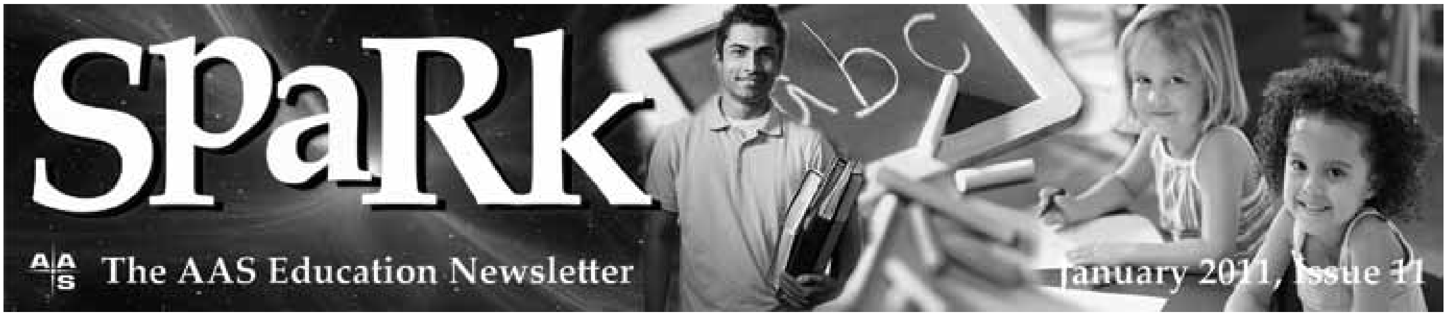

Got Education? The UW Astronomy Department Does—A Lot!

A first-generation undergraduate needs a research project (preferably a paid one), a professor needs help moving equipment into the planetarium to give a show to blind students, graduate students ask for the name of the University publicity officer because they are being featured in a press release on communicating science, and a postdoc needs advice on mentoring undergraduate researchers. This is a typical day for the academic adviser in the Astronomy Department at the University of Washington (UW). What is the one amazing thing in common with all of these requests? They are all related to the diverse range of educational projects happening at UW.

In our Department, educational opportunities are also abundant. From efforts to recruit and retain underrepresented students in the sciences, to developing astronomy curriculum for the blind, the UW's programs are actively engaged in increasing diversity of all definitions. In addition to diversity, the Department has courses focused on professional development, including a senior and graduate-level course on teaching methods for introductory astronomy, a graduate-level course on how to effectively communicate science to the public, and a 3-course undergraduate capstone sequence introducing students to astronomical data analysis, observational techniques and research, and scientific writing.

When I started working as a program adviser in this Department five years ago, I never thought I would be writing an article for an astronomy education newsletter, but I have become swept up in the passion and determination the department has when it comes to astronomy education. What first caught my eye was the Pre-Major in Astronomy Program (Pre-MAP). Pre-MAP is aimed at increasing diversity in the sciences by recruiting freshmen to participate in research during their first quarter at UW. Founded in 2005 by a group of dedicated graduate students, Pre-MAP has grown into a flagship program; 82% of enrolled students have obtained degrees in a STEM field (the vast majority are in astronomy). Experiences of two Pre-MAP students can be found in this issue of *Spark* in the Feature Section "Astronomy Undergraduate and Graduate Student Education & Research," and more details, including a guide on how to start a program like Pre-MAP at your institution, can be found on our website: http://www.astro.washington.edu/users/premap/

Last spring, a few graduate students approached me about developing a course on effectively communicating science to the public. The goal of this course is to engage scientists in activities to increase their knowledge and ability to describe their research. Activities range from improvisation games to acting, knowing your audience, and devising an "elevator pitch". The interdisciplinary course, taught by members of the Astronomy Department and Forest Resources, has attracted a wide range of students from such fields as neurobiology, aquatic and fishery sciences, and rehabilitation medicine: http://engage-science.com/about/

With one of the largest undergraduate astronomy programs in the U.S., the UW Department of Astronomy has a high demand for research projects and mentoring. A good example is our workshop on how to mentor undergraduate students. One of the most common questions I get from undergraduates is "how can I find a research project?" and we can proudly say that nearly all of these students find something suitable to do with a graduate student, postdoc and/or professor. This means that we have a large population of undergraduates working with all levels of researchers in our Department and we began to wonder, at what point in your PhD are you formally taught how to mentor? Mentoring often is something you learn along the way using a combination of your own experiences with mentors and a process of trial and error. We took this informal collection of strategies to

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SPaRK

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The views expressed in this newsletter are those of the individual contributors, and not necessarily those of the American Astronomical Society, the Astronomy Education Board, or the Editors.

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In This Issue

Welcome to issue 11 of *Spark*!

We hope that our readers have all enjoyed a fabulous holiday season, and we are sure that 2011 will be a great year for Astronomy Education and Outreach. This winter Seattle welcomes the American Astronomical Society for our 217th meeting, and our cover story, contributed by Sarah Garner and Suzanne Hawley, describes the diverse education and outreach projects happening locally led by the University of Washington's Astronomy Department.

Inside this issue, Michael Heinz of the New Jersey Department of Education guides us through the basis behind the design of the new Draft National Science Education Standards, which will be sure to start having an impact on K12 Astronomy Education in the very near future. Later in the issue George Nelson (Western Washington University) takes a look for us on the role of research on science teaching and learning in particular in education policy.

Our Educational Research Columnist, and University of Arizona Professor, Ed Prather shares a fascinating interview with AAS Education Prize winner Phil Sadler (Harvard-Smithsonian Center for Astrophysics) touching on many topics relevant to astronomy education at all levels.

Also in this issue, we hear both from participants at this summer's "Cosmos in the Classroom" conference, where professionals share the latest in undergraduate instruction research and techniques, and from undergraduates who have participated in a range of programs designed to enhance their astronomy education experiences. Nora Grice (You Can Do Astronomy, LLC) explains the latest directions in providing access to astronomy to people of all visual abilities and Alberto Conti (STScI) describes how data exploration with Google Sky™ and Microsoft® WorldWide Telescope can increase everyone's access to astronomical data.

Finally, be sure not to miss Ed Guinan and Scott Engle's article reflecting on the unofficial parties that bring our community together at each AAS meeting, and if you are in Seattle we hope to see you there! (10pm Wednesday, location TBD).

Gina Brissenden & Jake Noel-Storr
Editors

spark@aas.org

Got Education? The UW Astronomy Department Does—A Lot! continued

the next level and developed a mentoring workshop, where we discuss expectations and share experiences so that the mentor and mentee both receive useful tools to guide their professional relationship. Throughout the year, mentoring is also the focus of lunch talks and our diversity journal club.

Our introductory astronomy classes are taught both on campus and in the high school by certified high school teachers. The University of Washington in the High School (UWHS) program offers college credit for classes taught in the high school as part of the regular curriculum. Astronomy 101: Introductory Astronomy covering topics related to stars, galaxies and cosmology has been taught in several Northwest high schools since 2006. Led by Emeritus Research Professor Julie Lutz, this program has grown in interest and provides high school students with opportunities that go beyond the normal high school classroom. Many of the teachers bring the students to campus to sit in a lecture of the UW Astronomy 101, as well as visit our on-campus planetarium. I have had the opportunity to meet some of the UWHS students when they are in high school, and then again as astronomy majors. The program has provided the direct access that students can use to see if an astronomy major is a viable option for them. Information is located at: http://www.astro.washington.edu/uwhs/homepage.html.

The diversity of our educational programs allows almost everyone to be involved, depending on their educational interests. As a result, our programs are able to reach a large audience from high school students to tenured faculty. The supportive and engaged members of the UW Astronomy Department make these programs successful.

Sarah Garner & Suzanne Hawley

Top left: Local high school teachers have the opportunity to get hands-on experience at the Manastash Ridge Observatory (MRO) with UW Lecturer and MRO Associate Director, Dr. Chris Laws (far right). **Top right:** Graduate students, from left to right, Phil Rosenfield, Rachel Mitchell, Eric Hilton and Cliff Johnson are the co-founders and instructors of the UW Engage Science Speaker Series and Seminar. **Bottom left:** Astronomy undergraduates at the UW Manastash Ridge Observatory (MRO) located just outside of Ellensburg, WA in Central Washington. **Bottom right:** Science Night with Pre-MAP students and staff at the Theodore Jacobsen Observatory located on the UW campus.

K-12 Astronomy Education

Columnist: Wil van der Veen, Raritan Valley Community College

The National Academies are working with several other groups to develop new National Science Education Standards, with the intention that they will be adopted by all states. As a first step in developing these new standards, the National Research Council recently published a draft Framework for Science Education. This framework describes the major scientific ideas and practices that all students should be familiar with by the end of high school.

In this K-12 Astronomy Education section of *Spark*, Michael Heinz, the Science Coordinator for the State of New Jersey, summarizes some of the latest education research that helped shape this new Framework for Science Education. Mike's example from the New Jersey Science Standards illustrates how standards have evolved in response this research.

K-12 teachers will need ongoing support to successfully implement the new National Science Education Standards. To identify potential implementation challenges and to provide effective professional development in response, the science education community needs to be familiar with the new standards and the research that supports it. I strongly recommend the publications listed at the end of Mike's article for a more detailed description of this research.

New Science Standards: Integrating Science Content with Science Practice

Michael Heinz, New Jersey Dept. of Education

Should K-12 science teachers teach science as content knowledge or as a set of practices or both? If both, how is that accomplished? These questions have been examined, discussed, and debated within the science education community. A new conceptual framework has been evolving that moves science education beyond the dichotomy of science as either content knowledge or scientific skills. An examination of the work of contemporary scientists and of the literature on how students develop conceptual understandings suggests that science is both a body of knowledge and an evidence-based model-building enterprise that continually extends, refines, and revises knowledge (NRC, 2007)*.

This perspective has been advanced by several recent contributions to the science education literature base. The Board on Science Education (BOSE) at the National Academy of Science published two synthesis reports that are influencing how policy makers and science educators are thinking about science proficiency. *Taking Science to School: Learning and Teaching Science in Grades K-8* (2007) and *Ready, Set, SCIENCE!: Putting Research to Work in K-8 Science Classrooms* (2007) suggest learning goals that require students to be engaged in a process of building theories and models of science content using evidence, evaluating those theories and models for internal consistency and coherence, and observing and testing them empirically. The belief is that science content knowledge and science skills are interrelated and inseparable. That is, students develop understandings of science content knowledge by engaging in science practices such as making predictions, interpreting observations, making connections among ideas, and so on. At the same time, students cannot meaningfully learn about and engage in science practices void of content.

To elaborate further, the NRC has organized science literacy into four strands:

- Students know, use, and interpret scientific explanations of the natural world.
- Students generate and evaluate scientific evidence and explanations.
- Students understand the nature and development of scientific knowledge.
- Students participate productively in scientific practices and discourse (NRC, 2007).

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*References available in the online version of *Spark* (Issue 11, page 24)

They propose that the process of achieving proficiency in science requires students to be systematically engaged in all four strands; progress in one strand supports and advances development in the others (NRC, 2007).

In 2009, the Consortium for Public Policy Research in Education (CPRE) published a report, *Learning Progressions in Science: An Evidence-Based Approach to Reform* that is also influencing revisions of science standards. CPRE defined learning progressions in science to be evidence-based statements of what students should know and be able to do over time, with appropriate instruction. This work on learning progressions has given standards writing teams a research base from which they can strive to identify fewer and clearer standards, thus moving away from standards that result in curriculum being a mile wide and an inch deep. Developing learning progressions is currently a work in progress. The goal is to develop particular sequence(s) of learning experiences that would lead to proficiency on the part of most students, based on a solid body of evidence about what most students are capable of achieving (CPRE, 2009).

The evolution of the conceptual framework for science education is illustrated by the evolution of science standards in New Jersey. As an example, let's look at the NJ standards related to one concept in astronomy. *Science for All Americans* (1989, 1990) proposed that by the end of 12th grade, students should know that "Our solar system coalesced out of a giant cloud of gas and debris left in the wake of exploding stars about five billion years ago." In 1996, the first edition of the New Jersey Core Curriculum Content Standards (NJCCCS) established the expectation that "all students will gain an understanding of the origin, evolution, and structure of the universe." In 2004 the NJCCCS writing team added a verb and specificity to focus on the solar system. The revised expectation was for students to be able to "explain that our solar system coalesced from a nebular cloud of gas and dust left from exploding stars." The depth of knowledge implied in the revised standard remained low and achievable with passive student instruction.

Content statements and science practices were deliberately integrated in the revision of the NJCCCS in 2009. The current expectation is for students to "collect, analyze, and critique evidence that supports the theory that Earth and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago." In order for students to meet this expectation they will need opportunities to develop a protocol for gathering appropriate data and documents (e.g., journal articles and conference proceedings), for collecting the evidence, for analyzing the evidence, and for critiquing the body of evidence. During these types of investigations, students are to consider alternative theories to interpretations and evaluate others' evidence-based arguments. Finally, students are to engage in multiple forms of discourse as they refine and share their critique. The 2009 NJCCCS illustrate science standards that were written within the new framework; science is an evidence-based model-building enterprise that continually extends, refines, and revises knowledge.

For educators, the new frameworks view students as active participants in the sense making process. Individuals who would like to learn more about the new frameworks are encouraged to read and discuss *Ready, Set, SCIENCE!: Putting Research to Work in K-8 Science Classrooms*. It is a readable introduction to the frameworks behind new science standards.

Astronomy Education Research

Columnist: Ed Prather, Univ. of Arizona

Each year the American Astronomical Society awards its Education Prize in recognition of an outstanding individual's contributions to the education of the public, of students and/or of the next generation of professional astronomers. The 2010 AAS Education Prize has been awarded to Dr. Philip M. Sadler. Many of you may know Phil and, like me, have a great respect for all the hard work, pioneering research and innovative educational products he has contributed to the astronomy teaching community. I think this is captured best by the citation that accompanied Phil's prize, which states:

"For a lifetime of devotion to a research-based approach to better understand the nature of teaching and learning in K-12 and college-level astronomy."

"For opening our minds to the misconceptions and reasoning difficulties held by teachers and students about astronomy, and the role understanding these misconceptions and reasoning difficulties plays in improving teaching and learning."

"For helping the entire field of astronomy education research gain acceptance within the astronomical community."

"For developing the StarLab portable planetarium that has enabled world-wide educational experiences in astronomy for children and adults that would otherwise be inaccessible."

In this edition of the Astronomy Education Research feature section of *Spark* we will learn more about how this education leader and trailblazer sees the future, and reflects on his past, through the answers he provided to some questions I posed.

An Interview with Phil Sadler, Harvard-Smithsonian, CfA

Ed: Hey Phil, congratulations of being awarded the AAS Education Prize.

Phil: Thanks. It is a really wonderful recognition of the work of so many people with whom I have collaborated over the years.

Ed: You have contributed so much to the teaching and learning of astronomy, what are the things you've done that you're most proud of?

Phil: High on my list would be the development of the portable planetarium back in 1977 when I was a middle school teacher. The Starlab made the planetarium experience very affordable for schools and gave rise to traveling programs. These benefited from the participatory planetarium movement begun at the Lawrence Hall of Science. I loved being an entrepreneur launching a company intent on improving science teaching. About a quarter of my undergraduates vividly remember when a Starlab visited their school.

Project STAR, under Irwin Shapiro's leadership, provided a fresh approach to the teaching of astronomy. We triaged the myriad topics typically taught in Astronomy 101 to retain just those with terrestrial applications. We wanted high school students to gain an understanding of how astronomy helps to explain the world they interact with daily. Students build their own spectroscopes, celestial spheres, and other devices that they use to both measure and predict. Matt Schneps and I documented the astronomical misconceptions that are a natural part of learning astronomy, culminating in the video, *A Private Universe.* Interviewing Harvard seniors in their caps and gowns focused attention on the universality of the preconceptions that students bring to their science classes.

Building the MicroObservatory network of remote telescopes has allowed more than half a million images to be captured by pre-college students. Roy Gould and Mary Dussault have provided the leadership to expand its application to the cutting edge of science, the search for exoplanets. It is very exciting to see students progress from imaging the Moon to very sophisticated, original projects, especially in cities where they can see so little in the night sky.

I am also quite thankful for the opportunity I have had in working with teachers, both experienced and new. Teachers form the core of our curriculum projects, bringing in creative ideas and the energy to try out new approaches. Several have become part of our research staff, Bruce Ward and Hal Coyle, among them. Also, advising more than 200 student teachers over the years has kept me in touch with the rigors and challenges of teaching pre-college science.

Finally, my efforts to contribute to a more scientific approach to teaching has been a source of never-ending struggle and satisfaction. Helping to build up a scholarly tradition of investigating how people learn and how best to teach astronomy has spawned numerous other studies, dissertations, and papers. It is really rewarding to hear talks that build on some of my earlier work or to see my team's research referenced in papers and proposals.

Ed: Many advancements have been made in how astronomy is taught, and research has played an important role in helping make these changes happen, but what changes have not occurred during the last 20 years that you would have predicted to already have happened?

Phil: I guess the area ripe for the largest change is for teachers and professors to make more use of education research. In this area, the work you folks are doing at the University of Arizona's Center for Astronomy Education has made a big impact at the college level. Sadly, few future professors of science receive formal training in teaching. Graduate coursework in science teaching makes a big difference.

While so many astronomy professors do grow to excel in teaching science, graduate education coursework would vastly accelerate the process.

I also would have expected that astronomy students, both in college and before, would spend more time interacting with natural phenomena, both in the laboratory and in the sky. Experiments, remote observation, or even naked-eye observation provide tremendous learning opportunities. The riveting images and copious data that are produced by large instruments are both a blessing and a curse. It is too easy for students to be lulled into thinking that astronomy advances only with billion dollar telescopes and sophisticated computers. While these are incredibly important, astronomers have a tradition of modest undertakings producing amazing results, from Galileo's first telescope to David Charbonneau's MEarth project. Moreover, I prefer to imbue my students with the belief that "*those who are talking are doing the learning*." In too many classrooms, this can mean that the teachers are learning more than the students. Peer instruction certainly helps change this equation, but more project work outside of class helps as well.

Ed: If you could direct the formal education efforts of NASA and the NSF with regard to improving the teaching of astronomy, what would you put at the top of the list of things you would want to get done?

Phil: If I were Astronomy Education Czar, I would invest more in infrastructure. Every high school could use an astronomy course. Modern equipment and teacher professional development would be great, not to mention federal support to close the "wage gap" between science teaching and private sector jobs. Expansion of access to remote telescopes would allow every student to take his or her own pictures of objects in the night sky. Since so many future teachers take astronomy in college, I would invest in ways to make these courses far more active. I would also push for professorial tenure decisions in science to take into account not only research and teaching excellence, but publication in peer-reviewed science education journals. Conducting educational research, which can include evaluating the impact of your own teaching innovations, can be a powerful force for improving the teaching of science. This would only help to increase collaboration between research scientists and education researchers, benefiting our whole community.

Ed: Well, Phil, I guess all we can do now is be sure to vote for you when the next election for Czar happens .

Teaching Astro 101

Columnist: Rica Sirbaugh French, MiraCosta College

Though we promised you Julia Kregenow's installment on concept inventories for this edition of *Teaching of Astro 101*, we've put that on hold temporarily because of two wonderful events that happened recently: (1) Julia had a baby (congratulations Julia and Jason!) and (2) the Astronomical Society of the Pacific's (ASPs) *Cosmos in the Classroom* meeting happened in August. So while Julia revels in that new bundle of joy, our colleagues Daniel Loranz and Peter Newbury generously share their experiences at *Cosmos*.

If you've never experienced a *Cosmos* meeting, well…it's unlike any scientific conference you've ever attended—guaranteed! Cosmos is an amazing professional development experience offered by the ASP (www.astrosociety.org). It's a unique opportunity to interact with those teaching introductory astronomy to non-science majors, all of whom are there because they're concerned about the quality of teaching and learning in their classrooms. They simply want to do it better.

Cosmos really is like a family reunion of sorts. Newbies are eagerly welcomed into the community and "old-timers" are always ready with stories. Those of us at the last *Cosmos* (2007) knew we were in for another treat. But the level of exchange achieved this time was unprecedented. And with the onslaught of social media and networking tools, *Cosmos* truly became a leader in gathering Astro 101 educators.

So read on: Dan's first-*Cosmos* enthusiasm is palpable, while Peter has us all "a-Twitter". After this, you'll be chomping at the bit for the next *Cosmos* (2013 seems sooooo far away)!

Cosmos in the Classroom: Perspectives from Participants

Views from a Cosmos Newbie

This past summer I attended my first *Cosmos in the Classroom* conference for astronomy educators. Following along on the Astrolrner@CAE listserv, I remembered hearing great things about the 2007 incarnation of this meeting held in Pomona, CA, and I wanted to be sure not to miss out the next time. So when the announcement came out for the 2010 meeting in Boulder, CO, I made sure to register early. The following is a brief summary of the 2010 meeting as I experienced it.

Let me just start by saying ... Best. Conference. Ever.

First, the event felt very much like a gathering of old family and friends in which newcomers were immediately welcome. What a great community! The enthusiasm was infectious. Everyone was clearly eager to both share and hear new ideas. And everyone was easily approachable. I made a lot of new friends at the meeting.

Next, the schedule included so many great talks and workshops, it was difficult to choose between them. In fact, I overheard at least two different people remark something like "Wow, how could I ever hope to include all these great ideas in my course?" What a great problem to have!

Talks I selected included excellent presentations on: i) the natural linkage between Astro 101 education and earth science public outreach, ii) taking a scientific approach to science teaching, iii) a non-technical presentation on dark energy and the runaway universe, and iv) a great summary of the accumulated evidence for global climate change. In the workshops I learned more about: i) best practices for implementing Think-Pair-Share, ii) tips for successfully incorporating flash-based simulations in your classroom iii) a structured approach for engaging students in asking scientific questions, and iv) incorporating authentic scientific research in the intro astro curriculum.

Of course there were also many excellent posters, and many take-home resources available.

Lastly, how could I fail to mention the tricycle relay races at the Dark Horse Saloon? I learned that the group always finds some similar light-hearted way to close out the meeting. And while not formally on the schedule, everyone is very much invited. Like I said earlier—family.

I am so looking forward to the 2013 meeting. Hope to see you there!

Daniel Loranz
Truckee Meadows Community College

Tweeting through (the) Cosmos

I freely admit it: I'm an avid user of Twitter®. For those of you unfamiliar with Twitter®, it's a social media tool with which users post (or "tweet") short messages of 140 characters or less in response to the question, "What's happening?" My messages, posted under my username @polarisdotca, enter a vast reservoir of all messages recently posted by all Twitter® users. When my "followers" (people who have chosen to subscribe to my postings) log into Twitter.com, my messages are listed for them to read. Likewise, I read the messages of all the people I follow. By replying to authors or forwarding others' messages to our own followers, we extend and expand the conversations.

One of the most powerful aspects of Twitter®, in my opinion, is how easily it connects you to people with similar interests. Geography, age, expertise (or naiveté) play no role. The time it takes to build and foster these connections pays off, especially when you go to a conference.

I'm envious of those people who walk into the opening reception and immediately join a circle of friends while I desperately search for someone I know. I didn't want that to happen again so before this summer's *Cosmos in the Classroom*, I started tweeting about *Cosmos*, or #ASP2010 as we called it. So did some of my followers and their followers.

When I got to *Cosmos*, I walked into the Fiske Planetarium with a circle of friends I'd never met in person, like @pe_robinson, @starstryder, @jessicasuzette, @Patrick_M_Len, @RogerFreedman, @tadthurston and more. The next best thing to "Peter! Nice to see you again [hug hug]" (You, too, Gina!) is "@polarisdotca! Great to meet you in person, Peter!"

Throughout *Cosmos*, many of us read and contributed to the on-going Twitter conversation. To encourage others to join, including those listening in from elsewhere, I ran a daily "you supply the caption" contest where followers submitted captions to pictures I posted. Thanks, @CAEGina, @snowandscience and Andy Fraknoi for the prizes.

Cosmos was the best meeting I've been to because of the outstanding content and because of the people I met before, during and after through Twitter®. If you tweet already, please join our #astro101 community. If you don't but you'd like to start, I'd be happy to help.

Peter Newbury
Univ. of British Columbia

Astronomy in Unexpected Places

Columnist: Sara Mitchell, Goddard Space Flight Center

When I'm thinking about innovative and unexpected astronomy education and outreach efforts, I'm often focused on the *what* and the *where*—putting events and materials in unusual places to reach new audiences. But sometimes, what makes an effort special is the *who*—the audience itself.

I'm frequently frustrated that our efforts reach a limited, self-selective audience. We see the same folks again and again, and have a hard time reaching audiences that aren't already interested in astronomy. One thing I haven't discussed in these columns, however, is the existence of audiences that are already interested—but don't find our content accessible.

In the following article, Noreen Grice shares ways to bring astronomy to the visually-impaired, through a variety of barrier-breaking efforts. Some of her solutions are quick and easy, and others are more involved. But she's found ways to bring astronomy to people who might not otherwise get to enjoy it.

In the development of my own projects, I've encountered a variety of barriers that prevent people from utilizing or enjoying astronomy content. Some of these obstacles are physical, such as visual/auditory impairment or mobility issues. But there are many other hurdles to making astronomy accessible—location/transportation issues, unreasonable technological expectations, language barriers, and more. While no single product can reasonably be expected to reach everyone, everywhere, we can work to make our offerings as inclusive as possible. These audiences include people who are already interested in astronomy… and plenty of others who might become engaged with the right experiences.

I hope that Noreen's ideas will help you think of ways to expand and adapt your own educational projects to include some harder-to-reach new audiences.

Unveiling the Universe: Telescopic Viewing for People of All Visual Abilities

http://www.youcandoastronomy.com

Noreen Grice, Founder and President
You Can Do Astronomy LLC

In 1984, a group of blind students attended my planetarium show and told me that the program was not accessible. They were right; the pre-recorded show was not descriptive and the images were projected on a domed ceiling. That got me thinking of how to make astronomy accessible and to find or create solutions to do so. Here I describe why you should make telescopic viewing accessible to a variety of learners and how to do it.

Picture this: you are an astronomy instructor with night labs that involve looking through a telescope. You expect the students to make sketches of what they see. There has never been a blind person in your class. Surprise! A blind student walks into your class on the first day. She also happens to be majoring in astronomy. You think this can't happen? Right now, students of all visual abilities are taking astronomy. Before you panic or resign yourself to the fact that a blind student is probably going to fail, think again. You can modify your telescopic observing (labs or public star parties) for students who have visual challenges and/or different learning styles.

I am author of several accessible astronomy books. In the early 1990s, I began using a thermal expansion machine to create tactile astronomical images to accompany planetarium shows. By 2003, I was co-investigator for the SEE (Space Exploration Experience for the Blind and Visually-Impaired) Project (http://analyzer.depaul.edu/SEE_Project/).

One of the goals of the SEE Project was to examine the benefit of using tactile images with sighted visitors at public observatory open nights. At Western Connecticut State University, sighted visitors viewed a sky object through the telescope and then repeated their observation while touching a raised version of the same object. It was something new for visitors who expected only a visual experience, but instead got combined seeing and touching.

Jim Stryder, a NASA educator, encourages sighted students to touch tactile images from my books before viewing through his telescope.

I often participate in projects with the National Federation of the Blind (NFB). In the summer of 2007, we held a star party for the NFB Youth Slam: a week-long summer program with two hundred blind and low vision high school students from across the country. The Westminster Astronomical Society brought telescopes and video cameras, and we held star parties outside the library at Johns Hopkins University. For two nights, the amateur astronomers took images, provided telescopic views on monitors and pictorially described the objects. I was able to produce tactile versions of the digital images in five minutes.

It happened that two new college students saw the telescopes each night and joined in the viewing. This was their first star party experience; they did not know the high school students were blind. When the tactile images were ready, every student examined the images by touch.

Whether someone is blind, has low vision or a different learning style is not a barrier to participation. Seamless accessibility is awesome; you can make it happen, too!

Now, here's how to make your telescopic viewing accessible: You'll need a telescope, the ability to capture telescopic images to computer, Adobe Photoshop (or Photoshop Elements), a thermal expansion machine, Swell Touch Paper and a printer/copier.

Let's say you image Saturn and save the image as a JPEG file to your computer. Then you need to:

1) Open the image in Photoshop and INVERT THE IMAGE (so the object is black and space is white).
2) If needed, fiddle a bit with BRIGHTNESS/CONTRAST so the background is as white as possible and the object is easily seen. It's important for the background to be white and not gray.
3) PRINT THE IMAGE ONTO SWELL TOUCH PAPER. (Swell Touch paper has a special coating that reacts to the heat of a thermal expansion machine and is sold in packs of 100 sheets through American Thermoform Corp. (www.americanthermoform.com). Avoid Epson printers, as that ink doesn't work as well. HP is a good choice.

4) RUN THE SWELL TOUCH PAPER THROUGH A THERMAL EXPANSION MACHINE, and the black object on the page will come out "puffed up." (Thermal Expansion machines are sold under the names "Swell Form Machine" (sold by American Thermoform Corp.) and "Picture in a Flash (PIAF)" machine (sold by Humanware, www.humanware.com). Both work well and cost around $1300.

You can discover other ways to make materials accessible at www.youcandoastronomy.com.

Headshot courtesy of Lorraine Greenfield

Top left: While waiting to view the Sun through a safe solar filter Jim Stryder, NASA educator, passes around a copy of Noreen Grice's book *Touch the Sun* so students can explore tactile images of it. **Top right:** A blind participant explores a tactile image produced by Noreen Grice at the 2008 Texas Astronomical Society of Dallas Star Party. **Lower left:** A member of the Texas Astronomical Society of Dallas provides one little cowgirl a personal tactile tour of a telescope at the Star Party. **Lower right:** Sighted visitors touch raised images of the objects they are viewing at the Western Connecticut State University Observatory as part of the SEE Project.

Astronomy Undergraduate and Graduate Student Education & Research

Columnist: Alexander Rudolph, Cal Poly Pomona

Welcome to the feature section on majors and graduate education and research in astronomy! I am Alex Rudolph, the new columnist for this section. My first two feature articles will be devoted to programs designed to increase the number of minority and female students pursuing a B.S. or Ph.D. in astronomy or related fields. This issue's feature article highlights students from two programs focused on majors; the next feature article will focus on two graduate programs.

The first majors program is at my own institution, Cal Poly Pomona, a Hispanic Serving Institution (HSI) in Southern California. Our program focuses on creating summer research opportunities for our students and has two parts. One, the California Arizona Minority Partnership for Astronomy Research and Education (CAMPARE), is funded by the NSF Partnerships in Astronomy and Astrophysics Research and Education (PAARE) program and sends 2-5 students to the University of Arizona Steward Observatory for the summer. The other, funded by the NASA Astrobiology Institute (NAI), funds 3-4 students to participate in the SETI Institute summer REU program in Astrobiology.

The second highlighted majors program is the University of Washington (UW) Pre-MAP program, which targets entering UW students who are interested in math and science and who are traditionally underrepresented in astronomy. Pre-MAP students have a unique opportunity to learn astronomical research techniques and apply them to research projects conducted in small groups during the Fall quarter. These projects involve the use of cutting edge facilities available to UW astronomers, such as the Apache Point Observatory in New Mexico, the Hubble Space Telescope, or the Sloan Digital Sky Survey (SDSS) database. Funding for Pre-MAP is currently provided by the NSF and the Kenilworth Fund.

Creating Diversity: Students Share Their Experiences with Programs Promoting Change

The California Arizona Minority Partnership for Astronomy Research and Education (CAMPARE)

The extreme desert environment served as a rich backdrop for my summer internship at the University of Arizona. The hot days were spent working from my office analyzing astronomical data, while a select few of my nights were spent collecting that data from an observatory atop Kitt Peak, a mountaintop outside of Tucson that is dotted with more than two dozen telescopes.

I learned a lot during my eight weeks in Tucson, including how to collect and reduce data, how to use specialized data analysis programs like IRAF (Image Reduction and Analysis Facility), and what a typical night of observing is like for an observational astronomer. Most importantly for me, however, was being introduced to a community of astronomers, both students and faculty, who work together to understand not only their own research, but also the newest ideas in astronomy. Twice a week, a diverse group of students and faculty would gather for coffee and discuss a few recently published papers that presented the findings of researchers from around the world. It's an exciting community to be a part of, and it's dazzling and inspiring to realize the magnitude of not only our universe, but also the projects that are helping us advance our understanding of it.

Stephanie Zajac, Cal Poly Pomona

SETI Institute summer REU program in Astrobiology

The summer of 2010 is one I will never forget. I had the opportunity to work with the most amazing mentor, Dr. Rachel Mastrapa, along with 18 of the finest REU students SETI could possibly have chosen. We did everything from playing a game of soccer after work, to watching the Perseids meteor shower on top of Fremont Peak, to working tirelessly through the night scrambling to finish research. The trip to Hat Creek and Lassen was one of the most memorable events of the summer. I had a chance to check out the Allan Telescope Array, and actually drive one of the telescopes!

Besides all these exciting activities, I did find time for actual research, taking infrared spectra of ethane, and ethane water mixes. Data like this will be extremely useful in detecting organic compounds such as ethane on outer solar system objects. Since ethane is an organic compound, it is possible that it may have the ability to support simple life forms. This idea is one that kept me motivated through those long days in the lab, tirelessly collecting data day in and day out. Working at NASA Ames was an experience I will never forget, because the work done in these buildings truly does make a world of difference.

Ashley Curry, Cal Poly Pomona

Pre-Major in Astronomy Program (Pre-MAP)

When I entered the University of Washington as an undergraduate, I was far from home and uncertain about my choice to major in physics. Throughout my first week of classes I continuously heard about this wonderful Pre-Major in Astronomy Program (Pre-MAP) so I decided to join. I quickly made a lasting group of friends with whom we all spent countless hours both studying and hanging out together. Due to my involvement in Pre-MAP I made connections within the astronomy department that allowed me to work on research throughout all four years of my undergraduate education. Additionally, I won several research scholarships including the UW's Early Identification Program Presidential Research Scholarship and the NASA Motivating Undergraduates in Science and Technology Scholarship, which includes a summer internship at a NASA location. I am currently pursing my Ph.D. in astronomy at New Mexico State University with funding through the NSF Graduate Research Fellowships Program and could not be happier with my decision to continue my path towards becoming a professional astronomer. Thanks to the University of Washington Pre-MAP, I received early insight into the workings of the astronomical world and learned how much I would enjoy being an astronomer.

Kenza Arraki, New Mexico State Univ., (Univ. of Washington alum)

Pre-Major in Astronomy Program (Pre-MAP)

Coming fresh out of high school, my first collegiate quarter was when I participated in Pre-MAP. It was an exciting turnaround to be engaged in a scientific field where my actual work was contributing to the work of a greater community and not just a repetition of past research that was already well understood. The Pre-MAP class lasted only 10 weeks, yet in the two years after, it gave me a platform to co-author an article in a refereed journal, travel to conferences, and expand my research into another REU program. Without these experiences, I wouldn't have gotten the taste of a possible future, and without that taste we as students could only guess at what our professors do when they're not teaching classes. Knowing the ins and outs of a scientific field, through a program like Pre-MAP, illuminates a career path which otherwise would be a shot in the dark to pursue. Given my experiences thus far, I see them as an assurance that I can be up to the task to continue in the field onto graduate school and push our understanding of the Universe further.

Zack Draper, Univ. of Washington

Astronomy Education in Planetaria and Science Centers

Columnist: Lindsay Bartolone, Adler Planetarium

In early October, many science and technology center professionals had the fantastic opportunity to share resources, research and programs with one another in the beautiful setting of Hawaii. Hosted by the Bishop Museum in Honolulu, Hawai'i, the Association of Science and Technology Centers (ASTC) annual conference adopted the theme "Ho'okele–To Navigate: Science Centers as Wayfinders to New Horizons." With a theme like that, my mind immediately flies through the Universe, from celestial navigation to cutting edge research finding new cosmic horizons. The connections to astronomy were present in many sessions, but in the space available here, I can only highlight a few.

During one of the afternoon opportunities to attend the Bishop Museum, a colleague and I checked out a session describing the use of Science on a Sphere to explore scientific data with museum visitors. Since I work at a planetarium, using a spherical surface to display data is not a new idea for me; however, the presentations made on the outside surface of the sphere bring both new opportunities and challenges. Educational designers must consider the best use of the sphere and the best types of data to use. They must also consider the viewing angle of the audience and how visitors will interact with the presentation. Museums can enable the Sphere to work in several different modes, from a passive display to an interactive kiosk, or even experiences facilitated by museum educators. With the right combination of data sets, modes and multimedia flair, the Sphere became a powerful learning tool. If you work with data that could be displayed on a sphere, you might consider a partnership with a museum and Science on a Sphere to make the science come to life.

Another exciting session described an NSF funded program to engage minority girls in science, technology, engineering and math. The GirlsRISE (Raising Interest in Science and Engineering) Project will work with ten museums to develop training for informal science educators to begin programs at their own institutions to engage girls in STEM all over the country. They plan to use existing research and proven programs to inform their practice as they develop the trainings. This program is just in the beginning stages, but I am looking forward to hearing more and visiting their website for lessons learned as soon as it becomes available.

The next ASTC conference will be in Baltimore, October 2011, and I imagine it will offer many more opportunities to inspire people through Astronomy.

Engaging Students in Web 2.0

Columnist: Pamela L. Gay, Southern Illinois Univ., Edwardsville

The dark night sky is a resource that many can no longer observe. From the safety lights of the suburbs, to the lights of 24-hour commerce in urban centers, lights are erasing the night. In our astronomy classrooms many of us replace these lost skies with virtual sky software like World Wide Telescope® and Google Sky™. As instructors, these tools allow us to engage our students in data, providing easy tools to explore images from across the electromagnetic spectrum on any possible topic. It is easy for us to make guided assignments that take advantage of these immersive, data driven environments. But it is also easy for us to leave out the time needed to let students just explore. In his article, Alberto Conti describes how he got lost in Google Earth™, and was driven to become involved in building a virtual sky by that experience. Now that the true sky is missing from many of our students' lives, I challenge each of you to find ways to help your own students get lost, get inspired, and get engaged while exploring the virtual sky.

Data Exploration with Google Sky™ and Microsoft® Worldwide Telescope

Alberto Conti, Space Telescope Science Institute

It was the wee hours of a morning in October 2005 that my obsession began. It was 2:50am, and for the past 5 hours I had been exploring planet Earth using the first version of Google Earth™.

I was attending the Astronomical Data Analysis Software & Systems (ADASS) conference in Spain. In a common computer area, my friend and colleague, Antonio Volpicelli, had just downloaded the first version of a new piece of software developed by Keyhole, Inc., a company Google recently acquired, which had been re-branded as Google Earth™. Browsing the planet in Google Earth™ was easy, intuitive and immersive. As I am sure happened to most astronomers who used Google Earth™, it seemed natural to wonder whether such a technology could be used for other types of imagery. Why not turn the view right side up and browse the sky?

Serving imagery in this fashion was nothing new. The Microsoft® TerraServer and many companies like Keyhole, Inc. had been investing in this type of technology for a few years. However, for the first time it seemed that the combination of performance and an intuitive user interface (with little or no learning curve), could yield a breakthrough in visualization.

Back at the Space Telescope Science Institute in Baltimore, MD, and after a few contacts with Google Earth™ developers, my collaborator Dr. Carol Christian and I were invited to give a Tech Talk at the Googleplex, Goggle headquarters in Mountain View, CA, where we tried to convey all our excitement for what a product like Google Sky™ could bring to the general public and astronomers alike. Google's response was enthusiastic, and in August 2007 Google Earth™ added a new feature named Sky in Google Earth™ allowing sky exploration with a click of a mouse (http://earth.google.com).

Meanwhile, Microsoft® Research was using TerraServer technology to implement Jim Gray's and Alex Szalay's vision for the Worldwide Telescope (http://www.worldwidetelescope.com). Microsoft's® approach differed substantially from Google's. It seemed more polished, and avoided some of the drawbacks of using an "Earth projection" adopted for sky imagery by Google Sky™. However, it had limitations of its own, running only on Windows® OS and lacking an easy scripting capability, which was one of the most attractive "out of the box" features of Google Sky™. Regardless of these initial "growing pains," by the end of 2007 astronomy enthusiasts were browsing the night sky from the comfort of their computers. All of them, without realizing it, were accessing the same NASA archives professional astronomers used. This was huge.

The foundation of both Google Sky™ and the Worldwide Telescope is the data in the Digitized Sky Survey (DSS). The DSS is a collection of thousands of images taken over a period of 50 years covering the whole sky in visible wavelength by two ground based survey telescopes — the Palomar telescope in California, and the UK Schmidt telescope in New South Wales, Australia. The Multimission Archive at Space Telescope (MAST) delivered DSS images to both Google and Microsoft®. These images constitute the low-resolution "canvas" on which high-resolution images, such as the ones from the Hubble Space Telescope and many other NASA observatories and ground-based telescopes, are placed.

Initially on this canvas two radically different features stood out: the stunning high-resolution images from the Hubble Space Telescope (HST), and imagery from the most ambitious and influential survey in the history of astronomy—the Sloan Digital Sky Survey (SDSS). Where Hubble has been responsible for how most of the world views our universe, the SDSS has produced detailed 3-dimensional maps of our local universe using deep, multi-color images covering more than a quarter of the sky. These features alone are worth the download of these products!

Google Sky™ and the Worldwide Telescope are intended to be organic, growing technologies for professionals, amateurs, and novices alike. Since their launch, communities have formed around both products and are now providing users with a plethora of add-ons and discussion topics. Contributions and collaborations are encouraged, and it is easy for anyone to add their content, create tours and presentations, and generally showcase recent discoveries in their proper context.

NASA archive centers and professional astronomers have also jumped at the opportunity to share data using these new platforms: MAST, after its first release of Hubble data, has added ultraviolet images from the Galaxy Evolution Explorer; NASA's Spitzer Space Telescope showed us the universe in infrared light, and the NASA's Chandra X-Ray

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Space Telescope showcased its entire set of observations; the Virtual Astronomical Observatory added its real-time VOEvent feed that alerts users about new supernovae, gamma-ray bursts and gravitational microlensing events.

During the next decade we will witness the completion of massive, wide-area, multicolor imaging and spectroscopic surveys of the local and distant Universe. Google Sky™ and the Worldwide Telescope represent a first attempt at a multi-faceted view of the Universe covering the full electromagnetic spectrum at different resolutions: the first digital map of the sky. Giving users the tools to explore our universe on their own has already fundamentally changed the public's perception and understanding of astronomy. Ultimately, as scientists, we hope to be able to make direct use of these tools in our research. Stay tuned.

The Course Syllabus: A Learning-Centered Approach, 2nd Edition

By Judith Grunert O'Brien, Barbara J. Millis & Margaret W. Cohen

Jossey-Bass Publishing, ISBN: 978-0-470-19761-5

Amy Forestell, Reviewer

State University of New York at New Paltz

One of the hardest parts about teaching comes before the semester even starts, in creating the syllabus. The syllabus defines the entirety of your course and in many ways determines the course's success before you even step foot in a classroom. The Course Syllabus: A Learning-Centered Approach guides faculty members through the process of creating a syllabus with a focus on learning-centered techniques. The book is a quick read, consisting of a brief introductory text, examples from real course syllabi, and extended references.

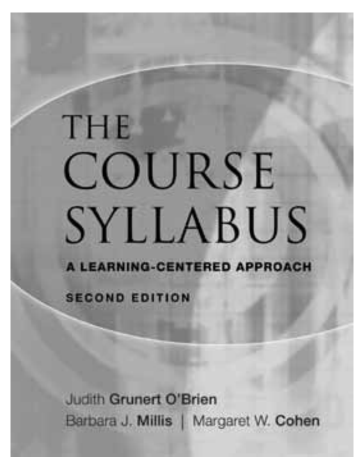
The book begins by motivating the reader to rethink his or her courses with a focus on the need for student-centered, active learning strategies that are based on how students learn. This section of the book is largely a literature review; it may be of interest to people unfamiliar with these ideas, but is probably nothing new to many readers of Spark. Even so, there were some places where I found myself thinking of how the ideas could be better incorporated into my courses. However, this section seems to jump from topic to topic without any logical organization. For example, a section on critical thinking is followed by an unnecessarily detailed guide for requesting permission to use copyrighted material.

The introductory section includes what steps to take in creating your syllabus, such as questions to ask yourself and a description of the backward design model of course planning. There is a discussion of concepts to be included in a syllabus, but it is too generalized and I found myself wanting to just skip to the examples.

I was growing weary of the book at this point, but finally the authors provide some useful guidance in the examples section, which is more than half of the book. They outline the sections to be included in a good syllabus, give a short description of their purpose and content, then provide examples from a variety of actual courses. The syllabus they describe is not a traditional syllabus, but rather is a lengthy course handbook that includes things like note-taking strategies and copies of readings. None of the examples are from astronomy courses, but I found that most of them were still useful and easily applied to an astronomy setting. The focus is on traditional classroom courses, though the authors do address online and hybrid courses.

The book ends with an extensive reading list, which is nicely organized by category. The references from the introductory literature review are also listed and there is an index indicating where each item is discussed in the text. The reading list and references are one of the great strengths of the book. For this reason alone it would be a good resource to keep handy.

Though the book has some weaknesses, I would recommend this easy read to someone looking to strengthen his or her course outline. It is most obviously helpful to early-career faculty, and while more experienced faculty may have already developed a strong syllabus, revisiting these strategies could provide a chance to reflect on course structure and goals.



Community Building

Columnist: Gina Brissenden (Center for Astronomy Education, Univ. of Arizona)

I am very excited to share our feature article on Community Building with everyone. I LOVE AfterParty—we'll learn more about this from Ed Guinan and & Scott Engle (Villanova Univ.) in a moment. I met Ed at an AAS meeting in the summer of 1998. I've missed three meetings since then, and each time I was very saddened. I don't think Ed has missed a one. Anyway…

I am really proud to be a member of the AAS! I am really proud of what our Society does to promote astronomy and astronomy education to Congress and our nation. I am proud of how our Society welcomes our next generation into our community and provides opportunities for us to communicate and collaborate with each other. Attending our Society meetings is a powerful way to experience, and become a part of, our community.

Too often, though, I feel that we don't fully appreciate the importance of our meetings beyond presenting our own research and networking with the handful of people who do similar research to us. We swoop in, present our research, meet with our collaborators for a couple hours, and swoop out. We might even let our membership laps, and not attend a meeting, if we don't have anything we want to present or don't have a position we're trying to fill—or find. I think we shortchange ourselves, and the rest of our Society, with this perspective on meetings.

I want to encourage everyone to attend every meeting—and stay the entire time. Keep your membership current! Encourage your colleagues, graduate students, and especially your undergraduate students to do the same. Did you know that many of our undergrads aren't even aware that our Society exists or that they are allowed and encouraged to be members and attend our meetings and present?

Arrive early enough to attend the undergraduate orientation. Introduce yourself and welcome them to our Society. Let them know you are happy they are part of our community. Go to the opening reception and mingle with old and new friends. Stop by the Graduate Networking Reception to meet our next generation. Attend the NSF, NASA, and other Town Hall meetings to learn about, and give input to, funding and research issues of importance to us all. Definitely attend the Society Business Meeting! I am shocked at how few of us do this… We learn from Kevin Marvel, our Executive Officer, about the health of our Society and Congressional challenges we may face. We honor incoming and outgoing Council Members. It is where we publicly nominate candidates to our very important Nominating Committee (By the way, if you get a call from a member of this Committee asking you to run for a position, say "yes."). Go to the Banquet and honor our Prize winners. Attend sessions on the last day—their work is just as important and interesting as those that presented on the first day, but these sessions are often ill-attended because so many people have gone home already. But, before you do this, come to the AfterParty!

Finally, invest yourself in the community that is our Society—be a role model!

The Community that Parties Together…

Ed Guinan & Scott Engle, Villanova Univ.

I imagine that many of you reading this have attended (and thoroughly enjoyed) the unofficial parties that take place after the banquet during AAS meetings. The usual manner in which we find out about these parties is by being handed a business card by Gina Brissenden (or one of the other party planning cohorts, Jake Noel-Storr, Emilie Drobnes, Ed Prather, as well as many others—including David Hogg, when he's around) giving the vital information about the time, place and location of a nearby club or bar where the party will be held, or by simple word of mouth (In my case, primarily from my younger students.). These

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Recollections of Debbie Elmegreen : I think the first party I attended was in Texas in the late '90's, when a large hotel room was the venue, and it was wall-to-wall people. Although I enjoyed more of the ever-expanding gatherings over the years, my most memorable ones were at the last two summer meetings. In Pasadena, I had just become president-elect, and the very first advice then-president John Huchra gave me was that it was my duty to show up at the party, enjoy a toast with him, and dance the night away. He stressed in his deadpan way how important it was for officers to set a good example for the Society by attending the parties, so of course I obliged. Gina was as always such a gracious (and zany) host, along with Jake, and John led the way on the dance floor. In Miami after John had passed the gavel to me, we enjoyed the obligatory toast involving those crazy solar drinks. And he danced with more exuberance than anyone–he loved every minute of it, and like everything else he did, he put his heart into it. Here's to you, John–we'll keep that tradition going.

Kevin Marvel (AAS Executive Officer) : Our discipline is a community of passionate scientists engaged in something they love, astronomy. It should not be surprising that they want to get together to celebrate this passion, both formally at the AAS meetings, and informally at events like the after-banquet party organized by the Out of the Rain team.

Adam Burgasser (UC San Diego) : The AAS party is the one event I most look forward to when attending the conference. It's where I catch up with old friends, meet new colleagues inside and outside my research field, and have real conversations on science, careers and life—all in a completely relaxed and fun environment. Plus, I have a certain nostalgia for this event—I met my wife at the Atlanta AAS party in 2004.

astronomical get-togethers typically start around 10 pm and last (depending on the age and stamina of the participant) up to ~2 AM (possibly even until Astronomical Twilight, if you're so inclined…). The parties are much as you would imagine, including music, dancing and imbibing. Their more elusive aspect, however, is their most important: community building. It would be a huge mistake to simply view these get-togethers as just an opportunity to drink with other astronomers. They are about much more, removing us all from the formalities of the meeting itself and allowing us all (from 21-year-old undergrad to 80-year-old emeritus) to mingle in a more colloquial atmosphere. As Gina herself has said, "*There are some people who think the parties are only for graduate students or that the organizers only want the 'cool people,' to attend. Who's cool? Everyone is invited. The parties are our way of giving back to our Society and our way of bringing everyone together to play and have fun together at the end of a meeting. We want the parties to help us realize that we are part of a community, and to feel a part of that community. It is our hope that by being part of a community we all continue to grow a stronger and more diverse Society*."

Since the summer of 1998, the AAS AfterParty fests have grown from a dozen people hanging out in a hotel room to a regular contingency of 25-30% of meeting attendees. Parties are frequently attended by Presidents, VPs, Council Members, as well as a motley crowd of dance and music crazed astronomers and astronomy students (and friends). It is sometimes a real surprise that some of the Presidents and council members have pretty good dancing skills. Among the notables are David Helfand ("interesting dance moves"), Bob Kirshner (a "possible *Dancing with the Stars* celeb"), Tom Ayres (The *King of Spin* himself), Neil deGrasse Tyson (*Astronomy's Hip Frontman*), and Jonathan McDowell (Harvard's own *Cambridge-trained Party Animal*). Other memorable party dancers include, of course, the late John Huchra (who will be greatly missed) and most recently Debbie Elmegreen.

In 2004, the *signature cocktail* was introduced into the party mix, leading to such "creative" concoctions as The 206, The Snare, and The Landolt Standard. The Landolt Standard was created in honor of favored party guest, Arlo Landolt, in honor of the many years he had served as our Society's Secretary—and in celebration of his retirement from that post. Arlo started coming to the parties very early on, and he was always surrounded by a group of graduate students, many of whom couldn't believe such an esteemed astronomer would attend. Over the years, these cocktails have become part of the unofficial, "official" changing-of-the-guard of our AAS Presidency, starting with a toast and ending with a dance. Craig Wheeler and John Huchra were particularly entertaining on the dance floor. And John and Debbie had style!

Jake said that *"the parties, the signature cocktail, our incoming and outgoing Presidents toasting each other and sharing a dance with everyone have organically grown into traditions. All families have traditions—being part of those traditions is how we bond."*

To put it simply, these parties provide an opportunity for astronomers and students to "mix it up", talk, dance, relax and have a good time (and even discuss some Astronomy). When making your AAS meeting plans, the AAS AfterParty will be the night of the banquet, and it will be late enough so you can go to both. So, when you're packing, don't forget your dancing shoes!

1. John Huchra and Gina Brissenden (CAE, Univ. of Arizona) share a beer, a Snare, and a smile in DC. 2. Dara Norman (NOAO) dances the night away with Greg Rudnick (Univ. of Kansas) smiling in the background. 3. Emily Drobnes (NASA/ADNET Systems, Inc./FHNW I4DS), Tara Clopper (Greencastle-Antrim High School), and Sara Mitchell (GSFC) enjoy the Austin skyline. Emilie, love the "ears"! 4. This was only one of the packed dance floors at TomTom—a perfect venue for Tom Ayres (Univ. of Colorado) to shake his groove thang! 5. It's Venus transit time, and Bob Kirshner (Harvard CfA) holds court at the Supreme Court in Denver. 6. Nick Scoville (CalTech) seems to be saying something very funny to John Huchra, and Debbie Elmegreen (AAS President, Vassar College) in Pasadena. You should have seen these kids on the dance floor!

Astronomy Education Policy

Columnist: Susana Deustua, Space Telescope Institute

A couple of points addressed in this issue's Policy feature article have caused me to stop, and, think. The first one is the pool of students who have received poor academic preparation, the second is the reformation of K-12 instruction, and perhaps undergraduate and graduate education. I am one of the many astronomers employed at an observatory/science center, not in academia; and my initial reaction was, " How do these issues matter to me?", followed by "What can I do about them?"

In attempting to answer my own questions, I concluded that concrete action is taking risks. When students apply for internships or research opportunities, take a risk on accepting a student or two from that pool. Gamble on developing a new research program with colleagues at underserved institutions. But, these are simple compared with changing instruction and education practices. Systemic reform of K-12 instruction remains a work in progress despite decades of effort—perhaps it's time to risk revolution over incremental change. While undergraduate education has and is changing, evolution of graduate instruction is slower. Perhaps we should all be willing to take more risks.

The Role of Research on Science Teaching and Learning: Why Now and What does it Mean for Astronomy

George (Pinky) Nelson, Western Washington Univ.

I was asked to write a short comment on this theme and, for fodder, to read a blog by Richard Felder in Tomorrow's Professor on the theme in the title (http://cgi.stanford.edu/~dept-ctl/tomprof/posting.php?ID=1043). There is increasing interest by the congress, administration, and funding agencies in improving science teaching and learning at all levels and the role of research is central in guiding our thinking.

It is complicated because there are at least three orthogonal meanings implied when we talk about "the role of research on science teaching and learning" depending on how you interpret the phrase. Is "research" astrophysics research or education research? The role of research can mean incorporating the latest astrophysics research results into our classes, or the assumed capacity to inspire and teach due to the quality of cutting edge research done by the instructor. Or it could imply adopting the latest education research on effective pedagogical tools and techniques to help students learn a carefully chosen set of ideas. That is the meaning that resonates with me.

Multiple contexts also confound the conversation depending on which students we are talking about. We are really good at, and should be proud of our system for producing the next generation of research astronomers from the pool of students with excellent preparation in mathematics and physics. The issue we face in our graduate programs is how to increase the diversity of the pool to include those students with the interest and potential, but lacking the academic preparation of their more privileged peers, a problem that goes way beyond the boundaries of the astrophysics.

We are learning through astronomy education research how to do a better job of getting our non-major, non-science students—who don't have the mathematics or physics sophistication—to remember the facts and some of the concepts that we cover in our overview courses. Sadly, much of this material is a rehash of the knowledge and skills that students should be acquiring in their K-12 careers, but aren't.

Even though astronomy is included in state and national science standards, few students arrive at college ready to take their learning in astronomy beyond re-memorizing the geometric cause of seasons (not the thermodynamics), phases of the moon, and a bewildering sampling from planetary and stellar astrophysics and cosmology. This argues for a focused, discipline-based effort to prepare the next generation of K-12 teachers and reform of the K-12 system so that effective science instruction is valued and supported. But now we are moving way beyond the interest of most astronomers and departments—and many schools of education for that matter.

Given these issues, what can we do in our departments to help meet the institution's mission to provide excellent educational experiences for students even if they are not our majors? And what can we do as professionals and academics to contribute to the improvement of the K-12 education system? At the same time, we don't want to diminish our capacity to do astrophysics at the highest levels. I wish I had the answers, especially in these difficult financial times.

In his blog, Felder argued for two steps that departments could take to improve teaching. Make sure that at least 10 percent of the faculty members specialize in teaching and educational scholarship, and use teaching and scholarship in education in tenure and promotion decisions. I would add a third step based on a successful model in my own university. Hire two astronomers interested in teaching and education research to work closely with their peers from other science and mathematics departments and the college of education to prepare the next generation of K-12 teachers. They would also teach in their departments at least half-time and their research can be either in astrophysics or education, both would be valued in tenure and promotion decisions.

Research on teaching and learning has a big role to play. Not all of us have the interest or motivation to engage in a new discipline, but we all have the responsibility to contribute to our students' teaching and learning. There is a continuum of positive actions we can take as individuals ranging from staying out of the way to becoming a full-time astronomy education researcher. As departments, we can take on the challenge of broadening our educational scope beyond our majors and graduate students. The stakes are just too high to not participate.

Astronomy Education Review: New Volume http://aer.aas.org

Astronomy Education Review (AER) is a web-based journal and magazine for everyone who works in astronomy and space science education. Published by the American Astronomical Society, the journal welcomes research papers, short articles on innovative work, comparative reviews of educational resources, op-ed pieces, letters to the editor, news items, and announcements of opportunities related to education and outreach. All papers and articles are refereed.

AER is continually adding additional publications to its annual volume. The recent additions to Volume 9 include:

- Improving Instructor Presence in an Online Introductory Astronomy Course through Video Demonstrations
  Scott T. Miller and Stephen L. Redman

- Enhancing Student Performance in an Online Introductory Astronomy Course with Video Demonstrations
  Scott T. Miller and Stephen L. Redman

- Daytime School Guided Visits to an Astronomical Observatory in Brazil
  Pedro Donizete Colombo, Silvia Calbo Aroca, and Cibelle Celestino Silva et al.

- Survey of the Goals and Beliefs of Planetarium Professionals Regarding Program Design
  Kim J. Small and Julia D. Plummer

- Call for Co-Operation in the Development of a Stack Exchange Site on Science Teacher Professional Development in Astronomy
  David McKinnon and Michael Fitzgerald

- Catching Cosmic Rays with a DSLR
  Kendra Sibbernsen

- Covering the Standards: Astronomy Teachers' Preparation and Beliefs
  Julia D. Plummer and Valerie M. Zahm

- Primary School Students' Ideas Concerning the Apparent Movement of the Moon
  John Starakis and Krystallia Halkia

- Student Ideas about Kepler's Laws and Planetary Orbital Motions
  Ka Chun Yu, Kamran Sahami, and Grant Denn et al.

When you go to the journal's web pages, you will see that Volume 10 is already under way. To see the full table of contents for Volume 9, as well as other issues, click on "Browse" link under the journal title.

AAS Divisions, and other, News…

AAS Divisions

Division on Dynamical Astronomy

The AAS Division on Dynamical Astronomy is planning to provide up to two stipends of $600 each, on a competitive basis, to students who wish to attend the 2011 DDA meeting in Austin, Texas, April 10-14. In addition to the stipend award, meeting registration and banquet fees are waived for the stipend winners. This competition is open to all students currently enrolled in an academic program at any college or university and doing research in any area of dynamical astronomy. For details, please see the DDA Student Stipend web page at http://dda.harvard.edu/student.html.

High Energy Astrophysics Division

HEAD is awarding a new Dissertation Prize to recognize an outstanding doctoral dissertation in high-energy astrophysics. Those who have received their degrees within 3 years prior to the HEAD meeting date are eligible for the prize, in this case since September 7, 2008. The winner of the prize will receive a certificate, a cash award of $1000, and an invitation to give a 30-minute invited talk at the HEAD Meeting. HEAD will also waive the meeting registration fee for the winner and cover up to $1500 of the winner's travel expenses to attend the meeting. The due date for nomination materials to be submitted to the HEAD Secretary-Treasurer is February 15, 2011. Visit the HEAD website for additional information. In addition, HEAD anticipates awarding early-career travel support for students to attend the next HEAD meeting. To learn more, please visit the HEAD website: www.aas.org/head

Other News

Albert Einstein Distinguished Educator Fellowships Announced

Tim Spuck, an Earth and Space Science teacher at Oil City Area Senior High School, Oil City, Pennsylvania was selected as a 2010-11 Einstein Fellow by the Triangle Coalition for Science and Technology Education. The prestigious Albert Einstein Distinguished Educator Fellowship Program offers elementary and secondary science, technology, engineering and math (STEM) teachers with a demonstrated excellence in teaching an opportunity to serve in the national education or public policy arenas. Selected teachers spend a school year in the Washington, DC metro area, serving in a Congressional Office or a Federal agency. Fellows provide practical insights and real world perspective to policy makers and program managers developing or managing education programs. The fellowships increase understanding, communication, and cooperation between the science, technology, and mathematics education community and legislative and executive branches of the Federal government.

Contributions to *Spark*

We encourage all members of the community to contribute articles to *Spark*, which is published twice a year to coincide with the AAS national meetings. If you are interested in making a contribution, we recommend sending us a brief description of your proposed contribution in advance so that we can discuss your idea and suggest a suitable article length (generally around either 400 or 800 words). Our editorial meetings are held in February and August of each year, so suggestions received before those months are easiest for us to incorporate. Article deadlines are April 1 for the issue released at the summer meeting, and October 1 for the winter meeting issue.

We look forward to discussing your ideas for contributions, and to reading your articles! Email the editors: Jake Noel-Storr and Gina Brissenden at spark@aas.org.

SPD Meeting, May 2010 - Miami, FL

1. SPD Studentship Awards fund travel to the annual SPD meeting for outstanding undergraduate and graduate students who plan to pursue careers in solar physics. This year's recipients included Yixuan Li (NJIT), Sung-Hong Park (NJIT), Rebekah Evans (GMU), Rona Oran (Univ. of Michigan), Robert Duffin (GMU/Univ. of Maryland), Qingrong Chen (Stanford Univ.), Hamish Reid (Univ. of Glasgow), and Lucas Tarr (Montana State Univ.).

2. Cathy O'Riordan (AIP) presents the AIP Andrew Gemant Award to Daniel Altschuler (Univ. of Puerto Rico) for his contributions to the cultural, artistic, or humanistic dimension of physics. Altschuler followed with a public lecture entitled "Science, Pseudoscience, and Education."

3. At the AAS/AAE K-12 Educators Reception, Ignacio Ugarte-Urra (NRL/GMU) chatted with Westin, Florida, schoolteacher Lisa Milesckovic and her family, including daughter Zoe, son Hal, and husband Victor.

4. College students Jerica Green (Univ. of Washington) and Bekki Dawson (Harvard) get some career advice from AAS Treasurer Peter Stockman (STScI) during the Student Reception.

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