

TEACHING THE TEACHER – EFFECTIVE TEACHER PROFESSIONAL DEVELOPMENT IN THE FIELD OF ASTROBIOLOGY. H. M. Nelson¹, L. Bug² ¹Penn State Astrobiology Research Center, 2217 EES Building, University Park, PA 16802, heathernelson@psu.edu, ²Penn State Center for Science in the Schools, 118 Chambers Building, University Park, PA 16802, Leahbug@psu.edu.

Introduction: The Penn State Astrobiology Research Center (PSARC), in cooperation with the Pennsylvania Space Grant Consortium, has been providing effective teacher professional development courses since 1999. Working with faculty at Penn State University the education and public outreach (EPO) team has coordinated workshops for more than 200 middle- and high-school science teachers in the field of astrobiology. These five-day, two-graduate credit courses utilize best practices and are designed to combine science content tied to National Standards and pedagogical strategies. In 2008 and 2009 the PSARC EPO team partnered with research scientists, educators, and museum personnel to coordinate three workshops relating to astrobiology; Evolution – How Important is it to a good science education?, and Earth’s History: Interaction Between Life and the Environment Part 1 and Part 2. Conducting these workshops aligns with outcomes in the NASA Education Strategic Coordination Framework [1] Outcome 2: *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.* Our goal is to continue providing long-term sustained professional development while strengthening astrobiology content knowledge and educational pedagogy through collaborations with the Center for Science and the Schools (CSATS) in the College of Education and other Penn State centers and colleges. We will discuss some of the specifics of the workshops listed above and the success of the teachers in incorporating astrobiology materials into their classrooms. We will also discuss the trials and tribulations of organizing teacher workshops and how creating partnerships to leverage resources enables us to continue to provide successful professional development opportunities to in-service educators.

Astrobiology and Workshop Activities: In 2008 and 2009 Penn State research scientists, educators, and museum personnel partnered to develop a sustained, long-duration teacher professional development program relating to Earth’s geologic and evolutionary history. Science teachers developed an understanding of how field-based geological investigations are used to infer environmental and biological change over Earth’s history. Faculty provided various curriculum integration techniques and over the course of two summers, workshop participants worked collaboratively with scientists and educators at Penn State to incor-

porate these ideas into classroom lessons as well as an exhibit for the Earth and Mineral Sciences Museum at Penn State. The museum exhibit included fossil specimens, emphasizing the range of species alive before and after a mass extinction and NASA research data was utilized to create and design the content. Teachers returned for the second part of the workshop in year two to share the projects and activities that they implemented into their classrooms and explore additional astrobiology content and pedagogy. This year teachers have been encouraged to share their experiences through presentations at professional meetings. The researchers and educators at Penn State have created K-12 teacher leaders through these professional development opportunities.

Trials and Tribulations: Our goal is to attract teachers who are interested in astrobiology and who will return to the classroom to inspire, engage, and educate their students. Educators are constrained by both time and money and it is essential to support them in both these areas if we want dynamic individuals to attend these workshops. We have learned that funding assistance in the way of tuition subsidies, and providing outstanding logistical support, are strategies we can incorporate to encourage participation. We partner with faculty and research scientists at Penn State to provide timely and accurate scientific content and work with CSATS to ensure that the workshops include the most recent pedagogical strategies. At the conclusion of the program each course is evaluated and the results are analyzed by PSARC and CSATS to determine if modifications are necessary for subsequent workshops. This is critical to our goal of creating an effective and replicable professional development model while providing improved teaching instruction every year.

References:

[1] National Aeronautics and Space Administration Education (2007) *Strategic Coordination Framework: A Portfolio Approach*, NASA NP-2007-01-456-HQ, 28 p.