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A Summary of FETTU In The U.S.

An evaluation of FETTU made possible by NASA funds. These data, however, are from a small fraction of the people who visited FETTU locations worldwide and was limited its scope (approximately $10,000 for evaluation organization, protocol creation and data analysis, with data collection completed by volunteers). However, given the ultimate size of the project, along with the model used to employ it, these data do represent some insight into the potential impact that this type of public science may have.

The results show that even brief, casual encounters with science in these public, non-traditional settings can have an effect on the public's exposure to science topics. The outcomes outlined in the analysis section also represent the potential for measureable impact that may be assessed and tested with future public science projects.

The evaluation strategy implemented in the U.S. for the NASA-funded FETTU locations was based on informal education evaluation models recommended by the National Science Foundation (NSF) publication, "Framework for Evaluating Impacts of Informal Science Education Projects" (2008). In the U.S., FETTU site evaluations collected information about the use of non-traditional settings and space science imagery to attract new audiences to further engagement with astronomy learning opportunities.

The audiences targeted for this evaluation were two-fold. First was the viewing audience to test such things as their interest in exploring knowledge, awareness of astronomy, understanding of science content, enjoyment, inspiration, and behavior. The

second audience was the staff of host-partner institutions. The FETTU evaluation looked to investigate the capacity to organize outreach events and increase knowledge of programs. For local community partners at each site, we wanted to look at nurturing new partnerships for science education for sustainability.

The FETTU data were collected on site through surveys and observations (see Appendixes A and B for questions). Analysis was provided by Jan Crocker LLC and their final report is incorporated in this section on data collection. The surveys included a 7-point Likert Scale with additional open-ended questions. The survey ratings were averaged for each of the 10 sites that were included and compiled. Written responses to the questions were grouped and then categorized into themes. Observations were collected from 5 sites. Compiled information includes the number of images viewed, the make-up of the groups viewing and the time spent at the exhibit.

In summary, visitors felt very positive about their FETTU experience as reflected in the very high averages (with 7 being the most positive response) for "Liked Overall," "Increased Curiosity," and "Would Recommend." The slightly lower response to "Learned a lot" is partly reflected in visitor comments that they were already knowledgeable about the subject matter in various ways before encountering the exhibit. As shown in the comments included in the appendix, people were very interested in the astronomy content of the exhibit. There was slightly less interest in how scientists go about studying the Universe. The lower scoring for interest in science-related careers was partly explained in comments that many people were already interested or engaged in science-related careers – or were already very settled in a different career path.

Impact on the Institution and Staff

On a scale of 1 to 7 with 1 being very negative impact and 7 being very positive, all of the responses fell between 5 and 7. The comments from the site organizers indicate that the exhibit both supported the additional events at sites and helped to make the IYA2009 more visible. In fact, one of the most common responses is that it provided increased visibility to the sites. Both of the museum sites commented that while it did not draw visitors specifically to their venues, people felt that it added value to the visit – and it allowed for augmented exposure to the planetarium and space programming in general. In addition, respondents commented that the experience strengthened partnerships with collaborating organizations, with specific examples being Ohio State University with COSI, and the Spitzer Science Center and Rhodes College with the Memphis Public Library. In Puerto Rico, six months after the exhibit left FETTU hosts continued to organize star parties at the request of schools and university students.

Impact On The Public Audience

On the same rating scale as was used for the institutional evaluations (1 being very negative impact to 7 being very positive impact,) the ratings from the general public who participated were once again very positive. All of the ratings were between 5 and 7 with the majority between 6 and 7.

Different sites also generated a diversity of feedback from site organizers. The Alaska organizer commented that although they had good attendance, he would have liked to

bring more people to the exhibit through events and after-school activities. However, during July when FETTU was in Anchorage, it seems a majority of people in that area prefer outdoor activities.

In Puerto Rico, the exhibit was popular with students and educators, with many asking for more events of this type. At least 16 schools and colleges on the island have organized astronomy clubs as a result of the exhibit. Several sites echoed the visitors' responses, commenting that people were visibly moved by the beauty and artistic nature of the images.

Site Data Summary

Although there is much diversity among the 10 sites visited by the traveling FETTU exhibit, there is consistency in the data collected. The data from the Visitors' Survey and the Survey Comments support a very positive response to the exhibit, especially in the areas of interest in astronomy, how much they liked the exhibit, and how strongly they would recommend it to others. In general, the amount of information on the label copy seemed to provide the right amount of information, without overwhelming the non-expert audience. The observations, especially from the non-airport sites, indicate that people were willing to spend upwards of 6 minutes viewing the images, a very long time for engagement in a non-interactive exhibit[1].

[1] Compare the length of time visitors spent on average viewing masterpiece paintings at The Metropolitan Museum of Art, as observed by Smith and Smith (2001): 27 seconds in front of Rembrandt's "Aristotle Contemplating the Bust of Homer", for example, but never more than 4 minutes viewing a single masterpiece (Smith et al, 2010, 4).

Likewise the responses from the Site Organizer Survey indicate that although, for some people, there was logistical challenges, everyone felt very positive about the experience and was appreciative that their site was able to be involved. It was also noted from a number of sites -- especially the universities and the library -- that hosting the exhibit helped to create or strengthen their place in the community. Finally, through both the visitor comments and those from the site organizers, the point was made that many viewers apparently felt a very personal connection with the images. In spite of the relatively new and complex technology that was used to collect the images, people communicated that they felt that the exhibit was accessible to them both through the content and visual beauty of the images.

Evaluation Summation For NASA-Funded FETTU

There are several findings that have emerged from the formal evaluations, including participant and local organizer feedback:

- Exposure to astronomy content in non-traditional science outreach settings leads to inspiration, personal connections and small learning gains.
- Exhibits in these settings can reach millions of people relatively inexpensively[2], especially considering the low cost and ability to duplicate the exhibits from a central repository of free, curated, shared material.
- Different location types (outdoor vs. indoor, academic/institutional vs. unexpected, fast-paced vs. slow, etc.) might have an impact on visitor engagement and offer an opportunity to study optimal locations for future public science events. For example, the airports led to very large amounts of exposure to

[2] The total cost of the 2009-2010 NASA-funded FETTU grant was $300,118.15

material, while libraries offer smaller audiences that can engage more deeply, especially when a “docent” or other personal interaction is included.

- Projects such as FETTU can forge new partnerships between otherwise disparate organizations in the same geographical area as well as link groups across international boundaries, providing better linkages within communities of both geography and interest, and enabling organizations to facilitate science outreach events.
- FETTU exhibits provide opportunities to study the effects of participant make-up and research into appeal, comprehension and related questions.

Appendix A. Interview questions

This questionnaire with content-specific and open-ended questions uses the standard method 7-item scale. The format of many of the survey items in this document was derived from NSF-funded informal education project evaluations done by Knight-Williams Research Communications. Note that airport locations used a shorter survey in postcard format, deleting questions 3 and 4.

FROM EARTH TO THE *Universe*

The following questions ask for your overall reactions to "From Earth to the Universe".

1. Overall, how do you feel about "From Earth to the Universe"? Circle one number on the scale of 1 to 7 for each pair of descriptions below. Please read the opposite descriptions carefully.

Disliked overall	1	2	3	4	5	6	7	Liked overall
Boring content	1	2	3	4	5	6	7	Interesting content
Boring Storytelling	1	2	3	4	5	6	7	Engaging storytelling
Visually dull	1	2	3	4	5	6	7	Visually exciting
Confusing presentation	1	2	3	4	5	6	7	Clear presentation
Learned nothing	1	2	3	4	5	6	7	Learned a lot
Decreased my curiosity	1	2	3	4	5	6	7	Increased my curiosity
Would not recommend	1	2	3	4	5	6	7	Would recommend

Please feel free to explain any of your ratings below:

2. Overall, how do you feel about the amount of information, science, and explanation of scientific principles in "From Earth to the Universe"? Circle one number on the scale of 1 to 7 (with 4 being "just right") for each pair of descriptions below. Please read the opposite descriptions carefully.

Too little information	1	2	3	4	5	6	7	Too much information
Too little science	1	2	3	4	5	6	7	Too much science
Not enough explanation of scientific principles	1	2	3	4	5	6	7	Too much explanation of scientific principles

Please feel free to explain any of your ratings below:

3. Did "From Earth to the Universe" cause you to think or feel about astronomy in a new or different way?

   Yes → Please explain how:

   No → Please explain why not:

4. To what extent has seeing "From Earth to the Universe" increased or decreased your interest in learning more about each of the following? Please use the scale from 1 (decreased strongly) to 7 (increased strongly).

Has "From Earth to the Universe" increased or decreased your interest in…	Decreased strongly	Decreased some	Decreased a little	Neither increased nor decreased	Increased a little	Increased some	Increased strongly
Astronomy	1	2	3	4	5	6	7
The methods scientist use to study astronomy	1	2	3	4	5	6	7
Science in general	1	2	3	4	5	6	7
Science-related careers	1	2	3	4	5	6	7

Please feel free to explain any of your ratings further:

5. Tell us something new you learned or discovered viewing "From Earth to the Universe":

http://www.fromearthtotheuniverse.org/

Appendix B. Exhibit Observation Sheet

This sheet template was employed to gather data about how visitors used the exhibit(s) via "tracking and timing" with an observation form and a watch with a timer/ second hand. All adherences to policies for informed consent for human subjects were made.

SAMPLE Exhibit OBSERVATION SHEET

Observer: **Date:** **Time of Day:**

FETTU location: **Total Visit Time:**

Composition of Visitor Group:_____
Key: **M** = adult male **F** = adult female
G = teen girl **B** = teen boy **g** = girl **b** = boy

Cooperation in Groups yes no
Comment:

Behaviors observed

_____look _____point at image

_____ read label _____read out loud

_____talk

_____show/explain to another

Images/ Exhibit Panels Visited (fill in)**:**

_____**Intro Panel** / Time spent:_____

_____ **Solar Sys** / Time spent:_____

_____

_____

_____

_____

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_____

Visitor comments overheard:

Notes:

Sites	Locale	No. of Surveys	Males	Females	Average Age	Comment Percent	Comment Number
Alaska	Library & Convention Ctr	6	4	2	48	100%	6
Arkansas	U. of Fayetteville Outside	8	4	4	36	88%	7
Atlanta	Airport	17	9	8	43	76%	13
Boston	U. Mass Outside MOS Outside	5	2	1	29	80%	4
Chicago	O'Hare Airport	18	9	9	32	79%	15
Columbus Ohio	COSI (science museum)	25	7	17	40	44%	11
Memphis	Library	135	58	69	36	46%	62
New York City	Columbia U. outside	43	21	21	30	56%	24
Washington DC	NASM outside	16	7	9	46	88%	14
Tucson	Airport	17	11	6	45	0%	0
Total		**290**	**132**	**146**	**38.5**	**54%**	**156**

Table 1: Overview of Sites. Note that in some cases, gender was not indicated on the survey so the Male/Female count does not add up to the total visitor count.

1. Overall, how do you feel about "From Earth to the Universe"?			
Disliked overall	>	Liked overall	Response: **6.5**
Learned nothing	>	Learned a lot	Response: **5.5**
Decreased my curiosity	>	Increased my curiosity	Response: **6.2**

Would not recommend	>	Would recommend	Response: **6.6**

Table 2.1: Summative Response to Survey Question "How do you feel about FETTU"

1. Overall, how do you feel about the amount of information, science, and explanation of scientific principles in "From Earth to the Universe"?		
Too little information	> Too much information	Response: **4.1**
Not enough explanation of scientific principle.	> Too much explanation of scientific principle	Response: **3.8**

Table 2.2: Summative Response to Survey Question on the amount of information/explanation

1. To what extent has seeing "From Earth to the Universe" increased or decreased your interest in learning more about each of the following?	
Decreased Strongly > Increased Strongly	
Astronomy	**6.0**
Methods scientists use for studying astronomy	**5.6**
Science-related careers	**4.8**

Table 2.3: Summative Response to Survey Question on increase/decrease of interest

Comment Themes	**Visitor Count**
Overall Positive	38
Overall Negative	8
Personal Connections	19
Facts	57
Recommendations for improvement	20
Visual/Artistic Connections	31
Religious/Spiritual Comments	5
Already Interested/Knowledgeable	27
References to the technology	12
Airport Comments	5

Table 3: Quantitative look at Comments/Themes