare their growing number of public school options in metropolitan Hartford, Connecticut. A team of students, faculty, and academic computing staff at Trinity College developed this digital tool in collaboration with two non-profit urban school reform organizations: the Connecticut Coalition for Achievement Now (ConnCAN) and Achieve Hartford (the city's public education foundation). While English and Spanish-speaking parents learned how to use SmartChoices through a series of hands-on workshops, my students and I simultaneously collected data to better understand the "digital divide" and factors influencing parental decision-making on school choice. Overall, our project supports two liberal arts learning goals: to deepen student interactions with members of our urban community, and to nurture student participation in creating original research for real audiences.

The idea for SmartChoices began during a conference call with community partners a few weeks before the fall 2008 semester. Marc Porter Magee from ConnCAN and I were brainstorming about a possible collaboration between his education reform group and my [Cities, Suburbs, and Schools undergraduate seminar at Trinity](#). Building on Trinity's long-standing Community Learning Initiative, I designed this interdisciplinary seminar as a team research workshop, where we read historical and social science studies on schooling and housing and then design local research projects to test the application of research findings to metropolitan Hartford. Our region is a land of extremes: Hartford is one of the nation's poorest cities, located inside a belt that includes some of the wealthiest suburbs. A year earlier, while learning basic GIS skills, my students created thematic maps to explore city and suburban differences in educational resources and outcomes, using data provided by ConnCAN. We all sensed the power of maps, and sought to build on our relationship by going a step further.

Marc and I agreed that the expansion of public school choice would soon become the most pressing issue for Hartford parents, because each family's number of options was dramatically increasing, for two reasons. First, the Sheff v O'Neill school desegregation case created more interdistrict choices. Based on a 1996 ruling, the court mandated Connecticut to create more magnet schools (designed to attract both city and suburban students), encourage suburban districts to accept more city student transfers, and begin counting public charter and technical school students when calculating racial integration goals. Second, the Hartford Public School launched its district-wide school choice program. The district replaced neighborhood school assignment with a citywide lottery, required for all students who completed their current school's last grade level, and optional for any students who desired to change schools. Suddenly, Hartford parents who were accustomed to sending their children to the neighborhood school were surrounded with more choices, and now when their child finished elementary or middle school, they were required to submit a choice application to advance to the next grade level. All together, a typical Hartford parent of a child entering the 6th grade now faced over thirty different school options. Moreover, competition between interdistrict and district providers meant that there were two different major application processes--and a host of minor ones--

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each with their own application form and procedures. While public school choice was intended to improve educational opportunity, it quickly became overwhelming.

"Do you think you and your students could design a brochure to show Hartford parents their school choices?" Marc asked.

I explained that there was no way to create one printed document that showed parents their exact set of eligible choices. We needed a dynamic system to deliver the right school data--and only that data--for each family, based on their residence and child's age. First, parents wanted to see only those schools that offered their child's grade level, and these varied widely across the two hundred public schools in the metropolitan region (ranging from K-2, K-5, K-6, 3-5, 5-8, 6-8, 7-12, 9-12, and so forth). Second, the Hartford Public Schools divided the city into four zones, guaranteeing bus transportation only for students attending schools within their residential zone, provided they did not live so close that they could walk. Third, across the region, many schools were limited to enrolling students from designated attendance zones or school districts. Yet public school choice happened so fast that most Hartford parents, particularly new arrivals with limited literacy skills, had little sense of where their interdistrict and district school options were located.

"The only way we can do this is to create a Web site," I replied, "and it needs to show parents their eligible schools on a map, in relation to where they live." We agreed to cooperate on attempting to build a pilot version during the fall semester, with Trinity designing the technology and ConnCAN providing school data and community support. The fact that my graduate training had focused on history and sociology (not computer science), and that I had acquired only "advanced beginner" GIS and HTML skills during the past decade at Trinity, should have made me think twice before leaping. But I was fascinated by the idea of blending a much-needed community outreach project with a research tool to better understand how parents from different neighborhoods made school choices.

Prior to this conversation, I had read innovative research studies on parents, information, and school choice. In Washington, DC, Jack Buckley and Mark Schneider created a Web site where users could compare different public schools (traditional and charter), while researchers monitored mouse clicks and search patterns.¹ The authors found that parents using the site displayed racial preferences: when comparing two schools with comparable achievement levels, parents were more likely to drop the school with a higher percentage of black students. Later, I became aware of a related study by Justine Hastings and Jeffrey Weinstein in Charlotte-Mecklenburg, North Carolina, where researchers experimented with providing school data to parents in different paper formats.² They discovered that low-income parents who received a list of schools ranked by test scores were more likely to choose higher-performing ones than a control group which received an alphabetical list, without test data. Furthermore, Trinity economics professor Diane Zannoni, our undergraduate co-authors and I published an article that analyzed how much money suburban homebuyers were willing to pay for a comparable home on the more "desirable" side of an elementary school attendance line, and connected this trend to the growing availability of school-level data on the Internet.³

Fortunately, my Trinity colleagues and students shared in the enthusiasm and hard work to create the SmartChoices Web site. When parents type in a child's home address and grade level, the site displays all of their eligible district and interdistrict public schools on an interactive Google Map, as well as a table for sorting and comparing distance from home, racial balance, and student achievement levels. Additional links point users directly to individual school Web sites, application forms, and transportation information. David Tatem, academic computing instructional

technologist, helped me to conceptualize the interactive map and school database, and provided GIS support. Undergraduate research assistants Jesse Wanzer and Nick Bacon digitized school attendance boundaries. My seminar students compiled address and demographic data for over two hundred schools in the city and nearby suburbs. Devlin Hughes concentrated on refining the user interface as a case study for her senior thesis on data visualization, with assistance from Trinity's social science data coordinator, Rachael Barlow. Another student, Christina Seda, provided the Spanish translations. Jean-Pierre Haeberly, the college's director of academic computing and an exceptionally talented programmer, developed the Web application. Based on Web 2.0 design principles, SmartChoices exists on a three-tier server architecture, which integrates the Web server (for the search page and interactive map) with the application and database servers. Asynchronous requests permit the user to initiate searches and view results without having to reload the page, as in a traditional form-based Web site. To encourage other regions to create similar Web sites, we are distributing SmartChoices code as free, open-source software upon request by email <SmartChoices@trincoll.edu>.



Figure 1. Smart Choices Web interface

Prior to our public launch, ConnCAN community organizer Lourdes Fonseca helped organize a series of focus groups to receive feedback from Hartford parents and administrators of different school choice programs. My seminar students designed interview guides and guided participants through the pilot site, while recording how users interacted with and interpreted school data on their screens. We made several revisions to make the site as user-friendly as possible for Hartford parents, including many who have little or no experience with computers. We also faced difficult choices when deciding which school-level data categories to feature, since we committed to developing

a site that would fit on display screens no larger than 1024 pixels wide. School choice administrators sometimes requested revisions that would serve their particular program's needs over others, or feature promotional material. Some education officials expressed concern about direct school-to-school comparisons of test scores or student racial composition. As a result, we took the position that SmartChoices would stand as an independent project, not affiliated with any school, district, or choice program. Furthermore, we committed to reporting data obtained from public sources of information, such as the state department of education or school Web sites. By providing the most comprehensive source of public school choice information, SmartChoices has filled the role of a "consumer reports" service for public education in the Hartford metropolitan region.

After our public launch in early 2009, the Achieve Hartford local education foundation joined the project to fund research and community outreach. Our primary research questions were: Who uses SmartChoices, and how does digital information influence parental decision-making? My Trinity students and I organized a series of parent training workshops to collect both qualitative and quantitative data, and ConnCAN contracted with community organizers from another Hartford organization, the Voices of Women of Color, to assist parents at public libraries and to bring laptop computers into people's homes through school choice "house parties." Print, radio, and television media also broadcast features about the Web Site.

Who used SmartChoices, and where did they search? In our [full report](#), we analyzed Web site statistics and found that during the five-month choice application period in 2009-10, over 3,385 distinct searches were conducted on SmartChoices. Over three-quarters of these searches were conducted for addresses in the city of Hartford, while the remainder included addresses in suburban towns and outside our coverage area. The dot distribution map illustrates the geographical spread of SmartChoices usage across urban and suburban areas. The grade levels most commonly searched were Kindergarten (16 percent) and 9th grade (14 percent), which matches the most common grade-level entry points in the system.

SmartChoices distinct searches Year 2 (Nov 2009 - March 2010)

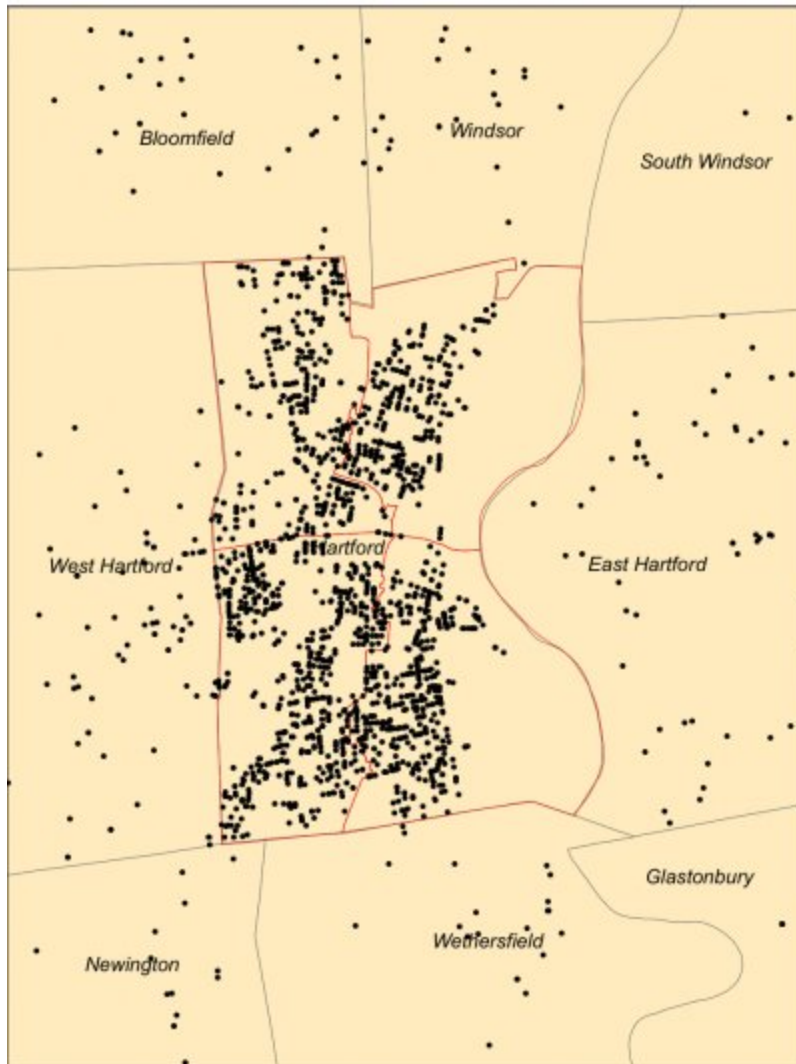


Figure 2. Distribution of SmartChoices searches

How did people use SmartChoices, according to Web statistics? We created a sorting feature that allowed users to organize their search results in five different categories: school name, distance from home, racial balance, test scores, and test gain over the previous year. The Web site randomized how each user's initial results were sorted, to determine which categories were most frequently selected. Among users who sorted results, the most popular categories were Distance (25 percent) and Test Goal (24 percent), with Test Gain and Racial Balance trailing behind. However, we observed that most users never sorted their results (70 percent of the 3,385 distinct searches), perhaps because they did not see the sort button, nor understood how it worked.

Rather than simply waiting for users to find and visit our site, Trinity students and I organized ten hands-on workshops (in both English and Spanish) in Hartford to train parents how to use the site, while interviewing them in depth about their decision-making process. Our sample of 93 workshop interview participants was limited to parents

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of children entering elementary school (grades PreK-8) in the next academic year. Each workshop participant interacted one-on-one with a trained Web site guide, in front of a computer, for about fifteen to forty minutes, and gave informed consent to be interviewed. Each guide followed a script that asked parents to list their top-choice schools (before and after using SmartChoices), and walked users through the Web site while explaining what data labels meant. About half of these interviews took place in workshops at local neighborhood schools, while the other half occurred during larger regional school choice fairs. At the neighborhood events, our most successful workshops were organized with the assistance of Hartford Public School Family Resource Aides (FRAs), who helped us arrange access to school computer labs and attract interested parents with bilingual flyers. Note that these workshops were not located at representative locations across the city (due to research design and logistical issues). Furthermore, all workshop participants were self selected, meaning they voluntarily responded to a neighborhood workshop flyer or walked up to our regional school choice fair tables. By definition, self-selected participants are not necessarily representative of the Hartford-area population at large, limiting the interpretation of our results.





SmartChoices parent workshops. Photos by Nick Lacy.

How did the SmartChoices workshop influence participants' decision-making? Before introducing the Web site, our interviewers asked a pre-workshop question: for one child in your family, what are your top choices for schools next fall? After hands-on Web searching and sorting, we asked it again as a post-workshop question. When we compared participants' pre- and post-workshop responses for their top-choice schools, we found that the total sample divided into roughly equal thirds. About one-third changed their top choice, meaning the workshop experience led them to switch from one school to another. About one-third clarified their top choice, meaning they began with no response or one that was too vague for an application form ("the school near Walmart") but eventually selected a specific school. Finally, about one-third did not change their top choice.

For the thirty-two workshop participants who changed their top choices, we compared their initial selection to their final selection, to measure the relative influence of the four key data categories in the SmartChoices search results. To compare pre/post-workshop responses across different categories, we expressed all in common units, based on one-third of a standard deviation of the mean difference. On this scale, Test Goal (69 percent) and Test Gain (64 percent) were the most influential categories in this sample, followed by Racial Balance (47 percent). Interestingly, Distance was the least influential category in this phase of the analysis, because roughly equal portions selected new schools that were farther, closer, or a similar distance to their homes.

Does this mean that school distance from home does not matter to parents? Absolutely not. When we compared how workshop participants sorted results, we found that Test Goal and Distance were virtually tied (at 23 and 22 percent, respectively), followed by the other categories. Given that parents often make trade-offs between distance and school quality factors they value, we infer that SmartChoices helped workshop participants to identify desirable schools that were located closer to, or a similar distance from, their initial top-ranked school. In other words, we suspect that the SmartChoices map and distance calculator helped workshop participants find "good schools" (however they defined them) that they were not previously aware of.

Does increased public school choice improve education for all? SmartChoices cannot answer this policy question, because this project only considers families who seek to make a choice and self-selected to try our website. For our next research project, Diane Zannoni and I wish to conduct a spatial analysis of who does (and does not) participate in school choice, either by submitting an application or by exiting the district. We are also deeply interested in spatial research that uncovers racial and social stratification as a result of choice.

Nevertheless, the movement for public school choice has attracted multiple supporters in our politically divided nation, particularly in metropolitan Hartford. Advocates of the Sheff ruling support voluntary interdistrict magnet schools and city-suburban transfers as the most viable means to racially integrate schools. At the same time, market-oriented advocates embrace public school competition as a means to empower urban parents to exit low-performing schools and enter those more likely to reduce the achievement gap. "Choice" has become such a politically popular label in metropolitan Hartford that it appears in the name of at least three distinct entities: the Open Choice city-suburban transfer program, the Regional School Choice Office, and the Hartford Public School's "All-Choice" initiative.

We cannot ignore the influence that the Internet has had on consumerist activity in "shopping" for public schools. Google, the ubiquitous search engine, recently reported that the category of "school comparisons" was the leading type of public data search conducted on its Web site in November 2009.⁴ In their report, Google defined "school comparisons" as any search on education from PreK to higher education, such as: "Douglas County schools" or "top law schools." Indeed, other categories might have ranked higher if Google had not broken out certain subgroups of searches, such as separating "cancer" from "health" searches in general. But the report confirms that citizen-consumers are eagerly looking to the Internet to help them make judgments about comparing the relative qualities of different educational options.

Whether or not one supports public school choice, it exists and continues to grow in our nation's urbanized areas. To participate in these application processes, families need access to reliable information to make informed decisions about public schools. To be sure, some information flows through parents' social networks: the opinions of trusted relatives and neighbors, conversations with principals and teachers, and personal visits to schools. But other sources of information--such as student achievement, racial balance, distance from home, and program offerings--are more readily available on the Internet.

Yet access to information, and knowledge about how to search and interpret Web sites, is not uniformly distributed. The "digital divide" was more commonly discussed a decade ago, but it has not disappeared, and remains as one of the most challenging barriers in the twenty-first century knowledge-driven economy. While working on the SmartChoices project, we were struck by the difficulty of obtaining reliable, current data on the scope and size of the digital divide in the Hartford region. In 2007, the US Census Current Population Survey posed this question to a national sample: "Do you (or anyone in this household) connect to the Internet from home?" The proportion responding "Yes" who resided in the city of Hartford ranged from 34 to 55 percent, while those living in the three-county Hartford metropolitan statistical area ranged between 75 to 92 percent. The range in estimates is due to the large number of people whose responses were omitted because they answered "No" or did not respond to the initial question, "Do you access the internet from any location?" Therefore, if we include these omitted responses, the results point to the low end of the estimated range. In addition, we still lack comprehensive data on the true scope of adult literacy--particularly computer literacy--among residents of the city of Hartford, compared to the metropolitan region or state. Based on our first-hand experience with the SmartChoices parent workshops, we witnessed a wide range of computer ability between adults who self-identified as new versus regular users.

As the "SmartChoices" name clearly implies, familiarity with the World Wide Web has become a necessary ingredient to be an informed consumer of public education in Greater Hartford. The rapidly expanding (and constantly changing) set of public school options, as well as differences between competing choice providers and their eligibility guidelines,

made it nearly impossible for us to communicate with parents through a paper booklet or catalog. We created SmartChoices as a dynamic Web site--with an interactive map of school locations, distance-to-home calculator, and transportation links--because we could not conceive of a way to adequately present the key information that each parent needed on paper. Furthermore, beginning in January 2010, the Hartford Public School Choice Office shifted from paper-only to Web-only applications. For families in our urban setting, learning how to navigate the Internet is not an option, but a requirement.

To be sure, digital tools like SmartChoices are only valuable to people who have access and knowledge of how to use them. In our parent workshops, my Trinity students observed significant differences between participants who had greater familiarity with computers and higher levels of education. If school choice is expected to improve public education for all, then community outreach needs to focus on novice computer users, with information literacy to help users understand and interpret key data categories (in English and other languages), as well as hands-on guidance on Web skills such as sorting data and following through with online applications. Liberal arts college students, staff, and faculty already enjoy most of these skills, and we can learn a great deal about our broader communities if we find meaningful ways to engage with them on these important issues.

Notes

1. Jack Buckley and Mark Schneider, *Charter Schools: Hope or Hype?* (Princeton, NJ: Princeton University Press, 2007). [\[return to text\]](#)
2. Justine S. Hastings and Jeffrey M. Weinstein, "Information, School Choice, and Academic Achievement: Evidence from Two Experiments," *Quarterly Journal of Economics* 123, no. 4 (November 2008):1373-1414, [posted online 15 October 2008](#). [\[return to text\]](#)
3. Jack Dougherty, Jeffrey Harrelson, Laura Maloney, Drew Murphy, Russell Smith, Michael Snow, and Diane Zannoni, "School Choice in Suburbia: Test Scores, Race, and Housing Markets," *American Journal of Education* 115 (August 2009): 523-548, [published online 4 June 2009](#). [\[return to text\]](#)
4. "Statistics for a Changing World: Google Public Data Explorer in Labs," Official Google Blog (8 March 2010), <http://googleblog.blogspot.com/2010/03/statistics-for-changing-world-google.html>. [\[return to text\]](#)