CHALLENGER LEARNING CENTER OF ALASKA

"Nanotechnology in Space" with



The Challenger Story

- Jan 28, 1986 was one of the most disastrous days in space exploration ever.
- The crew included Christa McAuliffe, Teacher in Space
- Challenger Learning Centers became a living memorial to the shuttle astronauts who perished.



NASA

Challenger and Nano!

Hosted a NanoDays event 2011, 2012, 2013

Received a Nano Mini Exhibition

 Attended the NiseNet conference in Boston 2012 where I networked and learned ALL that the NISENet has to offer!

2012 Mini-Grant Recipient

- Align NISENet resources into a "Nano in Space" module
- Designed to be a 2.5 hour stand-alone workshop that has the flexibility to be integrated into summer camps.
- Module was beta-tested at Girl Scout Women of Science event in Anchorage

Addition of Other Activities





Darling Models Carbon Tubules activity

Molymod Models of Graphite, Diamond and Buckeyball



Aerogel Demonstration







CHANTELLE ROSE DIRECTOR OF EDUCATIONAL OPERATIONS CHANTELLE.ROSE@AKCHALLENGER.ORG 907-283-2000

children's Museum **NISEnet Mini Grant: Incorporating Nanotechnology** concepts into in-house and outreach fieldtrips Jamie Bonnet and Alison Luk

Wind tubes with 3-5 year olds





Wind tubes with 5-8 year olds







Chemical Reactions Outreach -

Rockets

Fuel Launch Testing

Break tablets in half and place them each in their own cup. Break tablets again to match the pictures.

Begin Testing

- Add half a cup of water to testing canister.
- Drop one cup of tablets in canister.
- Snap on lid and flip canister over.
- Time how long it takes to launch.

	Time to launch:	
T		
	Time to launch:	

× .	-		2
	N		
	-	-	-

Time to launch:



Did	one	fuel	launch	faster	?

Why?

Now begin building a rocket to cover your canister. Use the fuel that launched the quickest to power your rocket.





Nano Mini Grant: Thematic Field Trip Bus

Jessie Herbert Museum Manager spectrUM Discovery Area



NanoBus

- FREE Thematic Field Trip Bus
- Bring students to spectrUM for a field trip





Extension of Field Trip



- Thematic bus is an extension of the field trip
- Educators and researchers on the bus with the students
- Sing songs and do activities on the bus

SpectrUM

Nano Researchers



6





Results

• 4 weeks

6

- Up to 5 trips a day
- 484 K-5th grade students







NISE MINIGRANT - NANO CAMP Partnerships Increase Resources

Heather Armstrong University of New Mexico



- Heather Armstrong & The Nanoscience
 and Microsystems Program
 - The University of New Mexico
- Annette Mares-Duran
 - Children's Choice

Partners

- 16 week after school program Zuni Elementary School
 - Students opt to join
- Students would learn about nano science
 - NISE NanoDays kits
- Every other week "specialist" visits
 - NSMS graduate students & Post Docs would present their research and kits
- Four UNM Laboratory tours
- Final trip for parents and students to Explora
- NISE funding further supported by United Way grant

The Plan



Who brings what?

- Children's Choice KIDS!
 - Very successful not-forprofit after school program with emphasis on education
 - After school structure including "classes"
 - Interested & willing
 - Multiple sites for expansion
 - Additional funding support from United Way

- NSMS at UNM SCIENCE!
 - Graduate community who wants to bring science to their community
 - NISE Grant
 - NISE kits
 - Science toys (Laboratories)
 - Specialized knowledge
 - Other areas of interest on campus

Who brings what?

A picture is worth a million words, right?

Here are some of our pictures.



Dress for success



Amber – Magnetic Drug Delivery



Carol – Protocell/Aerogel



Samantha – Imaging & Computers



Eric, Patrick, Harry – Tissue Growth



THE BEST NEWS....

WE ARE DOING IT AGAIN.

Children's Choice is continuing to offer this after school program.

But wait! There's more!

UNM NSMS has adopted Monte Vista Elementary.

A teacher at the school is using the minigrant plan and NISE resources to teach Nanoscience during their enrichment time.

- 17 activities
 - NISE kits
 - Videos
 - Linked websites
 - Specialist visits
 - UNM laboratory tours
- Target audience
 - All first, second, and third grade classes.
- Two lessons a week, 1.5 hours per lesson



Natural History Museum of Utah NISE Net Mini-grant

Natural History Museum of Utah

Nano Summer Institute 2012

A collaboration between the University of Utah's Nano Institute and the museum's Youth Teaching Youth program






Nano at the Nuclear Science and History Museum

Fun with NANO!!



Bucky Balls and Marshmallows





It always works better if you stick out your tongue!



Nano Guest Speakers

During camp, guest speakers are invited. This is a nano engineer who came to speak with the camp about the basics of nano technology and what products are currently being developed and used in the public right now.





Thank goodness for tall teenage counselors!



These clean suits are cool and make me look like a frog!!

This guy is way smart!





Top Secret

Lots of COOL Stuff!





Thanks UNM-we love NANO!!



NanoDays Natural History Museum of Utah



NanoDays Natural History Museum of Utah



NanoDays Natural History Museum of Utah





NanoDays Harlem Shake Video

"Nanotechnology- It's a Small World!" Outreach Program Rosalia, Washington

April 17, 2013



Nanotechnology

Nano means billion

A <u>nanometer</u> = one billionth of a meter That's really tiny!!!

How small a piece of paper can you cut?

1 mm? A nanometer is a million times smaller than that!

Here's are some ways to think about how small a nanometer is:

- Your fingernails grow one nanometer every second.
- Your DNA is 2 nanometers wide
- One red blood cell is about 7,000 nanometers wide.

• A strand of your hair is about 75,000 nanometers wide



Nanoscale <u>science</u> focuses on things that are measured in nanometers, including atoms and molecules, the basic building blocks of our world.



Nano<u>technology</u> = using nanoscale science to make new materials and devices we can use! Materials made of the same kinds of atoms can have very different properties, depending on their nanoscale (molecular) structure.

Example: Carbon atoms

- Graphite
 - Diamond
 - Nanotube
 - Buckyball

Materials often behave very differently at the nanoscale level! WHY?

Some <u>forces</u> are more important than others at the nanoscale level.

Today you will explore the tools, forces, materials, and products that are part of the world of nanotechnology!

NanoDays Kits used :

- Exploring Size: <u>Scented Balloons</u>
- Exploring Tools: <u>Special Microscopes</u>
- Exploring Materials: <u>Graphene</u>
- Exploring Materials: <u>Ferrofluid</u>
- Exploring Materials: <u>Nanogold</u>
- Exploring Products: <u>Nanosand</u>
- Exploring Products: <u>Sunblock</u>
- Exploring Products: <u>Stain-Resistant Fabric</u>
- Exploring Products: <u>Memory Metal</u>
- Exploring Forces: <u>Gravity</u>

Which activity was the most interesting to you? Why?

Do you see any potential problems with the uses of Nanotechnology?

Here's how scientists hope Nanotechnology will be used in medicine: <u>http://nisenet.org/catalog/media/intro_nanomedicine_video</u> (Go to Resources, then right click and "Watch on Vimeo"

How many of you learned something new today that you never knew before?



NanoDays @WSU Vancouver

Praveen Kumar Sekhar, Kumar Subramaniyam and Hanna Mekonen

Nanomaterials and Sensors Laboratory School of Engineering and Computer Science <u>praveen.sekhar@vancouver.wsu.edu</u> 360 546 9186

Overview

WASHINGTON STATE UNIVERSITY VANCOUVER World Class. Face to Face.

- Educational nano-camps conducted in Summer 2012, Fall 2012 and Summer 2013
- Camps conducted in association with Southwest Washington MESA.
- MESA (Mathematics, Engineering, Science and Achievement) is a nationally recognized organization that has been serving students for over 30 years.
- MESA's goal is to help provide a pathway to college and careers in the STEM (Science, Technology, Engineering and Math) fields for student who are currently underrepresented in those fields: African American, Native American, Latino and females.
- Southwest Washington MESA is housed at Washington State University Vancouver, which provides significant in-kind support and fiscal oversight.



Summer 2012 Experience

- Total number of students participated : 60 (Middle and High School Students)
- Male: 30
- Female: 30
- 68% of student participants had not participated in any special (technology/summer) camps before
- Two sessions held: Morning and Evening for three days
- Lunch provided by SW MESA
- Volunteers: Hanna and Kumar (Undergraduate electrical engineering students)
- Supervision and Liability: Praveen

WASHINGTON STATE UNIVERSITY

World Class. Face to Face.

Camp Images



Women Power

WASHINGTON STATE UNIVERSITY

World Class. Face to Face.

Camp Images



Men Power



Evaluation

Questions asked of students:

•Were you interested in Engineering and Science before participating in the Summer Program?

57% Yes 3% No 40% Kind of

•Are you more interested in Engineering and Science now that you have participated in the Summer Program? 60% Yes 7% No

33% Kind of

 How much did you know about nanotechnology before the program? 10% A lot 87% A little 3% Nothing

Evaluation

- How much did you learn in your classes?
 65% A lot
 35% A little
 0% Nothing
- Would you recommend this program to your friends? 78% Yes 6% No 16% Maybe
- Rate the NanoToday Program 1(low) 5(high)
 - 1 0%
 - 2 0%
 - 3-6%
 - 4 62%
 - 5 32%



Future Plan



- Enhance experiential learning by observing the nanowires in an Scanning Electron Microscope.
- Partner with other institutions and universities in submitting grants to external funding agencies. Interested in collaborations.

Acknowledgements

Nanoscale Informal Science Education Network for support.

WASHINGTON STATE UNIVERSITY

VANCOUVER

World Class. Face to Face.

UNM - NanoDays

Heather Armstrong University of New Mexico
































Nano Mini-Exhibition National Museum of Nuclear Science & History





Nano Mini-Exhibition National Museum of Nuclear Science & History





Nano Mini-Exhibition Natural History Museum of Utah





Nano Mini-Exhibition Natural History Museum of Utah





Nano Mini-Exhibition Challenger Learning Center of Alaska



Nano Mini-Exhibition Challenger Learning Center of Alaska





Nano Mini-Exhibition Challenger Learning Center of Alaska





Nano Mini-Exhibition OMSI





Nano Mini-Exhibition OMSI





Nano Mini-Exhibition OMSI



