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Using Existing Programs as Vehicles to Disseminate Knowledge, Provide Opportunities for Scientists to Assist Educators, and to Engage Students in Using Real Data.

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Abstract- Many national and statewide programs throughout the K-12 science education environment teach students about science in a hands-on format, including programs such as Global Learning and Observations to Benefit the Environment (GLOBE), Project Learning Tree (PLT), Project Wild, Project Wet, and Hoosier River Watch. Partnering with one or more of these well-known programs can provide many benefits to both the scientists involved in disseminating research and the K-12 educators. Scientists potentially benefit by broader dissemination of their research by providing content enrichment for educators. Educators benefit by gaining understanding in content, becoming more confident in teaching the concept, and increasing their enthusiasm in teaching the concepts addressed.

Here we discuss an innovative framework for professional development that was implemented at Purdue University, Indiana in July 2013. The professional development incorporated GLOBE protocols with iPad app modules and interactive content sessions from faculty and professionals. By collaborating with the GLOBE program and scientists from various content areas, the Department of Earth, Atmospheric, and Planetary Sciences at Purdue University successfully facilitated a content rich learning experience for educators. Such activity is promoted and supported by Purdue University Libraries where activities such as Purdue's GIS Day are efforts of making authentic learning sustainable in the State of Indiana and for national consideration.

The Framework

- Utilize an established program that is nationally known with the following attributes:
 - Has a pre-made curriculum which is research based and NGSS friendly
 - Has a support mechanism in place to assist teachers in implementation after the workshop
 - Has the ability to recruit from a wide audience
- Incorporate multifaceted technologies
 - Allows for real-time data collection
 - Is portable
 - Allows for visualizations in the field (DEM)
- Authentic Connections to Current Research
 - Increases Teacher Content
 - Connects well with the program content

National Program



The GLOBE program is a worldwide hands-on, primary and secondary school-based science and education program. GLOBE provides access to Interdisciplinary materials to engage students in science and scientific discovery. The program has a network of support for educators that includes regional partners, national contacts, and international collaboration.

Technologies



The iPad is common to many schools and a universal device which can be used for many tools. The MapBox app allowed the use of DEM data in the field setting. The GLOBE program provided iPad loadable modules for teachers to learn and explore in informal settings. The iPad also allowed the use of Google Earth, internet information, photo documentation, and field journaling.

Current research



Faculty currently using LIDAR, USGS Waterway Mapping, Soils, and GIS data were interested in presenting their work, helping teachers with content, and lesson infusion.

The Implementation

On July 15-18, 2013, Purdue University Earth, Atmospheric, & Planetary Science (EAPS) piloted a technology based, content-research infused, GLOBE workshop in West Lafayette, Indiana. EAPS teamed up with the GLOBE program, Purdue GIS Libraries, Purdue Agronomy, West Lafayette Parks & Recreation, Tippecanoe Parks Dept., Civil Engineering, and the Discovery Learning Research Center to create this unique professional development experience.

Monday (7/15/13)

- Celery Bog Nature Area
- Introduction and overview to the GLOBE program
- Site selection and site mapping in the field
- Atmospheric protocols
- Introduction to Soils and site mapping for soils
- Soils with Purdue Department of Agronomy



Tuesday (7/16/13)

- Celery Bog Nature Area
- Soils protocols collecting and analyzing soils from various environments
- Soil Mapping in the field with iPads (bus tour with stops)
- Introduction to GLOBE data inputting (Purdue Campus)
- Using LIDAR
- making graphs with GLOBE data and using Google Earth



Wednesday (7/17/13)

- Celery Bog Nature Area
- Finish Soils analysis
- Introduction to GLOBE Hydrology sampling from marsh area
- Inputting Data (Purdue Campus)
- hydrology USGS
- Finishing GLOBE Hydrology and lesson planning



Thursday (7/18/13)

- Tippecanoe Battle Ground
- Hands on Hoosier Riverwatch training in classroom and Wabash River

The Discoveries

Benefits of using this framework:

For Teachers & Outreach

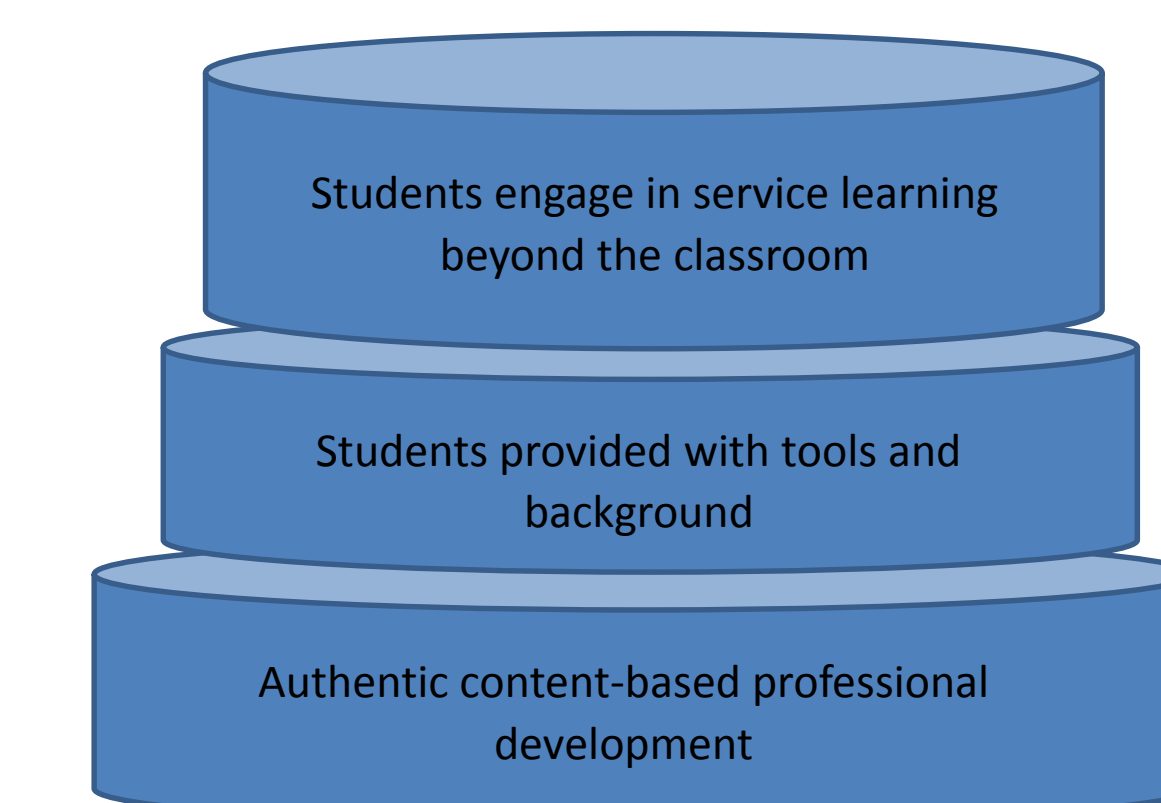
- Access to data
- Support in pedagogy and content.
- Resources beyond data access

For Researchers

- Dissemination of data
- Broader dissemination of research
- Excite and increase the pipeline of STEM future

Next Steps

-Refinement of the cycle to implementation in educational settings. We have the first level with the authentic, hands-on, content rich professional development completed. Now further efforts are needed in the support of educators in implementing a constructivist approach. Only with additional supports will educators be able to provide students with place-based educational experiences, in which they develop environmental stewardship and utilize service learning opportunities.



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