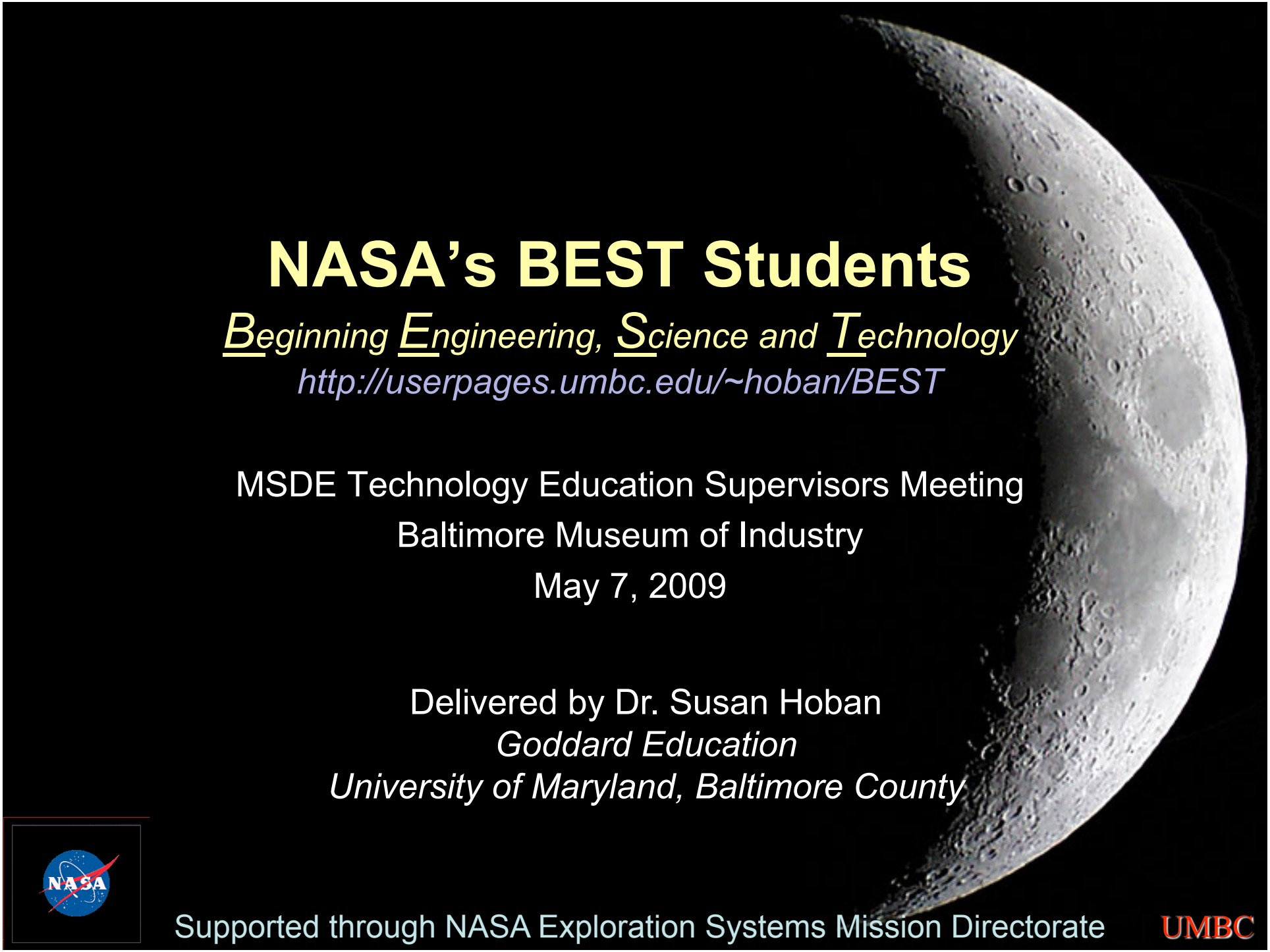

NASA's BEST Students

Beginning Engineering, Science and Technology

http://userpages.umbc.edu/~hoban/BEST

MSDE Technology Education Supervisors Meeting

Baltimore Museum of Industry

May 7, 2009

Delivered by Dr. Susan Hoban

Goddard Education

University of Maryland, Baltimore County

Supported through NASA Exploration Systems Mission Directorate

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Today's Presentation

- Issues & Approach
- NASA's BEST Students
- Fundamentals of Lunar Exploration
  - Aka The Search for Lunar Ice
- NASA's Digital Learning Network
- What's next?

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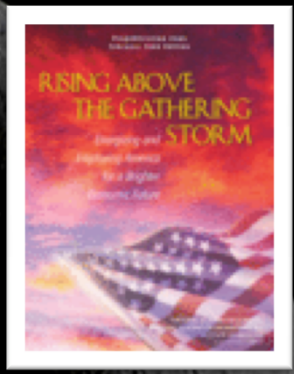
“The Gathering Storm”



Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future

Report from the Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology, National Academy of Sciences, National Academy of Engineering, Institute of Medicine (2007)

- The Issue: the position of the United States in today’s global knowledge-discovery enterprise.

  “A weakening of science and technology in the United States would inevitably degrade its social and economic conditions and in particular erode the ability of its citizens to compete for high-quality jobs.”

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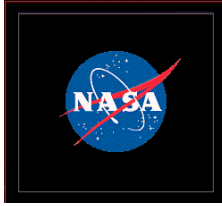
Career Choices

- US Students performing below international counterparts on science and mathematics
- US Students are not choosing technical careers
- ED342892 - A Comparison of Curriculum and Career Choices of Senior School Students in Taiwan and the United States (ERIC Study)
  - US Students choose careers for starting salary (NOT earning potential)
  - Taiwanese students choose careers based on interest



WHY??

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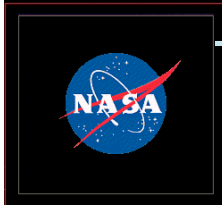
Approach

- Address generational learning styles
  - 50+ minute lectures are not effective
- Eliminate the artificial academic silos
  - that's the point of STEM
- Develop a focus on Teacher Education
  - Per recommendations of *Gathering Storm* report, 10,000 teachers, 10 million minds
- Put the *fun* back in "fundamentals"
  (INSERT FAVORITE INTRODUCTORY COURSE NAME HERE)
- Raise the bar.
  - Students will rise (or drop) to expectations.



"We choose to go to the Moon. We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win..."

JFK, Rice University, September 12, 1962

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NASA's BEST Students

Beginning Engineering, Science and Technology

- STEM standards-based, Engineering Clubs
- 2-week Summer Bridges
- STEM Collaborative Challenge
- STEM Systems
- STEM Expo

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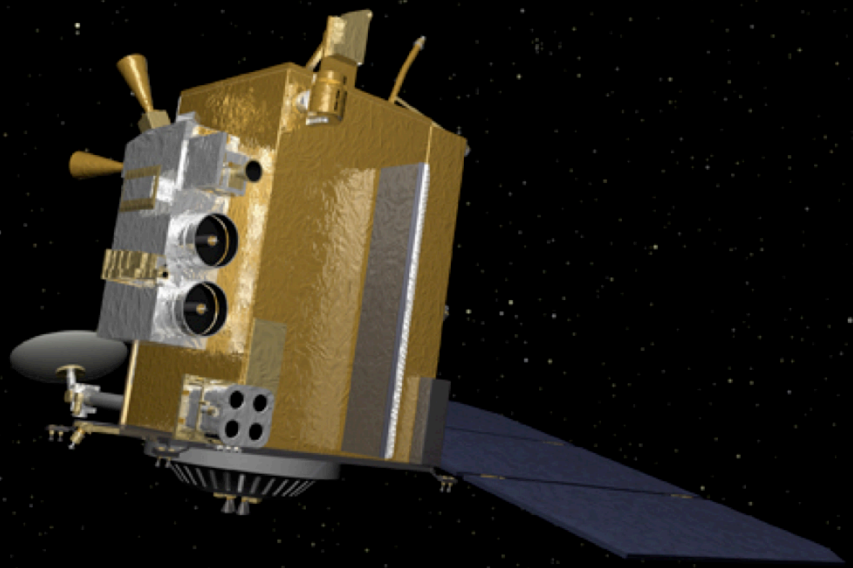
STEM Content in a NASA Exploration Context



Lunar Exploration

- LIDAR Mapping
- Search for Lunar Ice
- Rockets, satellites, rovers, habitats (power generation, food-water-oxygen), etc.
- Launching, orbiting, landing
- Mission Design & Execution

Having said that…

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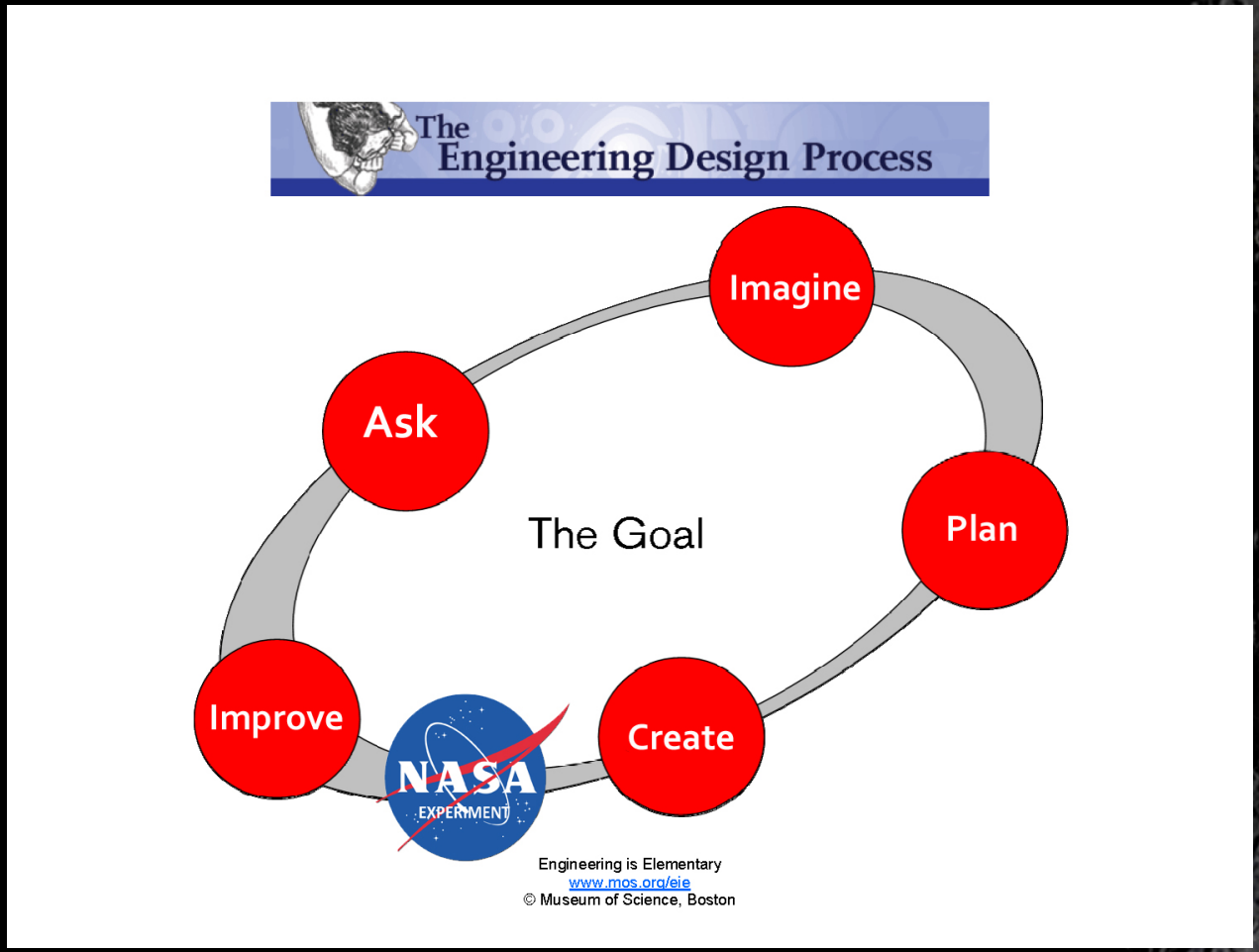
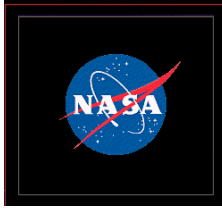
The Engineering Design Process





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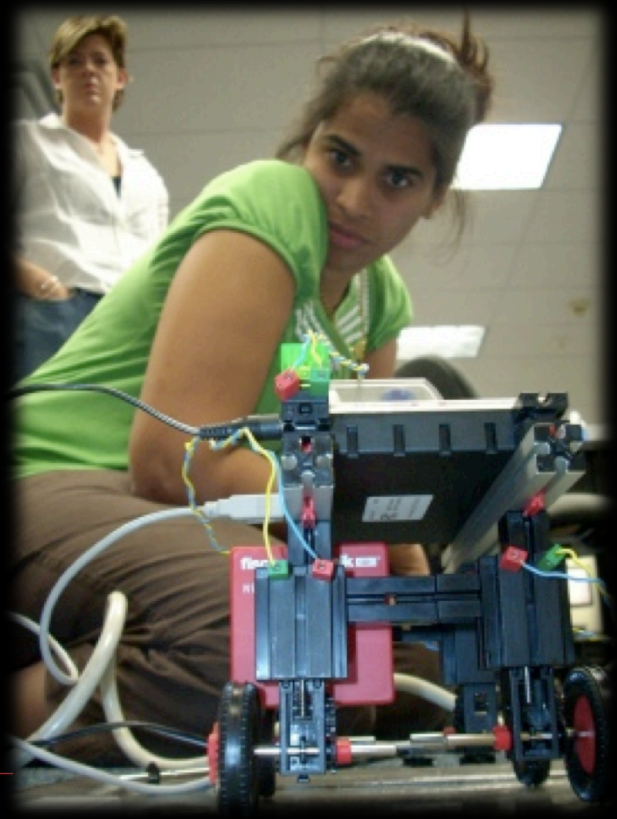
Target Audience

Professional Development



Curriculum

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BEST emphasis: Professional Development

Primarily ePD

- Engineering Clubs
  - K-2
  - 3-5
  - 6-8
- STEM Challenge, 6-8
- STEM Systems
  - 9-12
  - 6-8
- STEM Expo, “Family”
  - Mainly 6-8

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Project Status

- Engineering Clubs
  - Pilot completed 2008
  - 23 schools, >300 students
  - Activity Guides in Product Review
  - 12 more activities underway
  - ePD ongoing
- STEM Expo
  - Pilot Nov. 15, 2008
  - 149 attendees
  - Handbook in development

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- STEM Collaborative Challenge
  - Search for Lunar Ice Robotic Challenge
  - Underway with 3 schools (MD, England, Germany)… maybe to add one in AZ
  - ePD with a twist: in Second Life (under development with NASA Learning Technologies office)

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STEM Systems, ramping up

- Discussion Forum with stakeholders 3/19/09
- Summer Bridge in July
- High school course
  - Pilot in STEM Magnets
  - Fall 09, Spring 2010
- Middle School Modules to follow, 2010
- University Course (MAE Program), 2011

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Project Status, conclusion

- Summer Bridges
  - Last year combined MSDE Gifted & Talented, AACPS – 40 students
  - This year, two offerings
    - Robotics (offered twice, once for MSDE, once for AACPS)
    - STEM Systems (for AACPS)

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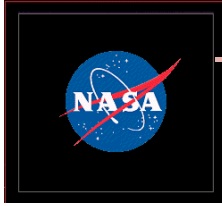
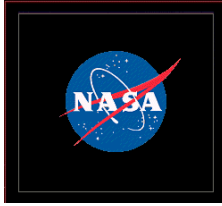
Notable Successes

- 2008 pilot of Engineering Clubs in AACPS
  - Strong positive feedback – uniqueness for K-2, 3-5
  - Strong positive student response – request to repeat
  - Constructive feedback from teachers
    - E.g. Activities take more than one session
    - May choose to run 6-week clubs instead of 12-week, particularly in elementary school
- Tentative results for ePD
  - Teachers responding positively to convenience
  - Teachers need more training on STEM content
  - Some self-discipline issues (too easy not to log on)



Fundamentals of Lunar Exploration (FLEX) For Educators

- Master's level course through UMBC
  - SCIE 510, has been taught for all levels of educators
    - Baltimore County – Elementary
    - Baltimore County – High school
    - Anne Arundel County – Middle and high school
- 3-day professional development workshop
  - Measurement Basics, Data Presentation and Analysis
  - Topographic mapping
  - Simulated robotic mission (process skills)
  - Basics of programming (Lego Mindstorms or BOE Bots)



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For Students

- Two week summer bridge, as mentioned during BEST discussion
- Online challenge, managed by local instructor but supported by inline interactions with NASA (i.e. the BEST project team)
  - In class or co-curricular
  - Teacher managers timeframe

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NASA Digital Learning Network
http://dln.nasa.gov

- *Live*, *engaging*, and *interactive* programs through videoconferencing.
- Goal is to provide *unique access to NASA resources & facilities to students and teachers.*
- Each event encourages *innovation* and *collaborative learning*

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NASA Digital Learning Network
http://dln.nasa.gov

- *Free programming* – just need the technology and an IP address!
- K-12 events available *on request* through an online registration system.
- Professional development offered through each DLN site upon special request.

Wall-e Movie

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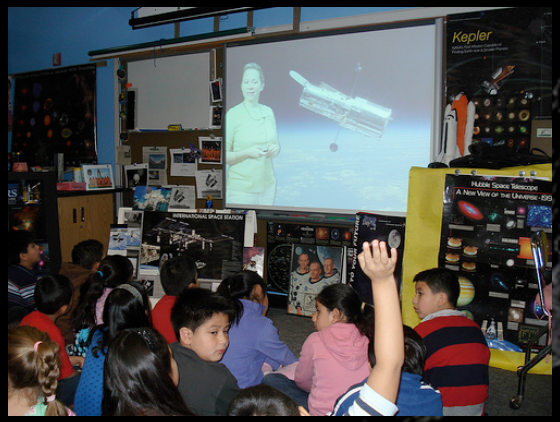
NASA Digital Learning Network
http://dln.nasa.gov

- *If your school doesn't have the technology, try*
  - NASA Educational Regional Service Centers
  - National Guard or other military base
  - Universities
  - Businesses
  - Museums & Science Centers



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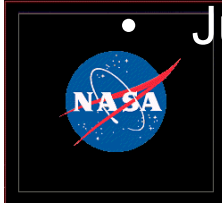
DLN InfoChannel - webcasts

- May 11, 12:31 pm EDT, Space Shuttle LaunchCast: Join Damon Talley of NASA's Digital Learning Network live for the launch of Space Shuttle Atlantis on STS-125 on the final mission to Hubble. Special guests will include experts on the Hubble Space Telescope, NASA Education Programs, and others. Interact with these experts live via email during this expanded 90-minute program beginning at 12:31 pm EDT and culminating in the launch of Shuttle Atlantis at 2:01 pm EST

- May 15, 3-4 pm EDT: HUBBLE's GREATEST HITS! Join Dr. Frank Summers of the Space Telescope Institute for an exciting look back at Hubble's illustrious history and the science behind NASA's best known space telescope.

- June 18, 4:00-5:30 PM: The Story of Ocean Heat Storage



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Contact Information

- BEST Materials
  http://userpages.umbc.edu/~hoban/BEST
- Digital Learning Network
  http://dln.nasa.gov
- Electronic Professional Development & DLN
  Marci.Delaney@nasa.gov
- BEST & FLEX Project Information
  Susan.Hoban@nasa.gov

The sky is no limit for NASA's BEST Students!

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