STEM Inquiry: Using the environment as an integrating concept of STEM

Session Summary

Science, Technology, Engineering and Math (STEM) learning encompasses a broad range of knowledge and skills that prepare students to address 21st century challenges and ultimately help to maintain U.S. competitiveness in the global economy. STEM fosters ways of thinking (habits of mind) that have a natural and important connection to environmental education programming in the Mid-Atlantic region. The STEM Inquiry session at the 2013 Mid-Atlantic Environmental Literacy Summit was developed to support a shared understanding of how STEM, Science and Environmental Education leaders can help to better connect these spheres of learning in support of Environmental Literacy and student learning in general.

Environmental education, at its best, supports problem based learning in an authentic environment relevant to the students, often in their neighborhoods, schoolyards and watersheds. The problem based nature or environmental education offers an engaging platform for STEM learning. To date, the application of all STEM disciplines to environmental problems has taken on numerous forms ranging from watershed wide environmental monitoring programs to underwater exploration, development of alternative energy, and professional learning for teachers.

During the STEM Inquiry session a few ideas emerged as important notions to consider in the shared environmental education and STEM spaces.

- Support for sustained teacher professional learning. The professional learning should allow for the integration of STEM in all grades for all students and an environmental education context is an appropriate context for this.
- Like formal teachers, nonformal environmental educators will need the necessary support to ensure that their work is aligned and supportive of STEM and NGSS
- There is a need for individual points of contact in each LEA that maintain knowledge of and support related STEM and environmental education efforts. These points of contact should have the opportunity to communicated across LEAs and States and be available for networking with nonformal partners
- STEMnet emerged as an example of a program and infrastructure that would be very useful across the region. Additionally, model programs like STEMnet need continued support from States, LEAs and Federal programs. Other models that were discussed include: Environmentors, GOBE, and VISTA

The STEM Inquiry session began with a poster gallery walk in which attendees had the opportunity to view a number of posters (would like to include a link to a site with the posters on it) that described regional programs that connected STEM and

environmental literacy. Following the gallery walk panelists George Newberry (MSDE), Elizabeth Edmondson (VISTA – VCU), and Todd Toth (NASA) discussed programs that they are involved in and the way those programs connect STEM and environmental education programming.

- George Newberry described Maryland's STEM Innovation Network – STEMnet. This program answers the call for increased opportunities for STEM learning for all that will move Maryland to #1 in the world in STEM. The central component of STEMnet is the infrastructure, training and support necessary to facilitate connections amongst STEM professionals, teachers and classrooms.
- Elizabeth Edmondson gave a presentation on the Virginia Initiative for Science Teaching and Achievement (VISTA). This I3 funded initiative supports in-depth professional development programs for elementary science teachers, graduate-level academic certification and support for provisionally licensed middle and high school science teachers, new science coordinator professional development, and collegiate-level professional development for science education faculty. Additionally, VISTA provides program participants with coaching and access to online and in-class resources. All program participants are then evaluated in multiple ways to validate the impact of "inquiry based" teaching.
- Todd Toth led session participants through a discussion of the GLOBE program that highlighted the alignment of environmental monitoring, NGSS and STEM. Todd also pointed out the functionality of the new GLOBE website and where protocols, data, lessons and other resources can be found.

Following the panel presentations a quick update was given by each state that discussed the status of environmental literacy efforts in the state and in some cases how those efforts are connected to STEM programming. Their updates are accessible via the link provided below.

Towards the end of the session participants were divided up into table groups and asked to consider 1 of 4 guiding questions. The guiding questions and main points of the discussion were:

- *How are common core and NGSS going to make opportunities for connecting STEM and MWEEs/Environmental Education better or worse?*
    - The GOOD
        - Env. Ed. = inquiry
        - Engineering opportunities exist in an authentic context
        - Opportunities for Problem Based Learning
        - Behavior components –
        - Good connections between nonformal and formal
    - The Bad
        - Difficulty in obtaining and using evidence of change

        - Nonformal needs to learn how to better assess programming in support of standards

- *What programs currently exist in the region or in each state to engage with STEM professionals? Encourage the thoughtful use of data?*
    - *Is the current level of engagement sufficient to meet the needs of the state?*
        - *If not, what are ideas to address the gaps?*
    - Nonformal program conduct work in schools
    - Scientists in classrooms
        - This is spotty at best, but some stories of true success here
        - Some examples: enviromentors, NOAA and Howard U.
    - ***NEED for guidelines around partherships (business rules for partners)

- *Where are the model schools or school division programs for each level elementary, middle, and high school and career readiness?*
    - *What characteristics are important at each level?*
    - *What are the lessons learned?*
    - *How do we disseminate this information?*
    - Commonalities
        - Administrator supported
        - Champions in the schoolas
        - Political support
        - Programs are problem based curriculum
        - Sustained PD
    - Recommendations:
        - Sustained prof. dev.
        - Informal educators tie in with classes and connect the ties

- *We appreciate that implementation largely happens at the LEA and school building level. Are there mechanisms at the state or regional level that could assist with implementation?*
    - Effective and public points of contact in LEAs
        - STEM Specialists
    - Provide connections between higher ed and k-12