



Integrating Learning Progressions into High School Students' Experiences with Geospatial Thinking and Technology in their Communities



Brinda Athreya, Dr. K. Czajkowski, Dr. B. Schlemper, Dr. S. Shetty, Dr. V. Stewart and Owusua Yamoah

Brinda Athreya: Brinda.Athreya@rockets.utoledo.edu , Contact info : (414) 861 8737

Context

- Jesup W. Scott High school, Toledo, Ohio
- ITEST - funded by NSF “Advancing Geospatial Thinking & Technologies in Grades 9-12: Citizen Mapping, Community Engagement, and Career Preparation in STEM”



Scott High School – Toledo, Ohio

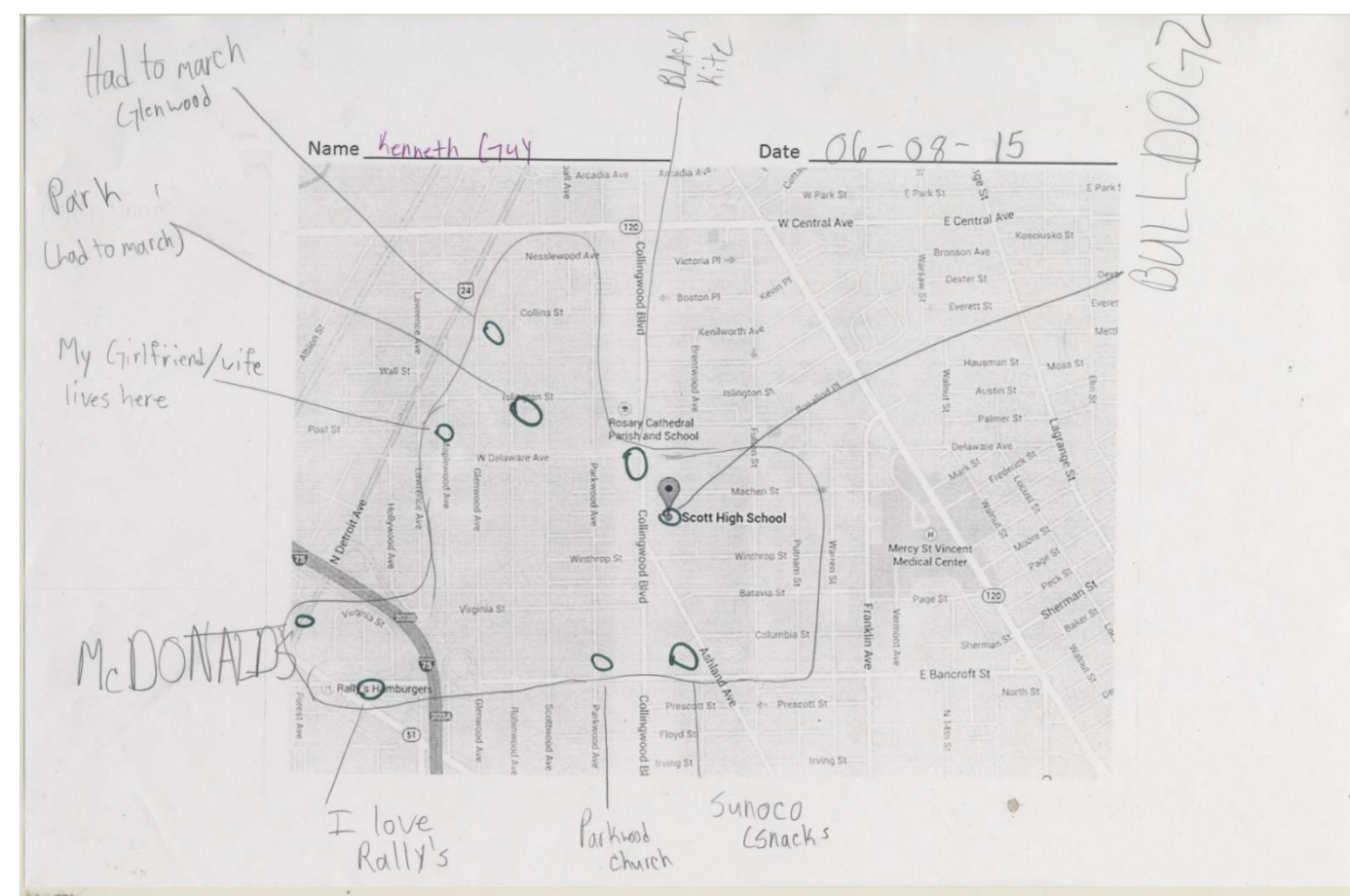
Purpose

- To advance geospatial thinking and technologies
- To raise awareness of geospatial career opportunities

Learning Progressions

- Progressively increase in complexity as students interact with content and improve skills
- Assist educators to design curriculum & develop learning modules

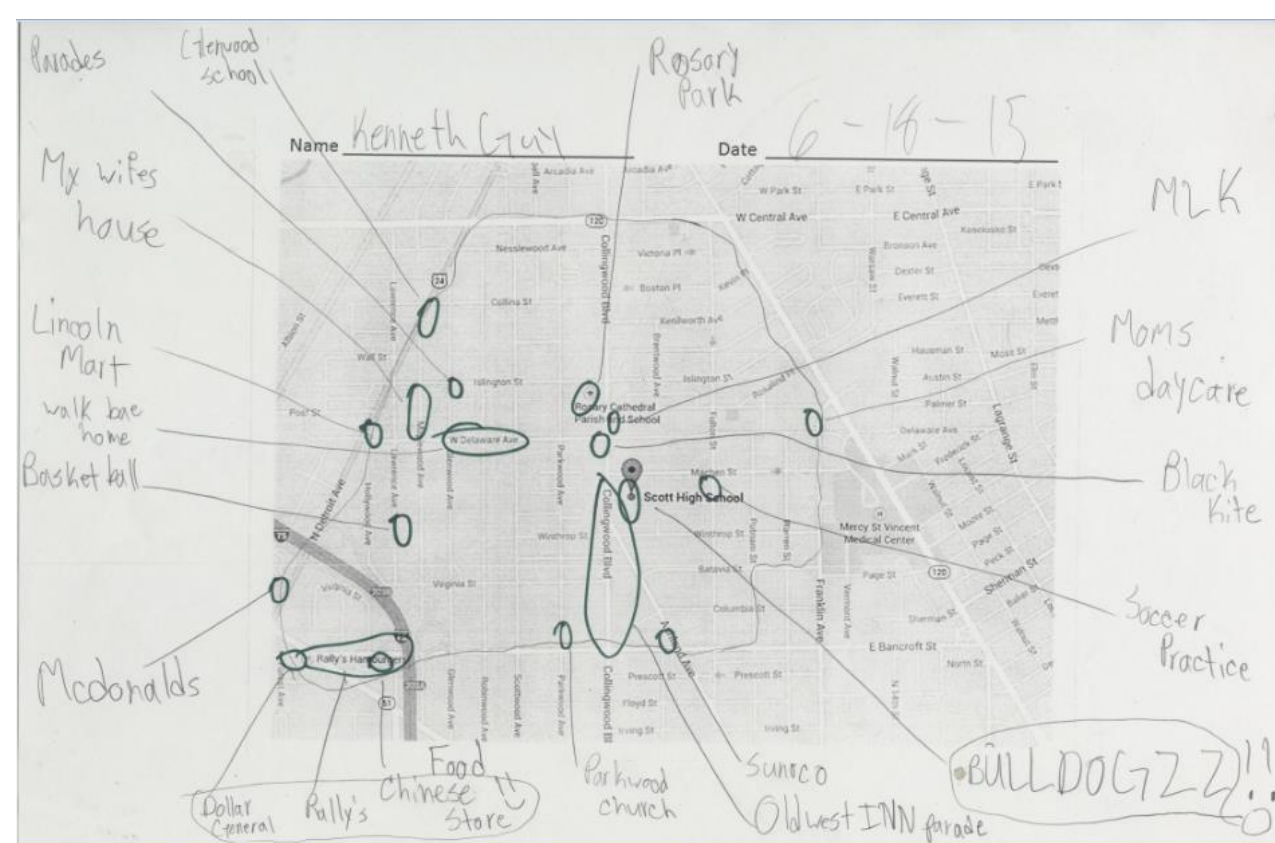
Familiar areas : Pre-test



- At the beginning of the workshop, students were asked to mark the areas they frequented and were familiar with, in green colour.
- Above image is an example from a student.

Familiar areas : Post-test

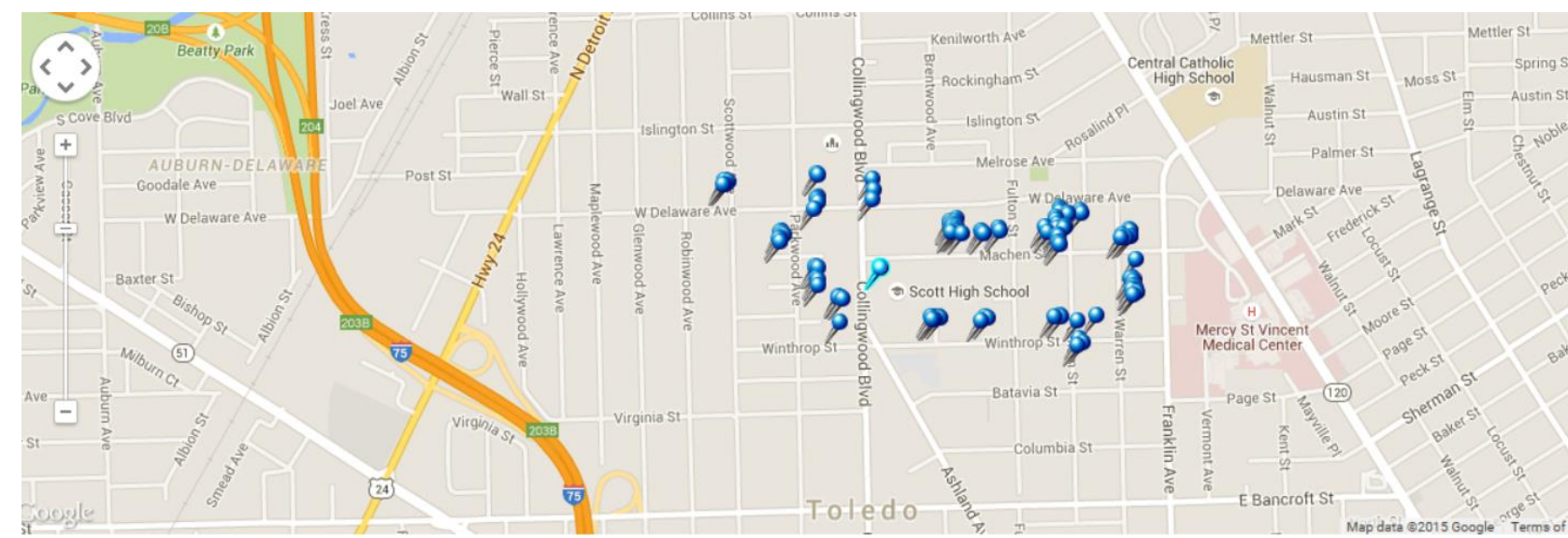
- At the end of the workshop, students were again asked to mark the areas they frequented and were familiar with, in green colour.
- Image on the right is an example from a student.
- There are differences in both the image as the perception changed after they analysed the area during the workshop.



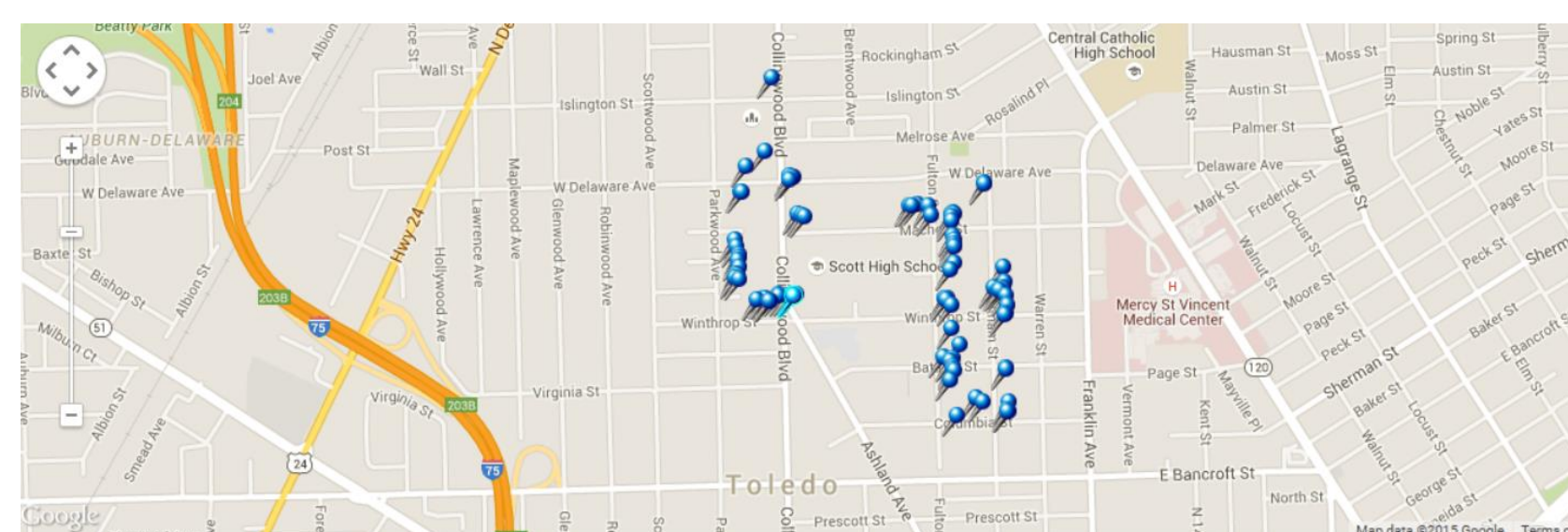
Student Topics

- Students examined crime, housing, and community needs

How do abandoned houses define the neighborhood?



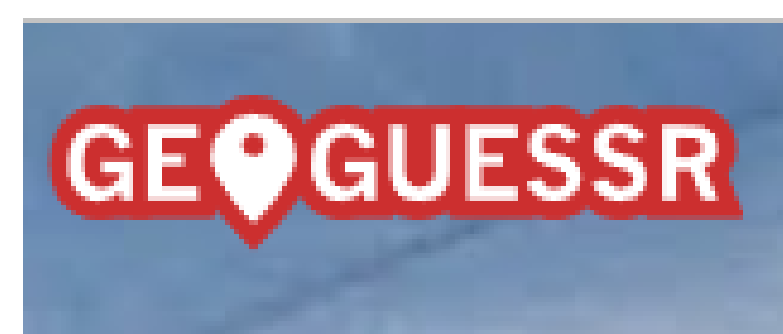
Can the abandoned lots and buildings be made into youth centers?



GPS Treasure Hunt



- In this above image, students are decoding the latitude/longitude of the hidden treasure by understanding the graffiti
- Students used information from geocaching.com website



- Geoguessr is an online location guessing game. Students had to guess the location from the pictures that showed up.
- Hint is to look at buildings, streets, greenery and other features that help in identification.

Learning Progression Activities

- Map Reading and Geography Questions
- American View Remote Sensing Memory Game
- Geoguessr Game
- GPS Treasure Hunt
- Data Collection with GPS & cameras
- Google Earth & ArcGIS Online

Map Reading and Questions

Geography related questions:

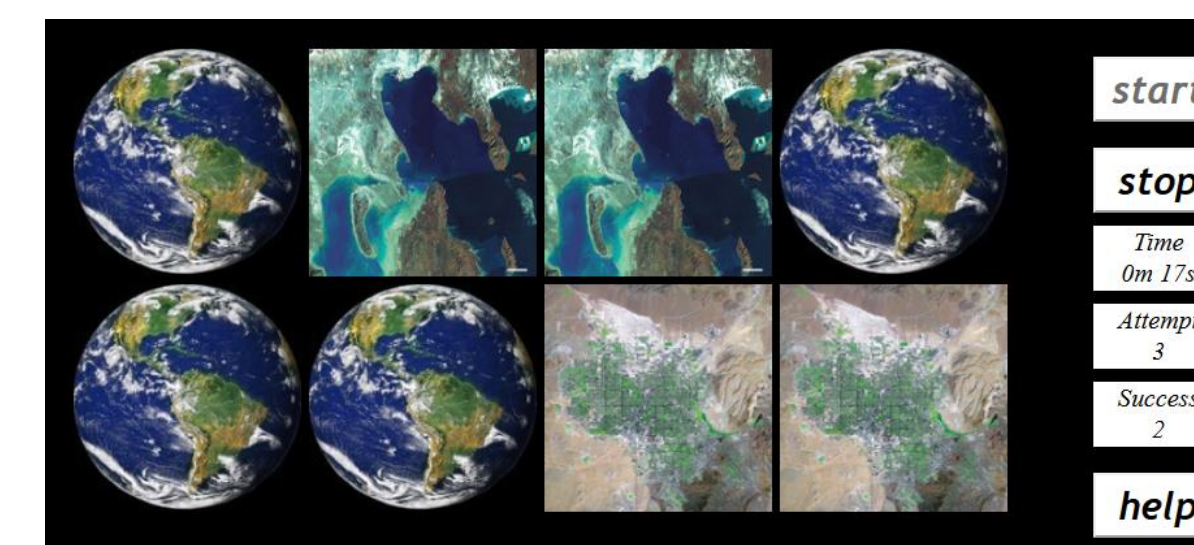
- Identify the states: Ohio, Texas and California on the map provided.
- Where is the Grand Canyon located? Can you spot the state?
- Can you identify all the 5 Great Lakes on the map provided?
- Please locate Toledo on this Ohio map
- Can you please name 5 states in the US?

Map Reading and Interpretation Activity

1. Is this map easy to read? Why or why not?
2. Where are the north arrow, title, legend and scale? Which of these are missing if any?
3. What is a legend?
4. Explain what is shown in the legend?
5. What latitude and longitude are shown on the map?
6. What is the latitude and longitude of the location _____ on this map?
7. What does this map depict? What is the purpose of this map?

- In the above image (left), students were given a map of USA and asked basic questions related to various locations.
- In the above image (right), students were asked basic questions related to map reading by giving them a map of Toledo.

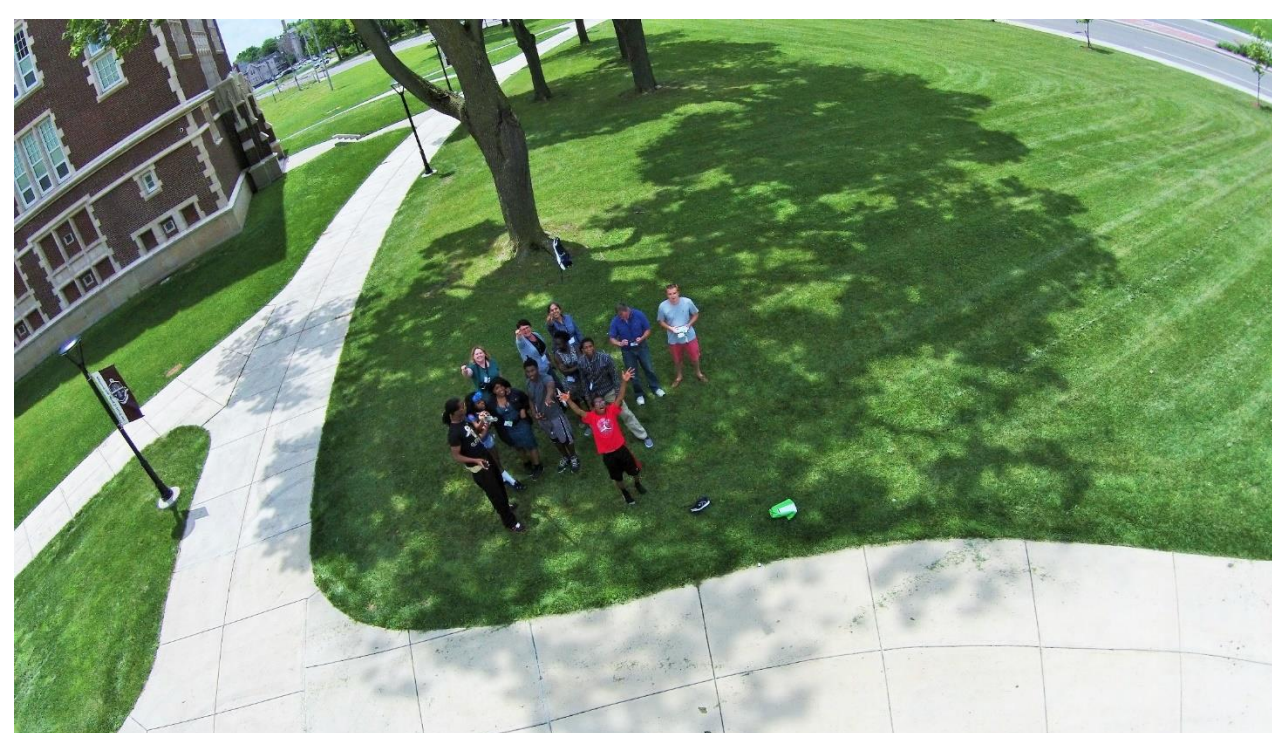
American View Memory Game



- The above image is a Remote Sensing game. Students had to match 2 similar locations by clicking on the earth icon.
- This game was competitive as students raced to finish in the shortest time.

Students Flying a Drone

- Students had great fun flying a drone!
- This image below is a picture captured by the drone



Data Collection and Analysis



- Students did fieldwork and collected data with GPS units, cameras, and written observations
- They also examined secondary data and worked with ArcGIS Online

ArcGIS Online Cook Book

Step-by-Step Instruction to use Arc GIS online:

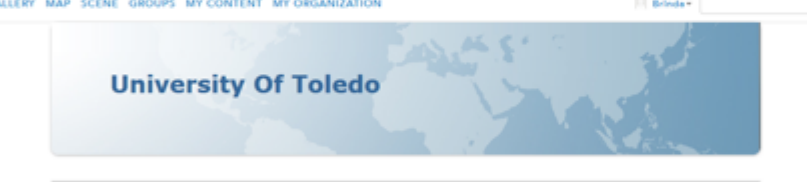
Step 1: To login

Go to <https://www.arcgis.com/home/>

On the right hand side, there is an option to sign in:

Use the [login](#) [password](#) to log in.

The home page will look like this:



Step 2: Selecting a map

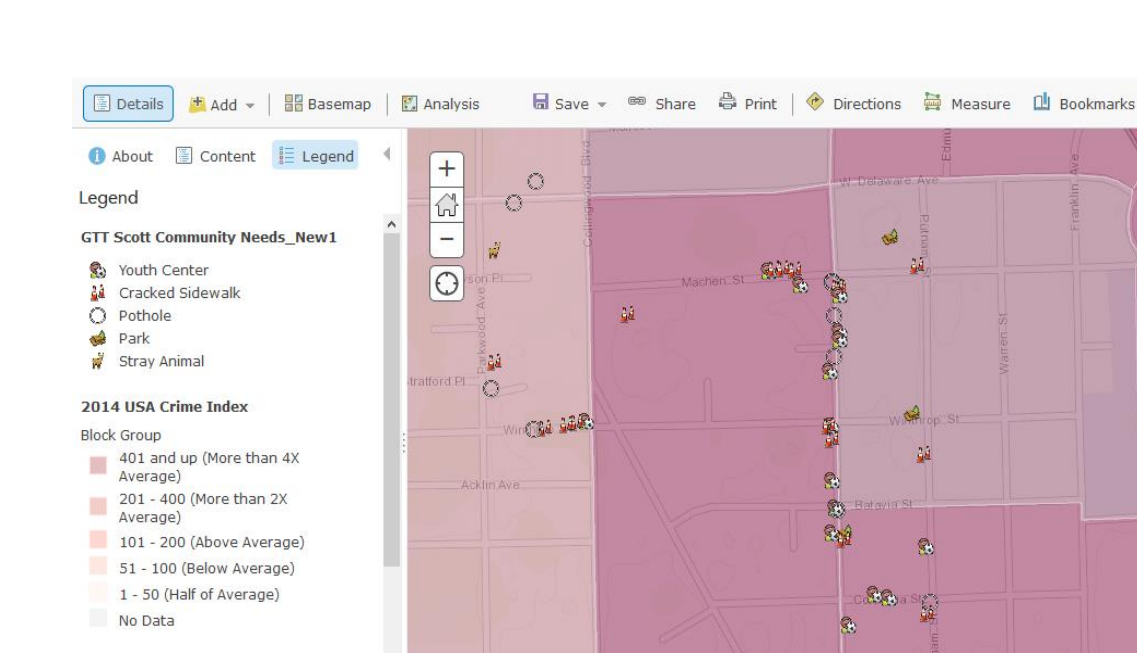
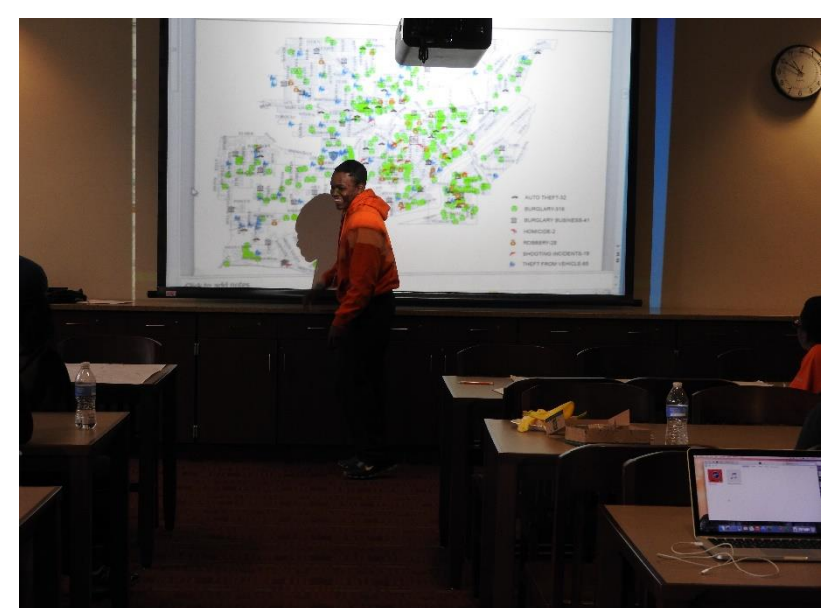
On the top of this page, you see the following tabs: Home, Gallery, Map, Scene, Groups, My Content, My Organization

Click on the word "Map"

Your screen should look like this now:

- The above image, is the step by step instruction for using ArcGIS Online – an Open Source website for citizen mapping

Students' Presentation



- Image on the right is an example of students' map
- Students presenting their work

Partners

Hilarie Davis, Project Evaluator; Teacher Advisory Committee; Toledo Public Schools; United Way Schools as Community Hubs; City of Toledo

References

Huynh, N.T., Solem, M., Bednarz, S.W. (2014). *A Road Map for Learning Progressions Research in Geography*

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