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Education Partnerships in the Stratosphere: Airborne Astronomy Education and Outreach

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Dana Backman, SOFIA Outreach Director
SETI Institute
February 19,2010

SETI Institute

The mission of the SETI Institute is to explore, understand and explain the origin, nature and prevalence of life in the universe.

SETI Institute

- Non-profit research institute
- 25 years old
- NASA, NSF, USGS, and private funders of science, space missions, education and outreach

Visit: www.seti.org

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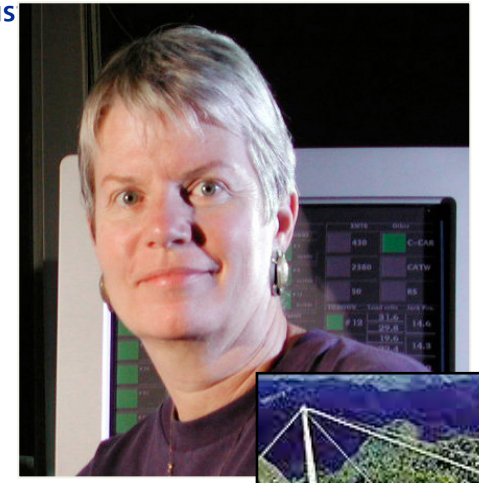
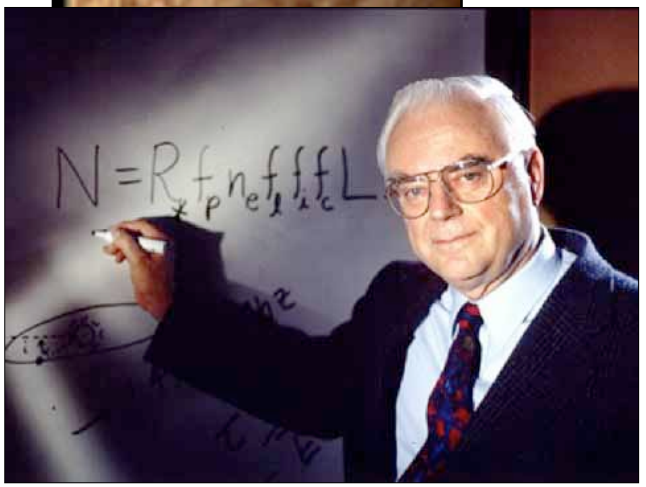


SETI — Center for SETI Research



Astrobiology - Carl Sagan Center for the Study of Life in the Universe

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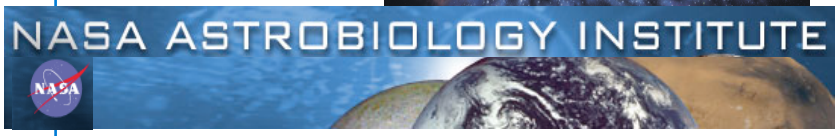
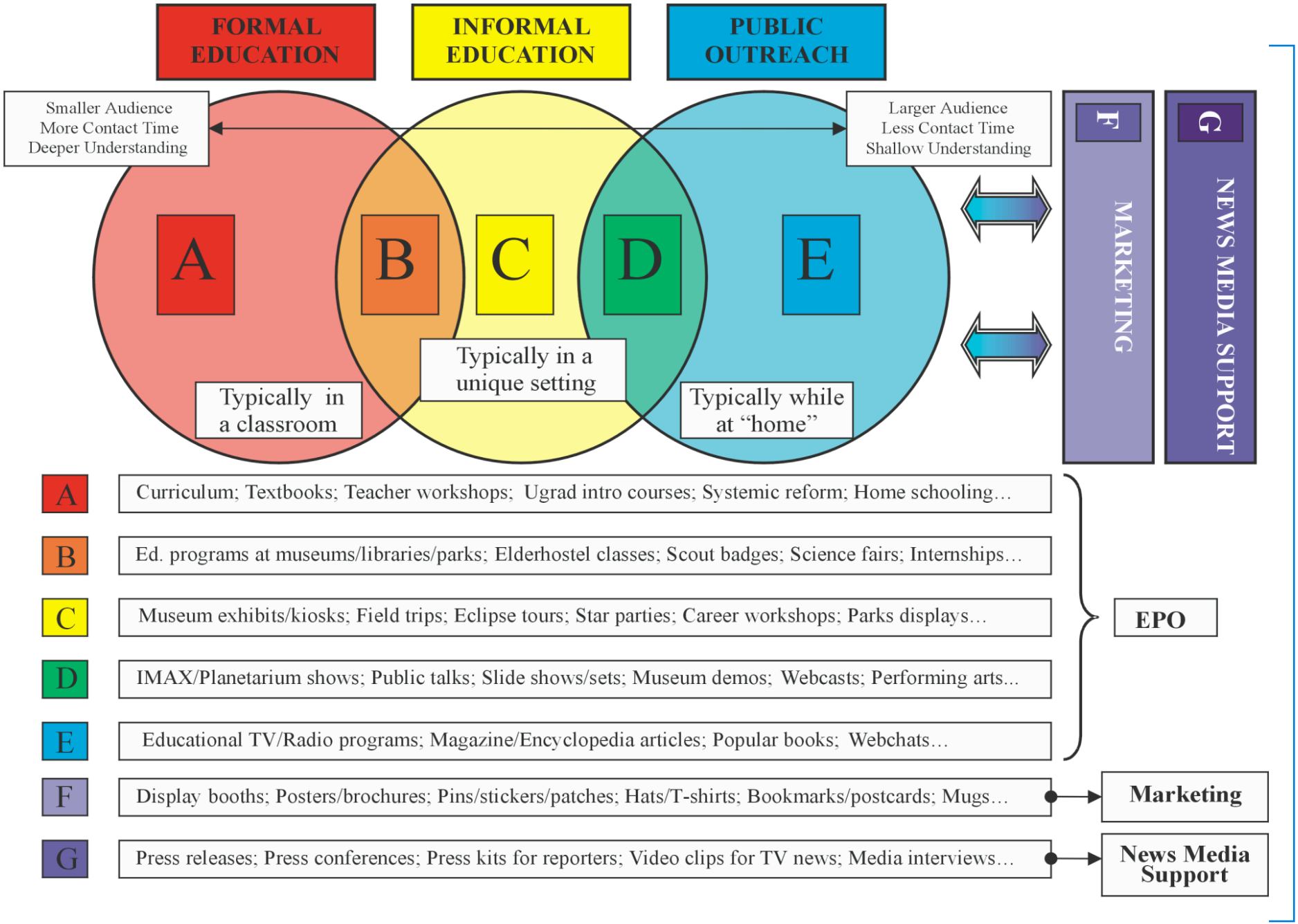


Center for Education & Outreach

- NASA EPO Programs
- Curriculum Products and Publications
- Teacher Professional Development
- Public Lectures
- Research Experiences for Undergraduates
- Planetarium Programs
- Museum Exhibits
- Principal Investigator EPO Activities
- Publications, SPACE.com
- Science & Education Conferences
- Radio Program: “Are We Alone?”
- Website
- Podcasting



"A Framework for Developing Education & Public Outreach Programs Associated with Scientific Research Programs" by C.A. Morrow, June 2000, camorrow@colorado.edu

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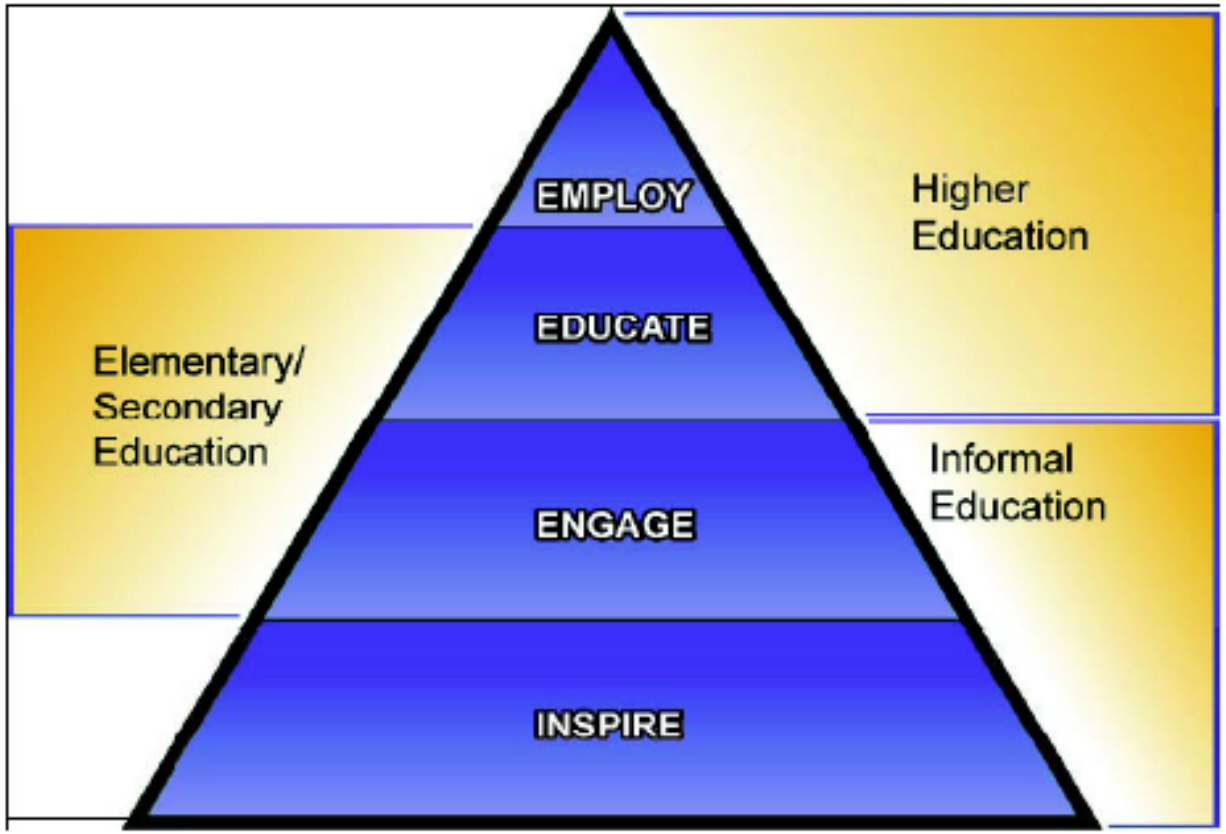
from NASA Education Strategic Framework:

"the pipeline"



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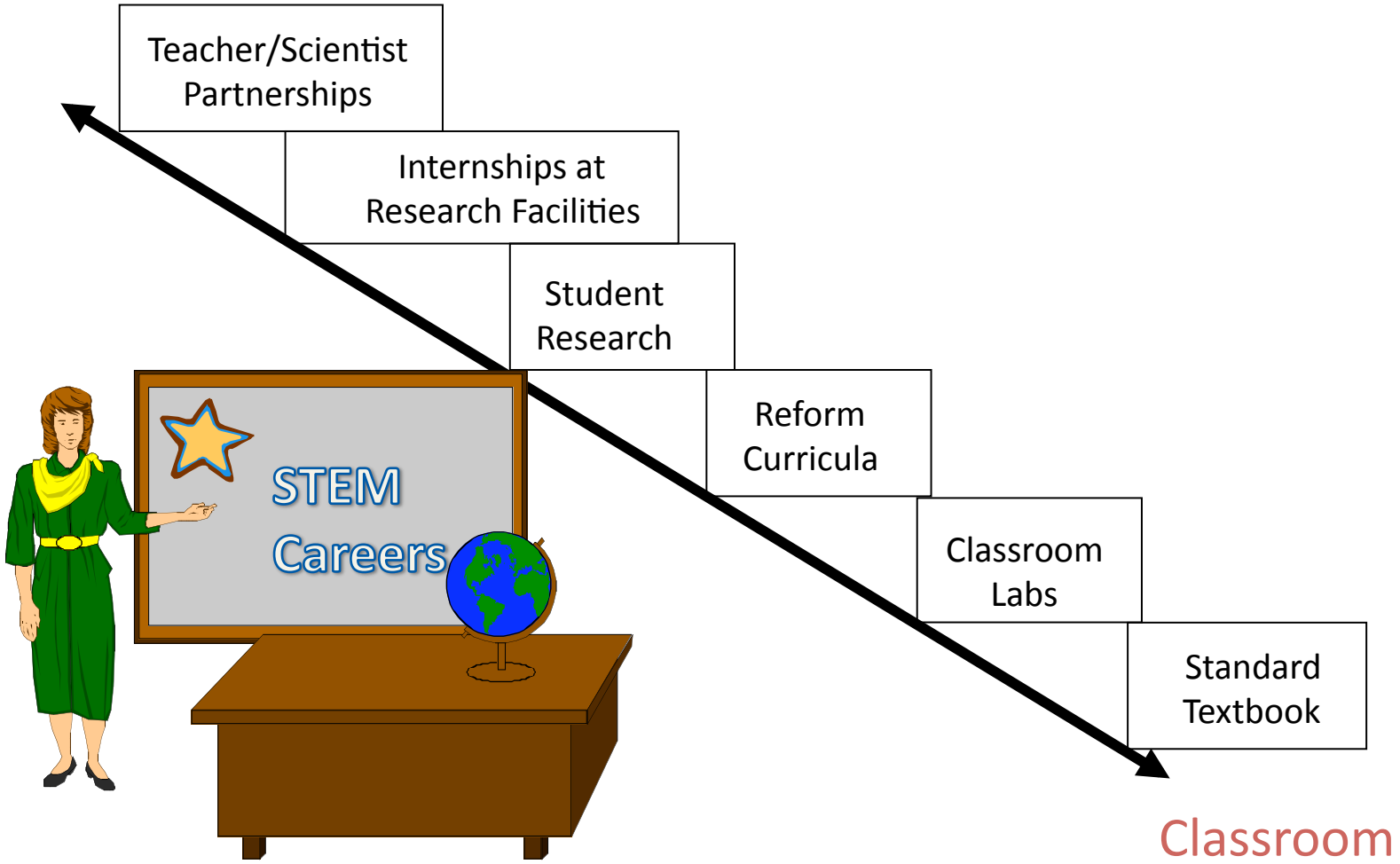
How do teachers & students do/learn science?

Research Site



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Continuum engagement in STEM education

Research Site

Teacher/Scientist Partnerships

Mentoring teachers/students

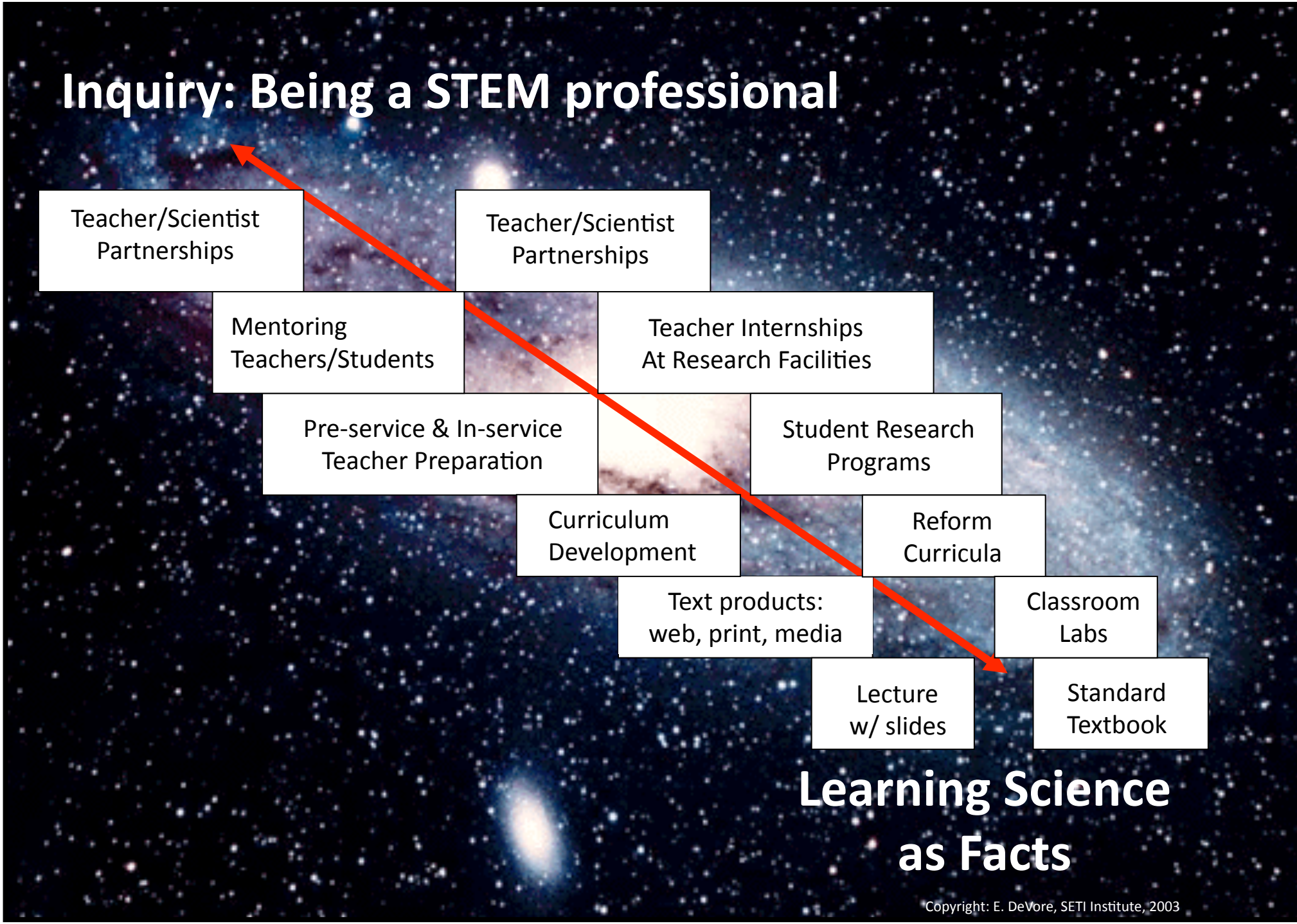
Pre-service & In-service Teacher Preparation

Reform curriculum development

Text products web, print, media

Lecture with slides

Classroom


Inquiry: Being a STEM professional
Teacher/Scientist Partnerships
Teacher/Scientist Partnerships
Mentoring Teachers/Students
Teacher Internships At Research Facilities
Pre-service & In-service Teacher Preparation
Student Research Programs
Curriculum Development
Reform Curricula
Text products: web, print, media
Classroom Labs
Lecture w/ slides
Standard Textbook
Learning Science as Facts
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Airborne Astronomy

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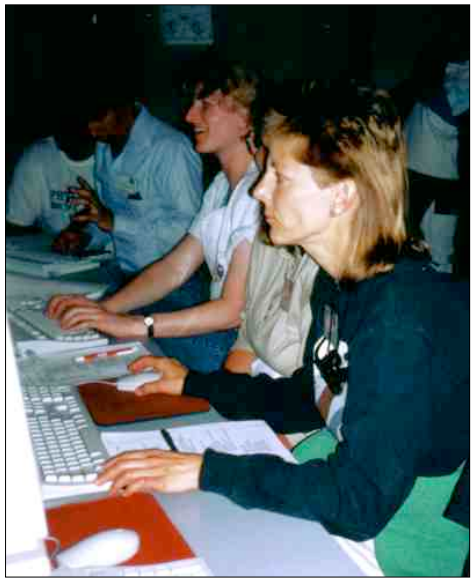
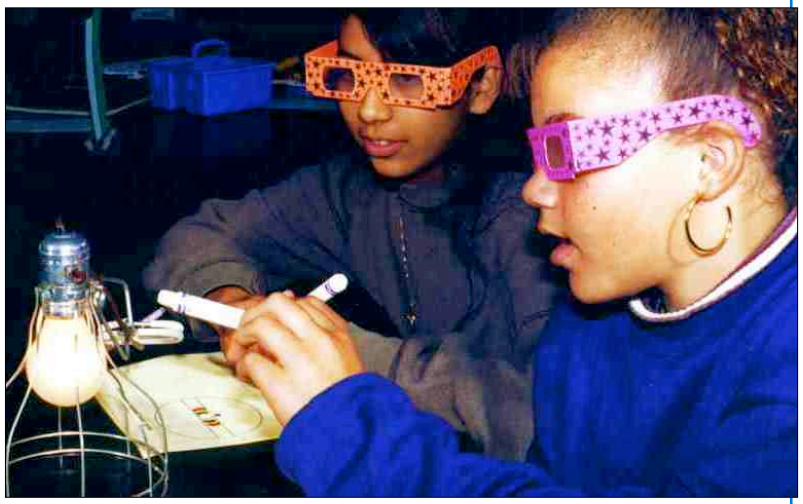
1992-1995—early NASA SMD EPO





FOSTER:
Flight Opportunities for Science Teacher EnRichment

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FOSTER: Flight Opportunities for Science Teacher EnRichment

- NASA SMD funded program
- Rotary International funded 1 team
- Piloted regionally; expanded nationally to 14 states (3rd year)
- Collaborated with Space Grant Colleges
- Recruited teachers in teams of 2
- Required administrator agreement
- Paid expenses, including substitutes
- Middle & HS STEM teachers

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FOSTER: Flight Opportunities for Science Teacher EnRichment

- 70 math/science/tech teachers
- Summer institute at NASA for teachers
- Participation of scientists in workshop
- Research flight on NASA's KAO
- Teachers conduct outreach
- 1992-95: 50 teacher flights
- Follow up conducted

Parallel programs:

-Dan Lester's Teacher Partnership

-Geoff Haines-Stiles, Live from the Stratosphere

-Exploratorium live communication experiment

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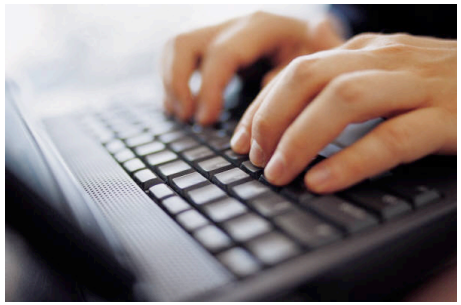
Lessons Learned

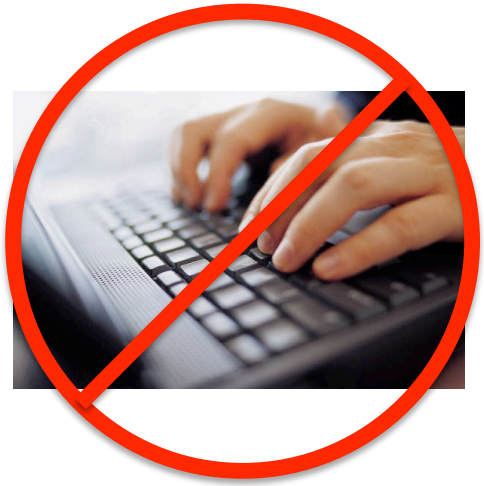
- Communication is essential to create and sustain partnerships, and funding is required for participation



SallyTeacher @ School.edu

Lessons Learned

- Communication is essential to create and sustain partnerships, and funding is required for participation
- In 1992, most teachers worked in a paper world.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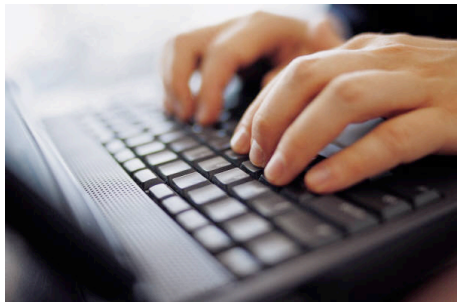
Lessons Learned

- Today, communications are easier.
- Funding is still required for participation
- Schools, colleges and universities are suffering financially



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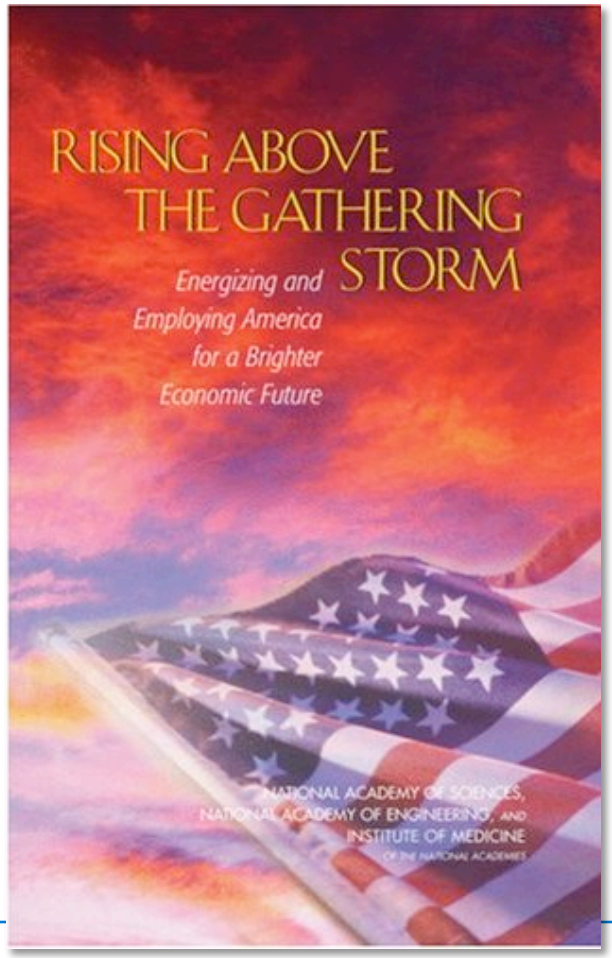
10,000 TEACHERS, 10 MILLION MINDS, AND K–12 SCIENCE AND MATHEMATICS EDUCATION

- **Recommendation A:**
  Increase America's talent pool by vastly improving K–12 science and mathematics education.



Norm Augustine, Chair

Published 2007

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Students in US Public Schools Taught by Teachers with No Major or Certification in the Subject Taught, 1999-2000

Discipline	Grades 5-8	Grades 9-12
English	58%	30%
Mathematics	69%	31%
Physical Science	93%	63%
Biology	---	45%
Chemistry	---	61%
Physics	---	67%
PE	19%	19%

SOURCE: National Center for Education Statistics. *Qualifications of the Public School Teacher Workforce: Prevalence of Out-of-Field Teaching 1987-1988 to 1999-2000. Washington, DC: US Department of Education, 2003.*

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Lessons Learned

- STEM educators want to participate, not just watch
- STEM educators & their students benefit when teachers do science and engineering
  (eg. STAR, IISME, Columbia U.)

- EPO specialists (payload specialists) bridge the world of high-tech research and teaching
- EPO specialist adds value: supports trainin, builds partnerships, and manages logistical requirements
- STEM educator professional development (aka training) is critical to successful programs
  - in person or via online (eg. MSU Advanced Astro)

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Airborne Astronomy

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Lessons Learned

- Partnership with research team prior to flight significantly enhances experience
- Teacher participation generates high community interest; long-term interest at schools
- Virtual experiences are valued: Live from the Stratosphere on last flights of KAO
- High level of media and political interest in teacher participation
- Financial support is required for broad participation

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Airborne Astronomy

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SOFIA--The Next Generation Airborne Observatory

- 2.5-meter (98-inch) telescope in a Boeing 747SP
- Based at NASA-Dryden's Aircraft Ops Facility in Palmdale
- SOFIA Science Center at NASA-Ames
- 120+ 8-hour research flights per year; 20 year lifetime
- 20% share with the German space agency DLR
- The world's largest portable telescope !
- Useful for both visible and infrared research
- 1+ month per year in southern hemisphere
- First test flights in '07, first science flights in '10

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SOFIA—Education & Outreach

- **Overarching Goals:**
  - Enhance Science, Technology, Engineering, and Math education across the U.S.
  - Support NASA's goal of inspiring the next generation of explorers.
  - Contribute to general public understanding of the value of scientific research.
  - Foster national and international visibility of the SOFIA program's achievements and discoveries.
  - Help the SOFIA scientific staff promote SOFIA to the astronomy research community.

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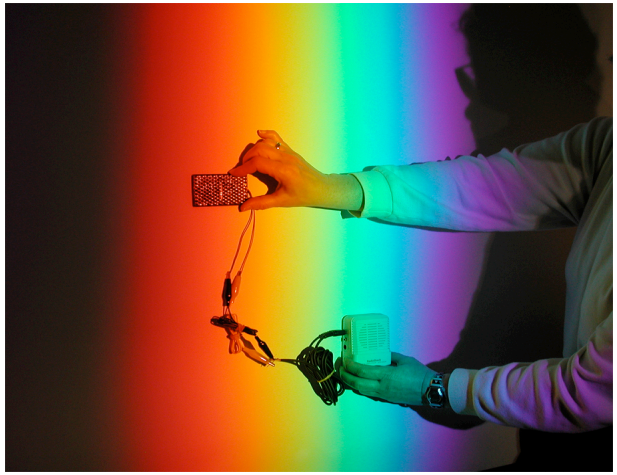
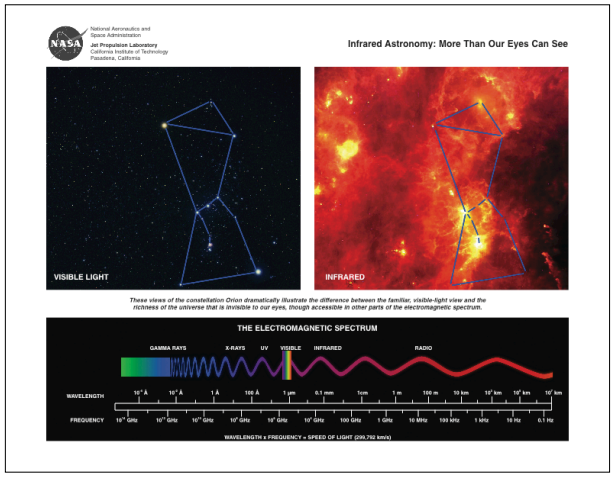
EPO Activities & Products

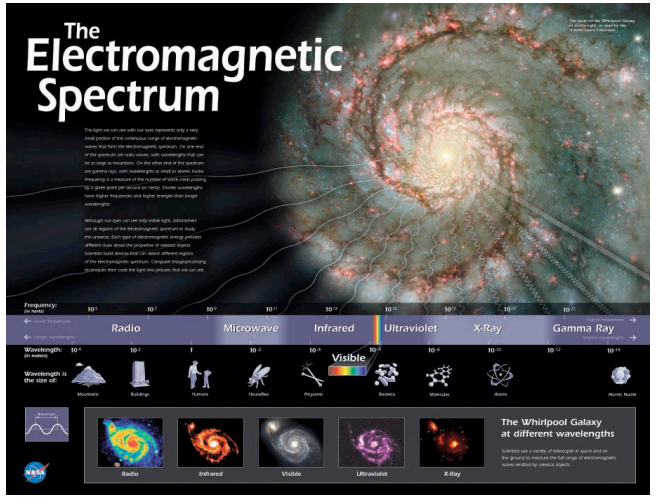


Hands-on lessons

Teacher professional development



Educational materials



Instructional posters

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SOFIA Education Flagship Poject

- Airborne Astronomy Ambassadors
  - teams from communities
  - training provided: online & in-person
  - flight experiences: week at observatory
  - sustained network of ambassadors
  - ongoing in-person and on-line events
  - data for educators (specifics TBD)
- Nation-wide impact
- Visit: http://www.sofia.usra.edu/

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