

HEA-Heliophysics Educator Ambassador Workshop—Chicago, IL July 6-10, 2010
Preliminary Questionnaire Analysis—Quantitative Data

PART 1—TEACHERS' BACKGROUND

This analysis (HEA-CHIQuan0710.doc) presents preliminary findings from the week-long HEA workshop held at the Adler Planetarium in Chicago, IL from Tuesday, July 6, 2010 through Saturday, July 10, 2010. This analysis includes all quantitative data from 1) the daily feedback forms—Tuesday through Friday, 2) pre- and post-assessments of teachers' perceptions of preparedness and 3) the end-of workshop questionnaire—Saturday. Qualitative analyses from Saturday's session are presented in two companion pieces—a Word file (HEA-CHIQual0710.doc) summarizing the content analyses of each open-ended question and an Excel file (HEA-CHIQualDetail0710.xls) containing detailed participant responses to each open-ended question. The pre-post knowledge assessment analysis guided by Lindsay Bartalone is forthcoming.

In total, there were 28 participants at the week-long workshop. All 28 participants submitted completed questionnaires each day except on Wednesday and Saturday when 27 questionnaires were returned. The information presented in this report is a summary of what participants shared on these questionnaires.

Of the attendees, 26 provided information about their professional responsibilities. Twenty-five identified themselves as classroom teachers, while one said he was a curriculum specialist having no classroom teaching responsibilities. Six of the teachers said that they had additional responsibilities outside the classroom. In addition to teaching their students, they mentioned that they fulfilled the roles of...

- Science coordinator (school-based)
- District Science coach
- Teacher monitor
- Middle school specialist
- TAKS bilingual teacher specialist
- Science Lead teacher for school

Teacher participants (N=26) are an experienced group averaging nearly 18 years of teaching, ranging from 3 to 32 years. The 25 participants who were classroom teachers reported instructing a total of 4,935 students in a typical year. These teachers said they are instructing anywhere from 25 to 1,800 students or approximately 197, on average (median 125 students, mode 150 students).

Details of the grade levels, subject areas, school environments and composition of classes follow in Tables 1, 2 and 3...

TABLE 1—TEACHERS' GRADE LEVELS AND SUBJECT AREAS

Grade Level	# of Teachers*	% of Teachers	Subject Areas	# of Teachers**	% of Teachers
	N=25			N=23	
Elementary	7	28%	General science/elementary	19	83%
Middle School	24	96%	Earth Science	3	13
High School	1	4%	Physical Science/chemistry	2	9
			Math/engineering	2	9
			Astronomy/space science	1	4
			Weather, climate, environmental science	1	4
			Life science	1	4
			Biology	1	4
			Reading	1	4

*Of the 25 teachers who responded, the following are teaching at various levels...

- Teaching one level=18
- Teaching two levels=7

**Of the 23 teachers who responded, the following are teaching various subject areas...

- Teaching one subject=17
- Teaching two subjects=4
- Teaching three subjects=2

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TABLE 2—TEACHERS' SCHOOL ENVIRONMENTS

Title I N=25	Receiving Free/Reduced Lunches	Setting		
	N=25	N=25		
% Teachers in Title I Schools	Average % Students	Rural	Suburban	Urban
72%	66%	16%	40%	44%
	% Range			
	10-100%			

TABLE 3—COMPOSITION OF TEACHERS' CLASSES

	Females	White and Asian Males	Other Males
	N=24	N=24	N=24
Average Percentage of Classes	48%	23%	29%
Range of Percentages	22-70%	0-50%	0-98%

Female and other male students are considered minorities with regard to taking science. Thus, we estimate that approximately 77% of the participants' students are minorities.

Twenty-seven of the 28 attendees revealed up to two factors that most influenced their decision to participate in the workshop. Across all attendees, the most compelling factors included their desire to learn more about astronomy/space science, personal enthusiasm/passion for astronomy/space science and their desire to use cutting-edge science with students. A complete summary of the factors teachers selected is below in Table 4...

TABLE 4—FACTORS MOST INFLUENCING DECISION TO PARTICIPATE IN PROJECT

	# of Teachers	% of Teachers
	N=27	
Desire to learn more about astronomy/space science	12	44%
Personal enthusiasm/passion for astronomy and space science	9	33
Desire to enhance resources/tools for use in the classroom	8	30
General love of learning	7	26
Interest in participating in a NASA project	6	22
Desire to share science knowledge with colleagues	6	22
Desire to learn more about inquiry-based, 'real' science	3	11
Desire to use cutting-edge science with students	2	8
Desire to see Chicago	1	4
Other	0	0

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PART 2—WORKSHOP EVALUATION

As part of the evaluation of the workshop experience, teachers were asked to consider the value of three workshop elements. Using a 5-point scale, participants rated these elements indicating that they added 'quite a bit of value' to their workshop experience. The museum exhibit visits and the planetarium shows each drew the highest mean ranking of 4.0 or 'quite a bit of value'—see Table 5 below...

Rating Scale For Value Of Workshop Elements

- 1=No value at all
 2=A slight bit of value
 3=Moderate amount of value
 4=Quite a bit of value
 5=Enormous value

TABLE 5—VALUE OF WORKSHOP ELEMENTS

Elements	Mean Rating	Ratings	Freq. #	Freq. %
Being in Chicago	3.7	N=26		
		1	2	8%
		2	2	8
		3	7	27
		4	7	27
		5	8	30
				100%
Museum Exhibit Visits	4.0	N=27		
		1	0	—
		2	3	11%
		3	3	11
		4	11	41
		5	10	37
				100%
The Planetarium Shows	4.0	N=27		
		1	0	—
		2	2	7%
		3	5	19
		4	11	41
		5	9	33
				100%

Workshop sessions/presentations offered Tuesday through Friday were rated by the participants according to their understanding of the topics presented and also their anticipated use of these topics when conducting their own workshops. 'Understanding/clarity of presentations' was rated using a 4-point scale, while 'anticipated use' was rated on a 5-point scale (see rating scale details below). A total of 28 questionnaires were completed on each day except Wednesday for which 27 questionnaires were collected.

The overall Chicago workshop agenda clustered into five categories—activities, content presentations, tours, planetarium shows and administrative discussions. The mean ratings for teachers' understanding and anticipated use for each category (cluster means) as well as the sessions comprising each category are summarized in Table 6 on the following page. Session titles are color coded to identify the day of the week the presentation was given—Tuesday=tan, Wednesday=green, Thursday=pink and Friday=purple. Detailed data on frequency counts and percentages are summarized by day in Appendix A with each table title highlighted in a color indicating the day the presentations were given. Table 6 provides a comprehensive overview, thus Appendix A can be easily skipped if this level of data is not important to the reader.

Rating Scale for Understanding of Presentations

- 1=Not clear at all
 2=Not clear enough
 3=Clear enough
 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

- 1= Will not present
 2=Unlikely to present
 3=Somewhere likely to present
 4=Very likely to present
 5= Certain to present

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TABLE 6—PRESENTATIONS CLUSTERED BY CATEGORY

PRESENTATIONS	UNDERSTANDING MEANS—4-point	ANTICIPATED USE MEANS—5-point
ACTIVITIES	3.7	3.9
Activity: Space Science Sequence (SSS) Lesson 1.1 Mysterious Events	3.9	4.1
Activity: SSS 3.8 Planet Size and Scale Models	3.9	3.9
Activity: SSS 3.10 Human Orrery	3.9	3.8
Activity: SSS 2.1 Intro to the Seasons	3.8	4.3
Activity: SSS 2.4 Observing Seasons	3.8	4.2
Activity: SSS 1.2 Sun-Earth Scale Model	3.8	4.1
Activity: SSS 2.2 Sun-Earth Distance	3.8	4.1
Activity: SSS 2.6 Reason for Seasons	3.8	4.1
Activity: SSS 3.3 and 3.4 SS Card Sort	3.8	4.1
Activity: SSS 1.3 Energy from the Sun	3.8	4.1
Activity: SSS 3.5-3.7 Solar System Brochures and Models	3.8	3.9
Activity: SSS 4.1 Universe Card sort	3.8	3.7
Activity: SSS 4.4 Lifespans of stars	3.8	3.6
Activity: SSS 4.3 Galaxy card sorts	3.8	3.6
Activity: SSS 3.2 Galileo Observation	3.7	4.1
Activity: SSS 2.3 Hours of Daylight	3.7	4.0
Activity: SSS 1.6-1.7 UV Shields	3.7	4.0
Activity: SSS 3.11 Pluto Evidence Circle	3.7	3.9
Activity: SSS 3.1 Modeling Activity	3.7	3.8
Activity: SSS 2.5 Intensity of Sunlight	3.6	3.9
Activity: SSS 3.9 Scale Map	3.6	3.7
Activity: SSS 4.7 Evidence Circle	3.6	3.7
Activity: NASA Resources Jig Saw	3.6	3.6
Activity: SSS 4.2 Moon Skit, light distance	3.6	3.5
Activity: SSS 4.5-4.6 Search for Life	3.6	3.5
Activity: Mapping Magnetic Fields and RBSP	3.5	4.1
Activity: SSS 1.4 Stormy Sun	3.5	3.7
Activity: SSS 1.8 Living with a Stormy Sun	3.5	3.7
Activity: SSS 1.5 Balloon Rocket Mission & TIMED	3.4	3.5
CONTENT PRESENTATIONS	3.5	3.6
Presentation: NASA Resources PPT	3.6	4.1
Presentation: Voyager Resources	3.5	3.5
Presentation/Activities: IBEX presentation and embedded activities	3.3	3.2
TOURS	3.7	
Tour: Solar System Gallery	3.8	
Tour: GLIMPSE Image	3.8	
Tour: Telescopes Gallery	3.6	
Tour: Sundials	3.6	
PLANETARIUM SHOWS	3.6	
Journey to the Stars	3.7	
IBEX: Search for the edge of the Solar System	3.4	
ADMINISTRATIVE DISCUSSIONS	3.7	
Discussion: Welcome and Introduction (PPT)	3.8	
Discussion: Comment Cards Friday	3.7	
Discussion: Comment Cards Wednesday	3.6	
Discussion: Comment Cards Thursday	3.6	

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PART 3—PLANNED USE OF MATERIALS

Of the 27 teachers who submitted the overall questionnaire on the final day of the workshop, Saturday, all of them said in an open-ended question that they planned to use the materials/ideas from the workshop in their classrooms. Solar system/scale models and 'Reason for the Seasons' were mentioned most often.

Twenty-six of these teachers listed the specific topics/activities they planned to use, with as many as four topics mentioned by a couple of the teachers—see Table 7. Multiple responses result in percentages exceeding 100%.

TABLE 7—TOPICS TEACHERS PLAN TO IMPLEMENT

Topics/Activities	# of Teachers	% of Teachers
	N=26	
Solar system/scale models	8	31%
Reason for the Seasons/Seasons	7	27%
All/most of the activities	4	15%
Unit 3	4	15%
How Sun effects Earth	3	12%
Electromagnetic spectrum	3	12%
GEMS	2	8%
Unit 1	2	8%
Evidence Circle	2	8%
Misconceptions of Earth/space	2	8%
Missions	2	8%
UV Bead Inquiry	2	8%
Unit 2	1	4%
Light spectrum	1	4%
Planet orbits	1	4%
Heliosphere	1	4%
News Flash	1	4%
Mystery	1	4%
Circular orbit	1	4%
Pluto not a planet	1	4%
Shields	1	4%
Solar weather	1	4%
Unit 4	1	4%

Of the 27 teachers completing the final questionnaire, 24 said that they plan to implement the materials with 3,601 students, ranging from 25 to 350. On average, this is 139 students per teacher per year. Data on the students they anticipate reaching and the ways they will be presenting heliophysics topics are outlined in Tables 8 and 9...

TABLE 8—STUDENTS' GRADE LEVELS, ABILITY LEVELS AND SUBJECT AREAS FOR PLANNED IMPLEMENTATION

Grade Level	# of Teachers	% of Teachers	Student Ability Levels	# of Teachers	% of Teachers	Subject Areas	# of Teachers	% of Teachers
	N=27			N=26			N=27	
Elementary*	4	15%	All/inclusive	20	77%	General science	24	89%
Middle School	27	100%	Gifted/honors	4	15	Astronomy/space science/electromagnetic radiation	5	19
High School	0	—	Specific grade level	2	8	Math	5	19
						Physics	2	7
						Earth science	2	7
						Social studies	1	4
						Reading	1	4

*Of the 27 respondents, 4 plan to implement at multiple levels in...

- N=4 Elementary and middle school

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TABLE 9—ANTICIPATED USE OF TOPICS

Anticipated Use*	Integral Part of Basic Science Curriculum*	Resource/ Supplement*	Non-Science Curriculum	To Train Teachers	To Use Another Way
	N=27				
# of Teachers	19	9	0	4	0
% of Teachers	70%	33%	—	15%	—

*Of the 27 respondents, 22 gave single answers while 5 said they plan to use the materials in two ways...

- N=4 As a resource and as an integral part of the basic curriculum
- N=1 As a resource/supplement and to train other teachers

PART 4—READINESS TO TEACH HELIOPHYSICS

A content knowledge and readiness to teach assessment was administered both before and at the end of the workshop sessions. Program leaders in Chicago, under the supervision of Lindsay Bartalone, are analyzing the pre-post content knowledge data. This section takes a look at the pre-post data indicating teachers' perceptions of their readiness to teach heliophysics topics both to their students and to fellow teachers.

While all 28 participating teachers completed the pre-assessment, only 27 completed the post-assessment and of those only 26 finished the 5-point rating scale questions on perceptions of readiness to teach heliophysics content—with '1' representing 'not prepared at all' and '5' indicating 'exceptionally well-prepared'. Since responses were anonymous, it is not possible to match pre-post responses by participant. We are forced to simply aggregate pre and post data across all participants—providing pre-post averages and an approximate change score based on groups of two different sizes (pre or T1 with N=28 teachers and the post or T2 with N=26 teachers)—see Table 10 below...

Rating Scale for Preparation to Teach Students

- 1=Not prepared at all
- 2=Minimally prepared
- 3=Moderately prepared
- 4=Well prepared
- 5=Exceptionally well-prepared

TABLE 10—PREPARED TO TEACH STUDENTS

Areas To Teach	T1 N=28	T2 N=26	Change
Different boundaries in the Solar System	1.8	4.0	2.2
The Sun's Output	2.4	4.4	2.0
Shields in the Solar System	1.9	4.4	2.5
Space-based tools to study the Sun and its effects	2.0	4.2	2.2
Importance of Magnetic Fields as Shields	2.1	4.5	2.4
Reasons for Seasons	3.8	4.9	1.1
Models of the Solar System	3.6	4.9	1.3
Using light to study and organize the Universe	2.6	4.5	1.9
Average Mean Ratings	2.5	4.5	2.0

In addition to possibly presenting workshop topics to their students, the attendees are required to conduct at least one workshop to share what they learned with fellow teachers. All participants were asked to estimate the number of colleagues with whom they will sharing heliophysics materials/ideas. In total 26 of the participants shared their estimates that are presented in Table 11...

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TABLE 11—SHARING WITH COLLEAGUES

Anticipated Sharing	Average number fellow teachers to be reached	Range of fellow teachers to be reached	Total fellow teachers estimated to be reached
		N=26	
# of Colleagues	51	2-100	1,331

Workshops participants not only completed pre- and post-assessment questions related to how prepared they felt to teach heliophysics materials/ideas to their students, but also how ready they felt to use heliophysics topics in workshops for their colleagues. As they embarked on 'spreading the word' to the more than 1,300 teachers they anticipated reaching, they offered ratings of their level of readiness for conducting workshops. Again, there were 28 participants for the pre-assessment and 26 in the post-assessment. The average mean ratings and approximate change from pre-assessment (T1) to post-assessment (T2) are summarized in Table 12 below.

Rating Scale for Preparation to Teach Other Teachers

- 1=Not prepared at all
- 2=Minimally prepared
- 3=Moderately prepared
- 4=Well prepared
- 5=Exceptionally well prepared

TABLE 12—PREPARED TO TEACH TEACHERS

AREAS TO TEACH	T1 N=28	T2 N=26	Change
Different boundaries in the Solar System	1.6	4.0	2.4
The Sun's Output	2.0	4.1	2.1
Shields in the Solar System	1.7	4.2	2.5
Space-based tools to study the Sun and its effects	1.8	4.0	2.2
Importance of Magnetic Fields as Shields	1.8	4.4	2.6
Reasons for Seasons	3.5	4.7	1.2
Models of the Solar System	3.1	4.7	1.6
Using light to study and organize the Universe	2.1	4.4	2.3
Total Average Mean Ratings	2.2	4.3	2.1

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APPENDIX A

Tuesday presentations—Teachers were asked to rate their prior knowledge of the ideas presented at Tuesday's sessions on a 5-point scale ranging from '1=no knowledge at all' to '5=expert knowledge.' Of 28 teachers completing questionnaires, all offered a response resulting in a mean rating of 2.3, which is in the lower end of the range of '2=a little knowledge' and '3=a moderate amount of knowledge.' Their ratings of their understanding of the presentations and their anticipated use of the topics are summarized in Table A1 on the next two pages.

Rating Scale for Understanding of Presentations

- 1=Not clear at all
- 2=Not clear enough
- 3=Clear enough
- 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

- 1= Will not present
- 2=Unlikely to present
- 3=Somewhere likely to present
- 4=Very likely to present
- 5= Certain to present

TABLE A1. TUESDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS									
Understanding of Presentation				Anticipated Use of Topics					
Presentations	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Discussion: Welcome and Introduction (PPT)	3.8	N=28							
		1	—	—					
		2	7	25%					
		3	21	75%					
		4	—	—					
Activity: Space Science Sequence (SSS) Lesson 1.1 Mysterious Events	3.9	N=28			4.1		N=28		
		1	—	—			1	—	—
		2	—	—			2	—	—
		3	3	11%			3	7	25%
		4	25	89%			4	12	43%
Activity: SSS 1.2 Sun-Earth Scale Model	3.8	N=28			4.1		N=28		
		1	0	—			1	—	—
		2	0	—			2	1	4%
		3	5	18%			3	6	21%
		4	23	82%			4	10	36%
Activity: SSS 1.3 Energy from the Sun	3.8	N=27			4.1		N=28		
		1	0	—			1	—	—
		2	0	—			2	1	4%
		3	5	19%			3	6	21%
		4	22	82%			4	10	36%
Tour: Telescopes Gallery	3.6	N=28							
		1	0	—					
		2	1	4%					
		3	10	36%					
		4	17	60%					

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Rating Scale for Understanding of Presentations

1=Not clear at all
 2=Not clear enough
 3=Clear enough
 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

1= Will not present
 2=Unlikely to present
 3=Somewhere likely to present
 4=Very likely to present
 5= Certain to present

TABLE A1 (Cont.). TUESDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS

Understanding of Presentation					Anticipated Use of Topics				
Presentations	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Activity: SSS 1.4 Stormy Sun	3.5	N=27			3.7	3.7	N=28		
		1	0	—			1	0	—
		2	1	4%			2	2	7%
		3	12	44			3	10	36
		4	14	52			4	10	36
Activity: SSS 1.5 Balloon Rocket Mission & TIMED	3.4	N=27			3.5	3.5	N=26		
		1	0	—			1	0	—
		2	2	7			2	4	15%
		3	11	41			3	10	39
		4	14	52			4	7	27
Activity: Mapping Magnetic Fields and RBSP	3.5	N=27			4.1	4.1	N=27		
		1	0	—			1	0	—
		2	2	7%			2	3	11%
		3	9	34			3	6	22
		4	16	59			4	3	11
AVERAGE MEAN RATING FOR THE DAY	3.7				3.9				

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Wednesday presentations—Teachers were asked to rate their prior knowledge of the ideas presented at Wednesday’s sessions on a 5-point scale ranging from ‘1=no knowledge at all’ to ‘5=expert knowledge.’ Of 27 teachers completing questionnaires, all offered a rating resulting in a mean rating of 3.2, which is in the lower end of the range of ‘3=a moderate amount of knowledge’ and ‘4=quite a bit of knowledge.’ Ratings of their understanding of the presentations and their anticipated use of the topics are summarized in Table A2 on the next three pages.

Rating Scale for Understanding of Presentations

- 1=Not clear at all
- 2=Not clear enough
- 3=Clear enough
- 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

- 1= Will not present
- 2=Unlikely to present
- 3=Somewhere likely to present
- 4=Very likely to present
- 5= Certain to present

TABLE A2. WEDNESDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS									
Understanding of Presentation					Anticipated Use of Topics				
Presentations	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Discussion: Comment Cards	3.6	N=26							
		1	0	—					
		2	10	38%					
		3	16	62					
		4	0	—					
Activity: SSS 1.6-1.7 UV Shields	3.7	N=26				4.0	N=25		
		1	1	4%	1		1	4%	
		2	0	—	2		0	—	
		3	4	15	3		5	40	
		4	21	81	4		12	48	
Activity: SSS 1.8 Living with a Stormy Sun	3.5	N=25				3.7	N=25		
		1	0	—	1		1	4%	
		2	1	4%	2		1	4	
		3	10	40	3		8	32	
		4	14	56	4		9	36	
Activity: SSS 2.1 Intro to the Seasons	3.8	N=27				4.3	N=26		
		1	0	—	1		0	—	
		2	5	19%	2		0	—	
		3	22	81	3		4	15%	
		4	0	—	4		10	39	
Activity: SSS 2.2 Sun-Earth Distance	3.8	N=26				4.1	N=28		
		1	0	—	1		0	—	
		2	0	—	2		2	8%	
		3	5	19%	3		3	12	
		4	21	81	4		11	44	
					5	9	36		

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Rating Scale for Understanding of Presentations

1=Not clear at all
 2=Not clear enough
 3=Clear enough
 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

1= Will not present
 2=Unlikely to present
 3=Somewhere likely to present
 4=Very likely to present
 5= Certain to present

TABLE A2 (Cont.). WEDNESDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS

Understanding of Presentation					Anticipated Use of Topics				
Presentation— Wednesday	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Planetarium Show: Journey to the Stars	3.7	N=26							
		1	0	—					
		2	7	27%					
		3	19	73					
		4	0	—					
Activity: SSS 2.3 Hours of Daylight	3.7	N=27							
		1	0	—					
		2	0	—					
		3	8	30%					
		4	19	70					
Activity: SSS 2.4 Observing Seasons	3.8	N=27							
		1	0	—					
		2	0	—					
		3	5	19%					
		4	22	81					
Activity: SSS 2.5 Intensity of Sunlight	3.6	N=27							
		1	0	—					
		2	2	7%					
		3	8	30					
		4	17	63					
		N=25							
		1	0	—					
		2	1	4%					
		3	5	20					
		4	11	44					
		N=25							
		1	0	—					
		2	2	8%					
		3	4	16					
		4	7	28					
		N=25							
		1	0	—					
		2	2	8%					
		3	7	28					
		4	7	28					
		N=25							
		1	0	—					
		2	2	8%					
		3	7	28					
		5	9	36					

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Rating Scale for Understanding of Presentations

- 1=Not clear at all
- 2=Not clear enough
- 3=Clear enough
- 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

- 1= Will not present
- 2=Unlikely to present
- 3=Somewhere likely to present
- 4=Very likely to present
- 5= Certain to present

TABLE A2 (Cont.). WEDNESDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS

Understanding of Presentation					Anticipated Use of Topics				
Presentation— Wednesday	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Activity: SSS 2.6 Reason for Seasons	3.8	N=27				4.1	N=26		
		1	0	—	1		0	—	
		2	5	19%	2		2	8%	
		3	22	81	3		3	12	
		4	0	—	4		11	42	
Tour: Sundials	3.6	N=24							
		1	0	—					
		2	10	42%					
		3	14	58					
		4	0	—					
Presentation: NASA Resources PPT	3.6	N=24				4.1	N=22		
		1	0	—	1		0	—	
		2	9	38%	2		1	5%	
		3	15	62	3		5	23	
		4	0	—	4		6	27	
AVERAGE MEAN RATING FOR THE DAY	3.7				4.0				

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Thursday presentations—Teachers were asked to rate their prior knowledge of the ideas presented at Thursday’s sessions on a 5-point scale ranging from ‘1=no knowledge at all’ to ‘5=expert knowledge.’ The 28 teachers completing questionnaires offered a rating resulting in a mean rating of 2.5, which is solidly between ‘2=a little knowledge’ and ‘3=a moderate amount of knowledge’. Ratings of their understanding of the presentations and their anticipated use of the topics are summarized in Table A3 on the next two pages.

Rating Scale for Understanding of Presentations

- 1=Not clear at all
- 2=Not clear enough
- 3=Clear enough
- 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

- 1= Will not present
- 2=Unlikely to present
- 3=Somewhere likely to present
- 4=Very likely to present
- 5= Certain to present

TABLE A3. THURSDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS

Understanding of Presentation					Anticipated Use of Topics				
Presentation— Thursday	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Discussion: Comment Cards	3.6	N=25							
		1	0	—					
		2	0	—					
		3	10	40%					
		4	15	60					
Activity: SSS 3.1 Modeling Activity	3.7	N=27				3.8	N=27		
		1	0	—			1	1	4%
		2	0	—			2	2	7
		3	9	33%			3	8	30
		4	18	67			4	7	26
Activity: SSS 3.2 Galileo Observation	3.7	N=26				4.1	N=28		
		1	0	—			1	0	—
		2	0	—			2	1	4%
		3	7	26%			3	7	25
		4	19	73			4	9	32
Activity: SSS 3.3 and 3.4 SS Card Sort	3.8	N=27				4.1	N=28		
		1	0	—			1	0	—
		2	0	—			2	1	4%
		3	5	19%			3	6	21
		4	22	81			4	9	32
Presentation: Voyager Resources	3.5	N=27				3.5	N=28		
		1	0	—			1	0	—
		2	1	4%			2	4	14%
		3	11	41			3	11	39
		4	15	55			4	7	25
						5	6	22	

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Rating Scale for Understanding of Presentations

- 1=Not clear at all
- 2=Not clear enough
- 3=Clear enough
- 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

- 1= Will not present
- 2=Unlikely to present
- 3=Somewhere likely to present
- 4=Very likely to present
- 5= Certain to present

TABLE A3 (Cont.). THURSDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS

Understanding of Presentation					Anticipated Use of Topics				
Presentation— Thursday	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Activity: SSS 3.5-3.7 Solar System Brochures and Models	3.8	N=27				3.9	N=26		
		1	0	—			1	1	4%
		2	0	—			2	3	11
		3	6	22%			3	4	15
		4	21	78			4	9	35
Activity: SSS 3.8 Planet Size and Scale Models	3.9	N=26				3.9	N=28		
		1	0	—			1	1	4%
		2	0	—			2	3	11
		3	4	15%			3	4	14
		4	22	85			4	11	39
Activity: SSS 3.9 Scale Map	3.6	N=27				3.7	N=28		
		1	0	—			1	0	—
		2	0	—			2	3	11%
		3	11	41%			3	10	36
		4	16	59			4	8	28
Presentation/Activities: IBEX presentation and embedded activities	3.3	N=27				3.2	N=28		
		1	0	—			1	3	11%
		2	1	3%			2	4	14
		3	18	67			3	7	25
		4	8	30			4	12	43
Planetarium Show: IBEX: Search for the edge of the Solar System	3.4	N=27				2.9	N=28		
		1	0	—			1	4	14%
		2	2	7%			2	5	18
		3	13	48			3	10	36
		4	12	45			4	7	25
AVERAGE MEAN RATING FOR THE DAY	3.6				3.8				

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Friday presentations—Teachers were asked to rate their prior knowledge of the ideas presented at Friday’s sessions on a 5-point scale ranging from ‘1=no knowledge at all’ to ‘5=expert knowledge.’ Of 28 teachers completing questionnaires, 25 offered responses resulting in a mean rating of 3.00, which falls exactly at the mid-point of the scale or ‘3=a moderate amount of knowledge’. Ratings of their understanding of the presentations and their anticipated use of the topics are summarized in Table A4 on the next three pages.

Rating Scale for Understanding of Presentations

- 1=Not clear at all
- 2=Not clear enough
- 3=Clear enough
- 4=Very Clear

Rating Scale for Anticipated Use of Topics in Workshops

- 1= Will not present
- 2=Unlikely to present
- 3=Somewhere likely to present
- 4=Very likely to present
- 5= Certain to present

TABLE A4. FRIDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS									
Understanding of Presentation					Anticipated Use of Topics				
Presentation—Friday	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Discussion: Comment Cards	3.7	N=26							
		1	0	--					
		2	1	4%					
		3	6	23					
		4	19	73					
Activity: SSS 3.10 Human Orrery	3.9	N=28							
		1	0	—					
		2	0	—					
		3	4	14%					
		4	24	86					
Activity: SSS 3.11 Pluto Evidence Circle	3.7	N=27							
		1	0	—					
		2	0	—					
		3	9	33%					
		4	18	67					
Tour: Solar System Gallery	3.8	N=28							
		1	0	—					
		2	0	—					
		3	5	18%					
		4	23	82					
Activity: SSS. 4.1 Universe Card sort	3.8	N=28							
		1	0	—					
		2	0	—					
		3	6	21%					
		4	22	79					
	3.8	N=27							
		1	0	—					
		2	4	15%					
		3	6	22					
		4	9	33					
	3.9	N=28							
		1	0	—					
		2	2	7%					
		3	9	32					
		4	7	25					
	3.7	N=28							
		1	1	4%					
		2	5	18					
		3	4	14					
		4	10	36					
	3.7	N=28							
		1	1	4%					
		2	5	18					
		3	4	14					
		4	10	36					
	3.7	N=28							
		1	1	4%					
		2	5	18					
		3	4	14					
		4	10	36					
	3.7	N=28							
		1	1	4%					
		2	5	18					
		3	4	14					
		4	10	36					
	3.7	N=28							
		1	1	4%					
		2	5	18					
		3	4	14					
		4	10	36					
	3.7	N=28							
		1	1	4%					
		2	5	18					
		3	4	14					
		4	10	36					
	3.7	N=28							
		1	1	4%					
		2	5	18					
		3	4	14					
		4	10	36					

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- 5= Certain to present

TABLE A4 (Cont.). FRIDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS

Understanding of Presentation					Anticipated Use of Topics				
Presentation—Friday	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Activity: SSS 4.2 Moon Skit, light distance	3.6	N=28				3.5	N=28		
		1	0	—	1		1	—	
		2	0	—	2		7	4%	
		3	10	36%	3		5	18	
		4	18	64	4		7	25	
Activity: SSS 4.3 Galaxy card sorts	3.8	N=28				3.6	N=28		
		1	0	—	1		1	4%	
		2	1	4%	2		6	22	
		3	5	18	3		4	14	
		4	22	78	4		9	32	
Activity: SSS 4.4 Lifespans of stars	3.8	N=28				3.6	N=28		
		1	0	—	1		0	—	
		2	1	4%	2		7	25%	
		3	5	18	3		5	18	
		4	22	78	4		8	28.5	
Tour: GLIMPSE Image	3.8	N=28							
		1	0	—					
		2	0	—					
		3	7	25%					
		4	21	75					

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- 4=Very likely to present
- 5= Certain to present

TABLE A4 (Cont.). FRIDAY—UNDERSTANDING AND ANTICIPATED USE OF TOPICS IN WORKSHOPS

Understanding of Presentation					Anticipated Use of Topics				
Presentation—Friday	Mean Rating	Rating	Freq. #	Freq. %	Mean Rating	Rating	Freq. #	Freq. %	
Activity: SSS 4.5-4.6 Search for Life	3.6	N=27				3.5	N=27		
		1	0	—	1		1	4%	
		2	0	—	2		7	26	
		3	10	37%	3		3	11	
		4	17	63	4		10	37	
Activity: SSS 4.7 Evidence Circle	3.6	N=27				3.7	N=28		
		1	0	—	1		0	—	
		2	1	4%	2		5	18	
		3	10	37	3		7	25	
		4	16	59	4		8	28.5	
Activity: NASA Resources Jig Saw	3.6	N=27				3.6	N=25		
		1	0	—	1		0	—	
		2	0	—	2		6	24%	
		3	10	37%	3		4	16	
		4	17	63	4		9	36	
AVERAGE MEAN RATING FOR THE DAY	3.8				3.7				