Astronomy Education at the AAS : The Current State

There is a quiet revolution occurring in astronomy education. So quiet that most of us haven't heard of it yet. But it is coming. Thanks to a growing science education research community, much is being learned about teaching and learning that will have profound impacts on the way we think about teaching and on the way we behave in the classroom. Astronomy education is a major responsibility of most members of the AAS. Most of us teach undergraduates—both future majors and the unwashed masses of non-majors—and/or train our replacements and future colleagues in our graduate programs. Due in large part to the good work of our predecessors (see article by Shipman) who set high standards and initiated so many thoughtful and fruitful activities, the AAS is deeply involved in astronomy education. The Society's focus is primarily on astronomy education in higher education, but we do spill over some into formal K-12 and informal education, especially in collaboration with our partners the Astronomical Society of the Pacific (ASP) and the American Association of Physics Teachers (AAPT).

The Society's education efforts are coordinated by the nine-member Astronomy Education Board (AEB) that I chair as the elected education officer. In reality, of course, the Board's work is headed up by the full-time Director of Educational Activities, Susana Deustua, who has been instrumental in forwarding the Society's goals. Following is a brief summary of some of the activities we have been involved in. (You can read more about the Society's education office, and access some useful resources, on the AAS website.)

At every AAS meeting there are a number of education related sessions and talks organized by the AEB. Of special interest are the workshop and sessions held on the weekend preceding the meeting. Saturday and Sunday is the two-day *Teaching Excellence in Astronomy Education workshop* (co-sponsored by the NASA Center for Astronomy Education). On Sunday afternoon is *Astronomy 101: A Continuing Dialogue* that addresses an important topic relevant to teaching Astronomy 101, and is a place for astronomers interested in learning or sharing to gather.

During the regular portion of the meeting, members interested in astronomy education will not have run out of opportunities. On Monday is *Cool Astronomy*, featuring an astronomy researcher and an astronomy education researcher discussing what is hot—and cool—in the world of astronomy. Throughout the meeting, members will find additional oral and poster sessions related to various aspects of education.

In addition to meeting offerings, the AAS is teamed with a number of physics organizations on an online project called comPADRE (http://www.compadre.org) that is part of the NSF funded National Digital Library. We have joined with the ASP in co-sponsoring a series of meetings called Cosmos in the Classroom which brings together astronomy teachers from all types of higher education institutions. And of course we have continued to contribute our voice to the ongoing struggle over the inclusion of Intelligent Design in K-12 science classrooms. In collaboration with the ASP we produced and distributed a nice document that makes the case for evolution of the universe and its contents called *An Ancient Universe* which you can find on the website (http://www.aas.org/education/publications/AncientUniverseWeb.pdf).

I hope that you find this newsletter useful as you think about your own involvement in astronomy education and share your comments and feedback with us as the revolution grows. ■

George "Pinky" Nelson, AAS Education Officer
Western Washington University

SPaRk

The AAS Education Newsletter
January 2006, Issue 1

Published by:
The American Astronomical Society
Washington, DC

About this Issue

You are reading the first issue of the American Astronomical Society's new Education Newsletter. Why now, you may be asking yourself. Well,…time for a little history.

The AAS has always had an interest in education. Since 1979, the Society has had an Education Officer, who also serves on the Council. Education has become increasingly important as evidenced by the hiring of a half time education coordinator in 1997, which led, in 2002, to the creation of the fulltime position of Director of Educational Activities, which I now fill. During the same period of time, the research on how people learn has led to changes in how people teach. All AAS members have been, or still are, formally educated—after all, one still has to go to school (high school, college, graduate-school) to earn a degree (despite the prevalence of mail-order diploma mills). And though not all AAS members teach for a living, many are involved in education-related activities, be it formal or informal. The purpose of this newsletter is to inform AAS members about hot issues—for example, the current discussion on creation design—opportunities to learn more about current pedagogical techniques and methods—e.g. through workshops and sessions at the semi-annual meetings, and other topics of interest as they pertain to astronomy education.

The Newsletter will come out twice per year. All submissions, including letters to the editors, should be sent to the editors, Gina Brissenden and Jake Noel-Storr, preferably by email to brissenden@as.arizona.edu and jnoelstorr@as.arizona.edu.

All issues of the Newsletter will be available from the AAS Members Only pages for viewing online or for downloading in PDF. An email alert will be sent to AAS members when a new issue is printed. Paper copies will only be available by subscription (free to AAS members). To **subscribe**, please send email to jones@aas.org.

We hope you enjoy this first issue.

Susana Deustua
Director of Educational Activities
American Astronomical Society

The Emerging E/PO Profession

Dan Caton is congratulated by ASP executive director Michael Bennett for winning the prize everybody wanted—that fancy Meade in the background.

ASP board member Bruce Partridge (L) and president Dennis Schatz (R) listen on as Jennifer Scott & Siming Liu (the 2005 Robert J. Trumpler Award winners) say thank you.

Program committee chair Tim Slater, and logistics coordinator Elizabeth Alvarez, share a moment of laughter (and relief) at the conclusion of another successful ASP meeting.

Photos: Julia Olsen, CAPER Team

The Astronomical Society of the Pacific recently hosted their 117th annual meeting titled "Building Community: The Emerging E/PO Profession" in Tucson, Arizona. The conference attracted over 350 attendees who are working in the area of Education and Public Outreach. The planning committee purposefully created an event that brought together a diverse range of voices from the rapidly professionalizing discipline of astronomy education to begin to foster a conversation about how it positions itself as a field of academic pursuit.

This being one of the first meetings on this scale in this field, we wanted to highlight a collection of the questions we felt the meeting was able to surface; questions we hope will continue to be discussed and debated by astronomy education professionals in a range of venues.

How does the funding structure affect the construction, not to mention the very existence of the field? How can we discuss the values of E/PO not just as a list of educational product activity? In what ways can we encourage education and public outreach professionals to develop the field outside of current funding strictures? How will we decide what are the standards for the E/PO profession? What professional development needs to be available for practitioners, and to whom does it need to be made available? What barriers are keeping *all* groups who conduct education and public outreach from participating in these meetings and discussions? How does the field ensure that developing professionals are participating in "how-to" and "best practices" trainings and events? How can we ensure that the audience for our efforts is more involved in determining the activities? And finally, how can we make communications on these topics more available and shared with large numbers of practitioners? We hope that publications like Astronomy Education Review and this newsletter will help to increase professional communication on these topics.

ASP's president, Dennis Schatz, is quoted as saying, "…we are moving in the direction of continuing this development [focus on education] at the next meeting at STSCI in Baltimore next year." We hope that the ASP and AAS both continue to capitalize on the interest and promise generated by this meeting.

We would like to acknowledge the valuable input of the "Cherry Street Astronomy Outreach Brown Bag" group and in particular Sanlyn Buxner, in helping us think through the issues we discuss in this article.

By Melissa A. Williams and Jacob Noel-Storr (University of Arizona)

The Scholarship of College Science Teaching

This position paper, adopted by the SCST Executive Board in April, 1998, is reprinted here with the permission of the Society of College Science Teachers.

A Statement from the Society for College Science Teachers
(Adopted by SCST Executive Board—April, 1998)
The following statement is a definition of scholarship in college science teaching. The purpose of the definition is to provide guidance in the important process of promotion and tenure AND to help college science teachers reflect on their own experience through the eyes of others. The statement is intended to be inclusive, i.e. to include as many characteristics of scholarly activity as possible. By no means is it expected that one person could, or should, demonstrate all of these characteristics.

Alan Gould of the Lawrence Hall of Science, and the lego model demonstrating Kepler's Laws, at the 205 Meeting in San Diego, CA.

The teaching scholar is one who:

1. Is knowledgeable about current developments in the discipline specialty and in relevant educational research, pedagogical skills and techniques. For example, the teaching scholar:
   - Reads journals in the discipline(s) and in educational practice and research.
   - Is professionally active in organizations, and contributes to best practices in college science teaching beyond the classroom or local institution.
   - Develops peer-reviewed resources for student learning in the discipline.
   - Demonstrates awareness of current science education reforms and issues, and applies these in teaching.
2. Demonstrates creative scholarship that contributes significantly to college science teaching. Reports of activities are published in refereed journals, presented at professional meetings, and in other appropriate venues. These activities include but are *not limited to*:
   - Significant, appropriately designed, and analyzed research in college science teaching;
   - Active classroom research;
   - Program development;
   - Writing position papers;
   - Organizing and directing teacher institutes;
   - Developing innovative courses and curricula and courses to be offered in non-traditional settings;
   - Securing external funds to improve college science teaching.
3. Sees scientific information in a number of contexts, and can use these insights to stimulate deeper understandings of the discipline in students. For example, the scholar:
   - Is aware of current developments in *several* science disciplines and of the interrelations among these disciplines.
   - Synthesizes research in the science discipline with teaching by introducing activities that use the scientific research to produce more effective teaching and learning.
   - Merges research from the discipline with that from education, using both to inform teaching practice.
4. Communicates to students the *connections* among science disciplines and the connection of science to other disciplines.
   - Demonstrations of connections among the science disciplines are a regular part of the teaching process.

- The global significance of science is taught whenever possible.
- The role of science in the local community setting is emphasized and integrated into the teaching process.
- Students are encouraged to understand the role of science in their personal lives and in every day decision making.

5. Demonstrates competency in communication and use of presentation techniques. The teaching scholar is aware of the diversity of student backgrounds, and that students have different learning styles. An in-depth knowledge of the disciplines can be fused with the knowledge of how and when to use analogies, metaphors, and images that promote deep student understanding. The teaching scholar:

- Accommodates diversity and learning styles with different modes of teaching.
- Uses analogies, metaphors, and images to make science meaningful to *all* students.
- Understands how to use technology to enhance teaching and learning.

6. Designs activities that require the students to ask questions, make observations, test hypotheses, carry out experiments, seek creative solutions to problems, and to analyze experimental results. For example, the scholar:

- Shows evidence that learning of science is enhanced.
- Uses problem-based learning when possible, both in the class and laboratory.
- Offers opportunities for students to learn to work in teams and to do science with others.
- Encourages and directs student research in the discipline whenever possible.
- Promotes critical reflection and analysis about scientific issues.

7. Shows evidence of critical reflection on his or her own teaching, and uses this information to continually improve the process of teaching.

Book Summary

How People Learn: Brain, Mind, Experience, & School
Edited by John D. Bransford et al. (2000), National Academy Press
http://books.nap.edu/html/howpeople1/

In the late '90s, the National Research Council commissioned a meta-analysis of research that had been conducted over the past thirty years related to the science of teaching and learning. Domains included cognitive psychology, developmental research, research on learning and transfer, social psychology, neuroscience, anthropology, and the design and evaluation of learning environments.

The results are the emergence of "five themes" that govern what we know about how we—humans—learn. The underlying principle explored is that more is expected of us as learners in today's society than ever before. Where drill and practice may have worked in the past (the Sputnik days), the amount of information available to us in the present makes it an impossible task to be taught *everything* through this method. In addition, our definition of what it means *to know* has shifted from memorizing and regurgitating information to being able to locate, integrate, and use it.

These "five themes" are:

1. *"Memory and the Structure of Knowledge"*: How is it that we associate and integrate information into a "coherent structure"?
2. *"Analysis of Problem Solving and Reasoning"*: How do the problem solving skills of humans compare between experts and novices?

3. *"Early Foundations"*: How does our early learning affect how and what we can learn as we age?
4. *"Metacognitive Processes and Self-Regulatory Capabilities"*: How is it that we can learn to know when we know—and when we don't?
5. *"Cultural Experiences and Community Participation"*: How is it that our interactions with family, friends, and community telegraph to us what is valued with respect to knowing and learning?

Probably the two most significant findings presented in this book for those of us who teach—anything—at any level—are stated most eloquently in the following quotes:

- "Humans are…goal-directed agents who actively seek information [Remember our four-year-olds asking us "why, why, why."]. They come to formal education with a range of prior knowledge, skills, beliefs, and concepts that significantly influence what they notice about the environment and how they organize and interpret it. This, in turn, affects their abilities to remember, reason, solve problems, and acquire new knowledge…If students' initial ideas and beliefs are ignored, the understandings that they develop can be very different from what the teacher [we] intends" (p. 10).
- "Students come to the classroom with preconceptions [and reasoning difficulties] about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for the purposes of a test but revert to their preconceptions outside the classroom" (p. 14-15).

Since traditional lecture in most college courses does little to address either of these findings, what are the implications for what we actually should be doing in our classes? Here's what *How People Learn* suggests:

- We need to create "*learner-centered environments"* that help students assimilate their current knowledge with what we want them to learn.
- We need to create "*knowledge-centered environments"* that help students make connections between the various concepts in our courses instead of simply promoting the learning of disconnected facts.
- We need to create "*assessments to support learning"* that do not simply assign students grades (tests, homework, etc.) but that provide students with the opportunity to assess their own understanding so that they may improve it before we assign them a grade.
- We need to create "*community-centered environments"* that make explicit the connection between our astronomy content and our students' lives (e.g. the greenhouse effect and global warming), and that emphasize collaboration over competition, since these are skills required to be meaningful members of our society.

How People Learn is an interesting and informative read. It is written in everyday language, avoiding much education jargon, and it is ideal for your next airplane ride. I think we would be remiss to ignore its findings.

How People Learn can be viewed online—free—at the The National Academy Press website (http://books.nap.edu/html/howpeople1/), where it can also be purchased in paperback for $24.95 (pdf only, $17.00) The website includes an Executive Summary which is not available in the book. ■

Summary by Gina Brissenden, Univ. of Arizona.

Education at the AAS : We've Come a Long Way, Baby

I like going to AAS meetings. One reason is that the same community of people gets together to have fun, share research results, drink beer, plan new projects, drink more beer, share developments in astronomy teaching, and have more fun. More seriously, the integration of papers on astronomy education research and astronomy research at the same meeting is a real delight to me personally as well as professionally.

It wasn't always that way. I first started going to AAS meetings a few decades back. Over a period of about fifteen years, I can remember only a few education sessions. I organized one as AAS Education Officer. I would not characterize any of the ones I remember as a roaring popular success. The same group of one or two dozen people attended these sessions. Some of us, at least, wondered if our interest in education put us on the endangered species list.

Over the years, these early seeds grew into something much bigger. As education moved higher on the national agenda, the AAS community developed a concrete interest in doing something more organized about sharing our insights into teaching. Under the leadership of various Education Officers, AAS meetings became more heavily populated with education sessions. Now we have so many that the education poster sessions have to extend over several days. We also have a very rich roster of pre-meeting workshops on astronomy education. The attendance at any one of these events dwarfs the dozen people who came to these sessions way back when.

I think it's important that we keep astronomy education in the mainstream of what astronomers do by having education sessions at an AAS meeting rather than separately. The astronomy community has assumed a collective responsibility for taking education seriously, teaching huge numbers of students in Astronomy 101, participating in K-12 education and in public outreach. Many astronomers who go to AAS meetings have an interest in at least one of these aspects of astronomy education, even if their interest does not go to the point of presenting papers. They can and do participate in the kind of professional sharing that goes on in the research part of our meetings. In other science disciplines like physics, chemistry, and biology, those interested in education meet separately and struggle mightily to get the larger community of more research-oriented scientists to pay attention and help out with what they are doing.

What began as some rather tentative changes in the content of AAS meetings has grown much larger. This story is a nice example of that oft-quoted Chinese proverb: The journey of a thousand miles begins with but a single step.

Harry Shipman, University of Delaware

Astronomy Education Review 1

Astronomy Education Review (AER) is a web-based journal/magazine for everyone working in astronomy and space-science education and outreach, and is endorsed by the American Astronomical Society. If you are not yet a regular reader, we invite you to take a look. *AER* covers all levels and aspects of education, from K-12 teaching to graduate training, from formal classroom work to learning in planetaria, museums, the web, and the media. AER now receives over 200,000 hits each month from around the country and the world.

With the help of a distinguished Board of Editors and a Council of Advisors, all contributions to the journal are refereed. Papers are posted as soon as they are accepted, so the site is continually updated. Back issues can be searched, and individual articles can be printed out. Subscriptions to *AER* are free, but regular readers are encouraged to register so that they may be notified of new issues.

AER welcomes a wide range of papers and articles. Scholarly research studies (and the application of such research to the "real world" of classrooms and museums) are its mainstay. But each issues also features:

- *Innovations*—a section of shorter, more informal reports on new ideas, techniques, and materials
- *Resources*—annotated guides and reviews of educational materials
- *Opinions*—op-ed pieces on current issues in space science education
- *Opportunities*—an announcement section for job openings, projects, meetings, etc.

A few recent papers of particular interest to AAS members include:

- Dealing with Disbelieving Students on Issues of Evolutionary Processes and Long Time Scales. M. Bobrowsky 4(1), 95-118.
- Research on a *Lecture-Tutorial* Approach to Teaching Introductory Astronomy for Nonscience Majors. E. Prather, et al.: 3(2), 122-136.
- **A Review of Astronomy Education Research. J. Bailey & T. Slater: 2(2), 20-45.**
- Goals for "Astro 101": Report on Workshops for Department Leaders. B. Partridge & G. Greenstein: 2(2), 46-89.
- The Role of Assessment in the Development of the College Introductory Astronomy Course: A "How-to" Guide for Instructors. G. Brissenden, et al.: 1(1), 1-24.

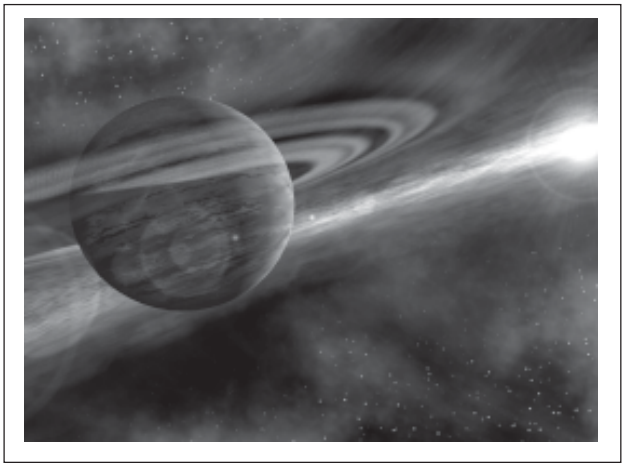
We gratefully acknowledge the support of the National Optical Astronomy Observatories, where AER is housed, and of NASA's Science Mission Directorate.

(Footnotes)
1 http://aer.noao.edu

Sidney Wolff (NOAO) and Andrew Fraknoi (Foothill College), AER Editors.

Andrew Fraknoi photo by Seth Shostak, SETI Institute

American Astronomical Society Statement on the Teaching of Evolution : September, 2005



The American Astronomical Society supports teaching evolution in our nation's K-12 science classes. Evolution is a valid scientific theory for the origin of species that has been repeatedly tested and verified through observation, formulation of testable statements to explain those observations, and controlled experiments or additional observations to find out whether these ideas are right or wrong. A scientific theory is not speculation or a guess — scientific theories are unifying concepts that explain the physical universe.

Astronomical observations show that the Universe is many billions of years old (see the AAS publication, *An Ancient Universe*, cited below), that nuclear reactions in stars have produced the chemical elements over time, and recent observations show that gravity has led to the formation of many planets in our Galaxy. The early history of the solar system is being explored by astronomical observation and by direct visits to solar system objects. Fossils, radiological measurements, and changes in DNA trace the growth of the tree of life on Earth. The theory of evolution, like the theories of gravity, plate tectonics, and Big Bang cosmology, explains, unifies, and predicts natural phenomena. Scientific theories provide a proven framework for improving our understanding of the world.

In recent years, advocates of "Intelligent Design," have proposed teaching "Intelligent Design" as a valid alternative theory for the history of life. Although scientists have vigorous discussions on interpretations for some of aspects of evolution, there is widespread agreement on the power of natural selection to shape the emergence of new species. Even if there were no such agreement, "Intelligent Design" fails to meet the basic definition of a scientific idea: its proponents do not present *testable* hypotheses and do not provide evidence for their views that can be verified or duplicated by subsequent researchers.

Since "Intelligent Design" is not science, it does not belong in the science curriculum of the nation's primary and secondary schools.

The AAS supports the positions taken by the National Academy of Sciences, the American Association for the Advancement of Science, the National Science Teachers' Association, the American Geophysical Union, the American Chemical Society, and the American Association of Physics Teachers on the teaching of evolution. The AAS also supports the National Science Education Standards: they emphasize the importance of scientific methods as well as articulating well-established scientific theories.

For further information on evolution and the process of science, please refer to the websites and publications listed below.

Reviews and Critiques

The Privileged Planet, by Guillermo Gonzales and Jay W. Richards, Reviewed by William H. Jefferies, The University of Texas at Austin
http://www.ncseweb.org/resources/articles/84_review_of_emthe_privileged_p_6_7_200 5.asp.

Devolution: Why intelligent design isn't., by H. Allen Orr, *The New Yorker*, 30 May 2005.

The New York Times series of articles on evolution, August 21-23, 2005

Politicized Scholars Put Evolution on the Defensive, by Jodi Wilgoren. The Discovery Institute is the ideological and

strategic backbone behind the eruption of skirmishes over science in school districts and state capitals across the country.
http://www.nytimes.com/2005/08/21/national/21evolve.html.

In Explaining Life's Complexity, Darwinists and Doubters Clash, by Kenneth Chang. Proponents of intelligent design say biological marvels point to the hand of a higher being, but mainstream scientists say such an explanation is unscientific.
http://www.nytimes.com/2005/08/22/national/22design.html.

Scientists Speak Up on Mix of God and Science, by Cornelia Dean. Disdain for religion is far from universal among scientists, and some are beginning to speak out about their faith.
http://www.nytimes.com/2005/08/23/national/23believers.html.

Editorials and Opinion Pieces
Why "intelligent design" doesn't deserve to be taught with evolution, by Verlyn Klinkenborg, *New York Times*, 23 August, 2005
http://www.nytimes.com/2005/08/23/opinion/23tue3.html?n=Top%2fOpinion%2fEditori
als%20and%20Op%2dEd%2fEditorials.

Show Me the Science, by Daniel C. Dennett, *New York Times*, 28 August, 2005
http://www.nytimes.com/2005/08/28/opinion/28dennett.html?incamp=article_popular.

Books
The Ancient Universe: How Astronomers Know the Vast Scale of Cosmic Time. Published by the American Astronomical Society. It is also available as a PDF on the Society's webpages at http://www.aas.org/education/publications/AncientUniverseWeb.pdf.

Evolution vs. Creationism: An Introduction by Eugenie C. Scott (2004)

Science and Creationism: A View from the National Academy of Sciences by National Academy of Sciences (2nd ed, 1999)

The Logic of Scientific Discovery by Karl Popper (15th ed. 2002)

The Structure of Scientific Revolutions by Thomas S. Kuhn (3rd Ed. 1996)

Professional Science Societies
American Astronomical Society: www.aas.org
American Association for the Advancement of Science: www.aaas.org
American Geophysical Union: www.agu.org
National Academy of Sciences: www.nas.edu
National Science Teachers Association: www.nsta.org
American Chemical Society: www.acs.org
American Association of Physics Teachers: www.aapt.org

Science Education and Science Literacy
National Science Education Standards, National Research Council
http://www.nap.edu/books/0309053269/html/index.html
Project 2061, American Association for the Advancement of Science
http://www.project2061.org/research/goals.htm
National Center for Science Education
www.natcenscied.org

Education and Related Sessions at the 207th Meeting, American Astronomical Society, 8-12 January 2006
Wardman Park Marriott Hotel, Washington, DC

Pre-Meeting Sessions and Events

Saturday
- The NASA Center for Astronomy Education (CAE) Teaching Excellence in Introductory Astronomy Workshop, 8:00am-4:00pm, Cotillion South
- Modeling The Universe, 9:00am-3:00pm, McKinley
- 2006 Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows 9:00am-6:00pm, Roosevelt

Sunday
- The NASA Center for Astronomy Education (CAE) Teaching Excellence in Introductory Astronomy Workshop -, 9:00am-5:00pm, Cotillion South
- Career Workshop, 9:00am-12:00noon, 1:00-4:00pm, Maryland Suite
- Annual NURO Meeting, 9:00am-4:00pm, Park Tower Suite 8226
- 2006 Symposium of the NSF Astronomy & Astrophysics Postdoctoral Fellows 9:00am-6:00pm, Roosevelt
- Astro 101, 2:30-5:30pm, Virginia C
- Undergraduate Orientation, 6:00-7:00pm, Cotillion Foyer

Regular Meeting Sessions and Events

Monday
Gadgets and Gizmos, Monday - Thursday 9:20am-5:00pm, Park Tower 8219
Session 27. Probing and Understanding Effective Learning and Teaching Poster, 9:20am-7:00pm, Exhibit Hall
Session 44. Astronomy Education with Radio Waves and Music Oral, 10:00-11:30am, Balcony B
Session 50. Cool Astronomy Special Session, 2:30-4:00pm, Virginia
Session 57. Astronomical Data from the NVO: Opportunities for Enhancement of Science Education Oral, 2:30-4:00pm, Balcony B
Society of Physics Students, 7:00-8:00pm, Virginia C

Tuesday
Session 65. Astronomy in the K-12 Classrooms Poster, 9:20am-6:30pm, Exhibit Hall
Session 66. Undergraduate Astronomy Poster, 9:20am-6:30pm, Exhibit Hall
Session 67.Reaching Out with Observatories, Planeteria and Activities Poster, 9:20am-6:30pm, Exhibit Hall
Session 76. Instruments for Small College Observatories Poster, 9:20am-6:30pm, Exhibit Hall
Session 92. Astronomy Education: Collaborations and Research Oral, 10:00-11:30am, Balcony B
Session 99. Instrumentation and Telescopes for Small College Observatories, Part II Special Session, 2:00-3:30pm, Delaware B
Graduate Student -- Employer Networking, 7:00-8:00pm, Exhibit Hall C Atrium

Wednesday

Session 155. Using the Tools of Science to Teach Science, Carl Weiman Invited, 11:40am-12:30pm, Ballroom/Salon 2
Session 156. Education and Public Outreach for NASA's Universe Special Session, 2:00-3:30pm, Ballroom/Salon 2

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The Education Newsletter of the
American Astronomical Society

American Astronomical Society, 2000 Florida Avenue, NW, Suite 400, Washington DC 20009
www.aas.org/education/