

Live, Interactive Planetarium Symposium (LIPS) 2013
13th – 16th August 2013

Hosted by Michael McConville, Derek Demeter and Daniel Falconer
at the ~50-seat Buehler Planetarium, Seminole State University, Florida

Disclaimer: These notes, by Rob Cockcroft, were written primarily for his own personal record, to help him share LIPS ideas with his own planetarium's presenters

Tuesday, 13th August 2013

Attendee Check-In & Registration
Opening Reception
Opening Ceremonies, LIPS Overview, and Dome Crawl
Buehler Planetarium Showcase: The Story of the Universe
Derek Demeter: Full Dome Photography & The Art of Storytelling

Wednesday, 14th August 2013

Mathieu Ranger: Blowing Minds with Big Numbers

How to get your audiences to appreciate astronomical numbers:

- Direct number method
- Direct number method with reference (e.g., \$1 trillion in \$1 bills stacked next to a person)
- Object substitution (e.g., with respect to football fields)
- Unit of measurement substitution (e.g., Saturn V takes 118,000 yrs to reach Proxima Centauri)
- Scale substitution method (e.g., Bill Nye, and the Solar System on a desert road)

Other ideas for getting some handle on the scale of the Universe and its contents:

- UKIRT Galactic Plane Survey (zooming in with an uncountable number of stars; zooming out)
- Ian: Fill train carriages with sand, 1 carriage goes past/5 secs, it would take 5 mins for all the stars in the Galaxy to go by
- 10-42 yrs old to count to 1 billion
- 60 balls (1 Moon and 59 to make the Earth), ask kids to make the distance correct
- Paint the dome with the Sun, then have planets made from LEDs to the correct scale
- How long would it take Voyager to go to Proxima Centauri? 75,000 years. In 2050, it will be 1 light-day away from the Earth
- Ask audience what ruler they would use?
- Use local geography for scale of the Solar System
- Base thing on light seconds

Andy Kreyche: Shadow Tracking: A Focusing Activity for School Groups

Materials needed: plunger (or something to cast shadow), and numbered tongue depressors (or something to easily mark and predict the various positions of the Sun's shadow)

- Do before the show
- Audience stands in a rough semi-circle around the plunger
- Make some simple observations (e.g., the shadow is longer than the plunger, one side of the plunger is bright and the other side is dark)
- Make some predictions of where the shadow will go
- Audience comes up one-by-one (maybe have a 5-4-3-2-1 for each person, depending on how

long they take!)

In the time it takes to do this, the shadow has already moved

Others can revise prediction

Shadow gets shorter, moving in one direction – what does it mean for the Sun’s motion? Ans:
it’s getting higher, and moving in the opposite direction. What was clockwise before
clocks? Ans: sunwise

More predictions with 5sec countdown

Call on the teachers/group leaders to make predictions!

Give planetarium show

Look at shadow later

Can extend this to talk about

Aligning buildings (e.g., pyramids)

Experimental design

Pirates wear eye patches for Sun sightings? Is it actually for dark adaptation so that they can
easily and quickly see below decks (e.g., if they capture and board another vessel)?

Jaap’s solar demo model

Emily Wojcik: Classroom Management in the Planetarium

Also see handout

You know what kind of class you have coming to your planetarium from

how they line up

how they interact with their teacher

With younger audiences, Emily spends more time outside of the dome than in it. Some activities the
group suggested:

Count something with jumping jacks

Follow the Sun

Focus (e.g., act out the constellation)

Give a story; this tends to shut them up

Stamp feet to speed up the Sun

Silent cheer (tell me with your hands instead of using your voice) – looks like jazz hands or
twinkling stars

For older students, you could

Talk about the technology

Call their bluff; tell them that they’re allowed to use their imaginations (they’re not too old!)

Set up expectations; be a hard-ass, then be fun so if you have to discipline it’s not a surprise

Give the teacher the red flashlight of doom

Ask them what they think they’re going to see (you get to see what type of stuff they know)

Keep “show reports” to get to know the audiences more – especially by teacher/school

Set out the unusual rules because of the unusual setting (e.g., talking one at once; not putting
hands up; say the answer **only once** and then practice with how many planets in the SS)

Ask them what they think the rules should be

Rearrange the chaperones/students when you’re in the dome (for a power play over everyone)

Meet the teacher right off the bus to talk about practicalities (e.g., loo break, classroom
management)

Have “reserved teacher seat” sign

Sit in the seats

For the public:

Kick people out if necessary
Usually the problems are caused by families who bring children who are too young
Set everyone to a task, and while you're doing that go and talk to the problem people; start by asking them how you can help
Looking at your cell phones ruins your night vision (as well as distracting others)
Light pollution demo with cell phones

Alice Enevoldsen: Incorporating Teen Presenters in the Planetarium

They create bulletin board outside the planetarium
Record youtube videos of presenters' experiences
Brian Mendez: use WWT to have them create shows
Planetarium "ads": PPT running at the beginning of the show, and be able to answer questions during the "ad" part of the pre-show
Host the space: "Here's the night sky tonight, and here are three constellations" – dome complements floor space
Create cards with mission people: scientists, engineers, computer software – pics and description of real people. Hand the cards out.
Tablet-based Q&A session while they wait to go into the planetarium (e.g., Perseid meteor counter; spot the station)
Pre- and post-activities for school groups. Demos creation.
Write a poem on HST image, and then explain the science behind it, and see what they think about that.
WWT: can focus on astronomy and presentation (rather than the mechanics of how to get it on the dome)
Could present to the "parents and friends" group
Pilot, presenter, researcher roles for a group
Provide the scaffolding for their training (presentations 101)

Sara Poirier: A Star is Born! Training Presenters for the Planetarium Setting

Brainstorm on what must be included in training:

Practice

- on your own
- in front of other presenters
- shadowing/buddy system
- in front of others' friends

Disaster training/policy/recovery
Going over policies in general
Voice training, proper diction
How to judge the audience (audience assessment)
Record the presenter during their practice sessions
Content coaching
How to use a microphone
Operating the technology
Respecting the audience
I don't know – is OK

Brainstorm on challenges that we face during training:

Balancing supplementary images with full dome software
Presenting live images
Verbal tics/correcting bad habits

Multitask/seamless shows/creating the story
Technical ineptitude
Hubris (proud/arrogant/know-it-alls)
Presenting
Audience dynamics
How to answer questions
Condescending voice
High turnover rate
Lack of confidence
Lack of time for training
Commitment level on their part

Brainstorm on possible solutions:

Multitask: quality control/auditing/going over your material more in depth
Voice/tone problems: tell me in your own words (seems like this was coming from a scripted show rather than how to deal with a personality). Off-script testing/content testing.
Time: have more seasoned staff train new members, record and play back, learn from several people.
Presentation knowledge: shadow presenters with opposite skills
Hubris: more challenging audiences
Problem-solving policy/scenario practice
Science communication: info/entertainment balance
Technical skills: practice!
Audience skills: shadow, peer review

Ongoing development/training:

Review every six months (have policy)
Gripe/feedback session
Present what we've learnt at LIPS and similar
Knowing your audience
Video/playback
Formal peer review
Professional development
Current science
Sitting with audience
Audience survey (to public or teachers): content, music, presenter, learnt anything to take with you?
Need to show impact of your shows if you have a grant – so ask for feedback
Bring in experts (theatre/storytelling/voice coach)
Get the presenters to change their stories
Monthly meetings
Professional development

Intro by: Joanne Young: AVI

Kim Small (with Julia Plummer): Astronomy Education Research in the Planetarium

Looking into

how people learn
how students learn science in the classroom
learning science in informal environments

Six lenses:

Learner
Knowledge
Assessment
Motivational
Sociocultural
Physical

Planetarium has probably learner-, motivational-, sociocultural- and physically-driven components

Instructional design:

Audience should want to learn
Engage active mental processes
Allow time

Research Study: "The Moon" modular planetarium program

36 1st grade students

3 short segments of video

6 live segments

Each video (4-10mins long) has a pre- and post-live segment

Video 1: observational features of the Moon

Video 2: understanding motion of the Sun and the Moon

Video 3: nature of the phases

Students have cards that have new, crescent, half, gibbous, full

Students didn't understand that e.g., crescents are around for more than 1 day

Activity idea: prepare 30 pics for them to create a calendar with

Also, for 3rd graders, match up peoples' birthdays: how many are on full/new/old moons
(few) vs. crescents/gibbous (lots)

Live segments reinforce new vocab and concepts, and include kinesthetic learning

AVI's newest program: "The Weather"

K to 2nd grade students

6-min module

Focusses on cirrus, cumulus and stratus clouds, and how to observe the weather using senses

Chuck Rau: ChromaCove

Manufactures their own lighting systems

Enhanced frequency modulation (i.e., no flickering with rapid eye movement)

Can control via:

slider board

computer

wall fixture

third-party controls

Buehler has "nano cove RGB"

LEDs draw so much less power!

"Watts" for LEDs no longer really applies for LEDs brightness

ChromaCove is cheaper than the previous standard rate of \$1000 per foot of dome

Can create any colour

Sunrise/sunset sequence is easy to create

Can blank out sections of the light (e.g., to avoid problem areas such as doors!)

Scott Niskach: Evans & Sutherland

What do planetarians want?

- Meta-data with data sets that the software uses
- Notes
- Tactile manual buttons
- Backlit keyboards (Deck keyboard USB with adjustable red light)
- Large amounts of data is coming (e.g., LSST)
- More 3D? (loss of brightness by 65%)

Chris Hill: SlicedTomato

H2O Cycle – came about from LIPS

Go Pro – little cameras for stills/movies (about \$1000 each)

Rhythm, Rhyme, Results “Evaporation” song

Japp Vreeling: Water, A Cosmic Adventure Made Interactive

Using socrative.com: similar to how we would use clickers during class, but instead uses smartphones/tablets to ask the audience questions in the planetarium (has prepared handouts with questions for those in the audience without phones or tablets)

The fulldome show is paused in various places so that the audience can answer the questions.

Thursday, 15th August 2013

Mark Webb: Developing Presentation Skills: Or, How to Avoid Whistling in the Dark

Adler uses Uniview, Digital Sky 2, and WWT

“Bucket evaluation” review

On a scale of 1-5, please indicate how satisfied you were with the show you viewed (1=Highly unsatisfied and 5=highly satisfied)

Don't consider 1+2,3,4+5 (people are too nice), but rather 1→4,5

Audience leans towards live (rather than rendered) shows

Chris Lintot, host of Sky at Night (after Patrick Moore; founder of Zooniverse; based at Adler)

Cosmic Wonder Show

Used high-res HST pics

Compare with the Earth/Moon with each picture to give the size comparison

Used WWT

Pace your material; let your audience absorb the material

“I think this is one of the most beautiful images; let's just enjoy it for a moment”

Real rehearsal time (~1 month prior)

Bring in an expert (voiceover actor – did tongue twisters; should drink apple juice not water)

Presenters worked alongside the script writers – and it worked well

One-on-one practice with an experienced theatre person – didn't work

Presenters made the show their own (personalized the script)

Make sure the presenters understand the content

Planetarian is scientist, educator and actor. Mark says it's easier to educate an actor with the science rather than give a scientist presentation skills

Sara Poirier: measure of success is the number of people who are asking questions after the show

Create a repository of questions asked during the shows.

Mark: planetarium is not the place you get the details (after the “oh no!” response to Jaap’s presenter who talked about their research)

Warm up and prep: body, voice and mind

Three E’s: energy, expression, enthusiasm

Personal connection: tuning into your visitor

Group unification: unifying your many-eyed, many-armed, many-brained visitor

Holding attention: keeping them there willingly

Improvisation: saying “yes, and…”

Conclusion: when and how to say goodbye

e.g., “Now is the time for men and women to come to the aid of their planetarium.”

Exercise: several volunteers, each person reads the above sentence, each emphasizing a different word. Sometimes the meaning changes.

Understand the content

Learn what you sound like (record!)

Shadow other presenters

Evaluate on a schedule (once per quarter)

Eliminate bad habits; make good ones second nature.

Seek professional help (go to voice/acting classes)

Rehearse (run through in the planetarium at least once before practice show)

Portal to the public (presentation skills for researchers)

Kim Small: Backwards Design in the Planetarium

National standards in the US are different state by state.

See the two handouts on UBD (Understanding by Design; aka “guide on the side”)

e.g., when baking a cake you have the cake in mind

Doing away with text books, which are seen as crutches for teachers, and students don’t read

UBD is being used by the LSST

Backwards design sounds like using ILOs and then matching syllabus and assignments/tests with ILOs.

Explain, interpret, apply, perspective, empathy, self-knowledge

Activity where groups each apply backwards design to a specific task

Karrie Berglund: Targeting Different Learning Styles

Multiple intelligences (computational power) vs learning styles (approach)

MI: Dr Howard Gardner, “Frames of Mind” (1983)

Defining intelligence:

create or offer service

set of skills to solve problems

creating or finding solutions

1. Linguistic

Most of us already use it

Could use poetry

Show an image/describe in your own words

2. Musical/Rhythmic

Elvis Castello

Incorporate songs (follow the drinking, in my backyard, Gustav Holst)
Pre-show music (to set the mood, or play related song, e.g., Fly me to the Moon)
Planck Visualization Project (with lots of instruments)
Talking to aliens with music
Radio astronomy

3. Logical/Mathematical Intelligences

Classification
Powers of 10 is classic
If ISS is two football fields wide, how many metres is that?

4. Spatial Intelligence

Teaching them how to use star charts
How the north star's position changes with latitude
Phases of the Moon (relative position)
Explain "travelling in a model of 3D space", not a window or live video
Show the Moon phases, then change location to look back at Earth and ask what we'll see

5. Kinesthetic

Measurements with hands
Each person is the Earth, demonstrate orbit and rotation

6. Intrapersonal

KWL (know, want to know, want to learn – keep it personal)

7. Interpersonal

One person given X-box, other audience members give directions
Contribute different plot themes as a group

8. Naturalist

Twinkling stars/not twinkling planets
Comets/asteroids/meteors
Red/blue stars
Pluto

9. Existential

Questions about life, death, reality
Feeling insignificant
A lot of the mysteries, so much still to learn
Inconsistencies with evolution-deniers
The sky as "the heavens"; are we going there

Not everyone supports MI, but standard IQ tests have many shortcomings. Psychometric (testing) community supports the ideas of different strengths – but would not use the word "intelligences"

HowardGardner.com

American Prospect, Nov-Dec 1996, "Multimedia and Multiple Intelligences"

Brain Rules – Brian Medina (especially sensory integration)

Michael McConville: Public and Media Relations for the Planetarium

Relationships outside the dome:

not marketing
not advertising
not spin

The campaign

- Coherent
- Comprehensive
- Consistent

Timeline and implementation of campaign is important

Campaigns should anticipate, and then mitigate, just about every contingency – especially for special events

SWOT matrix: strengths, weaknesses, opportunities, threats

	helpful to achieving the objective	harmful to achieving the objective
internal origin	S	W
external origin	O	T

Examples:

- S: people
- W: it is more difficult to be intimate with your audience in larger domes
- O: any astronomical event
- T: funding, equipment, football matches, earthquakes, what keeps you up at night,...

Campaign initial questions:

- What do you want to accomplish?
- Who are your target audiences?
- What messages do you want to communicate?
- What are your communication strengths and weaknesses?
- How do we want our facility or institution to be portrayed?

Campaign answers:

- Collect your research answers (e.g., tokens in buckets)
- Cost-benefit analysis
- Bring staff and admin on board

Mark: evidence+numbers = evidence
no evidence or numbers = opinion

More campaign components

- Brand
- Press releases and press kits
- Publications – print and digital media
- Who influences you/who do you influence?
- Make connections/build trust

Journalists

- Write the story for them
- Short, concise statements
- No technical terms
- Neil deGrasse Tyson as good case study

Karrie Berglund: Digitalis

- Nightshade NG: 3D capability with constellations
- Show tilt of Earth when on Moon, and show equinoxes and solstices
- Atmospheric effects in NG (Sun appears as squashed ellipse on horizon)
- Can do these videos: mpeg2, mpeg4, QuickTime

Martin Ratcliffe: Sky-Skan

Can adjust each 0.5mag bin

Can drop images on RA/dec

Has algorithm for atmospheric effects (e.g., atmospheric refraction built in)

Buttons are easy to create (record a script as you do motions manually)

Ken Yager: The Elumenati

1. World viewer

Earth with starry background

Pictures and images embedded on the Earth's surface, which you can zoom in on

Will incorporate Google maps, etc, soon

2. Eyes on the Earth

Live (past 24-hours) Earth view

Clouds, temperature, gravity maps (gravity map: based on water-ice x13million)

3. Eyes on the Solar System

All 3 of the above available in full dome for \$500.

eyes.nasa.gov, free desktop version available

Ken Andert & Keith Davis: The Large Hadron Collider's Data Rendered Live - Bringing Particle Physics to the Dome

LHC is 100m underground

Have to account for change in gravitational field due to Lake Geneva

Also have to take into account the trains moving overhead

Whole ring is evacuated, and maintained at 4 degrees Kelvin.

Can discuss centripetal force and the need for a large ring

Currently show CMS detector data sets and simulations; hope to expand to other detectors

"Party view" software to view (at least on desktop)

Could bridge colliders with what happens in stars

Andy Kreyche: Modeling the Solar System Under (Not On) the Dome

Imagine the Sun as the dome (30ft-diameter, in this case)

Get people to stand up and hold the various objects:

Earth = grapefruit (100 Earths could fit across the Sun; 1 million Earths could fit inside the Sun)

Venus = grapefruit

Mars = lime

Mercury = key lime

Moon = macadamia nut

Neptune, Uranus: beach ball

Saturn: larger beach ball (point out that the rings fit in between Earth and Moon)

Jupiter: largest beach ball

Could build in socrative.com for higher level

Exploratorium

Build a Solar System

Very easy comparison scales
Speed of light at this scale
Speed of New Horizons

Friday, 16th August 2013

The Future of LIPS: Discussion

What we like:

- The timing (including down time)
- Intimacy – everyone together
- Interaction and group work (culture of presentation)
- Ideas we can immediately take away
- Practical application
- Non-confrontational
- Low cost for vendors
- No exhibit hall/trade show

What we can fix:

- Size
- Too insular – expand, and let new people know what to expect
- Provide framework/guidelines
- Refine the message of LIPS
- Increase support
- More presentation skills
- Interactive technology
- Vendor and non-vendor dialogue so that vendors can incorporate what planetarians want to use in their presentations
- Focus groups
- Limit number of vendors

What has changed (2013 compared to 2011 and 2012)

- No keynote
- Keynote as icebreaker (suggestion: Holly Csig, as well as John Kaufmann)

2014 potential hosts

- Mystic Seaport, CT (starball only; no digital)
- Arlington
- Long Island
- Glastonbury Planetarium
- There was a general consensus that only planetariums that had previously attended a LIPS should be considered for future LIPS

Richard Gelderman & Ronn Kistler: Aiding and Abetting the Recognition of Star Patterns with Personalized Myth Construction Activities

Hand out the following:

- boards (with a few stars on; place boards such that groups are facing the stars they'll be using)
- flashlight/laser pointer
- star chart

Join the dots

Make a story

Share with everyone else

Find your constellation on the dome

Usually takes 1 hour

They use mostly for the public (but also intend for school groups)

If people choose to draw out an official constellation, and not play the game, then you just go along with it as if they were playing the game.

Alice Enevoldsen: Preschoolers in the Planetarium – Success

For 18months-5years old

“Preschool trip to the Moon” at the Willard (written by Jeremy Higgins)

Sara: OSC resisted preschooler shows but then realized it’s more about getting them comfortable in the dome rather than getting them to absorb any astro info

What is preschooler success?

Connection of planetarium with the natural world

Going out excited

Strong primary colours

Keeping it moving

Have the same character on dome as in the dome (dressed up)

Keep it short (12-15 minutes)

	child active		
teacher passive	- discovery	- scaffolding	teacher active
	- free play	- guided play	
	- motivation	- direct instruction	
	- rest	-rule-based games	
	child passive		

NAEYC.org

Moon activity:

Put out some flour

It’s sticky, gets into the air (talk about similarity to regolith)

Drop marbles (and talk about craters)

Dancing like an astronaut on the Moon (driving rover, playing golf, slow jump)

Play a video of astronauts on the Moon when they’re singing

Puppets

Use to say hello to individuals

Shadow play

One is a coyote, the other is a rabbit

Tell a story: rabbit is escaping the coyote by going to the Moon

Binoculars (made from toilet rolls)

Make observations of the planetarium (could compare to the classroom to make it easier)

Go around to everyone and try to engage

You should see everyone, they should see you

Scaffolding to look through telescopes

Important to tell the silent kids that it’s OK to tell you later, or to tell their neighbour instead

“Zoom, zoom, zoom, we’re going to the Moon” song

Kids see:

Leo as a mouse (like the ancient Chinese)

Pegasus as an octopus

Big Dipper as a kite

Ursa Major as a rocket
Connect with the children
Have a relaxed manner
Crouch down
Use names
Invite interaction
Speak to them individually
Choose your language carefully
Don't say "good job" or "that makes me happy" (judgemental comments), but rather "I see you put the cap on your pen" (observational comments, so they're not seeking external praise but you're still demonstrating an interest in the child)
Give warnings about transitions (kids like a schedule just like adults do)
Paraphrase the kids' statements
Use open-ended questions
Praise: selective, specific, positive

Alice Enevoldsen: Alice's Favorite New Graphics

Cupola on ISS – could create your own and put your own picture sliding behind it
Black hole map on the sky
Audience-created constellations on the dome as a walk-in pre-show

Darlene Smalley: An Interactive ISS Show

Show movie in waiting area while lining up
8" diameter Earth
2" diameter Moon
too small to accurately represent the ISS (but use shiny bit on the end of a pencil)
Use the movie "First ten years, next ten years" interspersed with pre-show, post-show interactions
Mentions 36 expeditions but there have been 37 (one more since movie was made)
Model made from cardboard – outline from NASA
Both sides of the solar panels absorb light (from the Sun and from Earthshine)
Hands out a flag per country that has been involved in the ISS; has a map at front pointing out these countries
ISS assembly from youtube (best version of movie has time along the bottom)
ISS control centres include St Hughbert (Canada), Japan (2 sites); also talk about launches in Kazakhstan and French Guiana
7 space tourists
Discuss China and India space programs, and why they are not in the ISS
Show "All Alone in the Night" timelapse video – talk about the aurorae
Bare Naked Ladies and Chris Hadfield song
Spot the Station, and how to interpret their sighting data
Could radiolink with ISS

Richard Gelderman & Ronn Kistler: Integrating Audience Participation into Fulldome Videos

"Two pieces of glass" movie
Metallic plastic spoon to talk about convex and concave surfaces
Bamboo sticks in folding foam to indicate light rays
Have different telescopes set up – talk about them and have a hands-on discussion when you get to the telescope part of the movie

Tube with bubble wrap simulating telescope and distortion with atmosphere

Cards held at arms' length with different holes in to show FOV of different telescopes, including HST
(from Astronomical Society for the Pacific)

It's important to have the interaction interspersed with the movie, rather than waiting until the end (it limits the ability to zone out)

Robert Cockcroft: History of Astronomy in the Planetarium

Various activities that can be adapted to groups of different sizes and ages, and can incorporate different focuses (here, keep bringing it back to ancient Egyptian astronomy as part of the workshop at McMaster)

1 (Daily Motion): North Star's Position in the Sky

Provide an alt-az map, and see how the north star changes its position in the sky according to observations at different latitudes (move to Cairo's latitude)

2 (~Monthly Motion): Wandering Stars (from Keith Davis, LIPS 2012)

Provide a constellation map, show 20-day periods, and ask audience to note positions of planets, eventually linking the positions to show retrograde motion (ancient Egyptians could distinguish the inferior and superior planets)

3 (Yearly Motion): Analemma

Provide alt-az map, and show monthly positions of the Sun, again having the audience note the position of the Sun

4 (Yearly Motion): The Ecliptic and Zodiac Constellations

Provide constellation map, and show monthly positions of the Sun, again having the audience note the position of the Sun (talk about the relevance of the Sun to ancient Egyptians, possibly also including sundial demo)

5: (Motion over generations) Precession

Provide a constellation map and show the audience the sky in 3000 year-intervals, until you go entirely around one precessional cycle (talk about the alignment of the pyramids using the north celestial pole, and how the pyramids' alignment can trace out precession)

6: (Motion over 1,000,000 years) Constellations (adapted from John Kaufmann, LIPS 2012)

Fast forward until the year 1000000 AD to show the proper motion of stars, and how the constellations we currently have will no longer be apparent. Ask the audience to create their own constellations (and discuss ancient Egyptians making their own constellations)

7: Create your own AE Star Clock

Use the desktop version that Rob provided