

**INSTITUTES FOR FACULTY INSTRUCTING FUTURE TEACHERS.** C. Shupla<sup>1</sup>, S. Shipp<sup>1</sup>, P. Asti<sup>2</sup>, J. Bailey<sup>3</sup>, L. Chambers<sup>4</sup>, J. Pomeroy<sup>5</sup>, G. Schultz<sup>6</sup>, T. Slater<sup>7</sup>, S. Slater<sup>7</sup>, D. Smith<sup>8</sup>, D. Stork<sup>9</sup>, and W. Waller<sup>10</sup>, <sup>1</sup>Lunar and Planetary Institute (3600 Bay Area Boulevard, Houston, TX 77058, [shupla@lpi.usra.edu](mailto:shupla@lpi.usra.edu)) <sup>2</sup>National Association of Community College Teacher Education Programs, <sup>3</sup>University of Nevada, Las Vegas, <sup>4</sup>NASA Langley Research Center, <sup>5</sup>University of California, Davis, <sup>6</sup>Astronomical Society of the Pacific, <sup>7</sup>University of Wyoming, <sup>8</sup>Space Telescope Science Institute, <sup>9</sup>University of Dubuque, <sup>10</sup>Massachusetts Space Grant Consortium.

**Introduction:** According to the American Association for the Advancement of Science, *There is a widely-recognized national crisis in science education, and scientists are an important part of the solution*<sup>(1)</sup>!

Surveys and focus groups suggest that education and science faculty who prepare future teachers benefit from networking with each other, and through professional development incorporating educationally-researched pedagogical techniques, the latest Earth and space science discoveries, materials, and new activities. A collaboration of scientists and science educators have created a model integrating these elements: two-day Faculty Institute for NASA Earth and Space Science Education (FINESSE). The Institute model has been delivered three times and six more institutes are planned. Evaluation suggests the model is successful and provides insights into strengthening Institute delivery.



**About FINESSE:** A collaboration of scientists and science education specialists, working with the Association for Science Teacher Education (ASTE), and the National Association of Community College Teacher Education Programs (NACCTEP), offers the Faculty Institutes for both science and education faculty involved in teacher preparation. Faculty Institutes were presented at the 2009 American Astronomical Society winter conference, the 2009 and 2010 ASTE conferences, and the 2009 NACCTEP conference, to approximately 80 science and education faculty.

This project was developed to help faculty overcome several roadblocks, including:

- the faculty responsible for training pre-service education students vary greatly in their own science experiences and level of expertise;
- the modeling of best science education practices (e.g., building understanding through authentic inquiry, use of real data, connections to educational research, alignment with standards, etc.) in classes also varies greatly;

- science faculty often have the content expertise, but rarely model teaching practices that are needed by classroom teachers, making it more challenging for pre-service students to translate science into their future classrooms.

**Teaching Inquiry:** According to national reform documents, science learning experiences for teachers must incorporate understanding science through inquiry, yet this is often not modeled because most science instructors are more comfortable and accustomed to using lecture-style approaches<sup>(2)</sup>. As the FINESSE team prepared to deliver 2-day faculty institutes, team members determined their goals should include the use of NASA data for classroom inquiry.

One challenge to inquiry is the time spent obtaining true data, and yet the majority of astronomers and planetary scientists are using existing data acquired by robotic missions, telescopes, and orbiters. Through these workshops, participating College of Science and College of Education faculty have co-developed mechanisms for working inquiry into a deeper understanding of science by using existing on-line data to develop and research Earth and space science topics, progressing from creating a valid and easily testable question, to simple data analysis, arriving at a conclusion, and finally presenting and supporting that conclusion in the classroom.

Another challenge identified early by team members was that future teachers, regardless of their science preparation, had a very difficult time formulating a science researchable question; in fact, that this was the most difficult aspect of a complete inquiry project. A portion of each institute is spent considering the characteristics of a good question.

This framework is the foundation of the FINESSE institutes, which also incorporate discussions on the nature of inquiry, assessment, presentations by Earth and space science researchers, and opportunities for the participants to design implementation plans of their own.

**Current Findings of FINESSE Faculty Institutes:**

*Overall goals:* The FINESSE team's original goals were to conduct Institutes that would increase understanding and use of best science education practices (e.g., integration of authentic inquiry, use of real data,

identification of misconceptions, assessments of understanding, alignment with standards); increase knowledge of current NASA Earth and space science research and missions; and provide access to appropriate NASA SMD education resources. The team is also attempting to create a synergistic network of science and education faculty; and evaluating this as a professional development model for pre-service faculty institutes.

*Current Evaluation Results:* Although not without challenges, Year One of the FINESSE program has been successful. All three Institutes were well-received by their participants, and nearly all of them indicated some or strong confidence that they would implement knowledge and/or activities into their own classes.

Over 90% of 2009 participants felt that the majority of FINESSE's goals had been completely or partially achieved, including, for example, improving content knowledge, sharing NASA resources, inquiry and assessment methods. The FINESSE team is incorporating more science presenters into future institutes and will meet the other goals through follow-up webcasts after the institutes are over. Another indication of success is the number of FINESSE participants that have informed us of their use of the institute's materials in their own classes or in presenting workshops of their own.

*Current Challenges:* FINESSE attendees have not had sufficient opportunities to develop into a supportive community, despite the establishment of tools for discussion and resources for further development. Team members are helping by introducing requests for input from the community, and more frequent opportunities to meet and participate in webcasts are being scheduled.

**Next Steps:** FINESSE institutes will be scheduled for late 2010 and 2011 at four national education conferences.

**LPSC members are welcome to join as participants, to share the opportunity with others, or to share their thoughts with the team.**

#### **Contact Us!**

**Applications, References, Resources, and Contacts**

can be found at

<http://www.lpi.usra.edu/education/facultyInstitutes/>

or email [shupla@lpi.usra.edu](mailto:shupla@lpi.usra.edu)

#### **References:**

[1] American Association for the Advancement of Science (1998) *Blueprints On-Line* Ch. 9 Teacher Education. [2] American Association for the Advancement of Science (1998) *Blueprints for Reform*.