COLLEGE & CAREER
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Using Geographic Information Systems to Support Equitable Work-Based Learning Planning and Implementation

OVERVIEW AND RESOURCES

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Overview and Resources

Places Matter: Overview, Implications, and Opportunities

Nearly five decades of research has demonstrated that the places where children live and learn have a dramatic impact on their opportunities and life outcomes (Dreier, Mollenkopf, & Swanstron, 2004; Orfield, 2011; Sampson, 2012; Sharkey, 2013). These **place effects**—*the advantages and disadvantages that one inherits by simply living in a particular location*—are the result of unequal access to resources and opportunities across multiple overlapping sectors, including housing, health care, food, education, transportation, and employment.

The complex and entangled nature of place effects has significant implications for state and local education agencies that are engaged in large-scale improvement efforts, because well-intentioned improvements in one sector (e.g., increases in density and walkability in the inner city neighborhoods) can have negative outcomes in another sector (e.g., gentrification and shrinking student populations in inner city schools). Thus, leaders need new tools to "see" how decisions and policies will impact different populations of people in different places.

Most state and local education agencies use geographic information systems (GIS) software as an operational tool to visualize school locations and administrative boundaries or as a communications tool to inform families about school attributes in different locations. However, to date, GIS has been underutilized as a strategic and analytic tool that can focus administrative decision making and guide the types of cross-sectoral collaborations that are required to plan and implement systemic change efforts.

GIS and Work-Based Learning

Although many state education agency staff recognize the value of high-quality work-based learning (WBL) opportunities for students, many state education agencies falter because the opportunities are place based in terms of school districts or regions, which means that state education agencies that often develop blanket or one-size-fits-all policies have difficulty navigating this terrain. Using GIS, along with available data, allows state education agencies to develop policies and strategies that accommodate place-based differences and address the potential inequities in opportunity.

To support efforts to develop these policies and strategies, the College and Career Readiness and Success Center (CCRS Center) at American Institutes for Research (AIR) is leveraging its expertise in behavioral and social science research and capacity building in combination with GIS software applications to support state education agency teams as they work to develop high-quality WBL systems. Using GIS, the CCRS Center supports state teams to explore questions such as the following:

- Are there locations (regions, districts, schools) where WBL supports in the K–12 sector need to be combined with upskilling or training opportunities for adults?

- Is the distribution of career and technical education programs aligned with the concentration of employers and industries across regions within the state?
- Are there places in the state where, due to their proximity to one another, high schools, community colleges, and employers could be collaborating more effectively to provide job training and internships in high-demand areas?

Investigating these questions using GIS allows state teams to buck the traditional one-size-fits-all approach and address barriers and improve coherence of WBL opportunities for students. In addition, GIS allows state teams to take advantage of place-based opportunities that are emerging or that are newly established based on a more holistic understanding of local contexts. The following pages include information about how GIS works, about the research on why places really matter, and additional resources that can help your team learn more about and use GIS to focus your efforts on equity and impact.

GIS 101

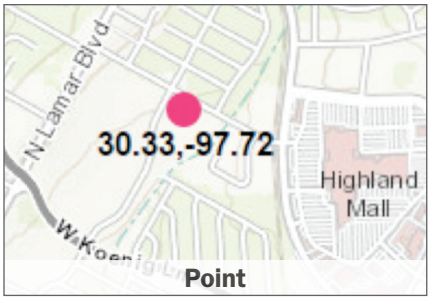
The CCRS Center at AIR provides the following levels of support that are customized to each state's context:

1. Support for augmenting existing GIS tools to incorporate cross-sectoral data sets and focus WBL efforts
2. Support for creating simple, internal mapping applications to support WBL planning and implementation
3. Communication tools and support (e.g., this document) to help make the case for utilizing GIS to support the WBL project
4. Technical assistance support for translating GIS-based insights into action

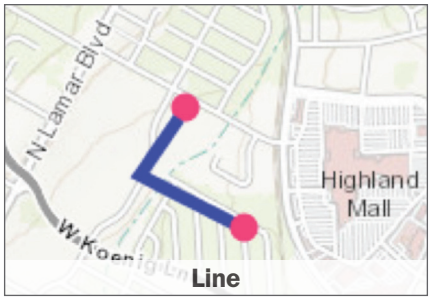
How GIS Works: The Different Geometries That Display Your Data

Trees, buildings, streets, and lakes are all examples of real-world objects. In GIS, these objects are referred to as *features.* Each map contains features shown as one of three geometry types:

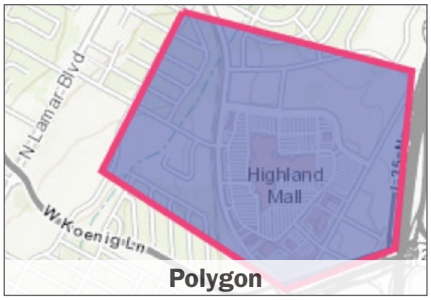
- **Points** in GIS are unique locations with one x-value and one y-value to define their locations. *Examples: schools, libraries, historic sites, police stations.*
- A **line** is a pair of points, where one point defines its beginning and the other point defines its end. *Examples: roads, railroads, rivers.*
- A **polygon** is an enclosed feature whose last vertex is the same as its first. *Examples: school districts, neighborhoods, feeder patterns.*



Point



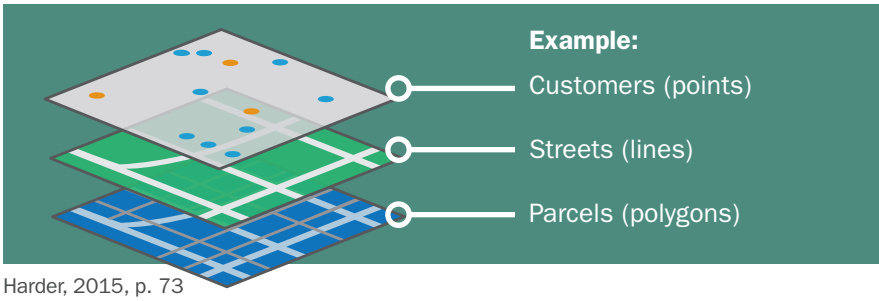
Line



Polygon

The Power Is in the Layers: GIS Shows How Data Overlap Over Space

Within a map, geometry is ordered with points on top, lines below points, and polygons on the bottom.



Harder, 2015, p. 73

The Workflow: How You Build a Map

After meeting with state education agency teams to discuss the state's needs, goals, and available data, the CCRS Center engages in the following workflow, which depicts the key steps involved in creating customized maps to support WBL efforts.

The Key Ingredients

1. Basemap

Each WBL map begins with a basemap. The basemap is used for locational reference and displays background information, such as landforms, roads, state boundaries, and much more.

2. Layers

The CCRS Center will work with our state partners to add their relevant WBL data to the map as layers. You can think of this process as layering data on top of your basemap. Each data set that you add on top of your basemap will be represented as a separate layer. The layering of the data is what enables more sophisticated spatial analysis.

Note: In the graphic to the right, we selected the light gray basemap and added two layers: major cities in France (displayed as points) and country regions (displayed as polygons).

3. Web Maps

The web map is one way that we can house all of the data layers and the basemap. The web map is where we symbolize, filter, edit, and reorder your layers. In addition, we configure "pop-ups" (the data that pop up when you click on a point or polygon), which enable users to explore features they click on.

4. Web Apps

The web map(s) feed into a variety of web apps. These web apps are simple applications designed to run in web browsers and also on mobile devices. Popular types of web apps include story maps and the web app builder.

A Short Syllabus: Place Effects Research

At the CCRS Center at AIR, we know that GIS is not just an engaging gimmick. There is substantial research demonstrating the need to examine places as key variables in complex change initiatives. What follows is a very short list of important works that have clearly demonstrated that places matter.

Anyon, J. (2014). *Radical possibilities: Public policy, urban education, and a new social movement.* United Kingdom: Routledge.

Chetty, R., Hendren, N., Kline, P., & Saez, E. (2014). *Where is the land of opportunity? The geography of intergenerational mobility in the United States.* Cambridge, MA: National Bureau of Economic Research.

Dreier, P., Mollenkopf, J. H., & Swanstrom, T. (2004). *Place matters: Metropolitics for the twenty-first century.* Lawrence, KS: University Press of Kansas.

Harder, C. (2015). *The ArcGIS book: 10 big ideas about applying geography to your world.* Redlands, CA: Esri.

Harvey, D. (1973). *Social justice and the city.* Baltimore, MD: Johns Hopkins University Press.

Logan, J. R., & Molotch, H. L. (2007). Urban fortunes: the political economy of place. *ACLS Humanities E-Book.*

Massey, D. S., & Denton, N. A. (1993). *American apartheid: Segregation and the making of the underclass.* Cambridge, MA: Harvard University Press.

Orfield, M. (2011). *Metropolitics: A regional agenda for community and stability.* Washington, DC: Brookings Institution Press.

Powell, J. A. (2007). Structural racism: Building upon the insights of John Calmore. *North Carolina Law Review, 86*, 791.

Rothstein, R. (2017). *The color of law: A forgotten history of how our government segregated America* (1st ed.). New York, NY: Liveright Publishing Corporation.

Sampson, R. J. (2012). *Great American city: Chicago and the enduring neighborhood effect.* Chicago, IL: University of Chicago Press.

Sharkey, P. (2013). *Stuck in place: Urban neighborhoods and the end of progress toward racial equality.* Chicago, IL: University of Chicago Press.

Soja, E. W. (1989). *Postmodern geographies: The reassertion of space in critical social theory.* Verso.

Additional GIS Resources

ArcGIS Online Forum

Ask questions, and get answers from Esri staff. The forum also includes good archived information.

- ArcGIS Online Forum

ArcGIS Online Blog

https://blogs.esri.com contains many posts related to ArcGIS Online and ArcGIS.

Free Online Training

Esri offers a variety of training options, including these courses you can take for free. Find more training opportunities at the Training website: http://www.esri.com/training/main/arcgis-online-training.

- Preparing to Implement an ArcGIS Online Subscription
- Creating Web Applications Using ArcGIS Online
- Sharing GIS Content Using an ArcGIS Online Subscription
- Authoring Web Maps Using ArcGIS Online

Free Recorded Live Training Seminars

Esri provides live training seminars for free online, as well as recordings from past seminars. The following are good starting points:

- ArcGIS Online Subscriptions: Mapping and GIS for Organizations
- Creating Hosted Map Services with ArcGIS Online
- Increase the Value of ArcGIS Services with ArcGIS Online
- Gain Geographic Insight with ArcGIS Online Analysis Tools

For More Information on Using GIS to Support Work-Based Learning

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