Social Contexts of New Media Literacy: Mapping Libraries

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ABSTRACT

This paper examines the issue of universal library access by conducting a geospatial analysis of library location and certain socioeconomic factors in the St. Louis, Missouri, metropolitan area. Framed around the issue of universal access to Internet, computers, and technology (ICT) for digital natives, this paper demonstrates patterns of library location related to race and income. This research then raises important questions about library location, and, in turn, how this impacts access to ICT for young people in the community.

OBJECTIVES AND PURPOSE

The development and diffusion of new media and digital technologies has profoundly affected the literacy experiences of today's youth.[1] Young people today develop literacy through a variety of new media and digital technologies.[2] The dissemination of these resources has also allowed for youth to have literacy-rich experiences in an array of different settings. Ernest Morrell, literacy researcher, writes,

> *As English educators, we have a major responsibility to help future English teachers to redefine literacy instruction in a manner that is culturally and socially relevant, empowering, and meaningful to students who must navigate a diverse and rapidly changing world.*[3]

This paper will explore how mapping and geographic information systems (GIS) can help illuminate the cultural and social factors related to how and where students access and use new media literacies and digital technology. Libraries play an important role in encouraging new media literacy development;[4] yet access to libraries must be understood through social and cultural contexts.

The objective of this paper is to demonstrate how mapping and GIS can be used to provide rigorous analysis of how library location in St. Louis, Missouri, is correlated with socioeconomic factors defined by the US Census including median household income and race. By using GIS, the role of libraries in providing universal access to new media resources can be displayed statistically, both challenging and confirming previously held beliefs about library access. This analysis raises new questions about how libraries are distributed across the St. Louis area and whether they truly provide universal and equal access.

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LITERATURE REVIEW

Advances in technologies are transforming the very meaning of literacy.[5] Traditionally, literacy has been defined as the ability to understand and make meaning of a given text.[6] The changing global economy requires a variety of digital literacies, which schools do not provide.[7] Instead, young people acquire literacy through a multitude of in- and out-of-school experiences with new media and digital technology.[8] Libraries play a vital role in supporting new media literacy by offering out-of-school access and experiences.

To understand the role that libraries play in offering access to new media literacy technologies, a few key concepts must be defined. First is the concept of the digital native. Those born around 1980, who have essentially grown up with technology, are known as digital natives.[9] Digital natives are expected to have a base knowledge of technology and to be able to pick up and learn new technology quickly because of that base knowledge. Digital natives have been exposed to technology from a young age and are adept at using a variety of digital technologies. The suggestion is that young people can quickly learn to make use of the new media and technology available in a specific location.

Key to any discussion of digital natives is the concept of the digital divide. The digital divide has been a central issue of education policy since the mid-1990s.[10] Early work on the digital divide was concerned primarily with equal access.[11] More recently, however, the idea of a "binary digital divide" has been replaced by studies focusing on a multidimensional view of the digital divide.[12] Hargattai asserts that even among digital natives, there are large variations in Internet skills and uses correlated with socioeconomic status, race, and gender.[13] These variations call for a nuanced study examining social and cultural factors associated with new media literacy, including out-of-school contexts.

The concept of literacy and learning in out-of-school contexts has a strong historical context. Hull and Schultz provide a review of the theory and research on literacy in out-of-school settings.[14] A variety of studies, including self-guided literacy activities, after-school programs, and reading programs were reviewed, and the significance of out-of-school learning opportunities was supported by these studies. Importantly for the research here, research has also been done on the use of digital technology in out-of-school settings.

Lankshear and Knobel examine out-of-school practices extensively with their work on new literacies.[15] Lankshear and Knobel also make clear the complexity of out-of-school experiences among young people. Students participate in nontraditional literacy activities such as blogging and remix in a variety of out-of-school contexts, from home computers to community-based organizations to libraries. Most importantly, Lankshear and Knobel found that the students did connect what they learned in the classroom with these out-of-school activities.

The connection between out-of-school literacies and in-school learning has also been studied. Education policy researcher Allan Luke writes,

> *The redefined action of governments . . . is to provide access to combinatory forms of enabling capital that enhance students' possibilities of putting the kinds of practices, texts, and discourses*

acquired in schools to work in consequential ways that enable active position taking in social fields.[16]

Collins writes about this relationship between in- and out-of-school literacies. Collins writes in her case study that there are a variety of "imports" and "exports" in terms of practices. That is, skill transaction works in both directions, with skills learned out of school used in school, and skills learned in school used out of school.[17]

Skerett and Bomer make this connection even more explicit when looking at adolescent literacy practices.[18] Their article examines how a teacher in an urban classroom drew on her students' out-of-school literacies to inform teaching and learning in a traditional literacy classroom. The authors found that the teacher in their study was able to create a curriculum that engaged students by inviting them to use literacies learned in out-of-school settings. However, the authors write that this type of literacy study was taxing and time-consuming for both the teacher and the student. Still, it is clear that connections between in- and out-of-school literacies can be made.

The role libraries play in making this connection has not been studied as extensively. Yet it is clear that young people do use libraries to access technology. Becker et al., found that nearly half of the nation's 14 to 18 year olds had used a library computer within the past year. Becker et al. additionally found that for poor children and families, libraries are a "technological lifeline." Among those below the poverty line, 61 percent used public library computers and the Internet for educational purposes.[19]

Tripp writes that libraries have long played an important role in helping people gain access to digital media tools, resources, and skills.[20] Tripp writes that libraries should capitalize on the potential of new media to engage young people. Additionally, Tripp argues that librarians need to develop skills to train young people to use new media.

The idea that libraries are important in meeting the need is further supported by the recent grants, totaling $1.2 million, by the John D. and Catherine T. MacArthur Foundation to build "innovative learning labs for teens" in libraries. This grant making was a response to President Obama's "Educate to Innovate" campaign, a nationwide effort to bring American students to the forefront in science and math.[21]

This literature review demonstrates that the body of research currently available focuses on digital natives and the digital divide, but that the research lacks the nuance needed to capture the complexity of social and cultural contexts surrounding the issue. This literature review further demonstrates both the importance of new media literacy and out-of-school learning, as well as the key role that libraries play in supporting these learning opportunities. The study provided here uses GIS analysis to demonstrate important socioeconomic and cultural factors that surround libraries and library access. First, I describe the role of GIS in understanding context. Next, I describe the methods used in this paper. Finally, I analyze the results and implications for the study.

Geographic Information Systems Analysis in Education

There is a burgeoning body of research which uses geographic information systems (GIS) to better understand socioeconomic and cultural contexts of education and literacy issues.[22]

There are several key works that link geography and social context. Lefebvre defines space as socially produced, and he writes that space embodies social relationships shaped by values and meanings. He describes space as a tool for thought and action or as a means of control and domination. Lefebvre writes that there is a need for spatial reappropriation in everyday urban life. The struggle for equality, then, is central to the "right of the city."[23] The unequal distributions of resources in the city help to maintain social and economic advantaged positions, which is important to the analysis here of library access.

This unequal distribution of resources continues today. De Souza Briggs and others write that there is clear geographical segregation in American cities today.[24] This is seen in housing choice, racial attitudes, and discrimination, as well as metropolitan development and policy coalitions. In the conclusion of his book, De Souza Briggs writes that housing choice is limited for low-SES minorities, and these limitations produce myriad social effects. Again, this finding is important to the contexts of where libraries are located.

Jargowsky writes of similar findings.[25] Like De Souza Briggs, Jargowsky focuses on the role that geography plays in terms of neighborhood and poverty. Jargowsky even finds social characteristics of these neighborhoods: there is a higher prevalence of single-parent families, lower educational attainment, a higher level of dropouts, and more children living in poverty. Important here, though, is that all such characteristics can be displayed geographically, which means that varying housing, economic, and social conditions can be displayed with library locations.

Soja goes beyond the geographic analysis offered by De Souza Briggs and Jargowsky and writes that space should be applied to contemporary social theory.[26] Soja found that spatiality should be used in terms of critical human geography to advance a theory of justice on multiple levels. He writes that injustice is spatially construed and that this spatiality shapes social injustice as much as social injustice shapes a specific geography. This understanding, then, shapes how I approach the study of new media literacies as influenced by cultural and social factors.

These factors are particularly prevalent in the St. Louis, Missouri, area. Colin Gordon reiterates the arguments of Lefbvre Jargowsky and De Souza Briggs in arguing that St. Louis is a city in decline.[27] By providing maps that project housing policies, Gordon is able to provide a clear link between historical housing policies such as racial covenants and current urban decline. Gordon is able to show that vast populations are moving out of St. Louis City and into the county, resulting in a concentration of minority populations in the northern part of the city. Gordon argues that the policies and programs offered by St. Louis City have only exacerbated the problem and led to greater blight.[28]

In terms of literacy, Morrell makes the most explicit connection between literacy and mapping with a study that used a community-asset mapping activity to make the argument that teachers need to make an explicit connection between literacy at school and the new literacies experienced in the community.[29] The significance of this is that GIS can be used to illuminate the social and economic contexts of new media literacy opportunities as well, which in turn could help inform social dialogue about the availability of and access to informal education opportunities for new media literacy.

METHODS AND DATA

The GIS analysis performed here concerns library locations in the St. Louis metropolitan area, including St. Louis City and St. Louis County. The St. Louis metropolitan area was chosen because of past research mapping the segregation of the city, largely because the city and county are so clearly segregated racially and economically along the north–south line. This segregation is striking when displayed geographically and illuminating when mapped with library location. Maps were created using TIGER files (www.census.gov/geo/maps-data/data/tiger.html) and US Census data (http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml), both freely available to the public via Internet download. Libraries were identified using the St. Louis City Library's "Libraries & hours" webpage (www.slpl.org/slpl/library/article240098545.asp), the St. Louis County Library "Locations & Hours" webpage (www.slcl.org/about/hours_and_locations), Google Maps (www.maps.google.com), and the yellow pages for the St. Louis metropolitan area (www.yellowpages.com). The address of each library was entered into iTouchMap (http://itouchmap.com) to indentify the latitude and longitude of the library. A spreadsheet containing this information was then loaded into the GIS software and displayed as X–Y data. The maps were then displayed using median household income, African American population, and Latino and Hispanic population as obtained from the US Census at census tract level. For median household income, the data was from 1999. For all other census data, the year was 2010.

For district-level data, communication arts data from the Missouri Department of Elementary and Secondary Education (MODESE) website (http://dese.mo.gov/dsm), was entered into Microsoft Excel, and then displayed on the maps. The data is district level, representing all grades tested for Communication Arts across all district schools. The MODESE data was from 2008, the most recent year available at the time the analysis was performed. The Communication Arts data was taken from the Missouri Assessment Program test. This test is given yearly across the state to all public school students. The state then collects the data and makes it available at the state, district, and school level. The data used here is district-level data. Scores are broken into four categories: advanced, proficient, basic, and below basic. The groups for proficient and advanced were combined to indicate the district's success on the MAP test. These are the two levels generally considered acceptable or passing by the state.[30]

Before looking at patterns of library location and these socioeconomic and educational factors, density analysis was performed on the library locations using ESRI ArcGIS software, version 9.0, to analyze whether clustering was statistically significant. This analysis was used to demonstrate whether libraries were clustered in a statistically significant pattern, or if location was random. The Nearest Neighbor tool of ArcGIS was used to determine if a set of features, in this case the libraries, shows a statistically significant level of clustering. This was done by measuring the distance from each library to its single nearest neighbor and calculating the average distance of all the measurements. The tool then created a hypothetical set of data with the same number of features, but placed randomly within the study area. Then an average distance was calculated for these features and compared to the real data. That is, a hypothetical random set of locations was compared to the set of actual library locations. A near-neighbor index was produced, which expresses the ratio of the observed distance divided by the distance from the hypothetical data, thus comparing the two sets.[31] This score was then standardized, producing a z-score, reported below in the results section.

RESULTS AND CONCLUSIONS

Using the Nearest Neighbor tool produced a z-score of -3.08**,** showing that the data is clustered beyond the 0.01 significance level. This means that there is a less than 1 percent chance that library location would be clustered to this degree based on chance. Knowing, then, that library location is not random, we can now examine socioeconomic patterns of the areas where libraries are located.

Figure 1 shows library location and population of individuals under the age of 18 at the census tract level for St. Louis City and County, using data from the 2010 US Census. To clarify, the city and county are divided by the bold black line crossing the middle of the map, the only such boundary in figure 1, where the county is the larger geographic area. Library location is important because previous research shows that young people use informal learning environments to access new media technologies,[32] and libraries are a key informal learning environment.[33] This map demonstrates, however, that libraries are not located in census tracts with the highest populations of individuals under the age of 18 in St. Louis City and County. In fact, for all the tracts with the highest number of individuals under the age of 18, there are zero libraries located in these tracts. This is especially concerning given that young people may have less access to transportation, so their access of facilities in neighboring census tracts may be quite limited.

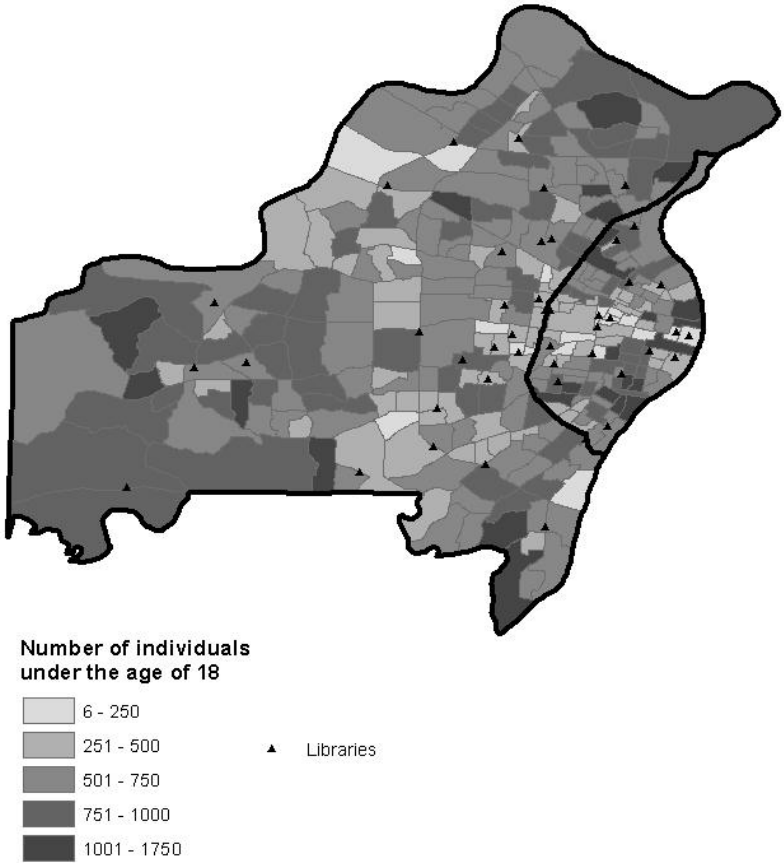

Figure 1. Number of individuals under the age of 18 by census tract and library location in St. Louis City and St. Louis County. Source: 2010 US Census.

Figure 2 includes maps showing library locations in St. Louis City and County in terms of poverty and race by census tract level, as well as ACT score by district, represented by the bold lines, where St. Louis City is represented by a single district, the St. Louis Public School district. Median household income in indicated by the gray shading, with white areas not having data available. First, census tracts with low median household income are clustered in the northern part of the city and county. There are four libraries in the northern half of the city, and eleven libraries in the central and southern parts of the city. There are fewer libraries in the census tracts with low median household income.

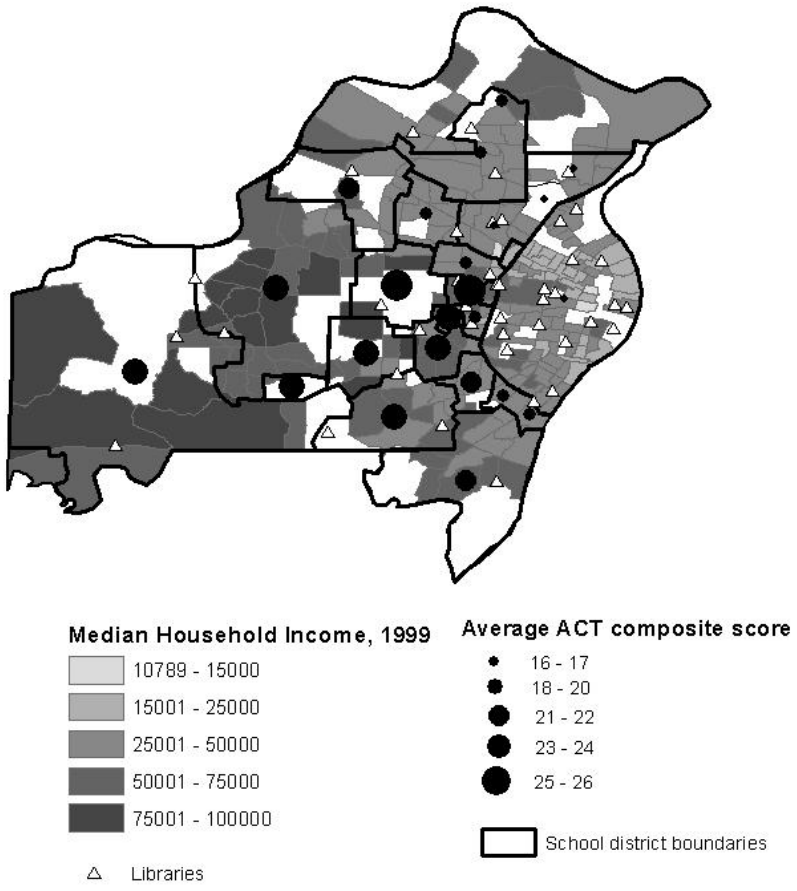

Figure 2. Median household income, ACT score, and library location, St. Louis City and County. Source: 2010 US Census and Missouri Department of Elementary and Secondary Education, 2010, www.modese.gov.

While the Nearest Neighbor analysis has already demonstrated the libraries are significantly clustered, the maps seem to suggest the pattern of that clustering. This is especially concerning given the report by Becker that 61 percent of those living below the poverty line use libraries to access the Internet.[34] First, in terms of median household income, it does appear that many libraries are located in higher income areas of the city and county. While the libraries appear to be

clustered centrally, and particularly near major freeways, there appear to be libraries in many of the higher income census tracts. Adding to the concern of location is that of access to these library locations. For those living below the poverty line, transportation is often a prohibitive cost, so access from public transportation should also be a major concern for libraries. Additionally, in a pattern repeated in figure 4, the location of libraries does not appear to have any effect on ACT scores, but there are clearly higher ACT scores in wealthier areas of the city and county. This is not to say that there is a statistical relationship between ACT score and library location, but rather to look at the spatial patterns of each in order to note similarities and differences in these patterns.

Figure 3 shows library location by race, including African American or Black and Hispanic or Latino. First, it is important to note that patterns of race in St. Louis have been carefully documented by Gordon.[35] The St. Louis area is clearly a highly segregated region, which makes the social contexts of libraries in the St. Louis area even more important. This map demonstrates that while there are many libraries in the northern parts of St. Louis City and County, none of these libraries is located in the census tracts with the highest populations of those identifying themselves as African American or Black in either the city or county. This raises questions about the inequality of access to the libraries.

On the other hand, the densest populations of those identifying themselves as Hispanic or Latino are in the southern part of the city, but not the county. There is a library located in one of those tracts. It appears the areas with higher concentrations of African Americans or Blacks have fewer libraries, while areas with the higher concentrations of Latinos or Hispanics are located in the southern parts of the city that do have libraries. It is important to note, however, that the concentrations of Latinos and Hispanics is quite low, and those areas are majority white census tracts.

As noted above, beyond location, access from public transportation is also an important issue. At the same time, the clustering and patterns shown on these maps raise key issues about access based on income and race. Libraries are not located in areas with low median household income or in areas with high concentrations of African Americans or Blacks. This raises serious questions about why libraries are located where they are, and whether the individuals located in these areas have equal access to library resources, particularly new media technologies.

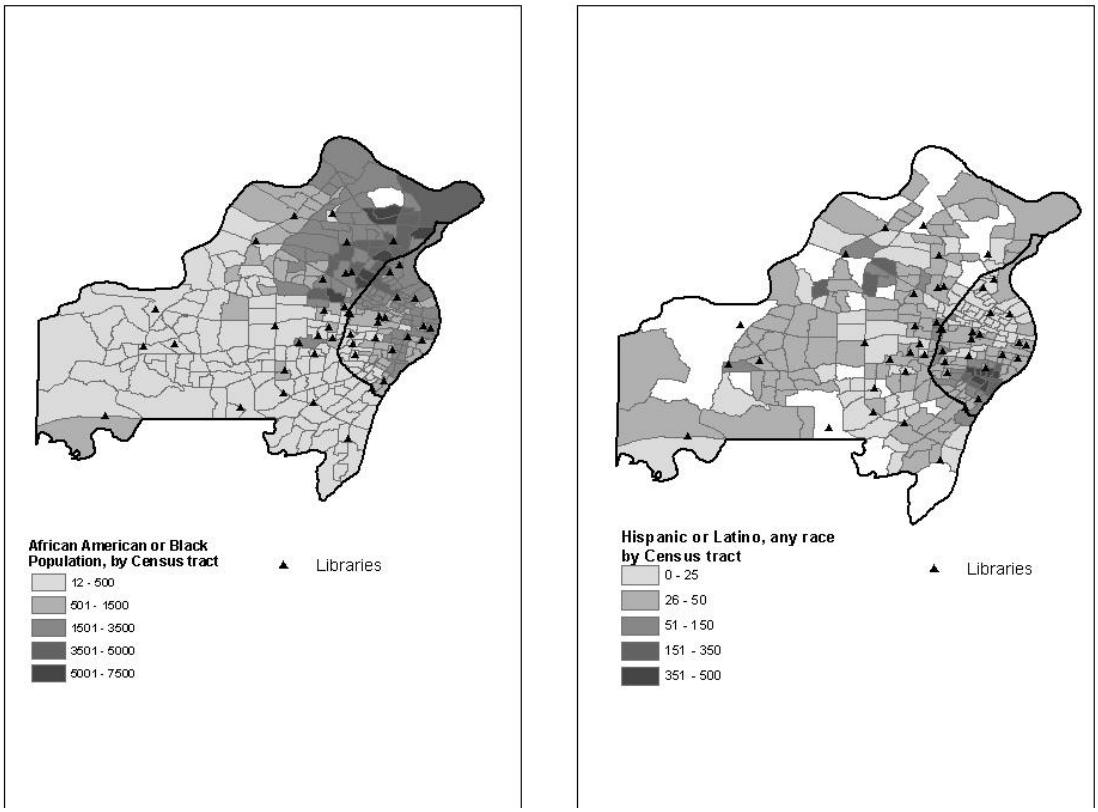

Figure 3. African American or Black and Hispanic, library location, St. Louis City and County. Source: 2010 US Census.

The final map raises a slightly different issue, one of test scores and student achievement. Figure 4 shows library location by percent proficient or advanced on the Missouri Achievement Program test by district. Beyond the location of the libraries, one factor that stands out is that the areas with the lowest percent proficient or advanced are also the areas with the lowest median household income and the highest percentage of those identifying as African American or Black.

Here an interesting pattern emerges. While there are many libraries in the city and northern part of the county, the percent proficient or advanced on the communication arts portion of exam is quite low (20–30 percent). On the other hand, in the western part of the county, there are few libraries, but the percent proficient or advanced is at its highest level. This suggests that there may not be a strong connection between achievement on the MAP exam and library location, similar to the lack of relationship seen in between ACT average score and library location in figure 2. At the same time, there does appear to be a correlation between race, income, and test scores. This correlation is noted throughout the literature on student achievement.[36]

Clearly, these maps raise important questions such as how and why libraries are located in a certain area, who uses libraries in a given area, as well as what other informal learning environments and community assets exist in these areas. What is made clear by the maps, though, is that GIS can be used as a tool to help understand the context of new media literacy.

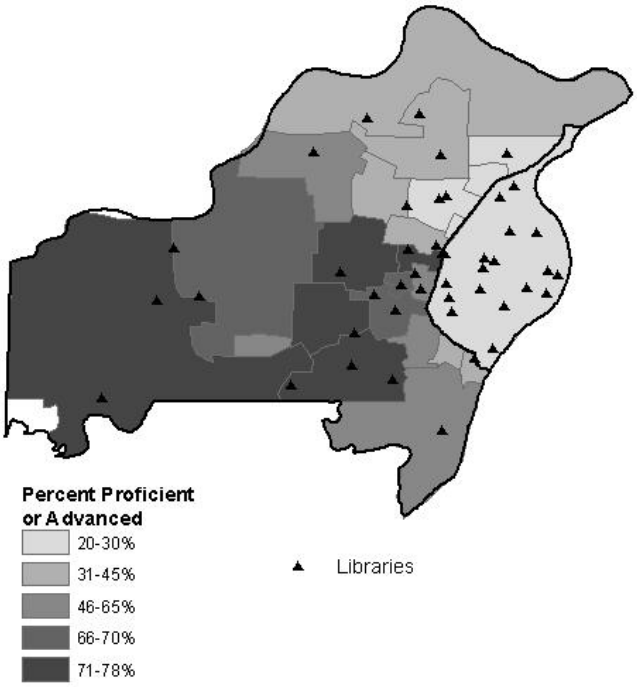

Figure 4. Proficient or advanced, Communication Arts MAP by district, 2009, and library location. Source: Missouri Department of Elementary and Secondary Education, 2010, www.modese.gov.

SIGNIFICANCE

These results demonstrate that GIS can be used to illuminate the social, cultural, and economic complexity that surrounds informal learning environments, particularly libraries. This can help demonstrate not only where young people have the opportunity to use new media literacy, but also the complex contextual factors surrounding those opportunities. Paired with traditional qualitative and quantitative work, GIS can provide an additional lens for understanding new media literacy ecologies, which can help inform dialogue about this topic.

For the results of this study, there does appear to be a relationship between library location and race and income. This study illuminates the complex contextual factors affecting libraries. Because of the important role that libraries can play in offering young people out of school learning opportunities, particularly in terms of access to new media resources, these contextual factors are important to ensuring equal access and opportunity for all.

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