

# How do spherical and flat displays compare on enjoyment and understanding of Earth science concepts?



**Initial exploratory study: April, 2014 – December, 2014**

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**Refined pre-study: October, 2015 - ongoing**

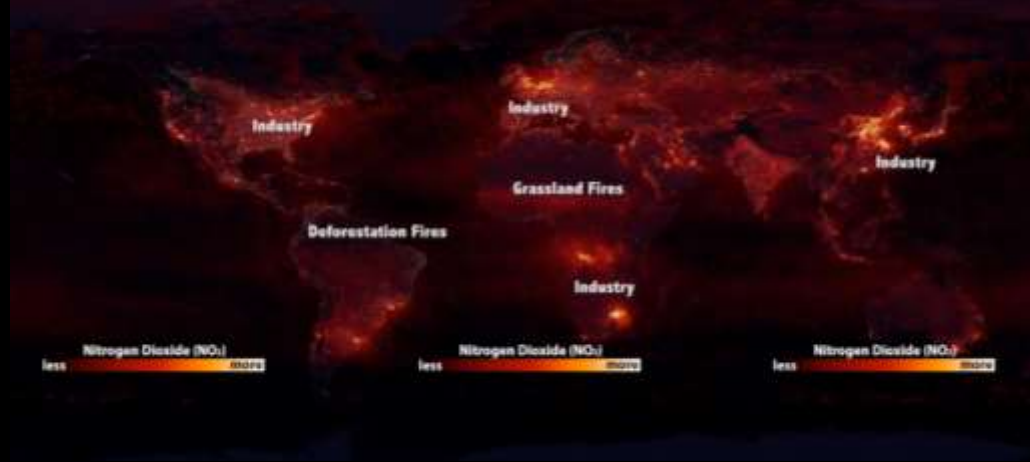
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# Initial exploratory study of 160 fifth grade students tested knowledge gain and retention by each method

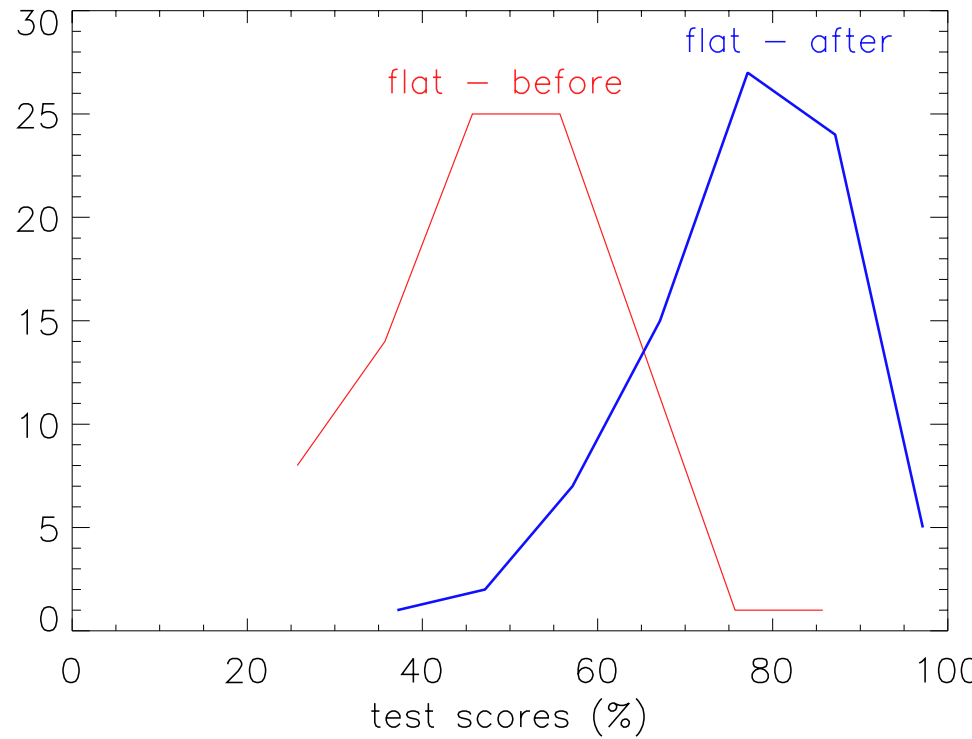


Half the group saw a live Sphere show at the Maryland Science Center



Half the group saw the same live show on a flat screen in their classroom

**Both sphere and flat screen groups had 26% gain after the show. Differences due to venue, time constraints, fluency**



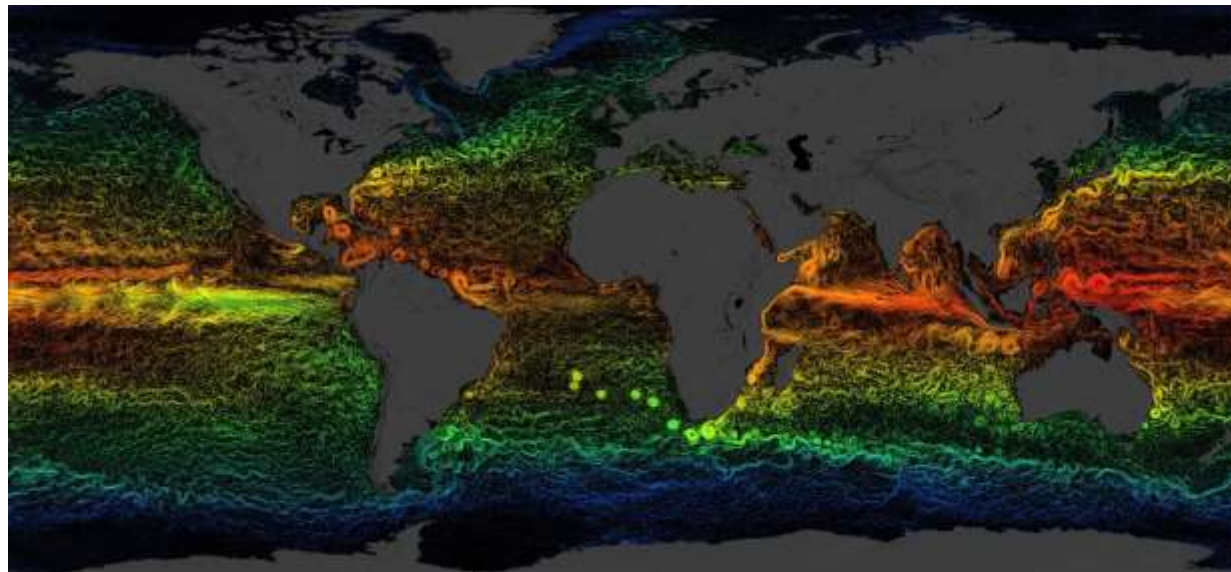
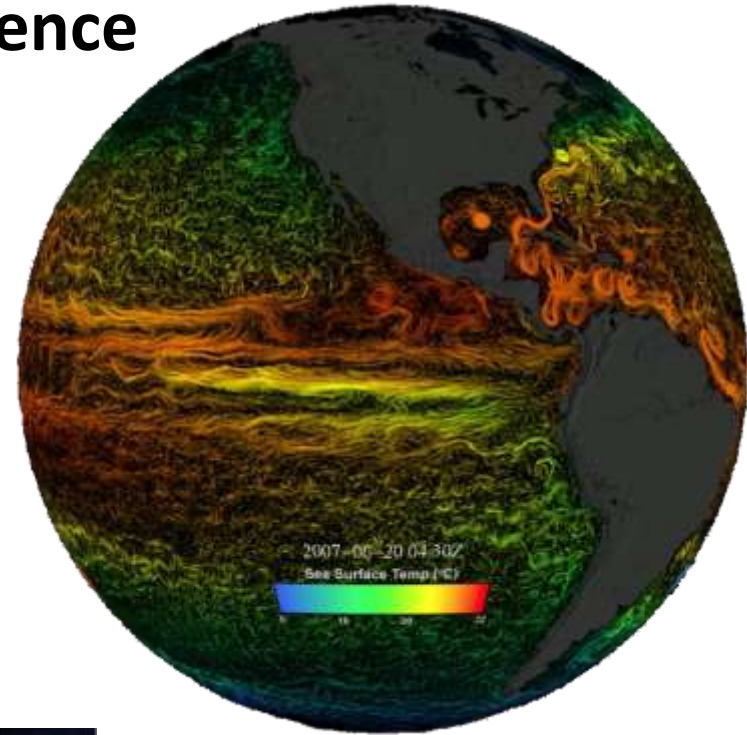
**No statistically significant *quantitative* difference.**

***Qualitative* comments about Sphere expressed more excitement**



# Refined pre-study of 90 tenth grade students tested affect and content gain of Earth system science

Half the group saw a live Sphere show at the NASA Goddard Visitor Center



Half saw the same show on a flat screen at the NASA Goddard Visitor Center

# Survey developed to test multiple dimensions: presentation overall, learning satisfaction, grasp of material

	Strongly disagree		Neutral	Strongly agree		
	-2	-1	0	+1	+2	Not sure
<b>Overall, the presentation was...</b>						
Engaging	-2	-1	0	+1	+2	Not sure
Entertaining	-2	-1	0	+1	+2	Not sure
Hard to understand	-2	-1	0	+1	+2	Not sure
Informative	-2	-1	0	+1	+2	Not sure
Objective and factual	-2	-1	0	+1	+2	Not sure

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Informative	-2	-1	0	+1	+2	Not sure
Objective and factual	-2	-1	0	+1	+2	Not sure

**Mean score SOS: 1.36**

**Mean score flat: 0.98**

**t-value: 0.004**

# Similar sections rate presenter, content of the show, and visuals

Presenter

Mean score SOS: 1.27  
Mean score flat: 1.09  
t-value: 0.2358

Content of the show

Mean score SOS: 1.30  
Mean score flat: 1.03  
t-value: 0.120

**Visuals**

**Mean score SOS: 1.65**  
**Mean score flat: 1.31**  
**t-value: 0.011**

# Learning satisfaction was quantified by student grading and the likelihood of recommending it or wanting to see it again

If you could give the overall show a grade, what would it be? A-

Would you: (circle one)

Like to see a similar show on related issues again?

Yes

No

Maybe

Recommend this show to others

Yes

No

Maybe

Learn more about Earth systems in the future

Yes

No

Maybe

What did you like most about this presentation?

I liked how we could see these different sets of data on a global scale over time.

What did you think was the most important message of the presentation?

I think the most important message was that we affect the earth in a lot more ways than we think and we should work on changing that



# Learning satisfaction was quantified by student grading and the likelihood of recommending it or wanting to see it again

If you could give the overall show a grade, what would it be? A- →

Mean score SOS: 89.3%

Mean score Flat: 83.8%

t-value: 0.010

Would you: (circle one)

Like to see a similar show on related issues again?

Yes

No

Maybe

Recommend this show to others

Yes

No

Maybe

Learn more about Earth systems in the future

Yes

No

Maybe

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If you could give the overall show a grade, what would it be? A-

Would you: (circle one)

Like to see a similar show on related issues again?

Yes

No

Maybe

Recommend this show to others

Yes

No

Maybe

Learn more about Earth systems in the future

Yes

No

Maybe



**SOS: 87%**

**Flat screen: 79%**

What did you like most about this presentation?

I liked how we could see these different sets of data on a global scale over time.

What did you think was the most important message of the presentation?

I think the most important message was that we affect the earth in a lot more ways than we think and we should work on changing that

**Analysis of qualitative comments is ongoing.**

# Grasp of material was tested through questions of Earth system science concepts presented

Loss of snow and ice cover is a problem for Earth's climate because snow and ice<sup>v</sup>

- a) reflect solar radiation back to space
- b) contribute to groundwater
- c) provide a habitat for polar bears and penguins

The seasonal cycle in carbon dioxide follows the growing season of which hemisphere?

- a) Northern Hemisphere
- b) Southern Hemisphere

The ocean moves heat from the equator toward the poles. When surface water cools, sinks and forms deep water in the North Atlantic, approximately how long will it be before it returns to the surface?

- a) 1 year
- b) 10 years
- c) 100 years
- d) 1000 years

El Niño is a periodic phenomenon that happens along the equator in the Pacific roughly every five years and causes the fisheries off of South America to collapse. This happens because:

- a) Currents carry the phytoplankton and fish away from the equator
- b) Upwelling stops and there is no source of nutrients to feed the marine food web
- c) A sudden overpopulation of seabirds eat the fish

**SOS group: 73%**

**Flat screen group: 63%**

**Science On a Sphere outperformed flat display on all criteria, significantly so for presentation quality, visuals, understanding gain.**

**Differences due to different groups?**

**Low differences in scores for presenter and content familiarity indicate no.**

**Pre-study warrants further testing different populations.**