STELAR ITEST PI & Evaluator Summit

Strand 4, Session 2:
Best Practices and Tools for
Engaging K-12 Students in Big Data;

Friday June, 16; 10:00-11:45AM
Agenda:

• 10:00-Recap Session 1
• 10:05- Guiding Questions and Assumptions
• 10:20- Learning From Our Own Research
• 11:00- Citizen Science Platforms
• 11:20- Youth Radio: Telling Stories with Data
• 11:30- Wrap-up and Take Stock
Guiding Questions, Assumptions, Themes

- What is meant by big data?
- How do people (adults and children) interact with big data in their everyday lives? Knowingly and unknowingly?
- What constitutes data literacy? What are the core competencies required to successfully interact with (big) data? What does success look like for K-12 students?
- Goal: SWBAT see the patterns and tell a story about the patterns
- What is meant by authentic data?
- What generates motivation in people to tackle big data (adults vs children)? Why take the time and effort to deal with something so large and messy? Academic versus economic motivation....
- What kinds of tools help to clean up the mess, see the pattern, then tell story about the pattern (data management, analysis, and visualization)?
- What do ITEST projects tell us about best practices? What do other projects tell us? What are the gaps?
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<tr>
<th>Researcher</th>
<th>Project</th>
<th>Description</th>
<th>How?</th>
<th>Best Practices?</th>
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<tr>
<td>Stephen Koury</td>
<td>Biogenetics in Research Partnership: Expanding Exposure, Career Exploration and Interactive Projects in Basic Genome Analysis and Bioinformatics</td>
<td>Our project introduces 9-12 students and teachers to the use of bioinformatics tools for analysis of genomic data.</td>
<td>Students and teachers learn to query databases of genomics data to find similarity to a unique gene under study.</td>
<td>We provided the foundation of tools for allow teachers and students to engage in the data analyses in terms of an easy accessible and free online toolkit called Geni-Act. Personalized instruction in the use of the tools contained in GENI-Act and a detailed project manual. We have found that allowing teachers to take part in a second year in the project to develop their own course or curriculum using the toolkit has resulted in teachers developing and sharing their own resources based on their first year of participation and their goals for using the material in their courses.</td>
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<td>Catherine Cramer</td>
<td>Big Data for Little Kids: Data Modeling with Young Learners and their Families</td>
<td>In an informal education setting, we are creating, testing and refining a curriculum that invites children ages 5-8 and their caregivers to engage in playful, hands-on, collaborative exploration of foundational concepts of data modeling, which will generate preliminary evidence on the impact of participation as these families from underserved communities engage in sustained and data-rich inquiries into questions that matter to them.</td>
<td>Children ages 5-8 are participating in a 6 week workshop series, along with their adult caregivers, in which they will collectively analyze and visualize data gathered from around the museum, with a goal of raising their data fluency and literacy.</td>
<td>From previous work, we have found the following software to be accessible to high school aged students: Python, Gephi, R, Ora, and NetLogo. Our current project is based on research on big data modeling, and in particular the research by Schable-Lehner. As our project is based on Research and Development in an informal setting, and our workshops are just getting under way, we can only mention what we will be looking at: Early childhood education (5-8 years old) Parental engagement Family engagement Context in which data are personally meaningful. Data gathered through hands-on experiences Understanding through visualization.</td>
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<td>Michael Johnson</td>
<td>Collaborative Research: Connected STEM - Promoting STEM Education Through Connected Devices and Building Automation</td>
<td>Promote engineering awareness and interest through building automation, IoT, and 3D printing.</td>
<td>Sensors will be used to collect data about building and environmental conditions; this data will be analyzed as part of the project.</td>
<td>We hope to use relevant and authentic data to promote interest and help emphasize concepts.</td>
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<td>Jim Hammerman</td>
<td>I'm the evaluator on two ITEST projects: Maine LearnToMid: Creating a Virtual Infrastructure for Engaging Rural Youth in STEM Disciplines through Computer Science and AIM-ED (All Included in Math): An important study to examine the efficacy of a mathematics professional development program for elementary teachers.</td>
<td>The Maine Learn to Mid program engages middle school students in learning through &quot;modding&quot; in MineCraft. AIM-ED provides PD supports for elementary math teachers around creating supportive discourse communities, and is studying the impact on teaching and student achievement. I'm also a Co-PI on a STEM+C project that's more closely aligned with the (big) data literacy theme, with high school students (sighted and visually impaired) working together with researchers/developers to design software so that blind and visually impaired students can engage in astronomy data collection and analysis. Data structures and data manipulation are important components of this work. I've been the evaluator on a DRK12 project (LOCUS) developing assessments of statistical ideas and professional development supports for teachers.</td>
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<td>Yang (Paul) Xu</td>
<td>Node-PI: An Affordable Cloud based IoT System</td>
<td>We explore the use of a $4 Wi-Fi and Python enabled micro-controller to introduce students to the concepts of Python programming and cloud computing with Internet of Things.</td>
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<td>Michael Stanley</td>
<td>Geotechnology Experiences for Students and Teachers</td>
<td>Integrating Geographical Information Systems and Geosciences, and geotechnologies, with middle- and high-school STEM curricula.</td>
<td>Students learn to identify, acquire, organize, visualize, analyze and present data and spatial data, using Web-based GIS, and mobile GIS apps.</td>
<td>ArcGIS Online, facilitated peer-to-peer learning, hands-on, inquiry-based learning.</td>
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<td>Alex M. Gurn</td>
<td>From Data to Awesome (DDA)</td>
<td>Youth Radio's From Data to Awesome (DDA) project aims to develop and test a design-based collaborative strategy to engage young people to learn, create, and teach using multi-modal data in the production of interactive media for local and national audiences.</td>
<td>Youth participants are introduced to data sciences and data-informed practices in the context of designing, producing, and publishing journalistic media that addresses issues and problems affecting diverse youth communities.</td>
<td>External evaluation research by Rockman et al has documented and analyzed informal STEM education at Youth Radio for over a decade. Most recent final reports available at: <a href="https://rockman.com/whats-new/2017/05/stem-media-matters-examining-youth-radios-stem-powered-media-production/">https://rockman.com/whats-new/2017/05/stem-media-matters-examining-youth-radios-stem-powered-media-production/</a> and <a href="http://www.informalsci.org/youth-radio%E2%80%99s-doi-initiative-summative-evaluation">http://www.informalsci.org/youth-radio%E2%80%99s-doi-initiative-summative-evaluation</a> Teach Youth Radio (<a href="https://youthradio.org/fac-teachers/">https://youthradio.org/fac-teachers/</a>) is a website designed for educators to implement digital media projects with youth in a range of settings. DIY educator toolkit includes: Teaching Stories With Data; How To Make An Infographic; Mobile App Ideation; using App Inventor, and others. Lee, C. H., &amp; Soep, E. (2016). <em>None But Ourselves Can Free Our Minds: Critical Computational Literacy as a Pedagogy of Resistance, Equity &amp; Excellence in Education</em>, 49(4), 480-482. This article discusses Youth Radio's approach to teaching critical computational literacy (CCL) that combines the strengths of critical literacy and computational thinking.</td>
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<td>Pasha Antonenko</td>
<td>DigFossils: Engaging K-12 Students in Integrated STEM via 3D Digitization, Printing and Exploration of Fossils</td>
<td>The goal of this project is to expand and extend our understanding of integrated STEM learning by designing and testing a model for student engagement using 3D scanning and printing, and computational modeling within a highly relevant but unexplored educational pathway to K-12 STEM – paleontology.</td>
<td>K-12 students and contribute to vast libraries of 3D scans of fossils. Examples of such repository include Digilillo (digilillo.org), Digimorph (digimorph.org) and MorphoSource (morphosource.org).</td>
<td>We are mostly using online repositories of 3D models and 3D scans like the ones I listed above. Most of the resources we use were designed for scientists and we are trying to expand their usage to include K-12 students and teachers.</td>
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Citizen Science Platforms
http://www.ciesin.columbia.edu/jbwq/
http://d2zahwnsqpmout.cloudfront.net/map/
https://platform.bop.nyc/expeditions/data
Examples with high motivation for youth

In recent years, the number of incarcerated kids in Alameda County, CA, has decreased drastically.

But at the same time, conditions in the county’s juvenile hall have gotten worse.


– Are Millennials more narcissistic?
– Youth incarceration rates are decreasing but conditions are worsening
What did we learn?