

Session Title: Connections to Formal Education

Moderator: Carrie McDougall

Note taker: Lexie Brown

Participants: Pat Hamilton – Science Museum of Minnesota

Abbey Spargo – Ocean Explorium (New Bedford)

Gary Randolph – The GLOBE Program

Brooke Hsu – NASA Goddard Space Flight Center

General Notes:

- Pat Hamilton
 - Interactions with University of Minnesota around scientific visualization and research
 - Undergraduate-level education
 - Scientific visualization and versatility can blur the lines between informal and formal education
 - Classes like the idea of having access to SOS without responsibility for it
 - Offers a unique experience for students
 - Useful tool to communicate concepts that are difficult to convey otherwise in a classroom setting
 - Professors get good feedback from students about SOS
 - 2 main modes
 - Students sent to museum for extra credit (come on their own)
 - Classes brought to museum together, as a field trip
 - Tony Murphy's STEM education class (for elementary and secondary science teachers) – instructors are responsible for SOS interpretation
 - Students download worksheet from Blackboard and interpret data as they go
- Abbey Spargo
 - Working on teaching STEM subjects through *emotion* and *context*
 - Museum has living exhibits that complement SOS
 - Museum has inquiry-based exhibits for younger learners
 - Intern program that allows students to act as docents/stewards for SOS
 - Teacher professional development around the sphere
 - Boat in the summer to do experiments on the water (associated with Explorium)

- Hubble Space telescope exhibit in conjunction with SOS
 - Strengths of SOS:
 - Teaches 21st century skills
 - Challenges
 - Access for students to museum
 - Educational attainment
 - Professional development
 - Connecting to local issues while using global datasets
 - Engaging only one side of the sphere
 - Inability to obtain data (solved by Interactive Earth?)
- Gary Randolph
 - The Earth System poster, Activities guide, teacher guides, and individual images available for teachers on GLOBE website
 - Activities provide understanding of Earth as a system
 - Images can be displayed on SOS
 - GLOBE activities could be pre-visit activity for classes visiting the sphere
- Brooke Hsu
 - Partnership with Howard B. Owen Science Center – help provide services to students in Prince George’s County (Maryland)
 - Work with them to develop classroom content relevant to SOS exhibit
 - Have started evaluating learning impacts of SOS – effective use for formal education
 - What method(s) work best with sphere?
 - What kinds of interactions with SOS are most effective?
 - Will develop modules using NASA Earth Science data based on evaluation results
 - Will evaluate modules based on effectiveness for student learning
 - Lessons learned will be shared with network and hope to work with network for some of the evaluation
- Questions:
 - Matt Benjamin: (*for Pat*) What have you done in terms of evaluating need of faculty at college institution? What do they need to integrate SOS into their lessons?
 - Pat: Have directly approached professors teaching SOS-relevant content.
 - Pat: SOS sells itself once professors come to see it at the museum, helps them think of science museum as an off-campus laboratory.
 - Craig Risien: Are there any formal modules for university-level science course that would be used with SOS (to make it easier to sell it to professors)?
 - Pat: One under-utilized element of SOS is inventory of datasets with no audio
 - Professors can interpret datasets themselves and don’t need audio
 - We help professors find the visualizations that already exist online that they need
 - Carrie McDougall: NOAA has not developed any specific modules
 - Abbey: Ocean Explorium works with professors of undergraduates from Dartmouth

- Have worked professors to design field trip (and SOS data) specific to their classes
- Brooke: NASA Goddard is in the process of developing air quality module that will include a related playlist but will be targeted to grade school
 - Concepts could be elaborated for higher grades using same playlist
- John McLaughlin: GLOBE activities were found to be very effective (by teachers) to introduce the concept of global visualizations and liked color scales
- Carrie: Tony Murphy has agreed to share his activities that he uses for his STEM classes

Recommendations to NOAA (Office of Education, Earth System Research Laboratory, National Visualization Laboratory):

- NOAA could create learning modules for university-level courses to use in associated with SOS

Actions/Next Steps:

<i>Action/Next Step</i>	<i>Responsible Network Member/Institution</i>

Research Questions for Further Exploration:

- Evaluation of what university professors need to integrate SOS into their lesson plans
- Learning impacts of the sphere – what types of interactions with the sphere work best? (NASA Goddard)
- Evaluation of NASA Earth Science learning modules (to be developed) in terms of learning effectiveness (NASA Goddard)