Creating Sustainable University-Community Partnerships in Science Education (Invited)

Finkelstein, N (noah.finkelstein@colorado.edu), Physics, University of Colorado, Boulder, CO, United States

Despite years of research and investment, we have yet to see the widespread implementation of a myriad research-proven instructional strategies in STEM education[1]. To address this challenge, we present and analyze one such strategy, a theoretically-grounded model of university-community partnership [2] that engages university students and children in a collective enterprise that has the potential to improve the participation and education of all. We document the impact of this effort on: university participants who learn about education, the community and science; children in the community who learn about science, the nature of science and develop their identities and attitudes towards science; and, shifts in institutional structures which may allow these programs to be part of standard practice. This project is designed to be sustained and scaled, and is analyzed through the application of a new framework [3] which brings together theories of STEM change that come from studies in higher education, faculty development and disciplinary-based education research in STEM. [1] National Research Council. (2003). Improving Undergraduate Instruction in Science, Technology, Engineering, and Mathematics: Report of A Workshop. Washington, D.C.: The National Academies Press. [2] Finkelstein, N. and Mayhew, L. (2008). Acting in Our Own Self-Interest: Blending University and Community. Proceedings of the 2008 Physics Education Research Conf, AIP Press. Melville NY, 1064, 19-22. [3] Henderson, C., Finkelstein, N. & Beach A. (to appear). Beyond Dissemination in College science teaching: An Introduction to Four Core Change Strategies. Accepted May 2009 in Journal of College Science Teaching.

Sustainable Outreach: Lessons Learned from Space Update and Discovery Dome

Reiff, P H (rei@rice.edu), Rice Space Institute, Rice University, Houston, TX, United States
Summers, C (csummers@hmns.org), Houston Museum of Natural Science, Houston, TX, United States
Law, C C (colinlaw@mac.com), Rice Space Institute, Rice University, Houston, TX, United States

A sustainable program lives on past its initial funding cycle, and develops a network of users that ensures continued life, either by fees, advertising revenue, or by making the program more successful in later sponsored grants. Teachers like free things, so having a sponsor for products such as lithographs or CD-Roms is key to wide distribution. In 1994 we developed “Space Update®”; under the NASA “Public Use of the Internet” program. It has new editions annually, with over 40,000 distributed so far (many purchased but most free at teacher and student workshops). In 1996 we created a special edition “Space Weather®”, which includes the space weather module from Space Update plus other resources. Initially developed with funding from the IMAGE mission, it is now sponsored by Cluster and MMS. A new edition is published annually and distributed in the “Sun-Earth Day” packet; total distribution now exceeds 180,000. “Earth Update” was created in 1999 under cooperative agreement “Museums Teaching Planet Earth”. It now has a total distribution of over 20,000. Both Earth Update and Space Update were developed to be museum kiosk software, and more than 15 museums have them on display. Over 4,000 users are active in our e-Teacher network and 577 in our museum educator network. Although these can certainly be considered successful because of their longevity and user base, we have had a far more dramatic sustainable program arise in the last six years… the “Discovery Dome®”. Invented at HMNS and developed under NASA Cooperative Agreement “Immersive Earth”, this dome was the first digital portable planetarium that also showed fulldome movies with an interactive interface (first shown to the public at the Dec 2003 AGU meeting). The Discovery Dome network (tinyurl.com/DiscDome) has spun those initial 6 NASA-funded domes into over 90 installations in 22 states and 23 countries. Creating high quality content is quite expensive and so needs sponsors, but the customers (typically school districts or museums) will pay a reasonable price for quality equipment to show them on. Creating an innovative, exciting product at an affordable price is certainly key to sustainability. If space permits, we will put up a dome as a demo in the poster session. The software and the dome will be on view at the “Exploration Station” the Sunday before AGU.

http://www.spaceupdate.com

Creating the EPO Quilt: Using small money to sustain large programs

Cobabe-Ammann, E A (ecobabe@spaceeducation.org), Emily A. CoBabe & Assoc., Boulder, CO, United States
Wood, E L (erin.wood@lasp.colorado.edu), CU/LASP, Boulder, CO, United States

Creating sustainable science education programs on limited dollars is both an art and a science that many of us are trying to master. In some situations, educational professionals can build regional and national programs by ‘sewing’ together several disparate pots of money to create a larger program, sometimes with national reach. The programs can then be sustained using the same model of combining opportunities. The key to effectively using this strategy involves creating programs that are flexible, either in their scope or their content, so that they can take advantage of varied opportunities. In addition, programs that meet national standards and are fully evaluated are more easily sustainable as time goes on, since the reach of the program can broaden and efficacy of the program.
can be demonstrated. Here we present successful examples of how to create this quilt in the areas of space weather, climate change and engineering education.

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