

Using Suborbital Flight Programs to Support Formal Education ... And Vice Versa!

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Who Am I?

- Until recently, the head of Communication and Outreach at CU/LASP
- Co-Chair, NASA SMD Definition Team for Student Collaborations
- Run formal and informal education programs for a number of NASA missions – match desires of projects with needs of the audience (Juno, NLSI, etc.)
- Currently Higher Education lead for

What Am I Interested In?



- Have national reach
- Are sustainable over time
- Can provide *measurable* impact on STEM in the classroom

What's Cool About Suborbital?

- Space Drives imagination
 - Drives public opinion
- Very sexy!
 - Engages EVERYONE!



- Allows direct participation (in theory)
- Has the potential to impact K-12 formal and informal education in a substantial way

Question: Is it more than window-dressing?

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Question: Is it more than window-dressing? It can be.....

What Are The Bounds on the Box?



- Event-driven
- Limited real estate/flight
- Geographically remote
- Short flights.....
- …But lots of them…..

There may be other defining parameters...

What Are The Bounds on the Box?

- Event-driven ...Need planning and backup
- Limited real estate/flight ...Can't fly a class
- Geographically remote..Too far to easily visit
- Short flights.....Lots of effort for a moment
-But lots of them.....

How Do We Engage? *Teachers!*

- Teachers are the gateway to the classroom
- There are excellent examples of how to get teachers involved...
- There is excellent resea on 'Best Practices'



What About K-12 Student Instruments?

On the plus side...

- Instrument builds are a perfect match for suborbital platforms
- Students can, individually or as a team:
 - Build instruments to fly in a manageable time frame
 - Conduct meaningful experiments
- Mentors can:
 - Build heritage
 - Get experience
- Resources can be found



What About K-12 Student Instruments?

On the other side...

- We want this to be more than flying an empty soda can
- We want this to be a vector for teaching authentic science and engineering
- For most class, even HS:
 - Not enough backgrour
 - Not enough experienc
 - Not enough time
 - Not enough resources



What About K-12 Student Instruments?

- There are excellent examples of K-12 student instruments
- They have very high impact on participating students
- Often on suborbital platforms
- Often partnered with a space science or engineering program
- Remains a small group c impacted students



How Do We Broaden the Reach?

Is there a middle ground for student instruments? **Yes...**.

- Programs and contests that focus on ideas, rather than fabrication and testing
- Programs that utilize data collected by instruments designed by others
- Heard some excellent examples of these today!



How Do We Bring It Into the Class?

- It's a tough business!
- The Era of High Stakes Testing takes a toll
- It needs to be "Plug-n-Play"
- Needs to be:
 - Standards-based
 - Inquiry-based
 - Multi-platform
 - Tech-savvy
 - Engaging



 Make the connection to the science and engineering and <u>those doing it</u>



A Successful Model: The Jason Project

- Similar to our scenario
 - Event driven
 - Limited real estate
 - Geographically remote
- What is JASON?



- Started in 1989 by Dr. Robert Ballard
- Comprehensive STEM program (and beyond) for K-12 students
- Uses exploration as a vector to engage and entrain students and teachers
- Currently reaches ~1 M students per year

The Jason Project Components JASON





Comprehensive Curricula





Multi-Media Assets

• Videos

Committed Science Teamseractives

- Live Events w/ Science Tea
- PD Support

Multi-Dimensional Teacher PD

- in-person and virtual
- short- and long-term
- substantial follow-up
- different levels of involvement



Argonaut Program

- Deep Involvement
- 15-day Boot Camp
- Teachers & Students
- Extended Activity

The Jason Project Impacts



- Reaches 1M per year and 12M students over JSMC lifetime.
- JMSC influences students' perceptions of scientists, doing science, and being scientists.
- Hands-on activities from the curriculum support student engagement and motivation, helping students be able to grasp complex scientific ideas by making them concrete.
- Multidisciplinary components of the JMSC provide coherence in students' learning through capturing their interest and providing opportunities for collaboration.
- Students appreciate the variety of experiences and access to knowledge that the multimedia components (videos, Live Broadcast, digital labs, Internet research, and other online activities) provided them; students claimed the affordances of multimedia helped them learn better.
- Students with varying literacy levels were able to access complex scientific concepts.
- JMSC use resulted in an understanding of key JASON scientific content, concepts, and technologies.

The Jason Funding Needs



- Annual Costs: \$4-5 Million/annually
- Participant Costs:
 - Registration is free
 - Some curriculum packets are downloadable for free, but most cost \$\$ (from \$80-\$3000).
 - Teacher PD at a single geographic point is available for a price, depending on duration and # of participants.

The Jason Funding Sources



Every source imaginable:







Microsoft









Ewing Marion KAUFFMAN Foundation



The Jason Feedback Loop



It's not just that Jason achieves its goal of impacting STEM education nationally

- Jason also benefits, in terms of recognition and national awareness, from its programs.
 - Carefully balanced Argonauts selection, based on diversity, demographics and geography.
 - When a teacher in SD is selected, the whole state knows it and participation in Jason for the state in the classroom increases.

Creates long lasting political goodwill at a

Where Does This Leave Us?



- Suborbital has all of the components for a successful, exciting and impactful education program!
- Topics are many: Heliophysics, Atmospheric science, Microgravity, Biology, Engineering, Rocketry, etc.
- Need a plan!
 - Built by the right mix of experts
 - A variety of flexible programs or targets that are scalable, depending on the opportunity.
- Probably not a substantial funding stream
 - But as a way to use unfunded capacity and



Nothing Beats It!

- Excitement of Exploration
- Connection to Working Scientists and Engineers
- Hands-On Authentic Research
- Being Part of the "Right Stuff"

Suborbital has all of this and can make a real difference in STEM