Summative Evaluation of the SOS Kiosk

at Maryland Science Center

Research report prepared by:
People, Places & Design Research

Use and Perceptions of the *'Science on a Sphere'* Kiosk at the Maryland Science Center
Summative Evaluation

prepared by
Jeff Hayward & Jolene Hart
People Places & Design Research
Northampton, Massachusetts

February 2010

Executive Summary

This research was conducted to evaluate visitors' use and perceptions of a computer kiosk designed and installed by the Maryland Science Center to complement and enrich visitors' experience with the *Science on a Sphere* exhibit. The trackball computer kiosk allows visitors to more deeply explore six of the SOS presentation topics and contains visual images culled from SOS data, additional information, and interactive game-like activities. Kiosk usage was investigated independently from the overall SOS experience in order to focus on the questions: Is the kiosk easy to use? Are visitors engaged by the activities? Do visitors gain a better understanding of the phenomena after using the kiosk? Overall, informational/educational benefits from the kiosk will enhance visitors' ability to understand and appreciate what's happening on SOS.

Method

Two methods were employed: 1) naturalistic observation of visitors using the kiosk; and 2) invited use of the kiosk followed by a brief interview to assess visitors' perceptions and understanding.

1. For the naturalistic observation, MSC staff observed 243 visitor groups using the kiosk on their own.[1] They recorded information about visitor characteristics, what they did (which topics and subtopics they selected, whether they clicked on features/activities in order to explore more deeply), how much time they spent, and any difficulties they encountered.
2. For the interviews, 100 visitor groups were invited by staff to "use this new computer kiosk and then give us your reactions."[2] Staff observed and recorded what they did, and interviewed an adult in the group after they were done using the kiosk. A sampling strategy was utilized to obtain information from approximately equal numbers of adult-only visitor groups and families with children in the target age range of 8-14.[3]

Results

Naturalistic observation of kiosk use

- About 80% of the kiosk users were family groups with children. Children, especially boys, were almost always the primary users (controlling the trackball and button). One-third of the primary users were young children (aged 3 to 7).

[1] It should be noted that 74 people were observed using the first version of the kiosk, and 169 people were observed using it after some revisions were made to the program. These data are presented separately in this report, and sometimes combined for cross-tabulations.

[2] The revised version of the kiosk was in place during the invited use phase of the study.

[3] The final sample consisted of 40 adult-only groups and 60 families.

Parents participated about half the time and 40% of the time it was used by children on their own.

- Most naturalistic kiosk users (70%) only viewed one or two of the six topics. However, the majority spent at least two minutes at the kiosk.
- The most popular topics/spheres were Hurricanes and Sun (each viewed by about 50% of users). The least viewed topic was Climate Change (~20%).
- The most engaging activity was the interactive 'make your own hurricane.'
- Comparisons of adult and child users revealed no significant differences in how many spheres they viewed or how much time they spent.

Observations of invited users

- When invited to use the kiosk ("one person will use the track ball and button but you can all do it together"), all of the parents participated in the activity with their children (compared with half in the naturalistic observations).
- There were significant differences between invited users and natural users in all aspects of observed behavior: invited users viewed significantly more topics and sub-topics, and clicked on more of the interactive features.

Perceptions of interpretive content (invited users interviewed)

- Visitors most liked the hurricane maker, the interactivity in general, and the visual images. They also liked the information and "learning stuff I didn't know before."
- Nearly everyone felt that they were familiar with some of the program topics before using the kiosk (especially the sun and hurricanes), which helped make it intellectually accessible.
- About 85% of visitors articulated some specific information that they found out or understood better after using the kiosk. Some examples of what they learned are: how water temperature, wind shear and humidity affect hurricane formation; that Mars has clouds; that the sun can be viewed in different wavelengths; and that one million earths could fit in the sun.
- When asked if there was anything unclear about the program, most visitors said "no." A small proportion of visitors (10%) commented about the program glitches, not knowing what to do, or having difficulty on certain activities (setting the wind shear, clicking on Mars features when it was spinning).

Conclusions and Implications

The SOS kiosk is an easy-to-use, engaging exhibit with appealing visual images and interactive activities. Children are drawn to it and able to engage with it for at least a few minutes (even young children without adult supervision).

The SOS kiosk exemplifies the idea that learning takes place when an exhibit experience starts with the familiar and then takes people to a higher/deeper level of understanding. The kiosk has some familiar images (hurricanes, the sun), and many

people already know something about how hurricanes form or how big the sun is, and people come away with a more detailed understanding.

The issue of invited vs. natural use: It was helpful to have observational data about the behavior of both natural and invited users, so that the differences could be revealed and considered in the interpretation of results. In this study there were huge differences – the invited users clearly explored more of the kiosk features. We do not feel that this negates the results about visitors' perceptions of interpretive content – invited use is an appropriate method for in-depth analysis of an exhibit element with multiple topics, levels and interpretive messages. The conclusion is that when people explored a range of topics and features, they learned something new.

The benefits of having staff on the floor: The results clearly show that visitors became more engaged with the exhibit when a staff member invited them to use it and was available if they had questions. Also, parents fully participated with their children when the staff member was present. Considering the current trend in many museums of reducing floor staff, this study provides evidence of the value of staff interacting with visitors.

The kiosk provides an alternative point of entry to the whole SOS experience: The formative evaluation study identified some challenges with the SOS experience: some visitors (especially children) don't understand at first what is being represented on the big sphere (and they may not stay long enough to fully appreciate the presentation), they have no control over the speed at which images are being presented, and sometimes people are on the opposite side of the sphere from the area that is being discussed in the narration. The computer kiosk can facilitate visitors' (especially children's) experience with SOS because it is an accessible entry point that gets people started in ways they understand and they can interact with and manipulate what they are seeing.

A. Characteristics of the Samples

This first section of the report identifies who used the kiosk (based on naturalistic observation), and also profiles the visitors who were invited to use the kiosk for the interview portion of the study. The key findings are:

- Children, especially boys, were the primary users of the kiosk under naturalistic conditions. About a third of users were under eight years old.
- Often, there were no parents viewing it with the children. When families were *invited* to use the kiosk, the parents always participated with the children.
- The sample of invited users differed from the natural sample (more adults, fewer young children as primary users) because of the sampling strategies: invite families that have children in the target age range of 8 to 14; and invite at least 40 adult-only groups (so that there are sufficient sample sizes for analyses).

A.1. Characteristics of kiosk users

NATURAL: Observed naturalistically, the majority of kiosk users (~70%) were children aged 3 to 14. Over one-third of the users were kids doing it without any adults present. Kiosk use was a joint activity much of the time (e.g., 2 or more people did it together). Boys were the primary users of this exhibit (50% of all users).

INVITED: In the sample of invited users, there were no cases where kids used the kiosk on their own – parents always participated. There was a more equal distribution of boys/girls and men/women as the primary users. The proportion of adult-only user groups was higher (40%) due to the sampling strategy (to have enough for analyses).

		Natural #1[4] (n=74)	Natural #2 (n=169)	Invited Use (n=100)
Group composition:	**			
adults-only		23%	16%	40%
children & adults		39%	43%	60%
children only		38%	41%	0
Age of children in group:				
ages 7 and under	**	42%	49%	28%
ages 8-14		39%	38%	32%
ages 15-17		9%	8%	9%
Group size:				
one		30%	23%	17%
two		49%	33%	43%
three		15%	24%	25%
four or more		6%	20%	15%
Age of primary user:	**			
3 to 7		26%	39%	15%
8 to 10		19%	25%	18%
11 to 14		18%	11%	11%
15 to 17		8%	7%	7%
18 to 29		7%	11%	23%
30 to 39		8%	2%	5%
40 to 49		7%	4%	12%
50 to 59		3%	1%	5%
60+		5%	2%	4%

** Asterisks indicate statistically significant differences ($p<.05$) between sets of figures. On this page the statistical tests compared natural use with invited use.

[4] Natural #1 refers to the first version of the kiosk. Natural #2 refers to the revised version. Note that the audiences are pretty similar for the two versions. Version #2 was in place during the 'invited use' part.

Characteristics of kiosk users (continued)

		Natural #1[5] (n=74)	Natural #2 (n=169)	Invited Use (n=100)
Gender of primary user:	**			
boy		50%	50%	27%
girl		20%	30%	22%
man		14%	13%	24%
woman		16%	6%	27%

[5] Natural #1 refers to the first version of the kiosk. Natural #2 refers to the revised version. Note that the audiences are pretty similar for the two versions. Version #2 was in place during the 'invited use' part.

A.2. Characteristics of the adults interviewed

OVERVIEW: The interview sample consisted of 100 visitor groups who were invited to use the kiosk (one adult in each group acted as spokesperson for the interview). Slightly more than half had been to the Science Center before. There were approximately equal proportions of men and women interviewed. Most have college degrees or graduate level education.

	Invited Use (n=100)
Familiarity with Museum:	
first-time visitors	43%
repeat visitors	57%
Gender:	
men	54%
women	46%
Age:	
18-29	29%
30's	20%
40's	32%
50's	10%
60+	10%
Education:	
high school	10%
some college	19%
college graduate	45%
graduate school	26%

B. Observations of Kiosk Use

This section of the report summarizes the results of the observational portion of the research, including both naturalistic and invited use. Observers recorded which screens people looked at and whether they clicked on the interactive features or not. The key findings are:

- Invited users looked at significantly more screens/topics compared to naturalistic users, and they were more likely to click on some of the interactive features.
- There were no statistically significant differences between child users and adult users in terms of the number of topics they viewed, or which topics (in either the natural or invited use samples).

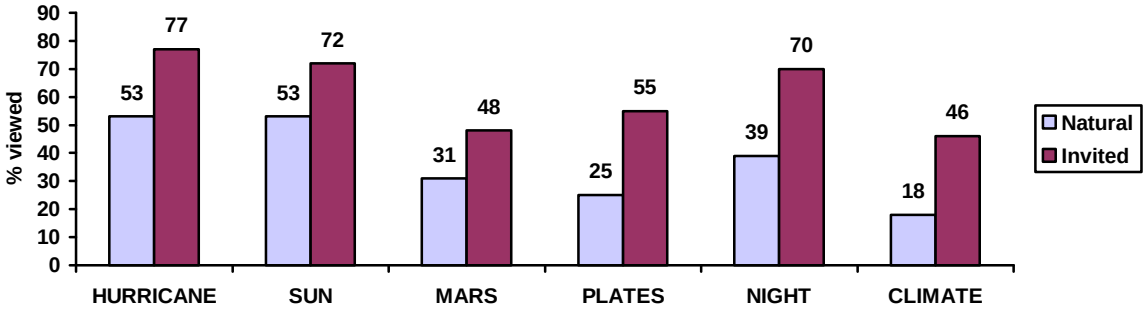
B.1. Exploration of topics and activities

OVERVIEW: In the naturalistic observations, most visitors looked at only one or two of the six topics. Visitors who were invited to use the kiosk looked at significantly more topics – most viewed at least three topics (and 22% viewed all six). Naturalistically, the two most viewed topics were Hurricanes (50%) and the Sun (49%). With invited use, these two topics were selected by about three-quarters of the visitors, as was the Earth at Night screen. All of the topics received more attention from the invited users.

How many topics did people view?

	Natural #1 (n=74)	Natural #2 (n=169)	Invited (n=100)
**			
one	46%	40%	6%
two	26%	28%	17%
three	12%	15%	27%
four	8%	9%	23%
five	4%	7%	5%
six	4%	1%	22%

The proportion who looked at each of the six segments was always higher among invited users



Which screens/options did people view?

OVERVIEW: Invited users also exceeded natural users in the extent of exploration of the options under each topic. The most selected activities (naturally) were: create a hurricane (33%), how many earths fill the sun (29%), and seeing the sun under different wavelengths (27%). Among invited users, these three activities were explored by 57%-71% of users, and even the least used activity (coral reefs) was explored by 36% of the people.

		Natural #1 (n=74)	Natural #2 (n=169)	Invited (n=100)
HURRICANES	**	50%	53%	77%
create a hurricane		33%	33%	71%
animation-how they form		24%	17%	54%
SUN	**	49%	53%	72%
different wavelengths		22%	27%	66%
compare size to earth		24%	29%	57%
MARS	**	39%	31%	48%
surface features		24%	19%	43%
evidence of water		15%	12%	45%
EARTH'S PLATES	**	27%	25%	55%
interactive-plate features		14%	11%	44%
earthquake locations		12%	9%	47%
EARTH AT NIGHT	**	23%	39%	70%
CLIMATE CHANGE	**	23%	18%	46%
polar bear game		14%	12%	43%
coral reef images		11%	8%	36%

Comparing usage by adults and children

OVERVIEW: There were no statistically significant differences between adults and children in terms of how many topics they viewed or which topics they viewed, in either naturalistic or invited use. There was one trend in the invited sample: 8-14 year olds were slightly more likely than adults to look at the Sun.

Analysis by user type: **NATURAL USE**

(no significant differences)	Adults[6] Only	8-14 no adult	8-14 w/ adult	3-7 no adult	3-7 w/ adult
Number of topics:	(n=59)	(n=48)	(n=40)	(n=36)	(n=48)
one	49%	44%	38%	33%	38%
two	24%	25%	30%	31%	33%
three or more topics	27%	31%	32%	36%	29%
Which topics:					
Hurricanes	41%	56%	53%	58%	56%
Sun	48%	48%	55%	44%	67%
Mars	32%	35%	35%	44%	23%
Earth's Plates	30%	29%	25%	22%	17%
Earth at Night	29%	31%	33%	42%	35%
Climate Change	17%	19%	20%	17%	21%

Analysis by user type:[7] **INVITED USE**

	Adults Only		8-14 w/ adult
Number of topics:	(n=42)		(n=29)
one or two	19%		24%
three or more	81%		76%
Which topics:			
Hurricanes	81%		79%
Sun	67%	++	86%
Mars	60%		48%
Earth's Plates	60%		62%
Earth at Night	71%		69%
Climate Change	55%		41%

(++) Plus signs are used in this report to indicate patterns of differences which are not quite statistically significant (milder differences, which may have occurred by chance), but which suggest a trend and may have some intuitive value in some circumstances.

[6] For these analyses, the 15-17 year old teens were included in the adult category.

[7] With invited use, the two categories of kids using it without adults disappeared, and there were not enough young children (using it with parents) for that analysis.

A.3. Extent of engagement

OVERVIEW: The first kiosk program had some glitches and features that were not working, but these data are included in the report for comparison purposes (actually the second version also had glitches). The data show that the most engaging aspects (defined as clicking multiple features and/or spending more time) were the interactive games, especially 'create a hurricane.'

PROGRAM 1 – NATURAL USE

Depth of exploring, by topic:	Just Looked	Clicked Feature	More [8] Engaged	Didn't do
HURRICANES (n=37)				
1) movie	68%	16%	16%	0
2) interactive (create a hurricane)	14%	8%	43%	35%
3) animation (explanation)	27%	8%	14%	51%
SUN (n=36)				
1) movie	69%	14%	17%	0
2) images (different wavelengths)	6%	14%	25%	56%
3) interactive (compare size)	6%	8%	36%	50%
MARS (n=29)				
1) movie	79%	3%	17%	0
2) interactive (surface features)	24%	14%	24%	38%
3) interactive (evidence of water)	7%	17%	14%	62%
EARTH'S PLATES (n=20; not enough for reliable percentages)				
1) movie	13	2	5	0
2) interactive (plate features)	3	3	4	10
3) image of earthquake locations	5	0	4	11
EARTH AT NIGHT (n=17; not enough for reliable percentages)				
1) movie	10	1	6	0
CLIMATE CHANGE (n=17; not enough for reliable percentages)				
1) movie	13	2	3	0
2) interactive (polar bears)	1	1	8	7
3) images (coral reef)	1	2	5	9

[8] The 'more engaged' category refers to people who clicked multiple features and/or spent a lot of time at this screen.

Extent of engagement (continued)

OVERVIEW: After the program was revised, more naturalistic observations were conducted. These results are similar to the results for the first program, showing that people were most engaged in making a hurricane and the polar bear game.

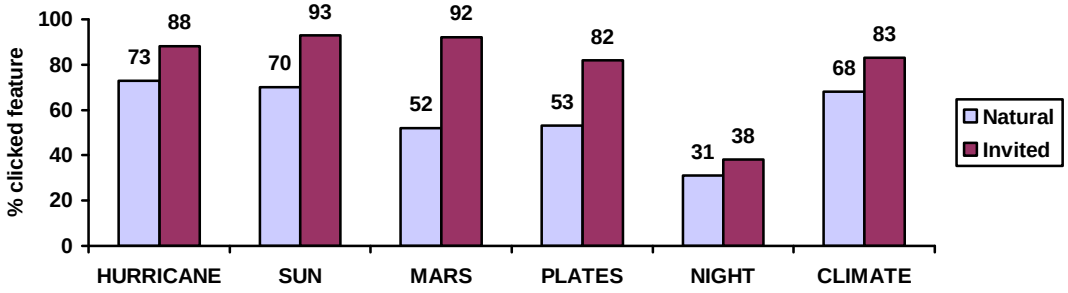
PROGRAM 2 –NATURAL USE

Depth of exploring, by topic:		Just Looked	Clicked Feature	More Engaged	Didn't do
HURRICANES	(n=89)				
1)	movie	83%	11%	6%	0
2)	interactive (create a hurricane)	8%	8%	46%	38%
3)	animation (explanation)	21%	5%	6%	68%
SUN	(n=90)				
1)	movie	85%	7%	8%	0
2)	images (different wavelengths)	9%	23%	19%	49%
3)	interactive (compare size)	10%	31%	13%	46%
MARS	(n=52)				
1)	movie	86%	6%	8%	0
2)	interactive (surface features)	31%	17%	13%	39%
3)	interactive (evidence of water)	19%	13%	8%	60%
EARTH'S PLATES	(n=42)				
1)	movie	74%	9%	17%	0
2)	interactive (plate features)	17%	17%	9%	57%
3)	earthquake locations	24%	0	12%	64%
EARTH AT NIGHT	(n=66)				
1)	movie	71%	14%	15%	0
CLIMATE CHANGE	(n=30)				
1)	movie	83%	7%	10%	0
2)	interactive (polar bears)	13%	27%	27%	33%
3)	images (coral reef)	17%	13%	17%	53%

Extent of engagement (continued)

OVERVIEW: When people were invited to use the kiosk, there was more engagement in almost every area, particularly: hurricane maker, sun viewing under different wavelengths, evidence of water on Mars, tectonic plates, locations of earthquakes, and the polar bear game.

If they chose a topic, the proportion who clicked on any feature was higher among invited users



PROGRAM 2 – INVITED USE

Depth of exploring, by topic:		Just Looked	Clicked Feature	More Engaged	Didn't do
HURRICANES	(n=77)				
1)	movie	82%	5%	13%	0
2)	interactive (create a hurricane)	10%	38%	44%	8%
3)	animation (explanation)	40%	14%	16%	30%
SUN	(n=72)				
1)	movie	71%	7%	22%	0
2)	images (different wavelengths)	13%	49%	31%	8%
3)	interactive (compare size)	8%	51%	19%	21%
MARS	(n=48)				
1)	movie	77%	13%	10%	0
2)	interactive (surface features)	29%	38%	23%	10%
3)	interactive (evidence of water)	19%	42%	33%	6%
EARTH'S PLATES	(n=55)				
1)	movie	73%	16%	9%	0
2)	interactive (plate features)	7%	46%	27%	20%
3)	earthquake locations	54%	6%	26%	14%
EARTH AT NIGHT	(n=70)				
1)	movie	61%	17%	21%	0
CLIMATE CHANGE	(n=46)				
1)	movie	83%	4%	11%	0
2)	interactive (polar bears)	17%	43%	33%	7%
3)	images (coral reef)	26%	33%	20%	22%

Engagement, analyzed by user type (NATURAL USE / PROGRAM #2)

OVERVIEW: The amount of time spent was roughly recorded and it is notable that young children (ages 4-7) did not spend significantly less time than adult-only groups using this kiosk (even when there were no parents facilitating the experience). The only statistically significant difference between child and adult primary users was that young children were less likely to try to make a hurricane; so that game was perhaps perceived as too difficult.

Time spent:[9] **program 2**	Overall (n=162)	Adults[10] Only (n=36)	8-14 no adult (n=33)	8-14 w/ adult (n=28)	3-7 no adult (n=28)	3-7 w/ adult (n=37)
up to a minute	32%	31%	33%	32%	29%	35%
2-3 minutes	35%	25%	39%	39%	39%	32%
4+ minutes	33%	44%	27%	29%	32%	32%
Hurricanes		(n=24)	(n=27)	(n=21)	(n=21)	(n=27)
created a hurricane (clicked on something)	**	**67%**	**59%**	**67%**	33%	37%

[9] Most of the observers did not use a stopwatch, so the recorded times are not very exact, e.g., 1 minute, 2 minutes, etc. Therefore these data are approximate (time data for users who stayed less than a minute is likely to be accurate, as well as data for users of 4 minutes or more, so the overall pattern is probably valid even without precise times to the seconds).

[10] For these analyses, the 15-17 year old teens were included in the adult category.

B. Visitor's Reactions

This section of the report presents information (based on visitor interviews) about what visitors found most interesting, which visual images impressed them, and whether anything was unclear or needed more explanation. The key findings are:

- Visitors most liked the information ("learning stuff I didn't know before"), the hurricane maker, the interactivity in general, and the visual images.
- The most captivating images were the Sun and Night Lights (but every topic/screen was mentioned by at least some people).
- Most visitors (adults and children alike) said there wasn't anything unclear about the program. Some people commented on the glitches, the lack of things to do on the Night screen, or wanted more information about earthquakes, hurricanes, the sun and other topics.

B.1. What was most interesting?

OVERVIEW: Visitors liked learning something new, making their own hurricane, the interactivity in general, and the visual images. People mentioned interesting information and activities from all six topic areas.

What was interesting about this to you?

30%	informative, learned something new, specified a fact
27%	Hurricane maker, how hurricanes form
24%	interactive, good for kids
22%	visual images
14%	Sun
14%	Earthquakes and plates
13%	Mars
11%	current / detailed data
10%	variety of topics
10%	Climate change, polar bear game, what we do affects environment
5%	Night
5%	other

***Why?* (sample of answers by category)**

Informative, learned something new:
It was interesting to learn about earth's plates, where they are
Learned a lot about climate, earth and mars - stuff I didn't know before
Hurricane maker; effect of humidity, wind sheer etc on hurricane
Mars, learned about clouds and ripples
Hurricanes form on water
One million earths fill up the sun, never thought it'd take that many
I learned something new, that white coral is dead

Making a hurricane:
I was interested because my son was so interested in the hurricanes
It's easy to use, I could create my own hurricane
Making the hurricane, I kept getting it wrong!
Hurricane maker was awesome because I got to create my own
Can set different things like humidity and wind shear

Interactive:
Interactiveness i.e. create a hurricane – you get to move things around
Can manipulate it, can interact, not just looking
I liked the interactivity; kept the kids interested which is rare
Interactive parts, more engaging than just reading
Interactivity was great, keeps you interested in what you're learning

Visual images:
Simulations, very visual and informative
Images, captivating but distracting
Showed x-rays of sun, showed what's inside sun, something we don't usually see
Mars, it had actual pictures of Mars
Earth at night, fascinating pictures

Sun:
On sun when you click different things you could see inside sun
Different wavelengths to view the sun, because it was cool
Sun-how big it was; liked putting earths in sun and seeing different spectrums

Earthquakes and Plates:
I didn't know there are earthquakes every day
How the rocks hit to make the mountains, where you can see recent earthquakes, I like volcanoes and mountains.
Earths plates, knowing the difference between boundaries, how they came to be

Mars:
Mars, there might be life on mars, water, etc.
Seeing the planet up close, interesting to see the color of Mars
Mar features, comparing mountains and Grand Canyon to similar features on Earth

Current / detailed data:
Earthquakes that showed recent activity, tectonic plates
Like how it was in depth, detailed
Had current hurricanes, strange that something happening yesterday would be available today

Variety of topics:
Liked that you got to choose interests, variety is good
Variety of subjects to learn about
Different things to look at, good variety of information

Climate change:
Climate change, I liked the polar bear; it was cute
Our effect on the environment
Climate change - visualize difference in polar change and effect on polar bears

B.2. What impressed visitors?

OVERVIEW: Visitors were most impressed by the visual images in the Sun and Earth at Night programs, although every one of the topics/spheres was cited as having memorable visual images. People often reflected that they had never seen that image before, or that the image helped them realize something.

What 2 visual images will stick with you?

46%	Sun
39%	Night Sky
28%	Hurricanes
20%	Mars
19%	Earth's Plates
19%	Climate Change

***Why?* (sample of answers by category)**

Sun:
Sun - I just think it's scary with waves of fiery stuff
Solar coronal light - didn't know that before
Sun - first image was vibrant and vivid
Sun spots - never saw that before
Sun - wavelengths, sun spots are really hot
Wavelengths on sun - different ways of seeing things
How many earths in sun - very visual
Earth filling up sun – didn't realize Earth was that small; explosions on sun

Night Sky:
Night lights - outlined the US and could compare it with other places
Earth at night - interesting to see who uses the most electricity
Night - soothing
Earth at night - didn't really know about it or think about it
Night - the light spacing was intriguing
Earth at night - interesting, pretty amazing what you can see from space

Hurricanes:
Formation of hurricane - because it was huge
Temperature of oceans, thought it was interesting about the warm air and cool water spinning
Anatomy of hurricane - good graphic, ocean temperature, hurricane animation - it was a cross section, 3-D models helpful
Hurricanes, hadn't see it presented that way before
Hurricanes-way it forms over oceans and moves like that

Mars:
Canyon on Mars - didn't know, compared to our Grand Canyon
Giant crater - it was 3,000 miles long!
Canyon - reminded me of a Superman scene
Clouds on Mars - didn't know they had clouds

Earth's Plates:
Earthquakes - because there were a lot of earthquakes
Earthquake plate images - fascinated that they move in different waves
Ring of volcanoes – hadn't seen it before
Himalayan mountain formation - moving image

Climate Change:
Polar bears - didn't make right decisions and polar bear suffered
Shrinking ice - graphic representation of something you've read about makes it more real
Coral reefs - pretty
Climate change - reminds us how actions affect the earth

B.3. What was unclear?

OVERVIEW: Most visitors (60%) said there wasn't anything unclear or unexplained. Ten percent mentioned difficulties using the program (e.g., glitches, not knowing what to do, having a hard time setting wind shear in the hurricane maker, and having a hard time clicking on Mars features when it was spinning). Some people also noted that the Earth at Night section didn't have as much detail or as much to do as the other areas. In general, people requested more detailed information about the variety of topics.

Is there something that wasn't so clear, or you were interested in but wasn't explained?

40%	YES
10%	how to use it, glitches, not user-friendly in places
8%	Night Sky – not much to do here
7%	more info about earthquakes
7%	more info about hurricanes
6%	more info about the Sun
3%	more about other planets, Pluto, Saturn, Uranus
2%	more info about oceans
1%	more info about climate change
1%	more info about Mars
3%	other

Sample of answers by category

How to use it:
What's happening on sun, confusing, didn't know what to do, ball/button were not user-friendly
Not computer literate, confused on how to drag hurricane
Wasn't sure how to interact
Why there were so many bugs in the software
I thought some of the things were hard to use (clicking on things at Mars, setting the wind shear in hurricane maker)
Trouble with wind shear made it hard to use, could explain how to use it better

Night Sky:
Earth at night didn't show much
Earth at night was very interesting but there wasn't anything to it
Night needs more information

Hurricanes:
Build a hurricane didn't provide info on what a hurricane needs
Definition of wind shear
Hurricanes - the actual explanation of how they form and move

Earthquakes:
Earthquakes, there wasn't much there on #3
Tectonic plates, wish 1st layer rotated to show plates all over world
Wanted to know more about size of earthquakes on third layer and damage

Sun:
How hot the sun is
Sun and what it is made of
Radio waves, how did they get on the sun?

Other:
Why Pluto is not a planet any longer
Interested in learning about tsunamis
More about oceans/coral reefs

C. Interpretive Messages

This section of the report presents the findings about what people learned by using the kiosk (when invited to use it). Some highlights of the results are:

- Nearly everyone felt that they were familiar with some elements of the program, especially the sun and hurricanes.
- About three-quarters of the visitors described something they found out from the kiosk that they hadn't been aware of before, including how wind shear factors into the formation of hurricanes, that there is evidence of water on Mars, and that a million Earths can fit in the sun.

C.1. Extent of familiarity with topics

OVERVIEW: Nearly everyone felt familiar with some of the content of this program, especially the sun and hurricanes.

Can you give an example of something about these spheres that you already knew about?

94%	YES
24%	Sun:, it's really hot, solar flares, it's really big
22%	Hurricanes: how they form
13%	Climate change: polar ice shrinking, coral dying, our affect
13%	Earth's plates: tectonic plates, earthquake locations
10%	Mars – features, evidence of water
9%	Night lights
6%	everything
5%	other

Sample of answers by category

Sun:
Sun is gaseous
Sun is really hot and big and you don't want to touch it
Knew about solar flares on sun
Knew about x-ray images of sun
The sun is really hot
I already knew that the sun was huge, but didn't know exactly how many earths could fit in the sun

Hurricanes:
A little, that they form over water
Understood how hurricanes formed
Hurricane: where they start, need humidity and warm water
Hurricanes because we live in an area with lots of them
Knew about hurricanes starting near Caribbean and going up north
Many factors go into changing a storm to hurricane

Climate change:
Climate change - amount of polar ice that has decreased
Ice melting kills polar bears
Coral reef bleaching
Knew about climate change, scientists have been able to document difference in temperature
We knew that what we do affects the climate
Sending too many things into atmosphere, causing global warming

Earth's Plates:
Earthquakes, the different ways the plates move
Earth has convergent, divergent, and transform boundaries
Tectonic plates
Knew about earthquakes along fault lines

Mars:
Knew there used to be water on Mars
Mars; knew there was a canyon and volcanoes
Olympus Mons on mars

Night lights:
I've seen pictures of night sky in the past
Earth at night, I knew US is a big energy user
Knew you could see lights on eastern seaboard

C.2. New information

OVERVIEW: About three-quarters of the visitors said they had learned something new, including: how wind shear and humidity factor into creating hurricanes, that there were clouds on Mars, that the sun could be viewed in different ways, that it took one million earths to fill the sun.

Is there something about these spheres that you weren't so aware of before?

78%	YES
7%	No, but mentioned something they had learned (in another question)
20%	hurricane formation
12%	Mars – clouds and water
11%	Sun – images, wavelengths
9%	Sun – size comparison
7%	Night Lights
6%	Earthquakes, locations and frequency
5%	Mars – canyons & mountains
5%	how our actions affect climate
3%	Plates & mountains
2%	other

Sample of answers by category

Hurricanes
Anatomy of hurricane, specifically about warm air and cool air
Temperature, humidity, wind shear determines size of hurricane
Didn't realize humidity had to be so high
How hurricanes are formed, need the perfect conditions
Hurricane, didn't know how they formed
Hurricanes have to form over warm water, that's why we never get hurricanes
Hurricanes - wind shear can stop a hurricane from happening
Hurricanes, didn't know how they worked
Hurricanes; wind shear and temperature factors to make a hurricane
Relationship between humidity, wind shear, etc for hurricanes

Mars – water
Clouds on Mars, I never knew there was an atmosphere to support clouds
Didn't know that they found evidence of water on Mars
Didn't know there were clouds on Mars, I knew there was some water, but not clouds
Mars and evidence of water
Mars, didn't know there was evidence of water on mars
Mars, it has clouds and ripples

Sun – images in different wavelengths
Solar radiation, visible light, x-ray, UV- differences in sun images, also that at north pole sun is stationary
Didn't know the sun gave out radio waves
Different wavelengths can show different aspects about the sun
How the sun can be viewed different ways
The different ways to look at the sun
The sun, it pointed out the energy coming from the core and percolating out, things you don't think about but were interesting

Sun – size comparison
Didn't know one million earths fit inside sun
How large sun is exactly
How much more massive sun is compared to other planets
Size of earth and sun
Takes 1 million earths to fill up sun

Night Lights
Didn't know how bright the lights were, didn't know you could see lights from space
Earth at night, India has large population but not many lights
How much electricity we use
Light along Nile River in earth at night

Earthquakes
Earthquakes every day but you can't feel them all
Fault line locations, number of earthquakes
How many earthquakes there actually are

Mars features
Mars features, the sand ripples, geological features
Mars is made of rocks similar to the earth
Mars, the canyon for instance

Climate change
Climate change – the way that it affects ice and polar bears; using cars, leaving water running melts ice, make it hard to live
Didn't realize using a bike instead of car or turning off lights had so much impact
Ice caps melting, how much coral is already bleached

Earths Plates
Different types of plates - diverging especially
Himalayas caused by earthquake, fascinating!

C.3. Does the kiosk achieve its goals?

OVERVIEW: Almost everyone thought the kiosk was successful at 'showing people some things about the processes of Earth and other spheres.' People referred to the various content areas (especially hurricanes) and also cited other reasons for success, e.g., interactive, comparing spheres, visuals.

Does the kiosk meet the goal of showing people some things about the processes and character of Earth and other spheres?

96%	YES
	<u>Content</u>
32%	shows how hurricanes form
14%	shows how we affect the environment
10%	shows how the sun looks with different perspectives
7%	shows Mars features
6%	shows plate tectonics
3%	shows light usage
	<u>Features</u>
7%	interactive, child-friendly
7%	compares different spheres to each other
4%	has good visuals to go along with the information
4%	informative, easy to understand
4%	but would like to see more details and depth
6%	other (not for young kids, not user-friendly, etc.)

Answers about kiosk features

<u>Interactive</u>
Interactive, move things around
Interesting for kids/fun, good learning tool
More friendly for younger individuals
Degree of interaction
Hurricane maker interactivity
Hurricanes, the interactive aspects of it

<u>Compares different spheres</u>
Compares Mars clouds with Earth clouds
Comparing spheres to each other
Mars related to earth processes
Comparison of sizes of earth and sun
The size of sun and other parts

Visuals
Movies that show changes, swirling clouds that show how atmosphere moves around
Shows pictures of everything
Useful to have high resolution pictures of planets like Mars
Usually shows what it's describing in words

Informative, easy to understand
As you go through it gives detail about what you're viewing
It covers basic questions, covers general information, if you had a question then click on icon that answered it
It explains in kid-friendly terms for certain spheres

Needs more detail
But energy in sun should be addressed
But needs more definitions of words
But I think you would find more elsewhere, I won't come back at next visit
Give basic information about each, could be more in depth

Other
At a real high level
Could be more user friendly though
It does but it's time consuming and might not be good for all grade levels
Segments on different things that are broken down into subcategories, kind of like a story
Yes, but not really for young children