Get a Grip on Demographics with Geospatial Technology

By Randall E. Raymond

Where are student population changes taking place in your community? How much change has occurred? Should you close some facilities? If so, which ones?

Aging school infrastructure, changing population dynamics, decreased funding, and increased accountability for reporting school success all require today's school business officials to combine a variety of disparate data sets into a coherent system that enables effective and efficient decision making. School business officials are required to

- Plan for change
- Monitor patterns and trends in land use, housing, and population characteristics
- Make decisions and allocate resources for service delivery and costs

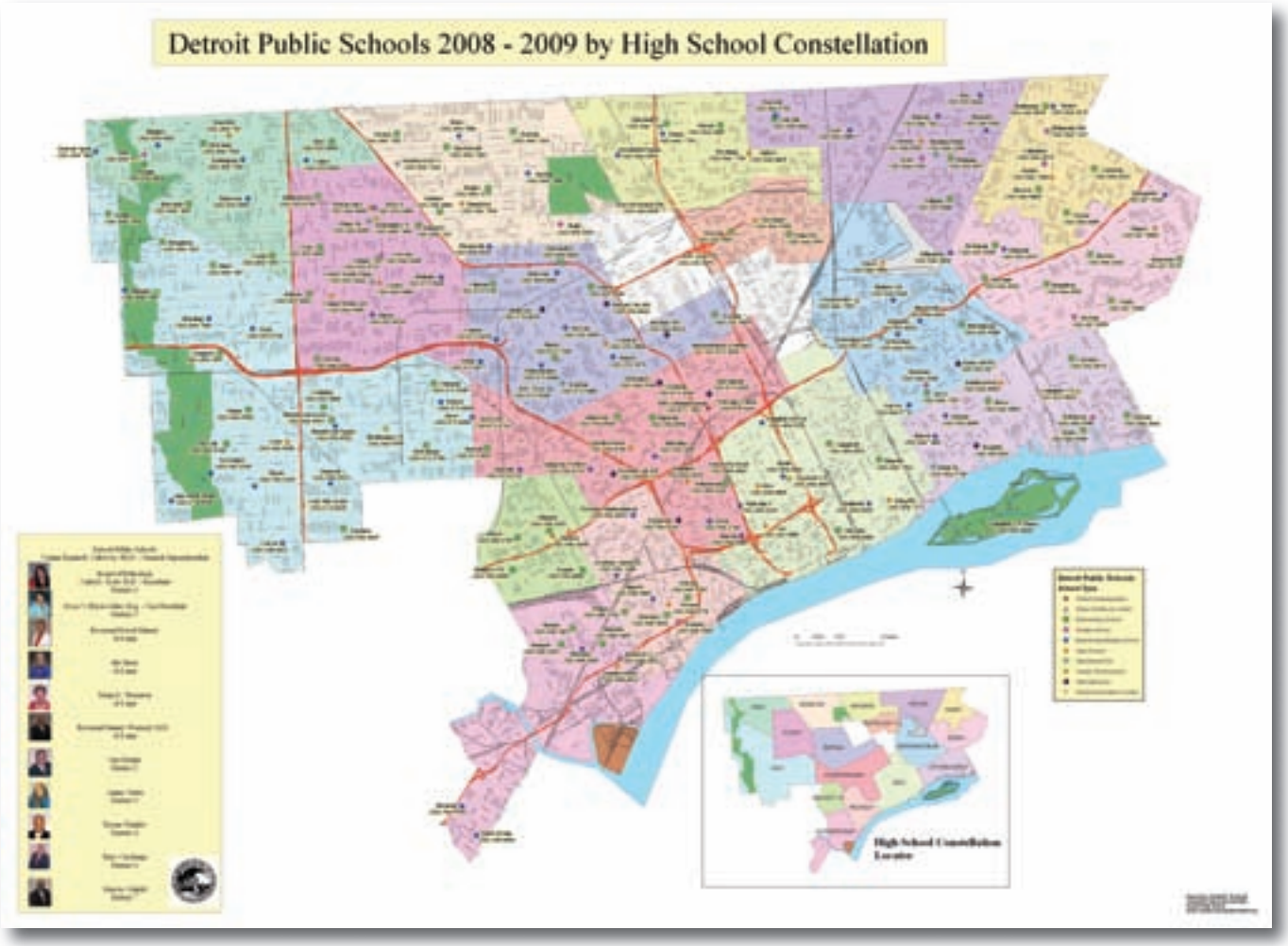

Figure 1. View schools by high school attendance area.

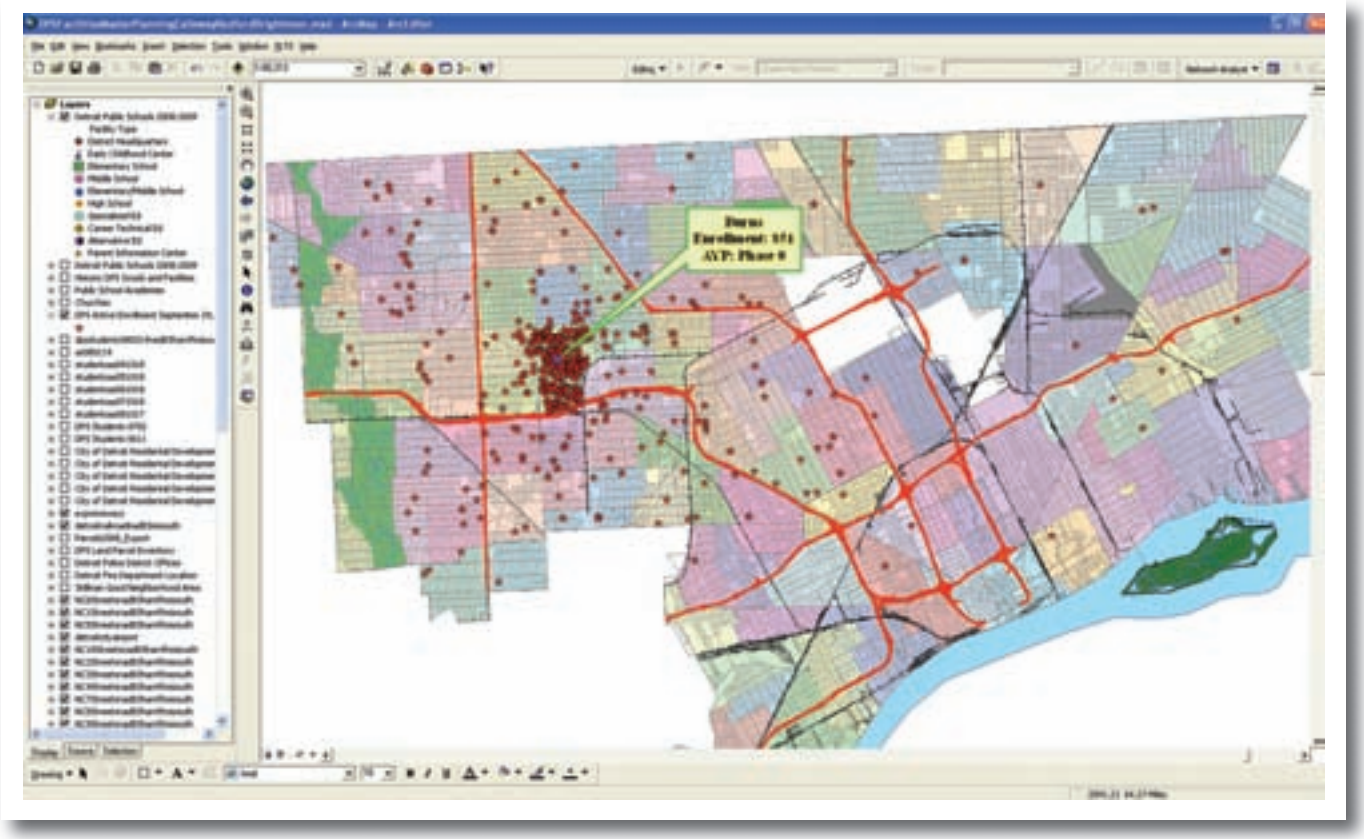

Figure 2. Identify where students who attend a particular school live.

- Negotiate agreements with city, county, and state officials
- Communicate with school board members, parents, students, and members of the community about changes, contentious issues, and district policies.

A geographic information system (GIS) does all of these things by integrating the hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.

For example, understanding student population dynamics requires school business officials to know where the students live in the community. Working with GIS makes it possible to place student addresses on a map using the address matching or "geocoding" tools. This data layer, made up of data points on the map, can carry with it all of the demographic and school success indicators of a particular student, such as age, sex, date of birth, school, free or reduced-price lunch status, special education needs status, and transportation eligibility.

At the core of the GIS is a powerful relational database management system. This makes it possible to query the data points based on the various fields (attributes in GIS) found in the data. School business officials can view these data points in a variety of ways; for example, they can see only those students who attend a particular school or they can see where all of the elementary school-age students live. This information can be provided to school principals to help them understand what neighborhoods are represented in their school community.

Additional data layers enable the principals to see all of the business locations near their schools as well as faith-based organizations, police stations, fire stations, and other agencies.

Most local government agencies use GIS systems to manage their critical infrastructure, which includes schools and district buildings. Using GIS, school business officials can integrate their data with the data of the local homeland security agencies, providing information about building floor plans, classroom schedules, and high resolution aerial photoes—all of which can prove important in a crisis situation when officials need to know where people are during an emergency.

Data Analysis

The real power of a GIS is in the way data can be analyzed. Student data points can be converted easily into "population density" diagrams. When student population density is layered with age-appropriate school buildings, it is much easier to see facility needs in relation to the number of students.

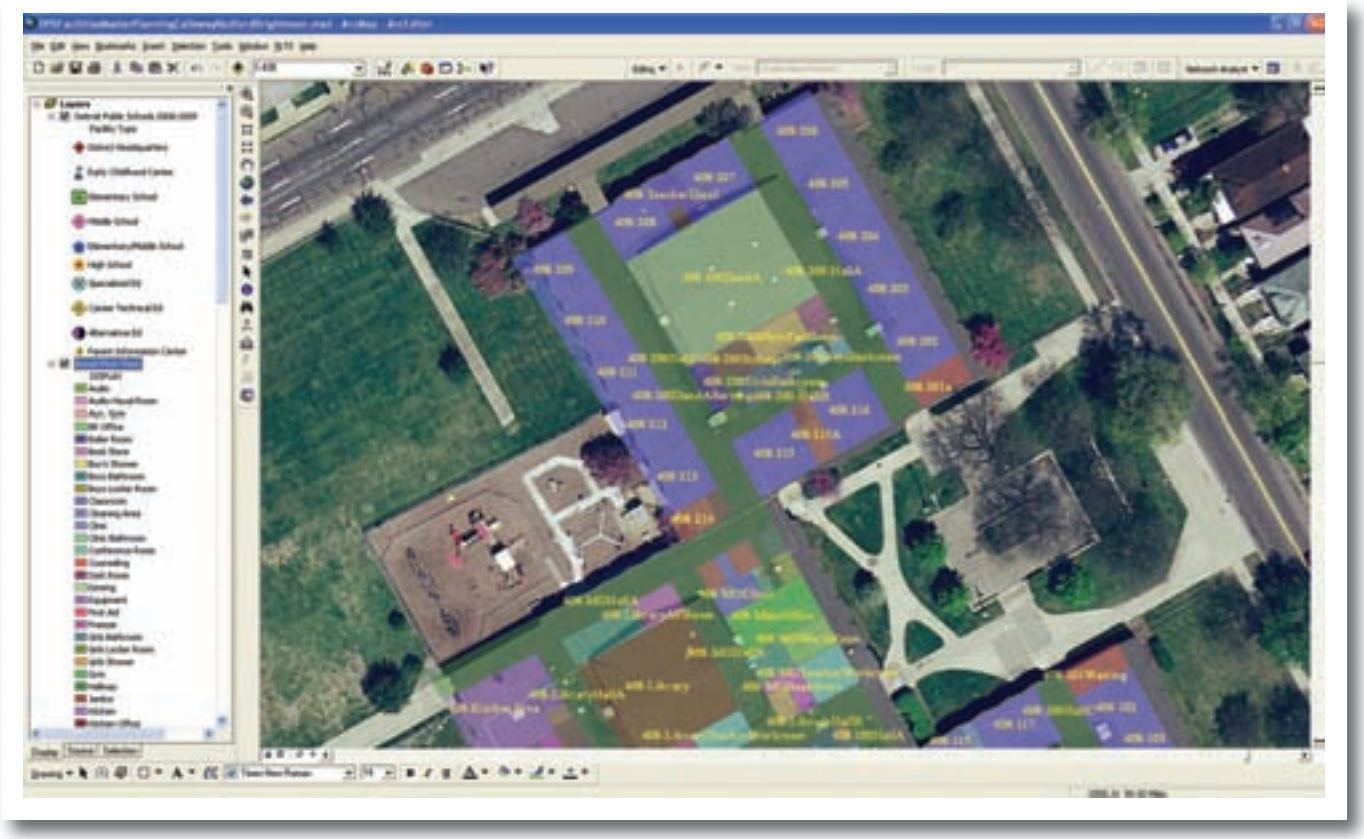

Figure 3. Integrate many different types of data, including high resolution aerial photos and building floor plans.

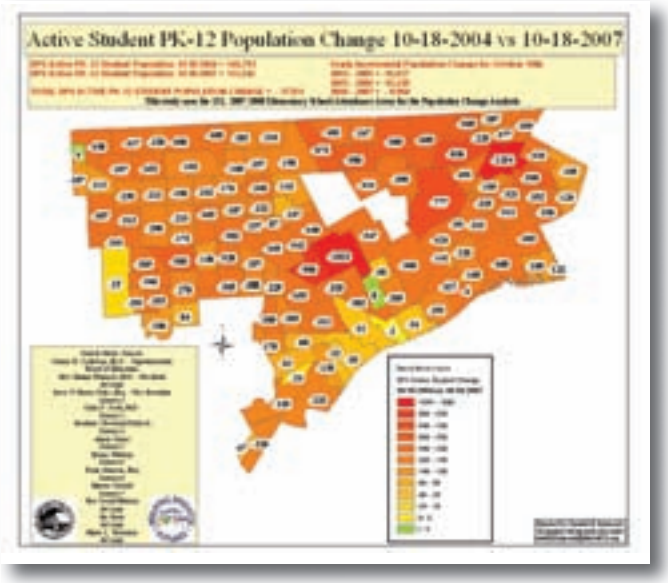

Figure 4. Examine student population change by elementary school attendance boundaries.

Working with local health agencies, school business officials can obtain information about the types of environmental health issues, such as lead poisoning, that might be affecting the learning potential of the local school population. Here again, these data can be layered with other school-related information to help plan intervention.

The best way to learn more about GIS, geospatial tools, and technologies is from the Environmental Systems Research Institute (ESRI), the world leader in GIS software and related technologies. The main Website is www.esri.com. ESRI also maintains a Website that has a direct focus on the education community at http://edcommunity.esri.com. On this education community Website you can obtain information about the administrative uses of GIS in schools along with classroom education applications.

The report from the National Research Council (NRC) released in 2006, *Learning to Think Spatially: GIS as a Support System in the K-12 Curriculum*, points to the importance of instilling spatial thinking skills across subjects and into the lives of learners of all ages. As the report contends, GIS can be significant in cultivating those skills. School business officials must be life longer learners.

Learning to use GIS and apply it to the work that you do for your school system could be one of the best decisions you make for your future and the future of your school district.

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