

# Planet Earth Decision Theater Live Performance: Formative Evaluation

By Molly Phipps and Zdanna King

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## Background

The Planet Earth Decision Theater (PEDT), funded by NOAA (grant # NA10SECO080021), will be a major component of the Future Earth exhibition, which opens at the Science Museum of Minnesota (SMM or the Museum) in late October 2011. The theater will operate in two modes: a facilitated show with live actors and an audience response system to engage the audience, and an autorun show with similar content. This evaluation focuses on the live performance part of PEDT. When complete, live performances will take place in SMM's newly refurbished Science on a Sphere (SOS) space that will include SOS, a flat screen for projecting local images to complement the global data displayed on SOS, 3-D objects to complement the images, and new more comfortable seating.

Planet Earth Decision Theater content focuses on human's impact on the planet and the facilitated version uses an audience feedback system (iClicker - <http://www.iclicker.com/>) to allow facilitators to interact with the audience and solicit their opinions. This report details two rounds of formative testing of the live facilitated performance. Since the facilitated performance is being developed ahead of the autorun SOS movie, the images used for these presentations are flat screen images that are similar to the images that will be used on the SOS for the final product.

## Methods

This evaluation occurred in two phases in April and August of 2011. In April, a rough version of the script was piloted with visitors on the Museum's Atrium Stage (located amid the hustle and bustle of the museum floor) where images were displayed on a large flat screen TV mounted above the performers. Nineteen visitors participated in the first round of evaluation where evaluators distributed surveys after the performance was complete. In August, the performances were held in the Museum's auditorium; an area that is more similar to the final version of the PEDT space, because it is enclosed and features a larger screen. Fifty-seven visitors participated in the evaluation in August where evaluators distributed surveys as visitors entered the auditorium. Visitors were instructed to fill out the demographic information before the show started, but to wait to fill out the rest of the survey until after the performance. Performances were announced over the Museum's PA system for both phases of evaluation. Visitors 12 years old and older were eligible to complete the evaluation.

Museum visitors were recruited to participate in both round of evaluations. Performers made announcements over the Museum's PA system announcing "Help us test a new show and WIN A PRIZE! Cast your vote about the future of our planet and WIN A PRIZE." Per standard evaluation practices at SMM, visitors who participated in the evaluation were given a bookmark with some wildflower seeds as small token of our appreciation for their help.

Although many of the questions asked in April carried through to the August evaluation, there were significant changes in the script and quality of the performance so only select questions draw on both rounds of evaluation. Visitor responses concerning iClicker usage and prior thought about human impact on the earth are pooled from both rounds, all other responses are only from the second round of data collection. Results from April and August are presented before ones solely from the August round of data collection. For open-ended questions, responses were coded into themes using both predetermined codes and codes that emerge from the data.

## Results

Overall, visitors enjoyed using the iClickers and felt that using the devices enhanced their experience and that the iClickers were easy to use (Table 1). About three quarters of visitors had never used an iClicker before (77%) so this was a novel experience for most visitors. Those who had used iClickers (or other audience response system) before had used them mostly in university classrooms (56%) or in high school or middle school classrooms (13%), 44% reported using them in other settings including work and conferences. No one had used them in a museum or other informal/free-choice setting before.

**Table 1. What did you think about using the iClickers at today's presentation?**

	Yes	Sort of	No
<b>Using the iClickers made the presentation more engaging. (n=74)</b>	<b>95%</b>	5%	-
<b>Using the iClickers was fun. (n=75)</b>	<b>87%</b>	12%	1%
<b>I liked knowing what other audience members thought. (n=75)</b>	<b>85%</b>	9%	5%
<b>I want to participate in another program with iClickers. (n=71)</b>	<b>80%</b>	16%	4%
<b>It was clear when my vote was counted.* (n=55)</b>	<b>80%</b>	6%	15%
<b>I couldn't tell if my vote was counted.* (n=18)</b>	11%	11%	<b>78%</b>
<b>Using the iClickers made the presentation more memorable. (n=73)</b>	<b>75%</b>	18%	7%
<b>Using the iClickers distracted me from the presentation. (n=74)</b>	5%	14%	<b>81%</b>
<b>Using the iClickers was confusing. (n=75)</b>	4%	1%	<b>95%</b>

\* This question was asked differently in the two evaluations.

Most visitors responded that they had thought either ‘a lot’ (49%) or ‘some’ (42%) about human’s impact on the earth (Table 2).

**Table 2. Before today, how much had you thought of humans' impact on the earth? (n=76)**

Percent of Visitors	
<b>Not at all</b>	1%
<b>A little</b>	8%
<b>Some</b>	42%
<b>A lot</b>	49%

To understand if the presentation is conveying the content it was intended to convey, we asked visitors what they thought the museum was trying to show. Almost half (45%) of visitors mentioned the human impact on the planet (the correct response), and many others gave responses that were related to the human impact on the planet, but not exactly in the way the museum was trying to present the topic. These responses are positive and show that the presentation is on the right track with the content delivery.

For the following open-ended questions only a sample of responses are listed, please see the appendix for the full suite of responses.

***In your own words, what do you think the museum was trying to show with this presentation? (n=49)***

*45% (22) Human impact on the Earth/environment*

- That humans can impact the world's climate both positively and negatively.
- That we all make an impact on the environment. This is a good topic to teach on.

*18% (9) Information about the Earth/environment*

- To gain awareness about societies' depletion of the Earth's resources.
- Promote global warming theory.

*10% (5) Presentation style*

- Make the presentation fun and interactive and informative.
- Everyone's opinion quickly.

*8% (4) How to improve the environment*

- How to help the future of the Earth and the people in it.
- Importance of acting to keep Earth habitable.

*18% (9) Other*

- To make connections between our actions and the consequences of them.
- Engage audience with scientific knowledge.

To better gauge people's reaction to the show and to see what they knew before watching the presentation, we asked what they found surprising. Almost two thirds of participants (64%) found something surprising in the presentation.

***Was there anything surprising about the content of the presentation? If so, what was surprising? (n=42)***

*14% (6) Human impact*

- We humans move more earth, stuff, than natural forces.
- How much ocean is impacted by humans.

*7% (3) Air traffic*

- That there are a ton of people in the sky right now!

*7% (3) Patents*

- The [number] of patents applied for in 2010.

*7% (3) Global warming & Climate change*

- The amount of climate change.

*5% (2) CO<sub>2</sub>*

- Yes - the amount of CO<sub>2</sub> being 30,000 million years ago.
- When CO<sub>2</sub> was as high as what is predicted.

*10% (4) Other specific responses*

- That I would get stats that I can use. 98% of scientists... [support human induced global warming]

*14% (6) Other*

- I think it could have had more content, but for children it's a good length.
- The energy of the presenter.

*36% (15) No*

- No. [11]
- Over the top. It is still a theory.

Because environmental topics are so politicized and polarized in the US, presenting environmental content can be sensitive. The Museum wants to get across current and accurate science about the human impacts on the earth in a way that engages a wide range of visitors and does not leave people feeling hopeless or paralyzed. To understand the affective impact of this

performance, we asked visitors to rate their views about humanity’s future after seeing this presentation (Table 3). For the most part, people’s feelings were more positive side than negative. Nervousness was one exception with almost two thirds of participants (63%) reporting feeling nervous about humanity’s future after the performance. On the other hand, 81% left feeling both motivated and optimistic, so that is a positive sign about the tenor of the performance.

***Table 3. How did this program make you feel about humanity's future?***

	Yes	No
<b>Concerned (n=49)</b>	<b>86%</b>	14%
<b>Motivated (n=42)</b>	<b>81%</b>	19%
<b>Optimistic (n=41)</b>	<b>81%</b>	20%
<b>Nervous (n=41)</b>	<b>63%</b>	37%
<b>Hopeful (n=57)</b>	<b>60%</b>	18%
<b>Excited (n=39)</b>	51%	49%
<b>Pessimistic (n=43)</b>	28%	<b>72%</b>
<b>Scared (n=39)</b>	26%	<b>74%</b>
<b>Apathetic (n=40)</b>	23%	<b>78%</b>
<b>Hopeless (n=39)</b>	8%	<b>92%</b>

It is one thing to report enjoying a performance; it is another to recommend that performance to others. When one recommends something, they are putting their reputation on the line for that product. It is extremely encouraging that almost everyone responded that they would recommend this program to others (96%, n= 54). Based on their other responses, the two participants who did not recommend the performance do not believe in global warming or human induced climate change.

The second half of this question asked, “If so, who would you recommend this program to?” and listed examples in parentheses. Some visitors responded “All”, which may mean everyone in general, or all of the possibilities from the listed examples. The examples included: 'people who believe global warming', 'people who don't believe in global warming', 'people who are unsure about global warming', 'environmentalists', 'entrepreneurs', 'youth', 'adults', 'decision-makers' and 'business owners'.

***If so, who would you recommend this program to? (n=41\*)***

*32% (13) Everyone*

*17% (7) Youth*

*15% (6) Adults*

- [But] not for little kids.
- All adults for sure, so they can teach their children.

*12% (5) Schools, teachers, students*

*10% (4) Friends and family*

*10% (4) Doubters/Unsure/Not aware of global warming*

- People who don't believe in global warming.

*7% (3) Environmentalists*

*5% (2) People who believe in global warming*

*5% (2) Companies*

- Companies that contribute to pollution/global warming.

*5% (2) Decision makers*

- Future decision makers.
- Decision makers.

*7% (3) Other*

- Liberals. They'd like it.
- People wanting to learn!
- People who are thinking of using remotes in a classroom situation.

To get a better sense of who came to the performance, we asked participants their view on global warming using a survey item from the Global Warming Six Americas study (Table 4). Unlike this study where visitors opted to watch the show, the visitors for the Global Warming Six Americas study were selected at random from museum visitors. Based on this question, the visitors who chose to watch the PEDT performance are less likely to think global warming is caused mostly by natural changes in the environment or that it is not happening, but are more likely to believe global warming is caused by a mix of human and natural causes. A slim majority (51%) of visitors who saw PEDT think global warming is mostly caused by human activities.

**Table 4. What do you think about global warming?**

	<b>Planet Earth Decision Theater (n=55)</b>	<b>6 Americas Study (n=466)</b>
<b>It is happening and it is mostly caused by human activities.</b>	51%	49%
<b>It is happening and it is mostly caused by natural changes in the environment.</b>	7%	22%
<b>It is happening and it is caused by a combination of natural causes and human activities.</b>	38%	19%
<b>None of the above, because global warming is not happening.</b>	4%	10%

### **Recommendations**

The live, interactive version of PEDT was well received by visitors and is communicating the main message, or parts of the main message to many visitors. One of the goals of this performance was to get people thinking about human impact on the earth in new ways and to avoid people digging in to their politicized and polarized position. Since only the two people who do not believe global warming is happening at all are the only ones who would not recommend the performance, it seems as though this goal was at least partially accomplished. Further testing with audiences who are unsure about global warming would be advisable to ensure the message is reaching the intended audience. Further testing should also occur once the performance is using the SOS paying special attention to the visualizations and how people interpret them.



## Demographics

***Table 5. Age of Survey Takers (n=74)***

Age Ranges	Percent of Visitors
6-8*	1%
9-12*	3%
13-17	8%
18-20	1%
21-29	12%
30-39	31%
40-49	22%
50-59	12%
60-69	7%
70-79	3%

\* A 6 and 10 year old both filled out surveys, though the survey was given to adults in their party.

***Table 6: How would you rate your interest in science on a scale of 0 to 10? [Zero being “not at all interested” and ten being “Extremely interested”.] (n=74)***

Rating	% of Visitors
10	22%
9	11%
8	22%
7	24%
6	8%
5	7%
4	3%
3	4%

**Table 7: Who did you come to the museum with today? (n=73)**

	<b>% of Visitors</b>
Adults only	15%
Adults and children	84%
Alone	1%

**Table 8: Gender (n= 75)**

	<b>% of Visitors</b>
Male	32%
Female	68%

**Table 9: With which group do you identify? (n=75)**

	<b>% of Visitors</b>
African American	1%
White	97%
Hispanic	3%
Native American	8%
Other	1%

**With which group do you identify? [What did visitor write in when they selected other?] (n=1)**

- Lots.

**Table 10: Before today, how many times have you visited the museum in the last 2 years?**

	<b>% of Visitors</b>
None	36%
1-2 times	33%
3-4 times	18%
5 or more times	13%

**Table 11. Have you attended other theater performances at The Science Museum of Minnesota? (n=55)**

	<b>Percent of Visitors</b>
<b>This is the first theater performance I've attended.</b>	80%
<b>I've been to one or two performances.</b>	15%
<b>I've been to three to five performances.</b>	6%

**Table 12: Are you here with children that you homeschool? (n=76)**

	<b>% of Visitors</b>
Yes, and we are currently here for homeschooling.	4%
Yes, but we are not here for homeschooling today.	1%
Yes, but we don't use the museum for homeschooling needs.	3%
No.	92%

## Appendix

The appendix contains the full range of responses to the open ended questions.

### ***In your own words, what do you think the museum was trying to show with this presentation? (n=49)***

#### *45% (22) Human impact on the Earth/environment*

- About human impact on the Earth in various ways.
- Human impact on our Earth.
- Human impact on the Earth.
- How humans impact the Earth and its systems.
- How much [of] an [affect] humans have on our environment and its consequences.
- Human activities are disturbing the condition of the Earth.
- Human's impact.
- Humans affect the earth through their group actions.
- Humans impact the condition of the Earth.
- Humans' activity affects the whole world; preservation of the world.
- How we can improve our impact on Earth.
- Impacts of humans on the environment.
- Our impact on the planet.
- The effect of humans on the Earth.
- The effect of people on the Earth.
- The effect that people today have on the Earth.
- The effects of humans to the planet.
- They were showing the impact of human activity on the Earth.
- This presentation makes us aware of human impact on the Earth and how much our lives are affected by this.
- That humans can impact the world's climate both positively and negatively.
- That we all make an impact on the environment. This is a good topic to teach on.
- Our impact on the world. [Missing.]

#### *18% (9) Information about the Earth/environment*

- To gain awareness about societies' depletion of the Earth's resources.
- The changes that the Earth [is] going/went through.
- What the future holds for our planet.
- Issues affecting our planet.

- Earth and protecting it.
- Environmental issues.
- Life evolves.
- The Earth.
- Promote global warming theory. [No.]

*10% (5) Presentation style*

- Make the presentation fun and interactive and informative.
- Everyone's opinion quickly.
- Different, but has promise.
- Great, entertaining.
- Let people use iClickers. [No.]

*8% (4) How to improve the environment*

- How to help the future of the Earth and the people in it.
- Importance of acting to keep Earth habitable.
- Teach ways the earth works and how you clean the Earth.
- Be green.

*18% (9) Other*

- Awesomeness.
- [I don't know.]
- [Educating] the public.
- To make connections between our actions and the consequences of them.
- Technology in science and finding information quickly.
- Engage audience with scientific knowledge.
- Number of Facebook users.
- Trying to get a message across about the earth.
- How we can learn stuff.

***Was there anything surprising about the content of the presentation? If so, what was surprising? (n=42)***

*14% (6) Human impact*

- A bit. How much humans contributed.
- The intensity of our impact.
- The impact photos.
- We humans move more earth, stuff, than natural forces.

- How much ocean is impacted by humans.
- Human impacts.

*7% (3) Air traffic*

- That there are a ton of people in the sky right now!
- The air traffic.
- Number of airplane riders a day.

*7% (3) Patents*

- The [number] of patents applied for in 2010.
- Inventions.
- The number of patents.

*7% (3) Global warming & Climate change*

- What showed how much global warming has changed over the years.
- The amount of climate change.
- Yes, global warming.

*5% (2) CO<sub>2</sub>*

- Yes - the amount of CO<sub>2</sub> being 30,000 million years ago.
- When CO<sub>2</sub> was as high as what is predicted.

*10% (4) Other specific responses*

- The Facebook users. I didn't think there [were] so many.
- 40% of the [non-inundated] earth is used for farming/livestock. I thought it was much less.
- The number of oil spills.
- That I would get stats that I can use. 98% of scientists...

*14% (6) Other*

- I think it could have had more content, but for children it's a good length.
- The energy of the presenter.
- How many places are in the world.
- How quickly you can find answers.
- No, good information and context.
- The monkey in my head stopped playing its cymbals.

*36% (15) No*

- No!
- No. [11]
- Not really.

- Over the top. It is still a theory.
- Not surprising so much, but interesting... I really liked the maps of the earth that showed various uses of land, air space, Facebook, etc.

***If so, who would you recommend this program to? (n=41\*)***

*32% (13) Everyone*

- Actually, probably all of the above.
- Everyone. [5]
- All groups.
- All people.
- Anyone.
- All. [4]

*17% (7) Youth*

- Youth - absolutely.
- Youth. [4]
- Children.
- The youth.

*15% (6) Adults*

- [But] not for little kids.
- Adults. [3]
- All adults for sure, so they can teach their children.
- [Yes for] adults, [Not for] young kids.

*12% (5) Schools, teachers, students*

- Schools.
- Students K-12.
- Teachers (field trip idea).
- School age and up.
- Teachers.

*10% (4) Friends and family*

- Parents, friend.
- Parents/friends.
- Family and friends.
- A friend.

*10% (4) Doubters/Unsure/Not aware of global warming*

- People not knowing/not aware about global warming.
- People who are unsure
- People who don't believe in global warming
- People who don't believe in global warming.

*7% (3) Environmentalists*

- Environmentalists. [3]

*5% (2) People who believe in global warming*

- People who believe in global warming, who want to learn more.
- People who believe in global warming.

*5% (2) Companies*

- Business owners.
- Companies that contribute to pollution/global warming.

*5% (2) Decision makers*

- Future decision makers.
- Decision makers.

*7% (3) Other*

- Liberals. They'd like it.
- People wanting to learn!
- People who are thinking of using remotes in a classroom situation.