

Providing Effective Professional Development for Teachers through the Lunar Workshops for Educators (LWE)

Marti Canipe¹, Sanlyn Buxner¹, Andrea Jones², Brooke Hsu³, Andy Shaner², & Lora Bleacher⁴

¹Planetary Science Institute, ²Lunar and Planetary Institute, ³AS&D, Inc., ⁴NASA Goddard Space Flight Center

Lunar Workshops for Educators (LWE)

Each workshop was a week-long, Monday through Friday. Each included introduction to classroom lessons, talks by NASA scientists, and tours (e.g. NASA Goddard). Participants were provided certificates of participation for professional development contact hours as well as professional development credits.

Goals for the LWE included:

- Increase lunar literacy among the general population
- Provide audiences with access to LRO data and science results.
- Inspire people to learn more about the Moon and provide connections to the opportunities to do so.
- Develop critical thinking skills that can be applied to the Moon (understanding the process of science)

Program Evaluation Tools

A variety of evaluation tools were used to assess participants knowledge about lunar science, impacts on their science teaching practices, and use of the workshop materials.

These tools included:

- Pre-Workshop Survey: collected information about the schools where participants taught (grade level, type of school, student population) as well as the challenges they encounter teaching about lunar science.
- Pre/Post-Workshop Assessments: designed to evaluate participants' knowledge about key ideas of lunar science and exploration that were a focus of the LWE.
- Daily Surveys: At the end of each day participants completed a short survey that assessed their understanding of the lunar science concepts from that day and elicited feedback about daily activities. Daily surveys provided the workshop leaders with a way to gauge the effectiveness of each day and make any needed adjustments to the next day of the workshop.
- Post-Workshop Survey: Participants reflected on what they had learned over the course of the week-long workshop and what impacts the workshop would have on their teaching practice. Participants were also asked to rate how their confidence in teaching lunar science had changed since the beginning of the workshop. Finally, participants were given an opportunity to provide feedback on the workshop itself.
- Follow-Up Survey: Participants were asked about how they had used workshop materials in their classrooms. In particular participants were asked which activities and visualizations from the workshop they had used, planned to use, or did not plan to use in their classrooms this year.

Lunar Workshop for Educators Participants by Grade Level Taught

	2010	2011	2012	2013	2014
K-2			1	0	
3-5			5	4	
6-8			37	23	
9-12			39	1	
Total*			71	25	

*Some participants teach in multiple grade bands.



Evaluation Foci

- Participant Demographics
- Changes in Participants' Understanding about Lunar Science and Exploration
- Participants' Knowledge about Challenges for Students Learning About the Moon
- Participants' Motivation and Related Intentions Related to Participating in LWE
- Changes to Teaching Practice
- Overall Workshop Feedback

In what way and to what extent did participation in the workshop change participants' knowledge about student misconceptions about the Moon and ways to address those misconceptions?

- Participants were generally able to name a common misconception students have about the Moon on both the pre and post workshop assessments.
- Participants' abilities to name an activity that could be used to address a particular misconception and describe how it would address the misconception increased from before to after the workshop.
- Almost all of the participants mentioned using a specific activity or information from the workshop to address students' misconceptions about the moon.



In what way and to what extent did participation in the workshop contribute to changes in participants' teaching practice?

Post-Workshop Survey

- Some participants indicated that they would be able to use the resources in their courses and that the information would be used to change their teaching practices.

Follow-up Survey (Fall following participation in LWE)

- Participants reported already having used all but one of the activities presented during the workshop. Additionally, many teachers reported planning to use activities later in the school year.
- Lack of time and lack of "fit" with curriculum/standards were identified as reasons why participants would not use a particular activity.
- Participants reported that they felt prepared to use the activities in their classroom after seeing them during the workshop.
- Participants reported already having used all but two of the visualizations presented during the workshop. Additionally, many teachers reported planning to use visualizations later in the school year.
- Lack of "fit" with curriculum/standards and complexity of the visualizations were identified as reasons why participants would not use a particular visualization.
- Participants reported having shared information about LRO with their students, often in the context of teaching about the Moon.
- Participants shared the experience was a positive one that helped them in their classroom through increased enthusiasm, improved knowledge about the Moon, and new teaching strategies and activities.

For more information about LRO teacher workshops please visit <http://lunar.gsfc.nasa.gov/lwe/index.html>
Contact andrea.j.jones@nasa.gov

What was the overall quality of the workshop?

- The workshops overall were rated very highly and participants were extremely satisfied with their experience. The satisfaction level is indicative that the workshop organizers effectively targeted the appropriate audience for this workshop and provided a workshop that met their needs.



In what way and to what extent did participation in the workshop change participants' knowledge about lunar science and exploration?

Participants reported increased confidence in their understanding of as well as their ability to teach about lunar science and exploration.

Participants' Average Ratings of Their Confidence
(Confidence was rated on a scale of 1 to 10, with 10 being very confident.)



Participants' knowledge of targeted lunar science and exploration concepts increased.

- Participants could score from 0 to 25 points on the knowledge assessment, with an average score of 12.5 showing a basic understanding of the target concepts of the survey.
- On the Pre-Workshop Assessment, scores ranged from 0 to 18 points, with an average score of 12.2, thus showing an overall average score just under basic understanding of almost all of the questions.
- On the Post-Workshop Assessment, scores ranged from 15.5 to 24, with an average score of 21.3, thus showing an overall average score between basic and full understanding for most of the target concepts.
- Additionally, participants were asked to rate their confidence in the answers they gave on the assessment. Generally, their confidence increased from the pre to post assessment.

Summary

- The workshop was an overall high quality, effective professional development experience for teaching educators about lunar science and exploration. Participants' feelings about the workshop and presenters were overwhelmingly positive.
- Participants increased in their overall knowledge of lunar science and exploration.
- Participants gained in their overall knowledge of students misconceptions related to the Moon and ways to effectively address those misconceptions as well as other ways to teach about the Moon
- The workshop gave participants resources to teach about the Moon including new activities, information, confidence in teaching the topics, and teaching techniques. In addition to giving participants resources to teach about the Moon, the workshop impacted the teaching practices of some participants more broadly to incorporate more inquiry and other teaching techniques.
- The workshop facilitators used evaluation of previous year's LWE to inform their recruitment of participants and make changes to the workshop.