

Providing Undergraduate Research Opportunities



Why and How?

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The World Has Changed!



Yesterday

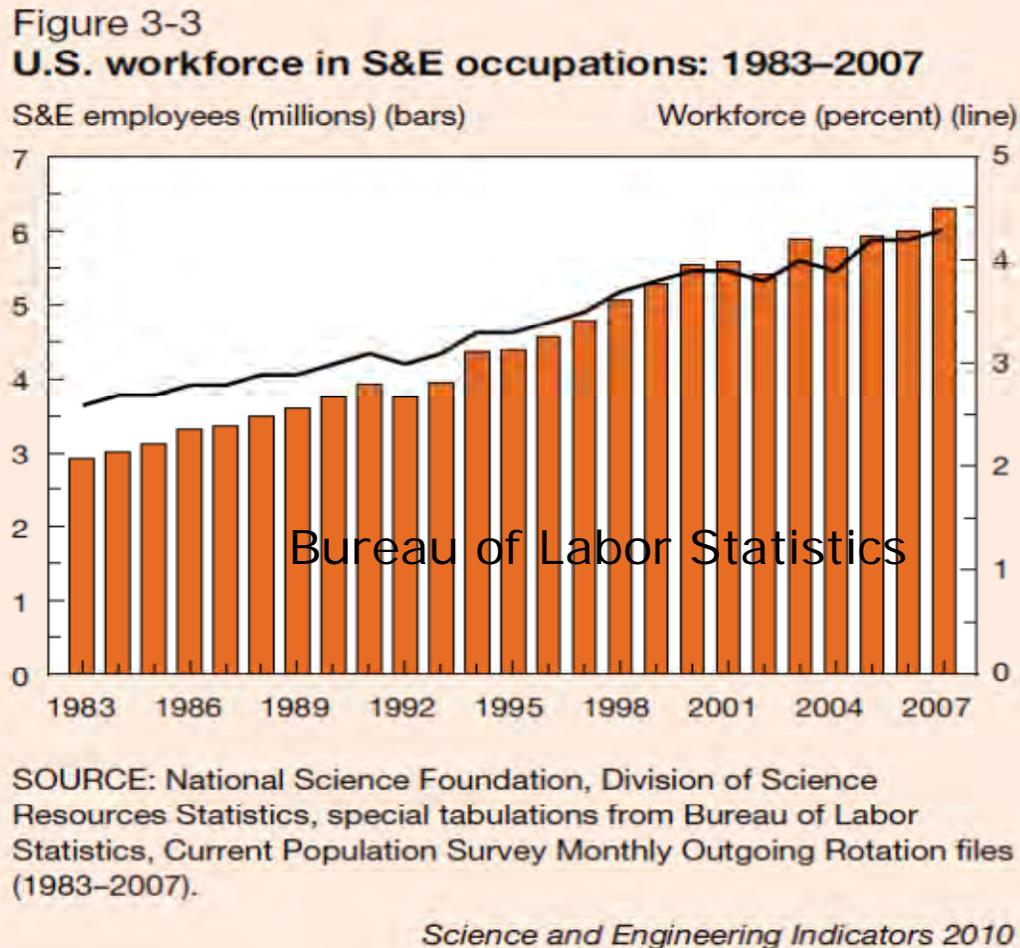
United States was a Leader in:

- **MANUFACTURING**
 - Steel, Automotive, Electronics and Textiles
- **SCIENCE**

Today

- *“World is Flat”* – Thomas Friedmam
 - The Play Field is Leveling

U.S. Workforce in S&E Occupations

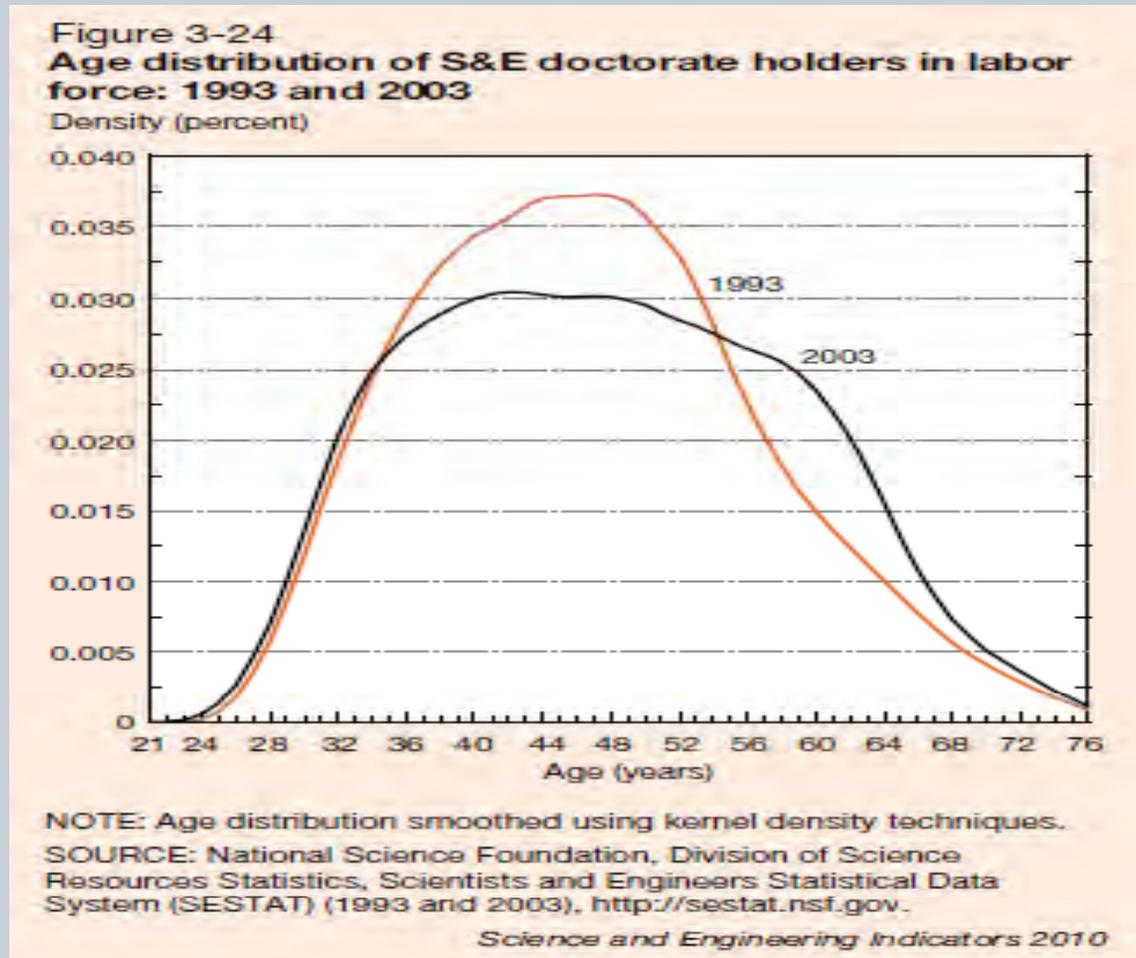


2010 - 7.6 Million
STEM Jobs – about
1 in 18 workers

Projected Growth in
STEM Jobs of 17%
from 2008 – 2118

U.S. Department of Commerce

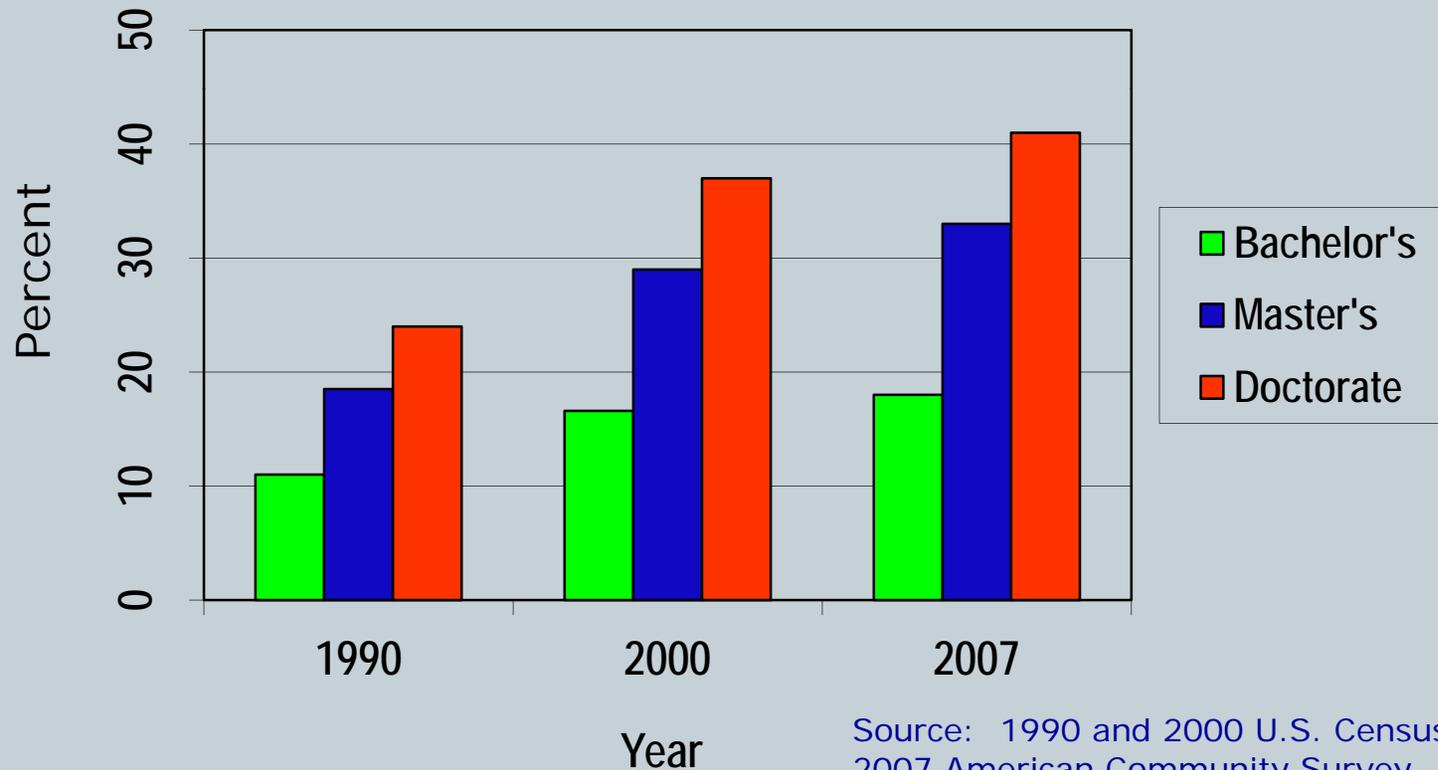
Age Distribution of S&E Doctorates



STEM Workforce – Reliant on Foreign Talent



U.S. Science is **INCREASINGLY** Reliant on Foreign Talent



The Face of STEM in the U.S. Today



**A Recently
Recruited
Cancer
Research
Team at the
University of
Kentucky**

**25 Team Members
19 Asian
6 Women**

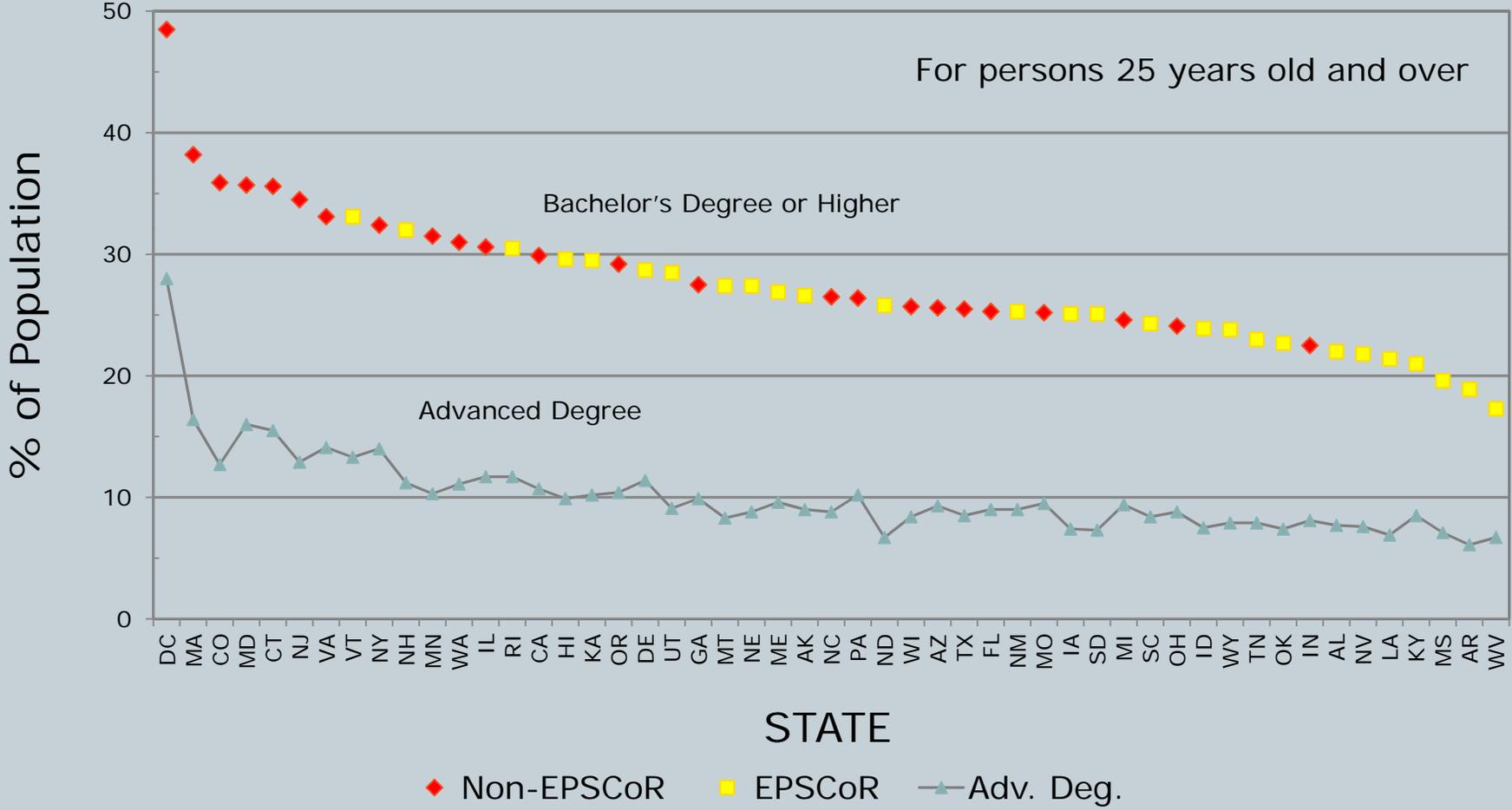


U.S. Strategy



Build a Knowledge-Based Workforce

Educational Attainment (2009)

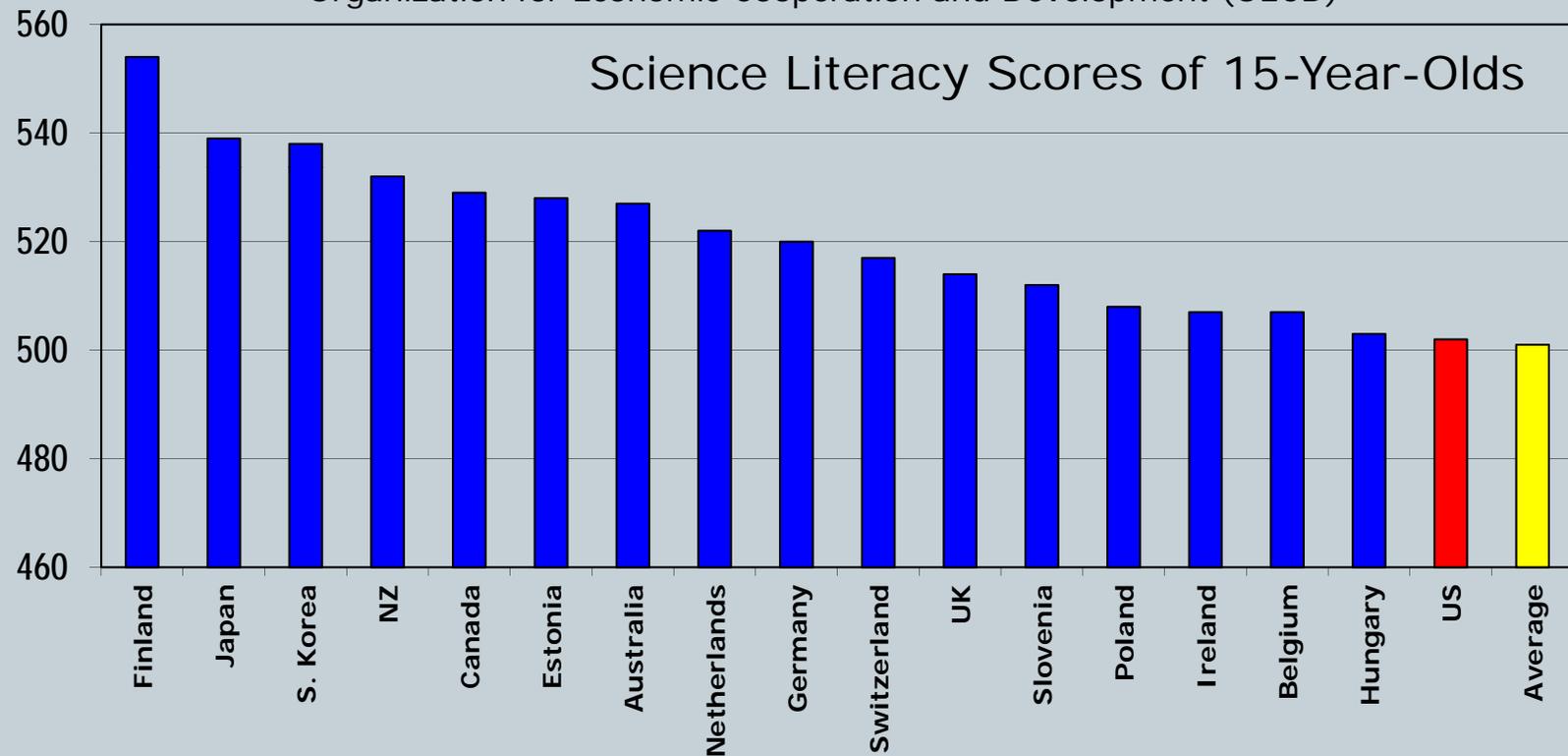


Precollege



Program for International Student Assessment (2009)

Organization for Economic Cooperation and Development (OECD)



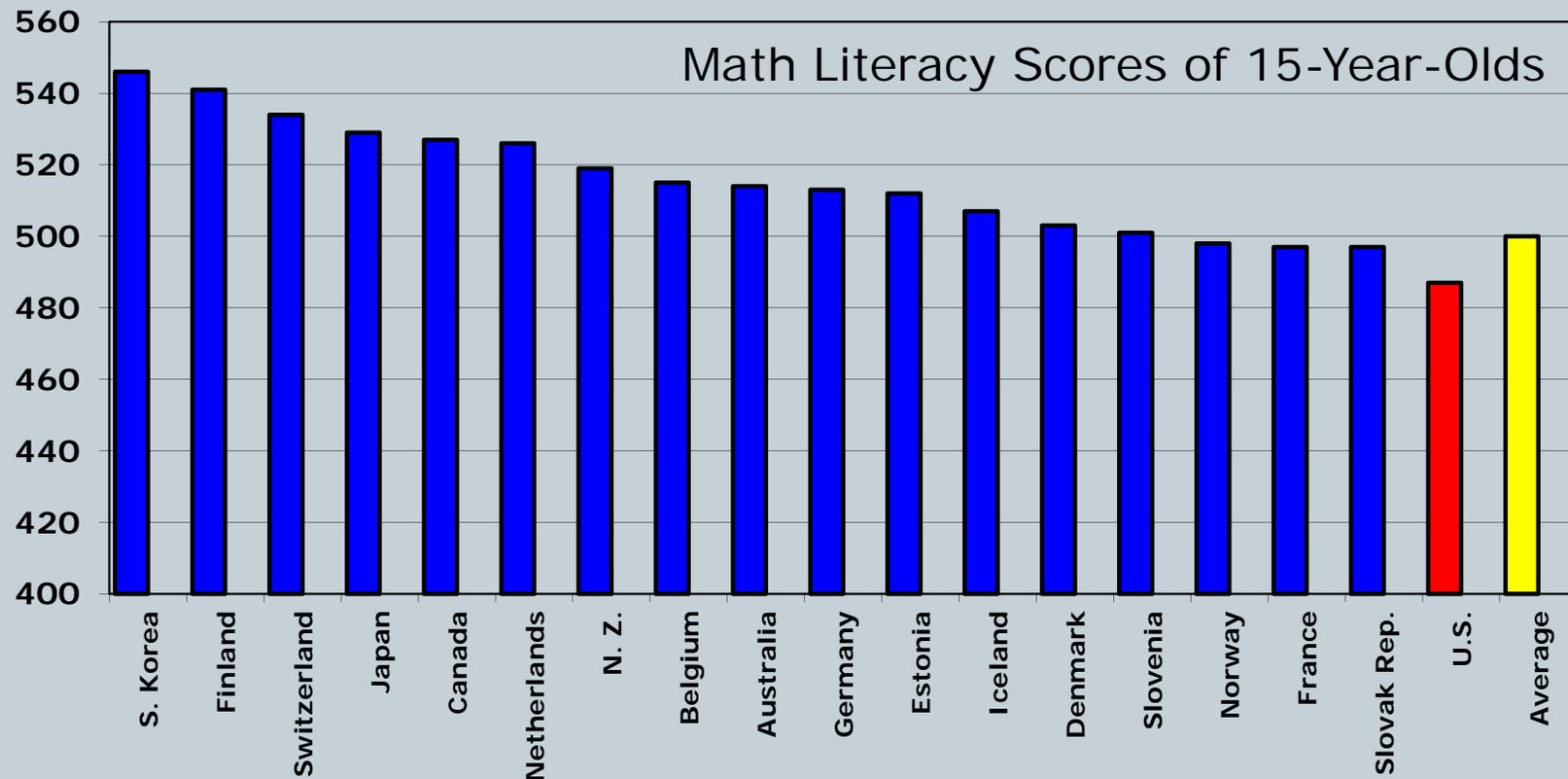
U.S. – 23rd Out of 65 Countries

Precollege



Program for International Student Assessment (2009)

Organization for Economic Cooperation and Development



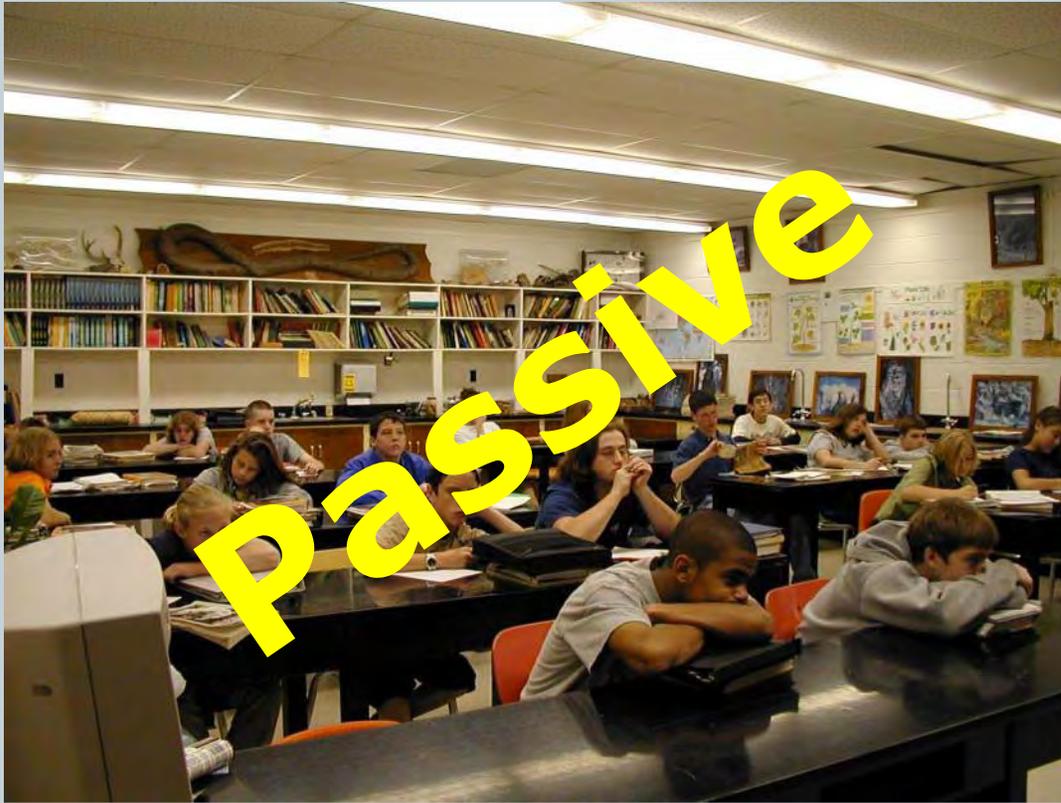
U.S. - 31th OUT OF 65 COUNTRIES

EPSCoR Conference

Coeur d'Alene, Idaho

October 24-27, 2011

Precollege



Fungi, Slime Molds, Lichens, and Mosses

EPSCoR Conference

Coeur d'Alene, Idaho

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Undergraduate



*Declining
by Degree:
Higher
Education
at Risk*

2005 PBS
Documentary

Undergraduate

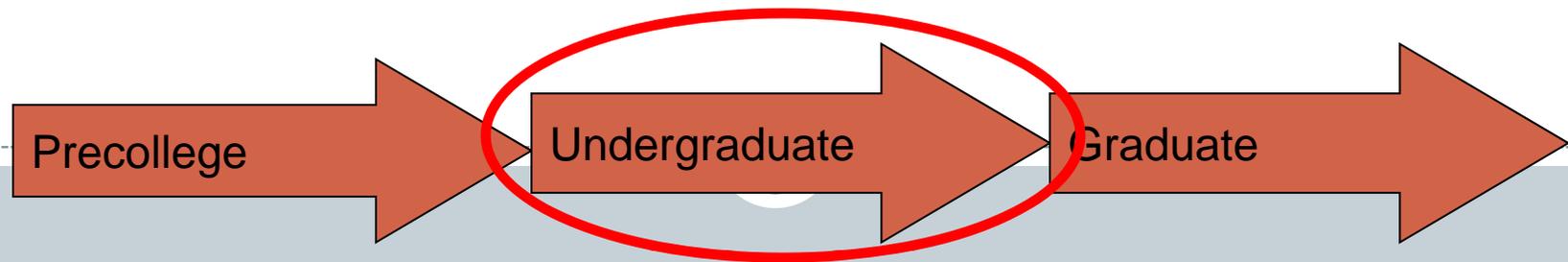


Academically Adrift

- ❖ 45% of Undergraduates Made **NO SIGNIFICANT IMPROVEMENT** in Their Critical Thinking, Reasoning or Writing Skills During Their First Two Years of College
- ❖ 36% Show **NO SIGNIFICANT GAINS** in “Higher Order” Thinking Skills after 4 Years of College
- ❖ Students **STUDY ONLY ABOUT 12 HOURS A WEEK**

Arum and Roksa (2010)

Where Do We Start to FIX the Problem?



Four Critical Years

Two Questions:

Who Prepares the Precollege Teachers?

Who Sends (or Doesn't Send) Students on for Advanced Degrees?

Undergraduate Research



Literature Now Shows that UR:

- Enhances Intellectual Development
- Increases Number of Students who Pursue Advanced Degrees in Science
- Builds Relationships Between Faculty and Students
- Helps Students Clarify Career Path
- Develops Student Self-Confidence
- Develops a Student's Ability to Solve Technical/Procedural Issues

Undergraduate Research



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It's Time for a New Approach



TIME TO PhD

(Years)

0 2 4 6 8 10

F S J S G1 G2 G3 G4 G5 G6

Undergraduate

Graduate

Coursework

Coursework

Research

EPSCoR States Need a New Idea if They Are to Lead!

Undergraduate Education: Front Door to an Advanced Degree!

What You Will Need to Do



Start Career Advising in the Freshman Year

- Help Undergraduates Understand that They Need to **Build a Resume!** Grades and Diplomas Aren't "Good Enough!"
- Explain to them that they will need **Letters of Recommendation**
- Let them know that **Research/Problem Solving Skills are Highly Marketable** and that such Skills Will Help Them Get a Job, Get into a Professional School or Go to Graduate School
- Tell them what a **Masters or Ph.D.** will enable them to do.

Design Your Program So It's a Win-Win



Undergraduates Can Be an Economical and Productive Part of Your Research Workforce

- Start Students Early
- Form Research Teams

Working with Undergraduates Does NOT have to Be a Burden!



Thank You

Now Let's Go Change Undergraduate Education
and Address the STEM Workforce Challenge!