How can we improve students' spatial thinking and geospatial technology skills through asking students to draw changes in their perceptions and expansion of knowledge of their communities? Jobs in both the geospatial technology industry and in geography in general are expanding. High school students participating in the Summer 2015 workshop focused on neighborhood blight, community gardens & parks, housing, crime, and community needs by using technology to do fieldwork, collecting data to explore these topics, and presenting their findings to key stakeholders in the community, such as the Mayor of the City of Toledo, neighborhood organizations, and planners. Students felt a sense of empowerment to make a difference in their neighborhoods by making recommendations to community leaders and organizations.

### AUTHENTIC LEARNING IN PRACTICE

#### COMMUNITY ENGAGEMENT

- Community engagement has been identified as one indication of active and participatory citizenship. It offers the opportunity to apply knowledge, skills, and technology in a meaningful and productive way.
- It is our goal that students will be enabled to become agents of change and will benefit from learning more about the complex processes that shape communities through the use of geospatial technology.
- A number of socio-economic and environmental issues can be addressed by students while engaging in citizen mapping projects and utilizing geospatial technology to suggest potential improvements.
- Citizen mapping includes gathering data to explore social and environmental issues by using GPS data, georeferenced photos, remotely sensed images, ground truthing, and other geographical sources, such as ArcGIS online to analyze, visualize, and present findings publicly.

#### CURRICULAR GOALS

- Authentic learning works best when it is applied to real-world challenges that are relevant to students’ lives and career opportunities.
- Asking students to draw sketch maps of their neighborhoods can reveal how they perceive and interact with this environment as well as how they feel about their place in it.
- Changes in students’ perceptions and expansion of knowledge of their neighborhood were evident throughout the workshop.

#### BROADENING PARTICIPATION

- Recent research on career aspirations suggests that having an opportunity to give back and make a difference in their communities was one goal of minority students considering various career paths.
- Jobs in both the geospatial technology industry and in geography in general are projected to grow 35% annually between 2010 and 2020 (U.S. Bureau of Labor Statistics, 2012).
- We seek to raise awareness of these career opportunities in the context of improving society, particularly among students of underrepresented groups.

#### PROJECT FOCUS

**Key Research Questions:**

- How can we improve students’ spatial thinking and geospatial technology skills through citizen mapping while preparing them for the STEM workforce of the future?
- How does the use of spatial thinking, geospatial technologies, and citizen mapping enhance student engagement and knowledge of their communities?

**Related Questions:**

- How can we increase awareness of career paths using geospatial technology and broaden participation of students in underrepresented groups in STEM?
- How do 21st century challenges relate to both the social and physical sciences, requiring a comprehensive and interdisciplinary approach to solutions?

#### SUMMARY

Supported by a grant from the National Science Foundation, we are focusing on advancing geospatial thinking and technologies in grades 9-12 through exploration of citizen mapping, community engagement, and career preparation. This project seeks to raise awareness of the application of emerging, dynamic technologies that are used in a range of social science and STEM disciplines as well as by citizens in their everyday lives. By engaging students in real-world issues in the context of their own neighborhoods, they are gaining knowledge and tools for enhancing their communities as well as exposure to the many career possibilities in high growth STEM sectors.

This study engages students at an inner city public high school in the Toledo, Ohio, a diverse region facing numerous challenges. Using the inquiry method, high school students are participating in summer workshops designed to introduce them to recent advances in geospatial technology, especially in relation to understanding their communities and preparing them for the STEM workforce of the future. Students are guided through the scientific process of inquiry, synthesis, analysis, interpretation, and evaluation. They input data they have collected through fieldwork in the community and from secondary sources into open source mapping programs to produce maps that can guide civic action. Students then present their findings and recommendations to key individuals and organizations in the city.