



Spatial Thinking and Geotechnologies Workshop: Jeffco Schools– 9 December 2015 – Irwin Preschool – Lakewood

Summary:

Half-day workshop led by an Esri education manager and geographer on integrating spatial thinking and geotechnologies (GPS, remote sensing, Geographic Information Systems (GIS)) into Jeffco School District curricula, with a focus on geography, history, and STEM.

Points of Contact:

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Course Goals:

1. Develop **knowledge and skills** in geotechnologies: GIS, remote sensing, and GPS, including technical skills and the foundational underpinnings, as well as pertinent issues surrounding geotechnologies, including analytics, cloud vs. desktop, data sources, data models, data formats, multimedia maps, story maps, data quality; map projections, symbolizing, georeferencing, measurement, classification, data table manipulation, GPS- and smartphone-to-GIS workflows, publishing data and maps, and spatial statistics.
2. Develop **teaching skills** with the spatial perspective and geotechnologies that foster critical thinking and problem-based learning in different knowledge domains and subjects.
3. Develop **confidence** that you can use these skills and perspectives to move forward with **your own** lessons, activities, and courses.

Course Philosophy:

1. This is **your** course. Let me know how we can help you today and in the future as you use geotechnologies.
2. It is important that you **network** with your colleagues so that you can move forward with implementing what you are learning and practicing, sharing ideas, data, lessons, and best practices with your own community of GIS-using educators. This is critical as your needs change, as you learn more about how to use geotechnologies in education, and as the technologies themselves change.
3. Using geotechnologies effectively is a journey. Your needs change over time, and the technology itself is rapidly evolving. Just as you cannot learn Earth Science or web development in one day, you cannot learn all of geotechnologies in one day. But we can accomplish a significant amount of skill building in a short time.
4. We will not have time to work with every single tool! However, we will build a spatial vocabulary and foundation so that you will be empowered and confident that you can take the next steps.
5. We will not have time to complete each exercise, but you can go through each of the exercises on your own after the workshop ends. I encourage you to do so soon to make these workshops as useful as possible.
6. The activities we have created for the workshop may not be the exact topics that you teach everyday. However, (1) they include core themes and skills that can be used in many topics, and (2) As you work through the activities, think about how you could apply these themes and skills in your own projects, lessons, and disciplines.
7. Joseph: My research interests focus on teaching and learning with GIS. I thus will vary the instructional style and your feedback is appreciated and important as I continuously strive to improve the quality of this instruction.

Agenda: 9 Dec 2015 - 12:30 – 3:30 pm

- Introductions.
- Introductions and Goals. Why mapping? Give short presentation and discuss topics raised and also demonstrate [ArcGIS Online presentation mode](#). Demonstrate: paper vs. digital maps; maps as reference documents vs. maps as investigative tools; table of data vs. a map of that same data.

- Fill out your own data in Editable Feature Service: <http://bit.ly/QPSzlc> and discuss: What is crowdsourcing? What are geotechnologies, how do geotechnologies (GIS, GPS, remote sensing, web mapping) work, cloud vs. desktop tools, data quality, scale, map projections, metadata.
- Penn State Geospatial Revolution: [Trailer video](#). Why geotechnologies matter in society. Discuss: How are geotechnologies used in society? How are they evolving? How is GIS becoming a platform? What career opportunities exist in the use of geotechnologies? Mention US Dept of Labor report.
- What is GIS? What is ArcGIS? What is [ArcGIS Online?](#)
- Discuss: AGOL use: (0) Anonymous. (1) Public, and (2) Organizational subscription.
- **Investigation 1:** [Examine temperature extremes lesson and data for the USA, January and July.](#)
- **Investigation 2:** [Examine demographics and lifestyles at different scales for USA.](#)
- **Investigation 3:** Examine 1 STEM-based [GeoInquiry](#): Group #1 - Weather. Group #2 – The Dust Bowl.
- **Investigation 4:** [Examine global plate tectonics: Plate boundaries](#), earthquakes. Map last 7 days of earthquakes. Create presentation in ArcGIS Online.
- **Investigation 5:** [Historical investigation of land cover changes in west Denver using USGS topographic maps.](#)
- **Investigation 6:** Examine [storymaps](#). Show gallery. Titanic story map. Lakota Language story map. Atlas for a Changing Planet: <http://storymaps.esri.com/stories/2015/atlas-for-a-changing-planet/>
- Show St Vrain students' storymaps:
<https://docs.google.com/a/svvsd.org/document/d/1EgFXsrQ8im22kbbArebkTWjhu-DTF6vP3NBD11qUYf8/edit?pli=1>
- [Show Hans B's Montana student storymaps: http://bhsgis.weebly.com/web-maps-lessons-sponsors.html](#)
- [Show Patrick Steele's investigations in Palisade Colorado.](#)
- Then focus on investigation: [A new road proposal: Through the Serengeti, Africa.](#)
- **Investigation 7:** Collect and map data on campus grounds. Discuss: Methods of collecting data. How GPS works; GPS accuracy; smartphone tools and accuracy; coordinate systems and formats.
- **Outside:** Collect data with GPS and smartphones using 4 methods: (1) Take photo and record data (vegetation type and height) on phone or clipboard. (2) Use location service on phone (compass, lat-long) and collect attributes on phone or clipboard. (3) Collect Tracks: Motion X GPS and My Tracks on smartphone; (4) Crowdsourcing: Use editable feature service with ArcGIS app on smartphone. (5) [Snap2Map](#): Create storymap.
- Log in to ArcGIS Online organizational subscription. <http://www.arcgis.com>
- On laptop/tablet: Start new map: Create Map Notes. Discuss multimedia in maps. Manually add locations at which data was collected in the field. Add photographs to notes. Classify, symbolize. Save and share map.
- Discuss maps vs. apps vs story maps.
- Start new map: Create spreadsheet and enter lat-long coordinates and field-collected data. Map data from spreadsheet: Classify it. Symbolize it. Save and share.
- **Investigation 8:** Related methodology: [Investigate soil pH data](#): Symbolize, classify, analyze spatial patterns.
- **Investigation 9:** Create story map tour via <http://storymaps.arcgis.com>
- **Investigation 10:** Demonstrate spatial analysis – [John Snow & Cholera 1854 London epidemic](#). Demonstrate [Boulder Colorado landslide investigation](#).
- Next Steps: Resources, curriculum, maps, networking, online and face to face courses and opportunities. [eNet](#) courses. [ConnectEd Program](#).
- Reflections. Survey: Critical Incident Questionnaire.

◆ **Joseph Kerski**, Ph.D. serves in education at Esri in Colorado, focusing on curriculum development, professional development for educators, partnerships to advance GIS in education and society, and research in the effectiveness and implementation of GIS in education. He teaches online university courses and MOOCs and online courses. Joseph joined Esri after 21 years as geographer at the USGS and US Census Bureau. Visit: <http://www.josephkerski.com> or contact jkerski@esri.com. Joseph blogs weekly about GIS in education on <http://edcommunity.esri.com/blog> and about spatial data on <http://spatialreserves.wordpress.com> and hosts nearly 3,000 videos on GIS, geography, STEM, space and place, and education on <http://www.youtube.com/geographyuberalles>.