AIA & HMI E/PO Report

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For period 1-31 August 2005

1. Science Fellow Service Learning Program (Partnership with Stanford’s Haas Center for Public Service, the Stanford Solar Center, and Montana State University)

At the May-June joint meeting of the AGU and SPD, Trae Winter (with David McKenzie as co-author) gave a well-received presentation entitled, "Education & Public Outreach in Montana, Supporting the Solar Dynamics Observatory". For this presentation, Trae received an Outstanding Student Paper Award. Subsequently, Mr. Winter has been invited to give a repeat performance of the talk at the American Meteorological Society's upcoming Symposium on Space Weather.

Over the course of the last academic year, the MSU SPOT Program has been gathering feedback and evaluations from the student presenters and the teachers whose classes we've visited. In the spring and early summer, PhD student Eric Brunsell compiled and summarized the evaluations, and conducted anonymous interviews with several of the student presenters. Eric's report was finished in July, and it is attached hereunto. There are some very positive findings, and useful recommendations. The SPOT evaluation is attached.

The SPOT Program is supported by three groups at MSU: Montana Space Grant Consortium, MSU's Space Science & Engineering Lab, and SDO/AIA. Representatives from all these groups met with the SPOT personnel at the end of July to review Eric Brunsell's report, and to discuss SPOT operations in the coming academic year.

During July and August, the MSU SPOT team started preparing for the coming academic year's activities. Designed a new presentation, updated our recruitment flyers, updated our advertising brochure, renegotiated the subcontract to UM-Missoula, and designed web-forms for paperless reporting.

SPOT had four presentations scheduled for the month of July. The first, for the Montana 4H youth conference, was canceled last minute due to an error in the 4H schedule. In mid July, two presentations were given to space science camps at the Museum of the Rockies. At the end of the month, a presentation was given to the MUCERPI space science camp during their visit to MSU. No presentations were scheduled for the month of August. A total of 79 students and 10 teachers saw presentations in July.
2. **Space Weather Monitor (SID & AWESOME) Project** *(jointly funded by NSF’s CISM program and NASA’s MDI instrument on SOHO)*

With the help of summer students Scott Winegarden, a Computer Science student at UC Irvine, and Shannon Lee, an astrophysics student entering Cal State San Francisco, we were able to complete functionality for a data access system for the SID monitors. “Raw” SID data is converted to a standard form, archived in the DSDS system here at Stanford, and copies made available for viewing and/or retrieving by interested students. Users can retrieve SID data by site, monitor, or time period, and plot multiple sites on the same graph. GOES data is also accessible. AWESOME data will eventually be included, once it is converted to a new, non-Matlab-based format, a project being undertaken by Morris Cohen, the EE graduate student working with AWESOME.

Although data retrieval functionality is now available on the web, the layout and interfaces could be improved. A design student with web experience is being brought in to redesign the Space Weather Monitor website and to assure it will be 508-compliant (i.e. accessible to people with disabilities).

3. **Solar Planetarium Show**

LHS has been testing the solar planetarium show with children’s groups throughout the summer. Some awkward activities and transitions have been improved due to their experiences. Starting in October, the show will be tested and evaluated with classroom visitors to LHS. Shortly afterwards, it will be sent out to 25 small and interactive planetariums throughout the nation for formal evaluation and testing.
OVERVIEW

The Space Public Outreach Team (SPOT) is comprised of undergraduate students at Montana State University and the University of Montana from a variety of science and non-science majors. Their goal is to provide space science presentations to k-12 schools and other groups throughout Montana. The undergraduate students are provided with training on public speaking and space science content. Before becoming a SPOT presenter, each undergraduate student is required to demonstrate their competency in both public speaking and the content related to the presentation.

SPOT is a program that effectively disseminates information regarding NASA’s current space exploration efforts to pre-college students and the general public. SPOT presentations are provided free of charge to schools. During the 2004-2005 school year, SPOT has given 57 presentations reaching 2483 students in Montana. Presentations were given at 23 schools and a number of other venues. Montana has a very low population density, leading to many students that are geographically isolated. Of the students that SPOT reached, 40.6% lived more than 50 miles away from a large population center (> 25,000 people) and 19.5% lived more than 125 miles from a population center. In addition, 16% of students reached by SPOT were from traditionally underrepresented groups.

This evaluation report focused on three fundamental questions. (1) What value do teachers see in the SPOT presentations? (2) How do SPOT presenters perceive the success of their presentations? (3) How do SPOT presenters describe their participation in
the program? This report will first discuss teacher and presenter feedback from presentations. Presenter feedback regarding the SPOT program will be discussed next. The report will conclude with general feedback and recommendations gleaned from the feedback. Data for this evaluation was collected from presentation surveys completed by teachers and presenters and informal interviews of 5 SPOT presenters.

SPOT PRESENTATION - TEACHER FEEDBACK

Teachers receiving presentations reported an overwhelmingly positive experience with SPOT. More than 90% of respondents indicated that they strongly agreed that their presenter was well prepared, well organized, and that the presentation was age appropriate. All of the respondents indicated that they either agreed or strongly agreed that their students were interested and engaged during the presentation and that they would recommend that their colleagues participate in SPOT. All but one of the respondents either agreed or strongly agreed that the presentation was relevant to their curriculum. These responses are remarkable, considering that the presentations were given at a wide range of grade levels. Table 1 summarizes these responses.

Teachers were also asked four open ended questions related to the presentation. The first question asked for specific evidence that students were interested and engaged in the presentation. One teacher wrote, “My fifth graders had so many questions and there was constant interaction.” Another teacher stated, “Students were still asking questions the next week.” These two comments are representative of the majority of responses that indicated that students asked many questions and continued the discussion after the presentation. The second question asked which aspects of the presentation worked best
for their students. The most common response was the visual aspects of the presentation. One comment in particular demonstrated how one presenter engaged students, “The presenter, __, had much knowledge and passion for their presentation. This radiated into the audience. She explained and added to the colorful and animated images.” The scale model and relevant connections to life on Earth were also mentioned as aspects that worked well during the presentation. The third question asked teachers to provide ideas to improve future presentations. The most common response was that the presentation should incorporate more hands-on activities. The comment, “Providing more hands-on experiences always engages students. Students were anticipating more participation,” is representative of these responses. A few teachers also indicated that the presentation would have been more beneficial if their group size would have been smaller. The fourth question asked teachers how they heard about SPOT. The vast majority of teachers responded that they learned about the program from the SPOT mailing.

Table 1: Teacher responses to SPOT presentations. (1 = Strongly Agree, 2 = Agree, 3 = Disagree, 4 = Strongly Disagree)

<table>
<thead>
<tr>
<th>Question</th>
<th>Average</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>The presenter was well prepared</td>
<td>1.1</td>
<td>93%</td>
<td>7%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>The workshop was well organized</td>
<td>1.1</td>
<td>93%</td>
<td>7%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>The content of the presentation was appropriate for your students</td>
<td>1.1</td>
<td>93%</td>
<td>7%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>The presentation was relevant to your curriculum</td>
<td>1.4</td>
<td>73%</td>
<td>20%</td>
<td>0</td>
<td>7%</td>
</tr>
<tr>
<td>My students were interested and engaged in the presentation.</td>
<td>1.13</td>
<td>87%</td>
<td>13%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>I would recommend that my fellow educators should participate in this program</td>
<td>1.2</td>
<td>80%</td>
<td>20%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>OVERALL</td>
<td>1.15</td>
<td></td>
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SPOT PRESENTATION - PRESENTER FEEDBACK

Presenters were asked to answer two likert-scale questions and four open-ended questions after their presentation. On the two likert-scale questions, all of the presenters either agreed or strongly agreed that the students appeared to be engaged and interested and that the presentation appeared to be age appropriate. Table 2 summarizes these responses.

The first open-ended question asked presenters to describe the number and types of questions that were asked. Most of the presenters reported a large number (40+) of questions. The presenters that reported a small number of questions tended to have larger audiences. Many of the questions that were asked were relevant to the topic of the presentation (Saturn and Cassini – Huygens Mission), but some were more general. The more general questions included: human space flight, aliens, why isn’t Pluto a moon, the 10th planet, mission costs, working for NASA, and other Solar System related questions. The second question asked presenters if they felt they were prepared to answer the questions. The presenters felt well prepared, but struggled with some questions. One presenter commented, “We felt prepared to answer most questions but we struggled with a question about what holds planets up.”

The third question asked which aspects of the presentation worked best. The responses were split between activities / demonstrations and “interactive” questioning. One comment that was particularly descriptive was, “Asking the kids for answers – they were almost dead on … brilliant!” Visuals, including movies, were also mentioned. The final open-ended question asked presenters to provide suggestions for improving presentations. Presenters provided a variety of suggestions, including:
• Using new images / updated information when available – three responses
• More interactive / More hands-on activities – two responses
• Shorter presentations (20 – 30 minutes + questions) – two responses
• Smaller groups
• Provide a laser pointer

Of the five SPOT participants interviewed, three had given presentations. Their responses supported the survey data that indicated that students were engaged during presentations. Their responses also provide additional evidence that a smaller group size results in a more interactive presentation. One participant commented, “The SPOT presentations are fun in general, but depend highly on the audience. Small audiences of enthusiastic students are the most fun because they have so many questions. Very large audiences are typically less personal and the students don’t ask as many questions.” Another comment was that it felt very good to go to the really small schools and expose those kids to real NASA space science. “They were so interested, enthusiastic, and appreciative.”

Table 2: Presenter responses to SPOT presentations. (1 = Strongly Agree, 2 = Agree, 3 = Disagree, 4 = Strongly Disagree)

<table>
<thead>
<tr>
<th>Question</th>
<th>Ave</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students appeared to be engaged and interested. (10 responses)</td>
<td>1.2</td>
<td>80%</td>
<td>20%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The presentation appeared to be appropriate for these students.</td>
<td>1.2</td>
<td>80%</td>
<td>20%</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

SPOT TRAINING FEEDBACK

Overall, the SPOT presenters felt that they were well prepared for the presentations. The following quote from a presenter survey is representative of comments on surveys and in the participant interviews.
“It is important to know about the entire solar system and to practice answering questions. It helped when I initially gave my presentation to pass the test – Dave and Trae asked me questions,…, that helped prepare me. I made sure that I repeated the questions that were asked so that everyone else could hear.”

The SPOT participant interviews provide further insight into the training of presenters. Five interviews were conducted. Three of the interviewed participants had completed presentations, while the other two had not. Those participants that had successfully “passed” the practice presentation requirement were very complimentary of the SPOT managers. They mentioned that the environment was comfortable and non-threatening, the content questions were age appropriate, and that the comments were constructive and useful. The two participants that had not presented both described a lack of time available to prepare. However, they felt that there were plenty of opportunities and that they would like to present next year.

Several suggestions were given for improving or increasing the training prior to the practice presentation. One participant suggested that new presenters focus particularly on the slides and information that they are most interested in, “There is plenty of information, so you might as well talk about the parts you are enthusiastic about.” The participants also said that it would be useful to sit in on other practice presentations to observe other techniques. Another suggestion was to have new presenters practice with veteran presenters in order to help fill gaps in knowledge and technique. One participant expressed some frustrations that they were left on their own to learn the content. That participant felt that it would have been useful to have a SPOT event focused on the content that they need to know for the presentation and questions. The event should present the information in a variety of styles, not just lecture. One other participant said
that it would have been nice to be able to select from multiple programs instead of having only one for the year.

All of the participants indicated that SPOT was a very worthwhile experience. All five stated that they improved their ability to communicate scientific knowledge to non-technical audiences. They also mentioned that it was a valuable experience for future work in science outreach, provided good networking, provided an opportunity to learn more about space science, and was fun.

RECOMMENDATIONS

Overwhelmingly, the teachers and presenters that participated in SPOT reported positive experiences. The program managers should be commended for developing a structure that is rewarding and valuable for all of the stakeholders: classroom teachers, students, undergraduate students, and NASA. Classroom teachers and students are able to receive current space science information in an engaging and effective manner. Undergraduate student presenters are able to improve their content knowledge and communication skills, and NASA is able to disseminate its efforts to a larger, and geographically diverse, audience in a personal and cost effective manner. It is important to note that the suggestions for improvement included in this evaluation are not signs of displeasure with the program. The evaluator and SPOT managers specifically asked responders to provide a minimum of one suggestion. As a result of this, several recommendations for strengthening SPOT have emerged from this evaluation.
1. Engagement of the audience and interaction with the presenter appear to be inversely related to the size of the audience. Communications to teachers regarding SPOT presentation opportunities should recommend that they limit the audience size to one class (20-30 students).

2. Students have a short attention span. The amount of presentation time devoted to talking “to” the students should be limited to 20-30 minutes.

3. Students are engaged during hands on activities and questioning. More of these types of activities should be integrated into the presentation.

4. A laser pointer should be included in the presenter kit.

5. Participants should have increased opportunities for training prior to their practice presentation. This could include “mentoring,” where veteran presenters are teamed with new participants to help them with content knowledge and presentation techniques. It may be useful to have exemplary presenters give their presentation during a SPOT meeting. If logistics permit, it would also be useful to have a small library of videotaped presentations that less experienced presenters can view.

6. One interviewed participant stated that it would have been nice to get the program going earlier in the year. Doing this, especially with veteran presenters, would increase the reach of the program.

7. The SPOT mailing appears to be the most successful dissemination method used by the program. The Montana Association of Science Teachers (MAST - http://www opi.state.mt.us/msta/) has a newsletter and annual conference that may provide an additional cost-effective dissemination method. John Graves (graves@montana.edu) is the editor of the newsletter and adjunct faculty at MSU. Rick Jones (rmjones@mymail.msu.montana.edu) is a past president of MAST and is currently a doctoral student in science education at MSU. Additionally, the National Science Teachers Association’s (NSTA) Building a Presence for Science program (http://ecommerce.nsta.org/bap/) strives to build a network to disseminate opportunities to all science teachers within a state. The Montana Coordinator for NSTA’s Building a Presence for Science is Dr. Walt Woolbaugh (walter@montana.com).