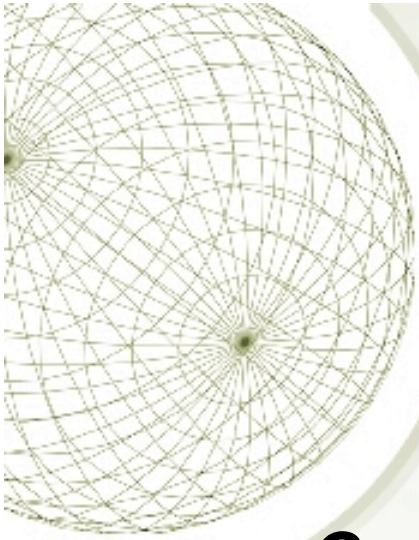


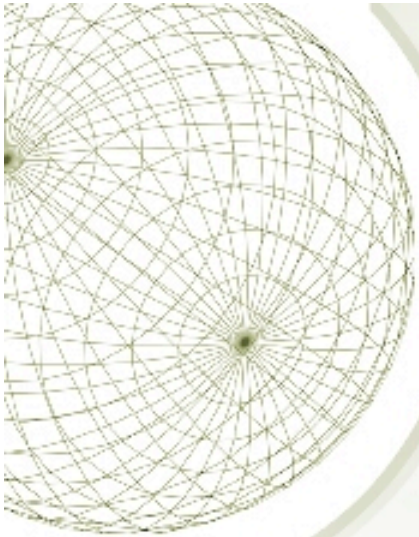
Oregon Science Teachers Association 2007 Conference

David Heil

President

David Heil & Associates, Inc.

Portland, Oregon

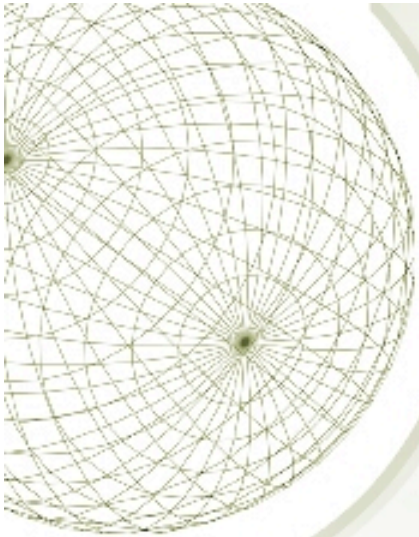


WESTERN OREGON UNIVERSITY

OSTA

OMSI

NEWTON'S APPLE

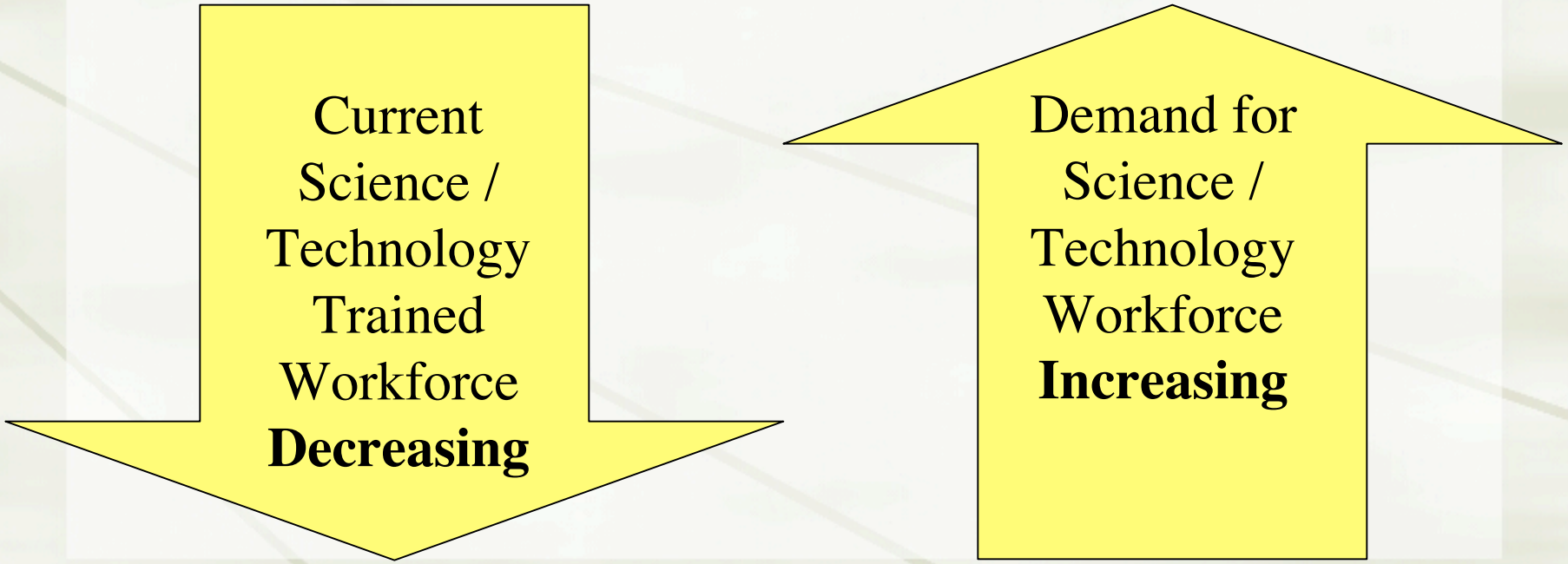


The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

Multiple trends and cumulative forces have contributed to the looming crisis in science and science education, impacting America's ability to compete as an innovative leader in science and technology and to reap the economic and societal benefits that accrue from such innovation.

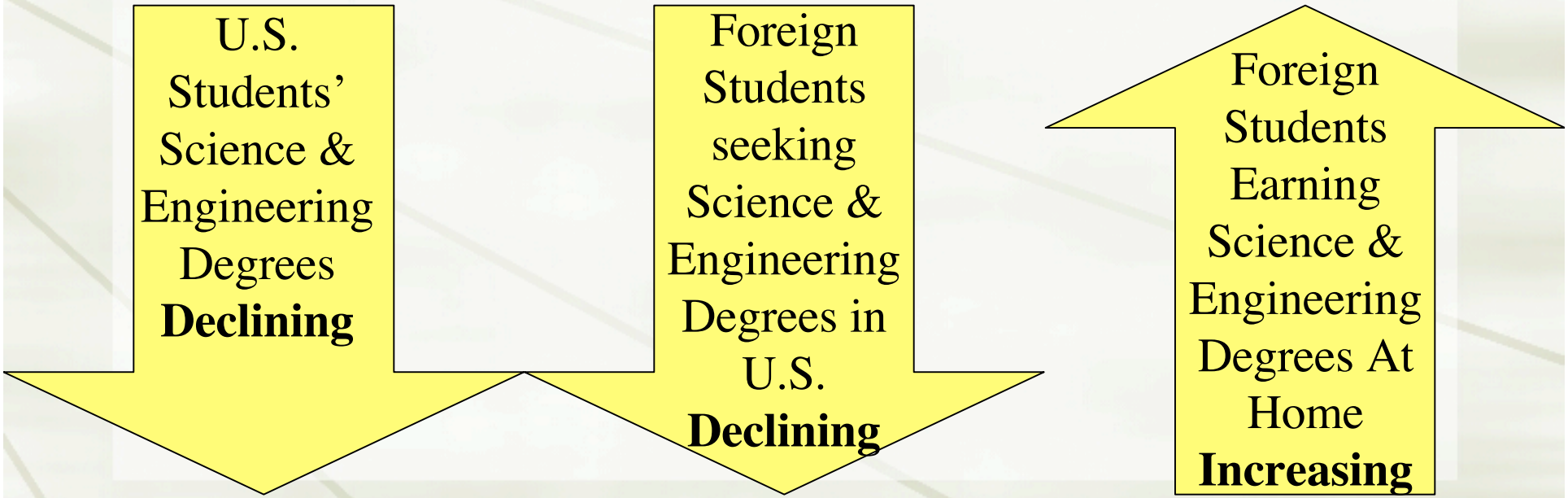
The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

U.S. Science & Engineering Workforce



The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

Undergraduate Degrees in Science and Engineering



The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

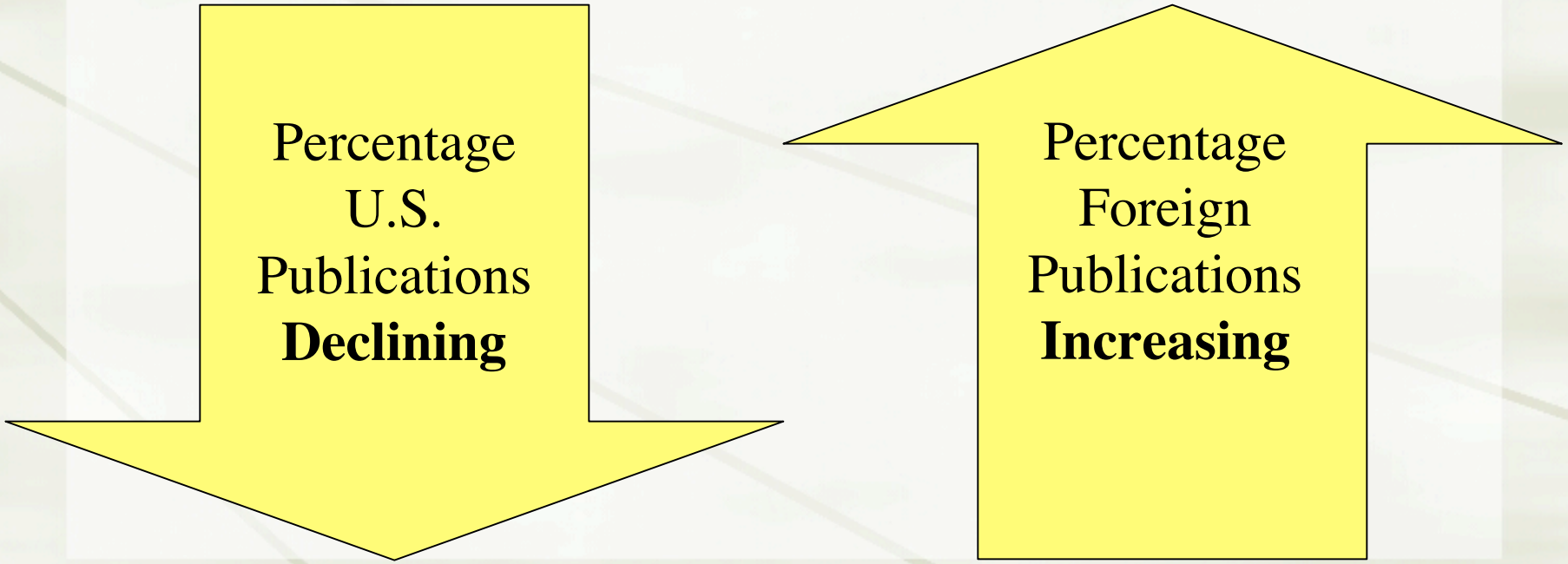
Foreign Nationals as Part of U.S. Workforce

Percentage of foreign students earning science and engineering degrees in U.S. that join U.S. workforce **Declining**

Percentage of foreign students earning science and engineering degrees in U.S. that return home to join non-U.S. workforce **Increasing**

The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

Papers Published in Science & Technology Fields

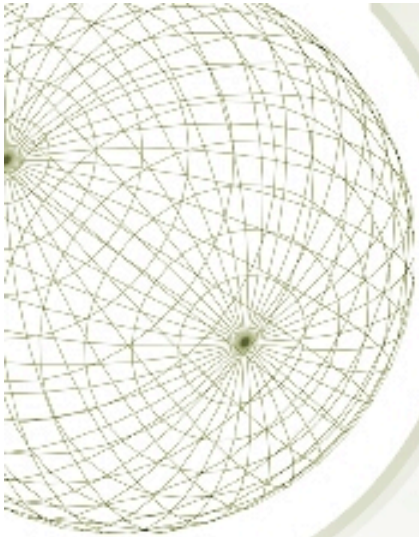


The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

Qualified K-12 Science Teacher Workforce

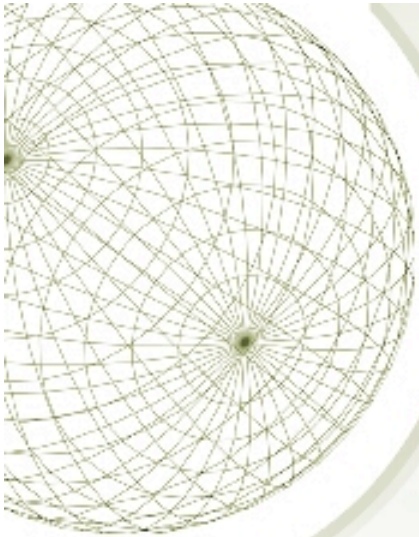
Number of New Science Teachers Entering Field **Decreasing**

Number of Experienced Science Teachers Leaving Field **Increasing**



The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

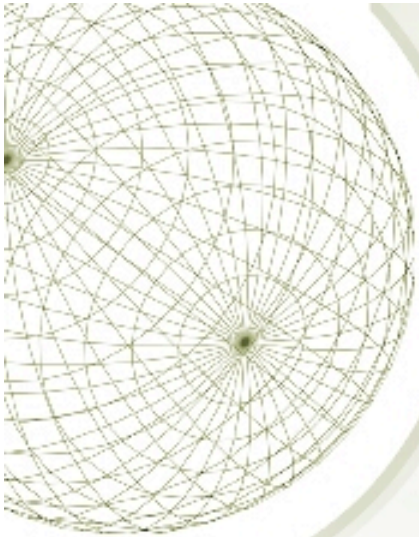
- Current U.S. science and engineering workforce 82% White
- Minority populations in U.S. growing 10 times faster than White population and quickly becoming the "New Majority"
- Minority representation in science and engineering workforce traditionally very low
- Minority student performance in science and engineering has consistently been below national averages



The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

Increased emphasis and investment in reading and math has resulted in a decreased emphasis and investment in science.

This has resulted in limited access to science learning in schools and a decline in science awareness and appreciation.



The Making of a "Perfect Storm" in U.S. Science Learning & Competitiveness

Increased public desire for simple, quick solutions to complex problems results in science being portrayed as a distraction or an impediment, rather than a valuable tool, for finding sound solutions.

Public debates mixing faith with facts,such as what we've seen with evolution, further confound broad scientific literacy and understanding.

Science Learning is the Foundation for U.S. Innovation & Global Competitiveness

Science Learning is the Foundation for Global Citizenship

Global Improvement of the Human Condition

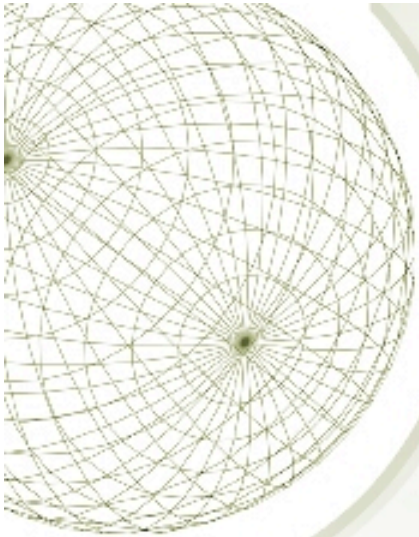
Solutions to Challenges in Health, Energy, Security and Environment

Public & Private Investment in Science & Science Learning

Policies that Support Science Research & Education

Citizens that Understand & Value Science & Science Learning

Pre-K & K-12 Science Learning



Preventing The "Perfect Storm"

- We must dramatically increase the value that citizens place on science and science learning
- We need to start nurturing science learning at a much earlier age

Preventing The "Perfect Storm"

- We need to more actively engage parents and families in the science learning continuum

Preventing The "Perfect Storm"

- We must increase access to, and engagement with our rich informal science resources because science learning doesn't just happen in school!

OMSI

Children's Museum & Planetarium Science Factory

The HIGH DESERT MUSEUM BEND, OREGON

Science Works HANDS-ON MUSEUM

ScienceWorks for families. ScienceWorks for learning. ScienceWorks for fun.

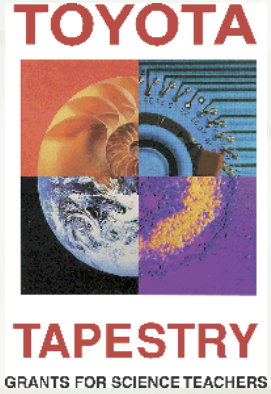
HATFIELD MARINE SCIENCE CENTER • OREGON STATE UNIVERSITY •

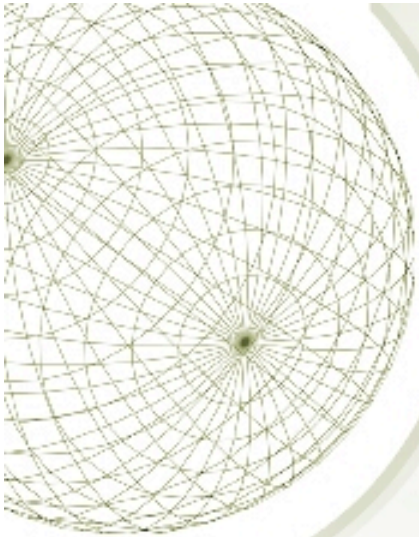
Preventing The "Perfect Storm"

- We need to foster greater collaboration between all levels of science education K-16 and beyond

Preventing The "Perfect Storm"

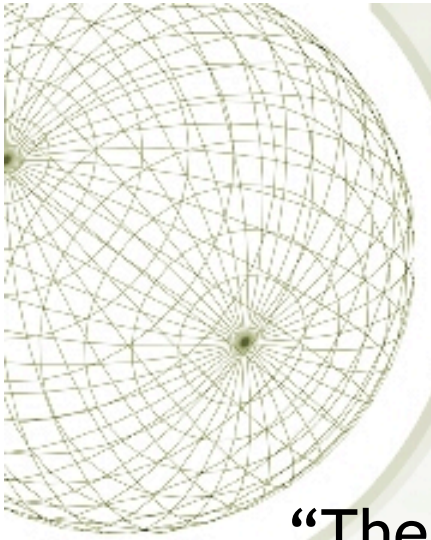
- We must be willing to collaborate with non-traditional partners to promote and nurture science learning in creative ways





Preventing The "Perfect Storm"

- Policy makers need to better understand and advocate for quality science learning at all levels
- Corporate America needs to leverage their influence to identify, promote and support quality science learning



Doing The Impossible

"There's no use trying," Alice said, "one can't believe in impossible things."

"I dare say you haven't had much practice," said the Queen. "When I was your age, I always did it for half-an-hour each day. Why, sometimes I've believed as many as six impossible things before breakfast."

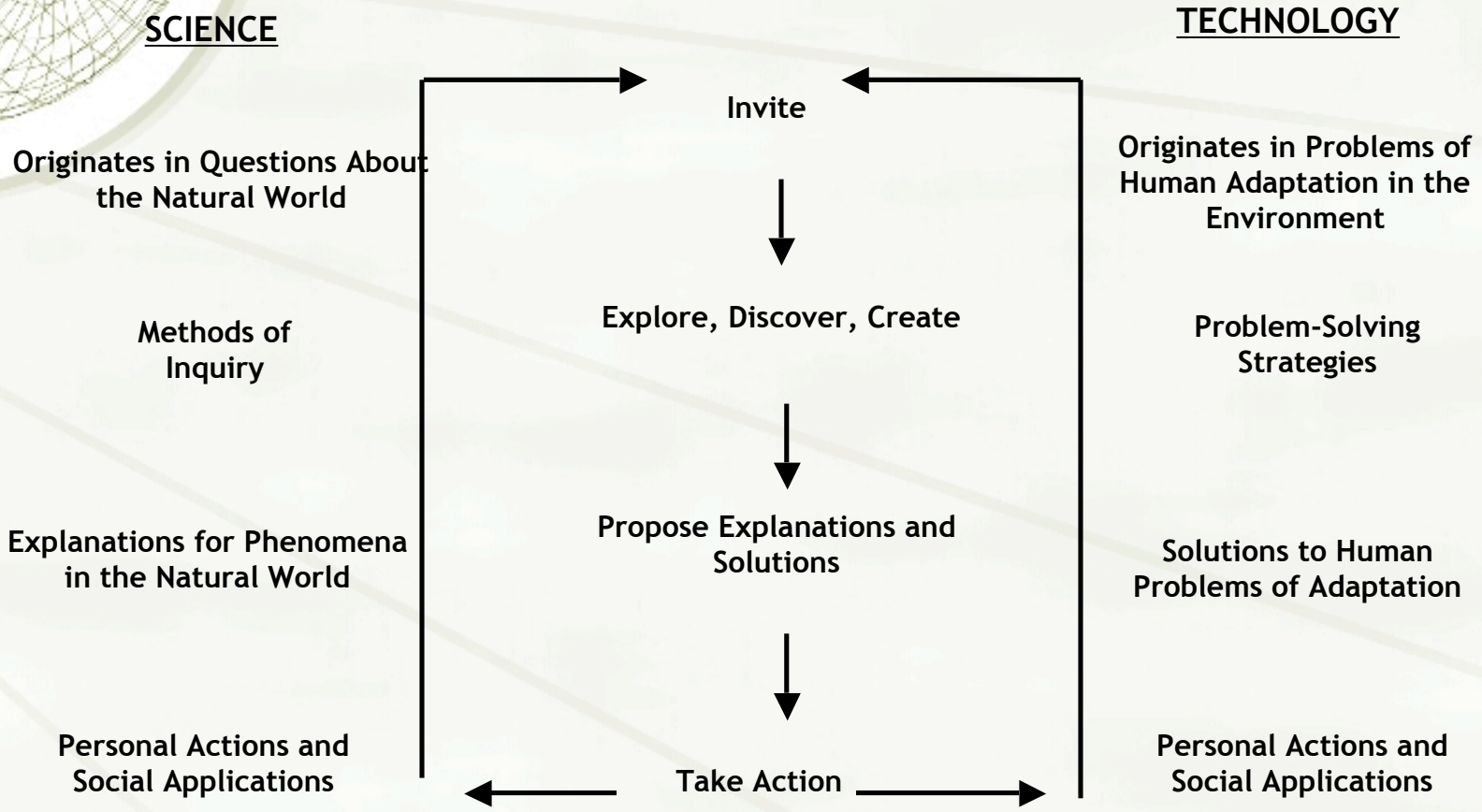
Lewis Carroll
Alice in Wonderland

Who Influences Children's Interest In Science?

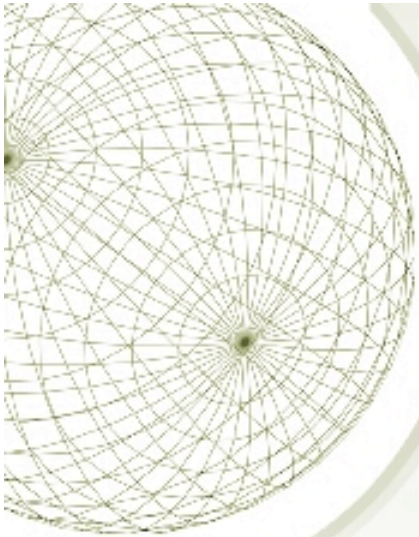
Influencer	Male Children	Female Children
Teachers	45%	57%
Parents	25%	25%
Media	17%	9%

Bayer Facts of Science Education Survey

INVITATIONAL LEARNING MODEL

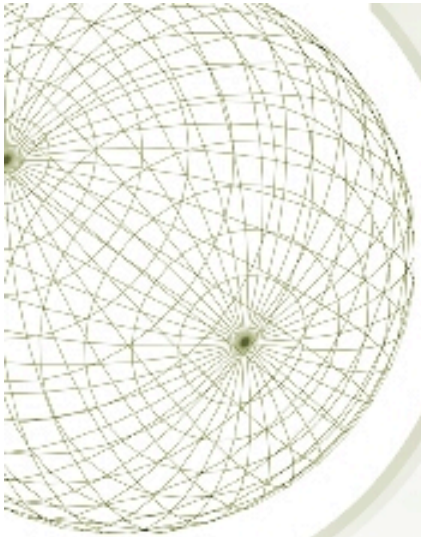


Adapted From: *Science and Technology for the Middle Years: Frameworks for Curriculum and Instruction*, National Center for Improving Science Education, 1990.



Science Learning for Every Child

- Encourage Questions
- Foster Curiosity
- Build Confidence
- Use Stuff
- Celebrate Discoveries
- Allow time for inquiry & reflection
- Create safe spaces for exploration
- Listen to children's explanations
- Challenge them to "Try it" themselves
- Engage parents in the learning adventure



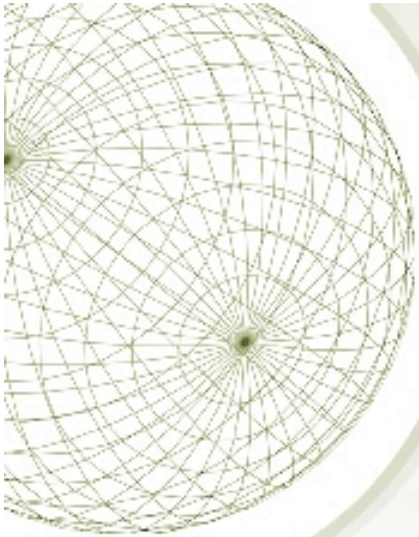
Experiential Learning

Experiences are memorable events revealed over time that engage individuals in inherently personal ways.

Scientific Inquiry

"…refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work."

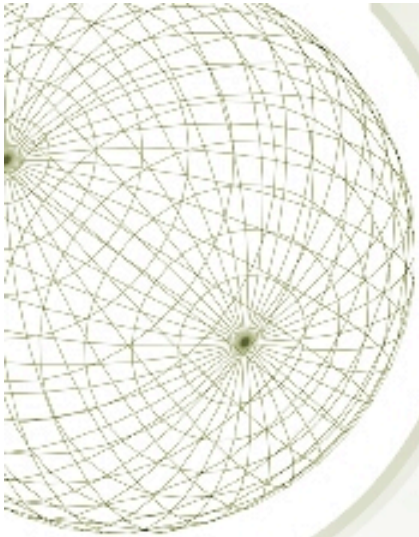
National Science Education Standards



Scientific Inquiry

"Inquiry also refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world."

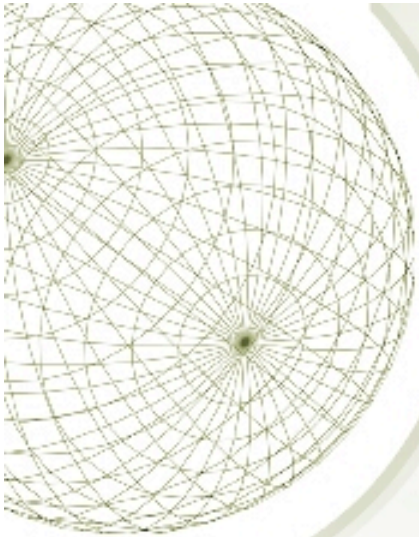
National Science Education Standards



It's okay to say "I don't know"

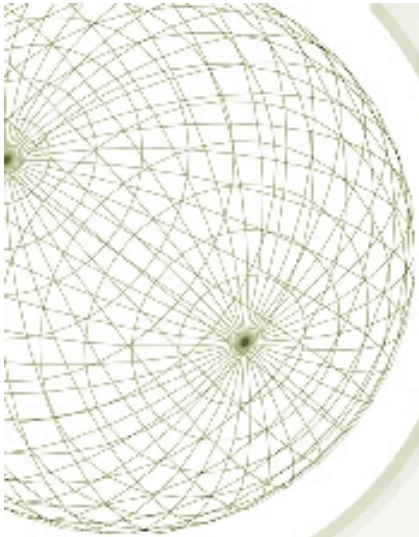
Oregon State Motto

"She flies with her own wings"



What Can We Do Today?

- Don’t lose sight of the real reason we became teachers of science - we love to learn!
- Support each other in keeping the focus on learning, in spite of the emphasis on testing
- Do what we do best - facilitate exploration, discovery and increased understanding
- Think of our mission as reaching beyond the classroom - cultivate a greater value for science and science learning among all citizens



“Nothing great was ever achieved without enthusiasm”

Ralph Waldo Emerson