



## St. Louis Workshops Will Test & Focus US IYA 2009 Plans



Endorsed by the United Nations, UNESCO, and the International Astronomical Union, the International Year of Astronomy (IYA) 2009 aims to stimulate worldwide interest in science through engagement in astronomy activities, under the central theme of “The Universe: Yours to Discover.” More than 100 countries are organizing events.

Helping to lead overall US planning for the International Year of Astronomy has been an exciting and challenging task over the past 15 months. In addition to being the associate director for public affairs and educational outreach at the National Optical Astronomy Observatory in Tucson, I serve as the US single-point-of-contact and co-chair of the US IYA Program Committee established by the American Astronomical Society (AAS), along with Dr. Susana Deustua (now at the Space Telescope Science Institute).

We’ve also just announced the core US IYA 2009 project office team: Dr. Stephen Pompea is the US IYA project director and Dr. Andrea Schweitzer is the US IYA project manager, assisted by Kristina Harding. Dr. Pamela Gay is the US IYA Web developer and New Media expert. For more on the team, see [astronomy2009.us/newscenter](http://astronomy2009.us/newscenter).

A separate US IYA Development Committee chartered by the AAS is charged with finding the funds to support our best ideas for activities and programs, supplemented by a recently hired private fundraiser—Stanley Weinstein & Co., [stanleyweinstein.com](http://stanleyweinstein.com)—and by significant NSF grant funds that we hope to obtain. NASA also has a point-of-contact and lots of creative plans tied to its missions.

This duty has taken us to international IYA meetings in Garching, Germany, and Athens, Greece, and to US meetings in Honolulu, Chicago, and Austin, Texas, where our plans

and proposed activities have garnered generally positive and supportive reactions.

We decided early in 2007 to aim high, with a goal of offering an engaging astronomy experience to every person in the country, nurturing existing partnerships, and building new connections to sustain public interest in astronomy. Some energetic brainstorming among our committees led to the following 10 major program areas:

- Looking through a Telescope (star parties, sidewalk astronomy activities, etc.)
- A Simple Telescope of Your Own (the Galileoscope) and Other Hands-on Optics Activities
- Astronomy for Classrooms, Afterschool Programs, and Families
- Dark-Skies Awareness (including programs to measure local sky brightness)
- Reaching the Public through New Media (Facebook, Second Life, Podcasts, etc.)
- Astronomy in the Arts and Entertainment
- Storytelling Activities and Cultural Astronomy
- Research Experiences for Schools and Citizens
- Programs at Science Centers, Planetaria and Observatory Visitor Centers
- From the Earth to the Universe: A Localized Exhibit of Astronomical Imagery

Each of these thematic areas has a working group of roughly 10 professional and amateur education and public outreach specialists (in addition to the three dozen people on the program and development committees), meaning we have engaged the volunteer efforts of well over 130 people.

In order to prepare, focus and test our planned activities, the AAS and the Astronomical Society of the Pacific

# SPaRk

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## In This Issue

It's hard to believe that *Spark* is in its third year of publication! And with this, the 6<sup>th</sup> issue, we would like to thank all of the contributing authors who have taken the time out of their busy schedules to make *Spark* the valuable and informative resource we think it is. Thank you! You have helped us all grow as astronomy educators. And speaking of growth, hasn't our Society grown with respect to education? The number of education talks, posters and workshops at meetings is a testament to this. And along with growth comes change; the articles in this issue of *Spark* are reflections of this.

We learn from Tim Slater, AAS Education Officer, that the AAS is taking over publication of *Astronomy Education Review*, in collaboration with the Astronomical Society of the Pacific, another testament to our Society's commitment to education, and we learn that the AAS is seeking a new editor for the journal as we say goodbye to Sidney Wolff (NOAO). For those of us who regularly read *AER*, we know the hard work and dedication that editors Sidney Wolff and Andrew Fraknoi have put into making this journal so vital. We once again hear from both of them about the 12<sup>th</sup> issue of *AER*. So join us in thanking them for their work, and help our Society find someone to (try) to fill Sidney's shoes.

In this issue, we also find the first installment in a series on innovations that have been made in the way we teach our majors and graduates, as well as about new and different astronomy degree programs. Our first article features an interview between Jarita Holbrook, at Univ. of Arizona, and Nicholas Campion, at the University of Wales, Lampeter, about degrees programs in cultural astronomy.

We hear from Jim Manning and Michael Gibbs of the Astronomical Society of the Pacific about new directions they are taking. Doug Isbell of NOAO, and US single-point-of-contact and cochair of the US International Year of Astronomy 2009 Program Committee, informs us about how we can help create global change in how humans view astronomy, and Doug Duncan from Univ. of Colorado will help us take some time this summer to change ourselves as Astro 101 instructors. Also, look for updates on what our AAS Divisions and Committees have been up to.

Lastly, with this issue we bid adieu to Susana Deustua, AAS Director of Educational Activities, as she moves on to new research endeavors at STScI. Susana has been such a strong leader and supporter of astronomy education. She has helped bring us the wide variety of education offerings at our national meetings. She helped bring us AstronomyCenter.org — the Astro 101 component of the NSF National Science Digital Library. She helped the AAS become actively involved in the NSF New Faculty Workshops. And she helped create *Spark*. Susana, thank you so much for your years of dedication to our Society's education efforts. You will be missed!!

*Gina Brissenden & Jake Noel-Storr, Editors*

(ASP) are sponsoring a weekend of workshops on how to present astronomy activities and ideas to audiences in schools, museums, nature centers, community groups, and everywhere people gather. No background in astronomy is required to participate.

The program is being held in St. Louis, Missouri, on the weekend of May 31-June 1, before the June 2008 meeting of the AAS, which this year includes an ASP symposium on the International Year of Astronomy, in the St. Louis Convention Center. Each day, there will be 3 or 4 workshops to choose from, addressing different topics and audiences; the workshops serve a dual purpose as both training sessions and prototypes to test our plans for IYA.

Among those expected to attend the workshops are:

- 1) K-12 teachers
- 2) museum, planetarium, and nature center educators
- 3) community college instructors who do outreach beyond their own classrooms
- 4) amateur astronomers actively engaged in outreach
- 5) NASA science program educational ambassadors.

The next three days (June 2-4) feature opening and closing plenary sessions on national and international IYA plans, including an opening address from IAU President Catherine Cesarsky, 90-minute interactive sessions, 10-minute oral presentations, and a wide variety of poster papers.

The IYA Symposium and associated workshops represent a coordinated effort by the AAS and the ASP to prepare scientists, educators, science communicators and other groups to use the International Year of Astronomy as a vehicle to engage the American public in astronomy, education, and science literacy.

Watch the US IYA and ASP websites for reports on meeting outcomes and more details on emerging activities and programs for 2009. And if you're at the St. Louis meeting right now—reading this article—go to some of these sessions!

*Douglas Isbell*  
NOAO

## Education Updates from AAS Divisions and Committees

*The chairs and education representatives of all AAS Divisions and Committees are invited and encouraged to submit updates on their education, outreach, and related efforts to the editors for inclusion in every issue of Spark.*

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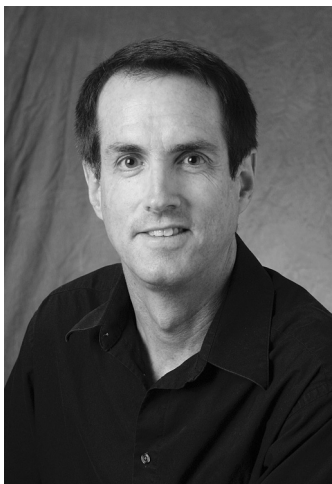
### ***Solar Physics Division (SPD)***

The SPD EPO committee continues to make progress in the development and implementation of various education and outreach efforts. At the joint meeting in Ft. Lauderdale, the SPD, in partnership with the Solar Physics and Aeronomy (SPA) section of the American Geophysical Union (AGU) and with strong support from the AGU education office, implemented a new outreach program for the local community. Exploration Station is based on the NASA/RIT and AAS program AstroZone and will be held at every spring and fall meeting of the AGU.

The committee has also completed phase one expansion of the education section of the SPD website. Improvements include a more organized structure with clearly defined sections for students, educators, SPD education opportunities, and useful resources. The hope is that a more robust education section will (1) help students better understand the opportunities available to them and feel more a part of the community, and (2) help engage scientists and facilitate their participation in education and outreach efforts. The next step will be to implement some user-end testing before moving on to phase two improvements. Progress continues on finding ways to enhance undergraduate and graduate student experiences at professional meetings as well as engaging the SPD community and supporting its involvement in IYA activities.



# Want to Enjoy Your Teaching More? Let Your *Students* do more of the Talking!



For most of us summer time presents at least a slight break from the intense schedule we face during the academic year. I suggest using a little time to consider changing the way you'll teach next fall. Have you taught the same course many times? Could you use some extra enthusiasm when you teach again? Would you be interested in an approach that would cause your students to be much more energetic and engaged than you've seen before?

There is such an approach, and it's called Peer Instruction (PI) or Think-Pair-Share (TPS). Peer Instruction is really nothing more than getting students to behave the way we do at a scientific meeting, over the coffee or cocktails, when we're talking to someone whose ideas interest or contradict us. At an AAS meeting you find hundreds of astronomers talking at once, thinking hard about the subject, *engaged*. In a typical classroom you find dozens or hundreds of students sitting passively, possibly taking notes, and not thinking very critically about what you are teaching—or what they are supposed to be learning. As one satirist said, "Lecturing is the means by which information passes from the professor's notes to the students' notes without passing through the brain of either." PI drastically alters the behavior of your students. PI means that approximately every 10 to 15 minutes you stop your lecture, pose a conceptually rich, multiple-choice question, and have students debate the answer with each other in small groups, usually after having given individual answers first. Since your students have been taught since they were small not to talk in class, at first you have to explain that you really do want them all to talk at once. But once they get started you will be amazed at the energy and engagement they show—just like we do, talking to *our* peers.

Like most new things you might try, PI takes some planning. (Even using a chalkboard takes some planning. If you stand in front of it it's much less effective than when you don't.) First of all you need some good conceptually rich, multiple-choice questions. Here are two examples, concerning the seasons. The second question is better because it can only be answered if you understand the concept, not by memorizing words such as "tilt" or "direct rays."

## Sample Peer Instruction Question: Seasons (entry level)

What is a prime cause of the seasons?

1. In summer Earth is closer to the Sun.
2. Due to the tilt of Earth's axis, in summer one hemisphere is closer to the Sun.
3. In summer the Sun is higher in the sky, so its rays hit the ground closer to perpendicular.

## Sample Peer Instruction Question: Seasons (deeper level)

Suppose Earth's orbit was exactly circular but the tilt of its axis of rotation was unchanged. That is, the axis is tilted  $23^\circ$  from perpendicular to the orbital plane, but Earth keeps exactly the same distance from the Sun throughout the year. What would happen to the seasons?

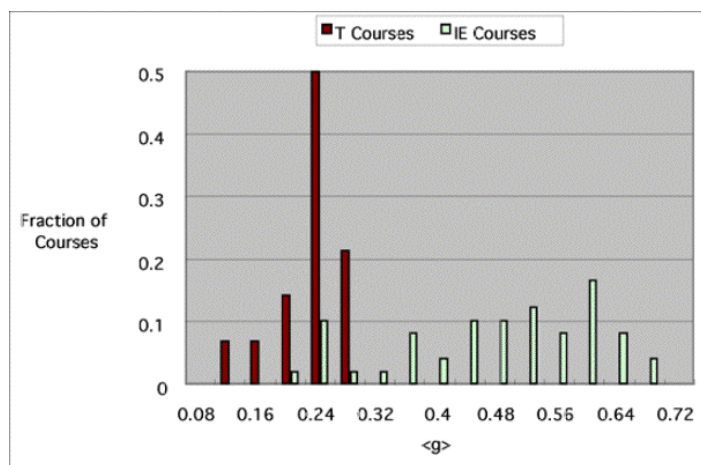
1. We would not have seasons.
2. We would still have seasons, and they would remain pretty much the same as they are today.
3. We would still have seasons, but they would be more extreme than they are today.
4. We would still have seasons, but they would be less extreme than they are today.

How do you get students to debate questions like this with each other? For the reward! First, you tell them that their answers to the questions are your clue whether to go on to a new topic or not. Second—and this is important—you tell them that unless they can explain a concept in simple terms to their friends, they haven't really learned it. Students who participate actively in PI do better on exams. So you tell them they will earn a higher grade and that you will not "curve" the class and take that away.

How do you collect a response from every student at once? One way is to give them colored or numbered index cards and have them hold one in front of their chest to answer. It's easy for the instructor to get a sense of how many are correct and whether to go on or have more discussion. You can also use a wireless student response system, usually called "clickers." Clickers are now relatively inexpensive and require no classroom wiring. A clicker system instantly records all the student answers, allowing you to give individual credit. This is a strong motivation for all students to participate, especially if you give partial credit even for wrong answers. The clickers are not providing the learning; the discussion is. But clickers make the process of collecting answers much easier, and they make students individually accountable (Duncan 2006, 2007). This is why the use of

clickers is spreading so rapidly in universities. Seventeen thousand are currently in use at the Univ. of Colorado.

You may have heard that teaching with methods of learner-centered instruction such as PI or *Lecture-Tutorial* activities (Prather et al. 2008) increases learning. It does, remarkably so when used consistently. Results from a study of 6000 physics students who had taken the Force Concept Inventory both pre- and post- their calculus-based physics course are shown in the Figure 1 (Hake 1998). A normalized learning gain of 1.00 means a student earned on the post-course FCI all the points they missed on the pre-course FCI.



**Figure 1: Gain Scores for Traditional vs. Interactive Engagement Courses (Hake 1998)**

Learning gains in interactive courses (IE) are typically higher than *any* pure lecture courses (T). Classes using Peer Instruction often achieve around 40% learning. To achieve >50% usually requires replacing some lectures with tutorials.

But my point today is different. It is that Peer Instruction makes teaching much more enjoyable for *you*, the instructor! It is a great experience to have all your students talking about astronomy. Honestly, when this first happens you will feel weird. You are standing in class and not saying anything. That is hard for many of us to do, especially good lecturers. But as you circulate around and listen during the minutes you give students to discuss, you will learn an enormous amount about their thinking, and your teaching will probably change in response. This makes class more interesting for you, even if you have taught the same class in the past.

Of course students would prefer that you tell them the answers. Thinking is work! That's why it's essential that you prepare for PI by planning how you will explain to them that *their* thinking, not *yours*, is what leads to understanding and good grades. So over the summer read the original publication from Eric Mazur at Harvard: *Peer Instruction, A*

*User's Guide*, or the PI part of Duncan (2006, 2007). You can also read an "expanded how-to guide" on implementing PI (or Think-Pair-Share) on the Center for Astronomy Education (CAE) website (Forestell et al. 2008; astronomy101.jpl.nasa.gov/tips/index.cfm?TeachingID=54). The result should be a more enjoyable teaching experience in the fall.

Note: Because you are changing the classroom dynamic in ways that are probably new to your students and to you, I do not recommend trying PI unless you plan for it. Watching someone who is experienced in teaching this way is a very fast way to see how it works. I highly recommended taking the time to observe a colleague who uses PI. Or attend a CAE Teaching Excellence Workshop offered at each AAS meeting because the workshops themselves have a major component devoted to best implementation practices using PI (astronomy101.jpl.nasa.gov/workshops/index.cfm).

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Mazur, E. (1997). *Peer Instruction: A User's Manual*. New York: Pearson-Prentice Hall.

*Douglas K. Duncan*  
*Univ. of Colorado, Boulder*

## A Changing of the Guards at *Astronomy Education Review*



As the premier astronomy education research journal, *Astronomy Education Review* ([aer.nao.edu](http://aer.nao.edu)), moves to its permanent home under the auspices of the American Astronomical Society and the Astronomical Society of the Pacific, we should take a moment to celebrate the Herculean efforts of Sidney Wolff and Andrew Fraknoi as the first *AER* editors.

Because of their courageous vision and endless dedication to *AER*, our community now has a highly respected and frequently cited journal to document and share our rapidly growing understanding of how students best learn and how astronomers best teach. The vital importance of the role of *AER* journal editor can not be understated and what follows is the job announcement seeking to appoint a new editor or editorial team who are charged with moving the *AER* forward to the next level of scholarship. Please share this announcement with individuals or submit nominations to the search committee chair, Tim Slater, at [timslaterwyo@gmail.com](mailto:timslaterwyo@gmail.com). Finding the right editor is important to all of us.

**Job Announcement: Editor, *Astronomy Education Review***  
American Astronomical Society  
2000 Florida Avenue, NW, Suite 400  
Washington, DC 20009

Email Submission Address: [timslaterwyo@gmail.com](mailto:timslaterwyo@gmail.com)  
(subject line: *AER* Editor)

Applications will be reviewed starting June 15 and will continue until position is filled.

Attention: Tim Slater, Chair, *AER* Editor Search Committee

The American Astronomical Society is soliciting applications and nominations of candidates for the position of Editor of the *Astronomy Education Review (AER)*. This person will replace the current Editor, Sidney Wolff, who is stepping down at the end of 2008. The *AER* is internationally known as the pre-eminent scholarly journal in astronomy education and research, and the new Editor will be responsible for enhancing the excellence of the Journal. The AAS Council has selected a Search Committee to fill this position, chaired by its Education Officer, Tim Slater.

The Search Committee has identified the following qualifications that must be satisfied by the successful applicant:

1. Recognized stature and achievement in astronomy and/or science education.
2. Experience with diplomatic management of peers, staff, or students.
3. A clear vision for the future of the *AER*.
4. Familiarity with budgets.
5. Experience as a referee.
6. Previous editorial experience would be useful but is not required.

The Editor is responsible for building and maintaining a cadre of referees and assigns most manuscripts submitted to the referees, assesses the referee's reports and recommends the papers for publication. The Editor is responsible for maintaining the efficient and timely flow of manuscripts. As part of this process, this person will also:

1. Actively recruit authors and referees.
2. Interface with the AAS Journals Manager.
3. Participate in the establishment and management of the Journal Budget.
4. Report to the Publications Board and the AAS Council on the status of the *AER*.

The Society expects to compensate the Editor at roughly \$10,000 per year paid as a stipend and performance will be reviewed annually by the publications board. No additional infrastructure will be provided. Specific questions about the historical operations of the journal to date can be addressed to Sidney Wolff, [swolff@nao.edu](mailto:swolff@nao.edu).

Candidates for this position should submit a cover letter, CV, bibliography, and names and contact information of three references to Tim Slater, Chair of the *AER* Editor Search Committee, at the above address. Email submission of PDF files is encouraged to [timslaterwyo@gmail.com](mailto:timslaterwyo@gmail.com) using *AER* Editor Search as subject line.

Nominations for the position may also be sent to the same address.

Selected candidates will be asked to provide evidence of institutional support for their assuming the above editorial duties.

The cover letter should address the candidate's qualifications, reason for interest in the position, and ideas for the operation, management, and future of the *AER*. In accordance with



the Bylaws of the Society, the Search Committee will make its recommendations to the AAS Publications Board and AAS Council. The final selection is made by the Council. Applications and nominations received by 15 June 2008 will be given full consideration. AAE/EOE.

The current website of the *Astronomy Education Review* is aer.noao.edu.

*Tim Slater*  
*Univ. of Wyoming*  
*AAS Education Officer*

## *Astronomy Education Review*

*Astronomy Education Review (AER)*, the web-based journal/magazine about astronomy education and outreach, announces the on-line publication of its 12th issue, now complete on the Web at aer.noao.edu There is no charge for reading or downloading the full articles in the journal. When you go to the *AER* site, you will see that the next issue is already under way. You can find the full 12th issue by clicking on back issues and then on vol. 6, no. 2.

Papers and articles in the 12th issue include:

Development of a Concept Inventory to Assess Students' Understanding and Reasoning Difficulties about the Properties and Formation of Stars by Janelle M. Bailey (University of Nevada, Las Vegas)

Regulations and Ethical Considerations for Astronomy Education Research II: Resources and Worked Examples by Erik Brogt, Erin Dokter, Jessie Antonellis, and Sanlyn Buxner (University of Arizona)

Modeling the Round Earth through Diagrams by Shamin Padalkar and Jayashree Ramadas (Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, India)

Project LITE Educational Materials and Their Effectiveness as Measured by the Light and Spectroscopy Concept Inventory by Erin M. Bardar and Kenneth Brecher (Boston University)

First Results from the Light and Spectroscopy Concept Inventory by Erin M. Bardar (Boston University and TERC)

This I Believe, No ...Understand: The Importance of Banning the B-Word from Science by Kristine Larsen (Central Connecticut State University)

Common Alternative Astronomical Conceptions Encountered in Junior Secondary Science Classes: Why Is This So? by Lena Danaia and David H. McKinnon (Charles Sturt University, Bathurst, Australia)

Instruction as a Scientific Experiment: A Professional Development Case Study of a Professor Changing the Introductory Astronomy Course for Non Science Majors by Erik Brogt (University of Arizona)

Astronomy Education Research Charter and Symposium Report by Aaron Price (Tufts University), et al.

Learning Physical Science through Astronomy Activities: A Comparison between Constructivist and Traditional Approaches in Grades 3-6 by R. Bruce Ward, Philip M. Sadler, and Irwin I. Shapiro (Harvard-Smithsonian Center for Astrophysics)

What To Drop From A One-Semester Version Of "Astro 101" (A Report on a Discussion at the Cosmos in the Classroom 2007 Conference) by Bruce Partridge (Haverford College)

Teaching Scientific Logic: Theories and Observations by Kelly Cline (Carroll College)

*Sidney Wolff and Andrew Fraknoi*  
*Editors*

*AER* actively solicits interesting papers and articles on all aspects of astronomy space science education and outreach. The journal gets between 130,000 and 200,000 hits per month from every state of the U.S. and over 90 other countries. All papers are refereed and a set of guidelines for contributing to *AER* are available on the web site.

# The Astronomical Society of the Pacific: Advancing the Cause of Science Literacy



James G. Manning

Michael G. Gibbs

The history of the Astronomical Society of the Pacific (ASP) dates back to 1889 and two important events. The first was a total solar eclipse that occurred on New Year's Day that year which was visible just north of San Francisco. Edward Holden, the first director of Lick Observatory, authored a public outreach pamphlet describing how best to both observe and photograph the event. Charles Burckhalter, then director of the Chabot Observatory, was so inspired by Holden's pamphlet that he gathered a group of photographers and amateur astronomers to be at the zone of totality to witness the eclipse. The second event occurred a few weeks later when the same group gathered back in San Francisco and Holden suggested establishing an organization to unite professional and amateur astronomers. They named their organization the Astronomical Society of the Pacific.

From the very beginning, the ASP was based in public outreach and bringing together those who enjoy astronomy, whether they be photographers, professional or amateur astronomers. During the next 120 years, the Society evolved to become an international organization and leader in astronomy and space science education and public outreach. Today, the ASP's mission continues to focus on increasing the understanding and appreciation of astronomy as a means to a higher end. The ASP works to increase public understanding and appreciation of astronomy through scientists, educators, enthusiasts and the public as a vehicle for advancing science literacy and exchange.

Astronomy provides many great "-ables." It is one of the most esthetic and appealing sciences and therefore *approachable*. The sky is available to everyone, making it *accessible*. And

since astronomy encompasses the universe – everything we know – it is the closest thing there is to being the science of everything, making it *connectable*—connectable to most other sciences. All of these "-ables" make astronomy a wonderful avenue to introduce science and its processes to students and the public, to characterize science as the adventure of discovery, to link to other sciences in interdisciplinary ways, to encourage consideration of science careers in the young, and to encourage a higher degree of scientific enlightenment among the public. It is about creating an electorate sufficiently science-literate to be able to make enlightened decisions on questions of science and technology that will largely determine the future of our species on this planet.

Since those first events in 1889, the ASP has brought people together who love the sky and want to share their passion with others. Building on this passion and history, the Society is advancing our purpose as part of a cause—to advance science literacy through engagement in astronomy.

This cause is bigger than any one person. It involves all of us.

Whether it is The National Academies' report titled "Rising Above the Gathering Storm" or the National Science Foundation's "Digest of Key Science and Engineering Indicators 2008," we are, on a regular basis, reminded about the importance of improving science literacy within our country. These and other reports continue to demonstrate the importance of investing in science so that we as a nation can continue to compete in the global market place. The workforce of the early twentieth century, during the industrial revolution, required manual labor. Today, the workforce of the early twenty-first century requires knowledge. We do not need the same level of physical muscle power, we need a workforce with brain power—a scientifically literate workforce.

How can we as a nation encourage our children to become interested in science? We at the ASP believe Edward Holden and Charles Burckhalter had it right back in 1889. It is through astronomy and those many "-ables" that capture an interest in science and begin the process of creating a science literate workforce and society.

Towards this end, the ASP manages various national networks that support the cause of improving science literacy. These networks exist thanks to amateur astronomers and their clubs taking part in the *Night Sky Network*; informal science educators participating in *Astronomy from the Ground*



Up; in-service science teachers and volunteer astronomers contributing to *Project ASTRO* and *Family ASTRO*; and those teaching undergraduate astronomy classes who take part in the *Cosmos in the Classroom* conferences. Individuals involved in any of these national networks directly interact with our children or the public, and we make it one of our goals to provide them with the resources and support necessary to utilize astronomy as a way of generating interest in science.

While our mission remains the same, the ASP continues to evolve. As a cause-based organization, the Society is pleased

to partner with other organizations that share in our mission, such as the American Astronomical Society. We look forward to working with the AAS and others as we celebrate the 2009 International Year of Astronomy. This is a special opportunity for all of us, as an astronomy and space science community, to bring together those who enjoy astronomy—just as they did that New Year’s Day in 1889—just 119 years ago.

*James G. Manning and Michael G. Gibbs*  
*Astronomical Society of the Pacific*

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## Innovations in Teaching Major & Graduate Students

### Part One of a Series

With this issue of *Spark*, we present what we hope is the first in a series of articles on innovations in teaching majors and graduate students. In this article, we hear from Jarita Holbrook of the University of Arizona and Nicholas Campion of the University of Wales, Lampeter.

Jarita is in the Bureau of Applied Research in Anthropology in the College of Social and Behavioral Sciences at UofA where she studies the many ways in which astronomy and culture intersect in Africa—focusing on how Africans use the sky, what they think about the sky, and how their artwork represents the sky. Jarita is in her second career as an anthropologist of science after a career as an astrophysicist. Nicholas is Director of the Sophia Centre for the Study of Cosmology in Culture at the University of Wales, Lampeter, where he is Senior Lecturer in Archaeology and Anthropology and Course Director of the MA in Cultural Astronomy and Astrology. In addition, he is on the faculty of Kepler College, Seattle. His research interests include the history of astrology and astronomy as well as the place of both disciplines in contemporary culture. Nicholas is

also editor of *Culture and Cosmos: A Journal of the History of Astrology and Cultural Astronomy* and is on the editorial board of *Archaeoastronomy*.

Jarita and Nicholas will reflect upon their graduate programs in cultural astronomy. Beginning with definitions of cultural astronomy, they touch upon current debates about terminology, disciplinary approaches to the subject, and details of what classes are offered in each program. They chose an interview format for their article as a demonstration of “data-gathering” for students interested in participating in this exciting branch of astronomy research.

If you think your department has something innovative to share, let us know. Maybe we’ll be reading about it in the future. In our next issue of *Spark*, Carl Heiles (UC Berkeley) will be telling us about their innovative undergraduate laboratory courses. Now, to Jarita and Nicholas.

*Gina Brissenden & Jake Noel-Storr, editors*

## Cultural Astronomy: A Conversation about Degree Programs & Research Questions from Both Sides of the Pond

**Jarita Holbrook, Univ. of Arizona and Nick Campion, Univ. of Wales, Lampeter**

**Campion:** Tell me Jarita, in your classes at the University of Arizona, how are you defining Cultural Astronomy?

**Holbrook:** I start my first lecture and all my public talks using your 1997 definition of cultural astronomy: “the use of astronomical knowledge, beliefs or theories to

inspire, inform or influence social forms and ideologies, or any aspect of human behavior. Cultural astronomy also includes the modern disciplines of ethnoastronomy and archaeoastronomy” (Campion 1997).

I always go on to say that this is a great definition, especially if you are writing grants, because it says that astronomy is related to everything and everything is shaped by astronomy! Then I go on to say that this definition does not



Nick Campion

Jarita Holbrook

give much detail as to what we do as cultural astronomers. I then present the *American Heritage Dictionary's* (2004) definitions of archaeoastronomy and ethnoastronomy. These are: "The study of the knowledge, interpretations, and practices of ancient cultures regarding celestial objects or phenomena (*ethnoastronomy*) and "the study of the knowledge, interpretations, and practices of contemporary cultures regarding celestial objects or phenomena" (*archaeoastronomy*).

Thus, broadly: *archaeoastronomy* studies the dead, *ethnoastronomy* studies the living. Archaeoastronomy arose out of archaeology, ethnoastronomy out of cultural anthropology which relies on ethnography. However, these are much confused because for "archaeoastronomy," up until the early 1990s, was the catch all term for the field, now cultural astronomy is. Also, now we do not associate archaeoastronomy only with the dead, but instead with a set of methods for measuring alignments of built and modified structures and landscapes to celestial bodies whether the people are living or dead. So, I summarize to my students that cultural astronomy is the study of people and the sky, leaving out all the qualifiers and sub-definitions. I end with a simple statement, but I think that going through the steps of looking at all these definitions is informative to beginning students. I hope that it isn't simply confusing.

Nick, tell me about the projects that your students are doing and what you see as the core approach towards research and theories that have emerged in your students' work.

**Campion:** I need to explain first that, as I began as a historian and evolved into an anthropologist, I steer my students naturally into either historical work (which can be contemporary), seeking explanations for current ideas and practices through literary evidence, or conducting fieldwork, which I see as gathering data which will one day be of use to historians. My ethnographic approach is phenomenological

and reflexive, by which I mean that the researcher—my students—is obliged to follow a methodologically-neutral approach, observing the phenomena under investigation as closely as possible, and both being aware of, and "bracketing out" his or her own prejudices. The optional modules (elective courses) allow students to address a variety of areas, astrological, astronomical, and cosmological, from the past and present, investigating mainly religious and scientific culture. The only limitation at present is the emphasis on western culture, which is mainly a result of the expertise of the teaching staff. However, I intend that to change. It also goes without saying that, as we are involved in cultural studies, there can be no question of the "proof" of any particular claim about the cosmos, only an investigation of what it is to be human.

Students begin by taking two compulsory modules in which they encounter key concepts (such as Platonism, Postmodernism, and tackle areas such as magic, enchantment, and divination) and research skills, including ethnographic ones. They then choose four optional modules, at which point they can begin to specialize. The modules are regarded as the *taught* component of the MA, after which the students are ready to undertake a research project. At the dissertation stage, students choose their own research area, in consultation with the course director, and we usually try to help them take on the topic of their choice. Perhaps I should just list a few recent titles, to illustrate the generally favored areas: "An Investigation of the Sky as a Source of Enchantment in the Twentieth and Early Twenty-First Centuries"; "The Astrologer as Magician or Shaman: A Consideration of Astrological Practice within a Cosmological Paradigm of Participation with the Divine"; "Cultural Influences, Changing Perceptions and Links between Astrology and Tarot from the Nineteenth Century to the Present Time"; "Naming the Planets"; "The Celestial Ascent of the Soul: The Morphology of an Enduring Idea"; "Astrology as the Language of the Western Esoteric Tradition"; "The Alchemical Soul of Cinema: Can the Cultural Art Form of Cinema be Informative about the Cosmos?"; "Entering the Matrix: A Contemporary Cosmological Journey". All the work has been fascinating but what attracts me to the last two titles is the investigation of the space conjured up in cinema as a form of cosmology not unlike, perhaps the space created by shamen on their journeys to the stars. How does all this compare to your syllabus?

**Holbrook:** In contrast to developing a graduate degree program, at the University of Arizona we are building an interdisciplinary graduate minor in cultural astronomy. A graduate minor is three courses and the three we have in mind are in three areas: 1) archaeoastronomy—studying built structures that have been aligned to celestial bodies, 2) cultural astronomy focusing on case studies drawn from anthropology, and 3) history of astronomy. Our first two

courses will be offered during the 2008-9 academic year. Our classes are combined undergraduate and graduate students or 400/500 classes as they are called and listed here at UofA. The first class for Fall 2008 is Dennis Doxtater's class listed in Architecture: Sacred Ritual Process in the context of Landscape, Architecture, and Celestial Phenomena. He focuses on the archaeoastronomy of the Southwest United States in this class. I am planning to teach the Anthropology of Astronomy in Spring 2009. One of the fun books I plan to use is *Bad Astronomy* (Plait 2002). I am interested in general astronomy knowledge in developed nations like the UK and the USA, and I have a five year project to study this, but in the meantime only a few scholars write about what we (Americans) know and don't know about the sky—Plait is one of these. I include Native American, African, and Pacific case studies. Richard Poss is working on the graduate syllabus for the History of Astronomy. He has taught the undergraduate equivalent for several years. In contrast to your degree program our efforts are on a much smaller scale, but our expectation for our graduates is that their first choice is to become research professors. Thus, we want them employable and at this time interdisciplinary is a positive as long as you also fit in a traditional department. There are no cultural astronomy departments in the United States.

My students mainly come from anthropology and education. It seems like there is an endless stream of young women at UofA who want to study gender issues in astronomy! I have supervised three such undergraduate projects. One mapped the usage of the computer room in an astronomy department and found that women used the computers the entire semester, whereas the men only used it near mid-terms and finals. The women also staked out their territory towards the back corner away from the door. The men used the computers closest to the door and towards the center of the room. Another student is doing a comparative study of family life choices in an astronomy department in the US and one in Germany. Hers is based on doing face-to-face interviews. A third began a study of grade discrimination based on gender in an astronomy department but couldn't get access to the records. In order to complete the study she would have to interview all the undergraduate students which she did not have time to do. It is odd that since my area of expertise is Africa that the students I attract really want to study astronomers. Since I was an astronomer I have insights into interpreting their data that they do not. My graduate students are mixed in that some are studying astronomers but others are focused on communities in Africa and other parts of the world. I would say that the core of my teaching is ethnographic interview based with participant observation, I teach some survey and statistical analysis, and I try to teach them what research questions are important to astronomers, cultural astronomers, historians, and just normal folks.

Being in an applied anthropology department has positively impacted my research and the questions I ask. I do more

mapping now, I have created a walking map of the Louvre, and my students have created walking maps of Heidelberg, Germany, and the University of Arizona campus. What are we mapping? Astronomy sites! Our maps take you to planetariums, streets named for celestial bodies, artwork with celestial bodies, pictures of important astronomers, places where astronomy papers are stored, sundials, celestial murals, etc. We are creating something tangible—a map—that we then share with others to highlight the importance of astronomy in popular cultures. This is one of the activities that I am promoting for the 2009 International Year of Astronomy.

Another change since joining my department is that I am much more involved in studying the link between “applied” astronomy knowledge and livelihood systems. This means how people around the world use their knowledge of the sky and celestial motions to aid in making a living such as being an astronomer, navigating to fish, or creating an agricultural calendar. Thus, my work has become grounded in the practical whereas I see your program as building on the esoteric and metaphysical roots of astronomy and astrology.

What may be unique to me as a professor is that I do a lot of K-12 outreach which I also encourage my students to do. Beginning from when I was an astronomy graduate student, I give a lecture to a K-12 audience once a year, sometimes I referee science fairs, and now groups around the US provide me with all expenses paid trips to give inspirational talks to young people to encourage them to study the sciences. One of my graduate students proposed to work with a NASA funded astronomer here at UofA to develop a parent-teacher night activity including the NASA findings, local Native American astronomy, and Arabic astronomy. Unfortunately, he was not funded but we will try again next year. My undergraduate Honor's student is creating a children's book on the Pleiades. She goes into K-12 classrooms, lectures about the Pleiades and legends about the Pleiades, and the children do illustrations. She is picking the best pictures to include in her book. I see these outreach activities as inspiring the next generation of cultural astronomy students.

I think it is clear that our two programs are different, yet, both fit under the rubric of cultural astronomy.

**Campion:** I agree, Jarita. Thanks for talking with me today. This was fun.

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