

GEOSPATIAL DATA STRATEGY
U.S. Department of Education, National Center for Education Statistics

GEOGRAPHY MATTERS

Education in the U.S. is a spatial enterprise. States administrate responsibilities for education through local school systems; school districts manage educational services through local school attendance areas; school funding is partly supported by local taxable property; and school choice proposals highlight concerns about the geography of opportunity. Educational resources and outcomes are influenced by place, space, and location. As a result, decision-makers, program managers, and researchers need information about geographic features like school district boundaries, neighborhoods, and school locations to understand the social and economic conditions of communities in and around these areas.

Geographic information is foundational to the Department of Education (ED). When Congress created the Department in 1867 (later known as the Office of Education), its first priority was to assess and report on the status of education land grants that had been given in trust to newly formed states by the federal government as a resource to support local education. A century later, Congress initiated the landmark Elementary and Secondary Education Act of 1965 that provided supplemental funding to geographic areas with high concentrations of children from low-income families. For more than 50 years, the Office and Department of Education has depended on geographic definitions and data to effectively allocate federal funds and oversee federal programs. Geographic information is also essential for understanding policy issues like access to digital infrastructure, variation in teacher labor supply, economic and racial segregation, and other critical issues that affect local, state, and federal education decisions. When it comes to education, geography matters.

THE EDGE PROGRAM

ED's primary strategy for developing and managing geospatial data is handled through the National Center for Education Statistics' (NCES) [Education Demographic, Geographic, and Economic Statistics \(EDGE\) Program](#). As part of the NCES Administrative Data Division, the EDGE program develops information resources about the social, economic, and spatial context of education in the U.S. NCES works closely with the U.S. Census Bureau to design and produce policy-relevant data products from existing data collections developed by NCES and the Census Bureau. Policy makers and researchers need demographic and geographic data to understand the relationship between people and place, so the EDGE program oversees data activities for these complementary spheres in a single, integrated data program.

DATA STRATEGY, PRINCIPLES, AND OBJECTIVES

NCES's geospatial data activities support ED's goal to strengthen the quality, accessibility, and use of education data by increasing the capacity to support and use data for informed decisions both at the Department and in the education community (ED FY 2022-2026 Strategic Objective 5.2). Our strategy for developing and managing geospatial data relies on four primary principles:

Principle #1. Develop geospatial data needed for ED programs and educational research.

- Objective 1.1. Support statistical program infrastructure to produce and maintain a robust geospatial data collection.
- Objective 1.2. Produce regularly updated data for core geographic areas and features.
- Objective 1.3. Collaborate with state and federal partners to source and develop geospatial data.

Principle #2. Share geospatial data in common formats through easily accessible locations.

- Objective 2.1. Apply relevant data and metadata standards.
- Objective 2.2. Produce and share data web services that use open standards.

- Objective 2.3. Share geospatial data assets through federal and commercial data portals.
- Objective 2.4. Coordinate geospatial data activities with the Federal Geographic Data Committee.

Principle #3. Apply geospatial data and methods to create new data solutions.

- Objective 3.1. Develop program and IT infrastructure to support geospatial analysis and innovation in ED.
- Objective 3.2. Integrate ED geospatial data with other federal data collections to produce estimates of social, economic, and spatial conditions relevant to education.
- Objective 3.3. Identify and pursue opportunities to improve and extend the ED geospatial data portfolio.

Principle #4. Provide supplemental resources to explain and visualize ED geospatial data.

- Objective 4.1. Provide tools to view ED school district demographic, economic, and administrative data in geographic context.
- Objective 4.2. Develop file documentation and metadata to support data collections.
- Objective 4.3. Promote the use of geospatial data through presentations, Q&A opportunities, and other activities.

Principal #1. Develop geospatial data needed for ED programs and educational research.

ED's geospatial data activities are supported through annual appropriations for NCES Statistical Programs. NCES collaborates with state and federal partners, particularly the U.S. Census Bureau, to collect and compile data about the administrative conditions of local schools and school systems. These data inform many activities throughout the Department, and they provide fundamental inputs to develop core geospatial data needed to support ED statistical and statutory programs. These core items include:

School district boundaries: ED needs school district boundaries to produce annually updated poverty estimates for Title I allocations as well as annually updated custom demographic and economic estimates from the Census Bureau's American Community Survey (ACS). In addition to their role in statistical estimation and ACS sampling operations, school district boundaries support spatial analysis relating to location, proximity, containment, exclusion, and other where-related conditions. The EDGE program maintains an annually updated [school district boundary](#) time series to support research and analysis.

Locale boundaries: Locale assignments are general indicators of the type of geographic area where a school is located (e.g., Large City, Rural Fringe, Remote Town), and annually updated [school locale boundaries](#) are needed to develop locale assignments for schools, districts, and other types of entities. Most NCES statistical surveys use locale assignments for sampling and survey operations, in addition to using them as substantive content items. The National Assessment of Educational Progress – the Nation's Report Card – uses school locale assignments for sampling and reporting, and the Rural Education Achievement Program (REAP), ED's primary initiative to support schools and districts serving rural areas, uses school locale assignments to support administration and oversight of program grants.

School locations: NCES relies on information about school location to help construct school-based surveys, support program administration, and analyze spatial associations with other types of geographic entities and conditions. The EDGE program develops latitude/longitude coordinates for public schools and school district administrative offices reported in the Common Core of Data (CCD) collection, private schools reported in the Private School Survey (PSS), and post-secondary institutions reported in the Integrated Postsecondary Education Data System (IPEDS). [School point locations](#) (also referred to as school address geocodes) are used by NCES to produce school locale assignments for ED programs and to create supplemental location-based indicators. School geocodes are used by researchers, state and local governments, businesses, and others who need to understand the spatial context of schools.

Principle #2. Share geospatial data in common formats through easily accessible locations.

Spatial data developed by ED provide a powerful tool for understanding local conditions that impact schools and families with school-age children. However, great data does little good if it's not accessible, so NCES takes multiple steps to ensure that ED geospatial can be easily shared. At the dataset level, the EDGE program incorporates data sourced from authoritative partners; relies on data and metadata standards appropriate to the geographic features; and produces data in common, industry-standard formats. Unlike other data assets developed by ED, geospatial data is unusual in its appeal to a wide variety of disciplines – not simply to data users in the education sphere. The common thread that unites these communities – aside from their interest in spatial data and focus on where-oriented questions – is their shared use of location-based technologies and geographic information systems (GIS). Therefore, the EDGE program attempts to design, develop, and package data in ways that are GIS-ready.

At a system level, NCES provides geospatial data as static, downloadable files from the EDGE website. It also provides the data as web services with open standards that can be accessed through APIs. This enables a GIS and other applications to directly access the data without burdening developers and data users with downloading, managing, and updating these data for their applications. In addition to providing these services directly from ED servers, NCES also registers the services with federal and commercial geospatial data portals (e.g., Geoplatform and ArcGIS Online) to make the data and metadata easier to find and search. These data are also included as part of the general collection of data assets that ED reports to Data.gov.

At an organizational level, NCES participates in the [Federal Geographic Data Committee \(FGDC\)](#), an inter-agency committee authorized by the Geospatial Data Act of 2018 and overseen by the Office of Management and Budget (OMB). The primary purpose of the FGDC is to provide guidance and coordination for geospatial data activities across the federal government so that data assets in the [National Spatial Data Infrastructure \(NSDI\)](#) can be managed as an integrated portfolio. By participating in the FGDC and registering ED data assets in the FGDC's [Geoplatform](#), ED helps to support the NSDI by sharing geospatial data with other agencies (NSDI Objective 2.3, 3.3), improving communication across federal agencies (NSDI Objective 4.2), and learning about data sources that may be useful for ED activities (NSDI Objective 3.1).

Principle #3. Apply geospatial data and methods to create new data solutions.

Geospatial data can help decision-makers and researchers visualize and analyze local and regional features, but an equally significant benefit is the ability to integrate it with other data sources using information about shared spatial conditions. New value can often be produced from existing data investments by applying geographic linkages or geoprocessing procedures. NCES maintains IT infrastructure to support geoprocessing and geospatial analysis, and it collaborates with the Census Bureau to leverage geolT resources and expertise to support research and data production.

One of ED's most visible expressions of geospatial integration is the use of school district boundaries to create social and economic estimates from the ACS. District-level estimates created by ED in collaboration with the Census Bureau inform billions of dollars in federal program allocations, but they can't be created without first defining and developing district boundaries to aggregate survey responses from individual households. Likewise, NCES incorporates Census-defined urban area definitions as a fundamental input for developing the NCES geographic locale framework. Census boundaries for Metropolitan Areas and Congressional Districts – combined with commercial satellite imagery and base maps – are also included in EDGE analytic tools to provide additional geographic context to help understand school district conditions.

The NCES EDGE program continues to look for opportunities to apply geospatial data, geoprocessing tools, and geostatistical methods to develop new insight and new data resources to inform educational programs,

research, and other education-related decisions. New data options are increasingly important as traditional metrics like the National School Lunch Program's (NSLP) count of students eligible for free and reduced-price lunches become less reliable indicators of school and community-level conditions.

Principle #4. Provide supplemental resources to explain and visualize ED geospatial data.

People affect places and change landscapes, but physical geography and jurisdictions also shape community conditions and statistical estimates. Therefore, it is important to visualize and understand the spatial context that informs and shapes the social, economic, and administrative data that are used for education-related decisions – particularly in a country as demographically and geographically diverse as the U.S. The NCES EDGE program attempts to address and explain this diversity with location-based tools that provide supplemental information about local contexts. School district social and economic estimates are bundled with public and private school locations, Congressional district boundaries, and a variety of basemap layers that allow data users to explore local jurisdictions, view school buildings and athletic fields, and even look carefully at street networks that may pose barriers to urban neighborhoods or provide lifelines to communities located in remote rural areas. EDGE tools designed to explore geospatial data also include supplemental boundaries of relevant legal and statistical areas, as well as a rich set of basemaps to better understand local contexts.

The metadata provided for ED geospatial data includes ancillary information to help data users apply and interpret the data appropriately. The NCES EDGE program provides additional comment and resources for geospatial data layers on its program website. These resources are designed to address common data user questions and needs such as: how have school district boundaries changed over time; how does ED define rural for statistical and statutory programs; how can data be accessed through APIs; and many others. Additional resources are provided through conference presentations, web demonstrations, and other types of public engagements. NCES also responds directly to a wide variety of questions from the interdisciplinary community of geospatial data users.

Perspective and prospective

Geospatial data is a small part of the ED data portfolio and of the [Federal Data Strategy](#) (see Action Step #11). ED's activity under the Geospatial Data Act is also relatively limited compared to other departments with large geospatial programs that function as lead covered agencies. However, geospatial data and geoIT play an increasingly important role in the administration of ED programs, and spatial analysis has become increasingly common in educational research. Rapid advances in GIS and geospatial data over the last two decades have created new opportunities to examine how location affects education, and the proliferation of location-based technologies suggests that geospatial data may play an even more significant role in the years to come as changes in local economies, local public health conditions, and local infrastructure create more need for local-level information. Although assessments of education land grants are no longer needed, the Department of Education continues to recognize that educational opportunity is affected by geography and that geospatial data is essential for understanding local community conditions that impact schools and school systems.