

Better Assessment Exams: A Role for PCAST



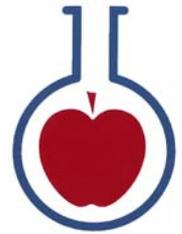
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National Institutes of Health
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NIH K-12 Programs



- **NIH Curriculum Supplements Series**

- Seventeen K-12 teaching units developed to date
- Brings NIH research to classroom teachers—free!
- 350,000+ titles shipped—requests from all over USA
- <http://science.education.nih.gov/supplements>



- **LifeWorks**

- Career exploration for MS & HS students
- 120+ careers in health and medical sciences
- Interviews, videos, education required
- ~100,000 visitor sessions/month
- <http://science.education.nih.gov/LifeWorks>

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LifeWorks[®] Explore health and medical science careers

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Explore Careers

Try our **Career Finder**

Or browse our 100+ career descriptions by...

[Alphabetical List](#) [Interest Area](#)
[Education Required](#) [Median Salary](#)

Education Makes a Difference

[text version](#)

Education Pays	Median monthly earnings in 2007 (\$1,000)
1.0th	1,477
1.1th	1,487
1.2th	1,497
1.3th	1,507
1.4th	1,517
1.5th	1,527
1.6th	1,537
1.7th	1,547
1.8th	1,557
1.9th	1,567
2.0th	1,577

Check Out a Success Story

Meet a real **Pharmacist**:

Leslie Adams

[Read Interview](#)

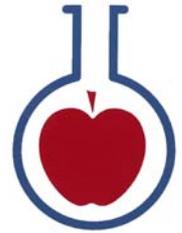
"Pharmacy has a number of specialties from which to choose, like veterinary sciences, infectious diseases, critical care, psychology, and ambulatory care. I am a clinical research pharmacist, and spend a lot of time working with investigational drugs that may eventually be considered for approval by the Food and Drug Administration (FDA)."

Activities

Compound and dispense medications following prescriptions issued by physicians, dentists, or other authorized medical practitioners.

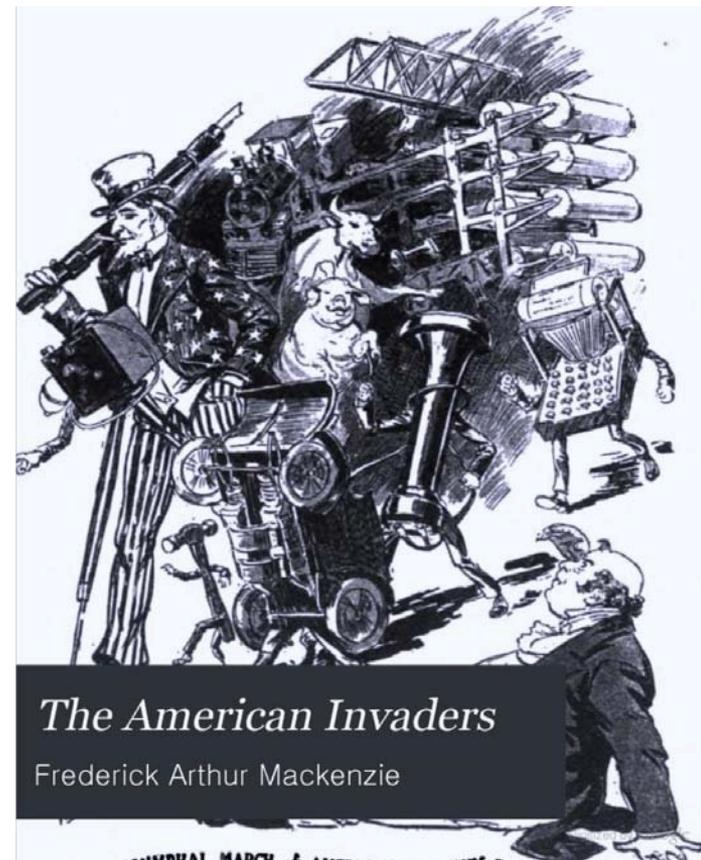
Minimum Education Required

Pharm. D.



The World is Flat(ter)

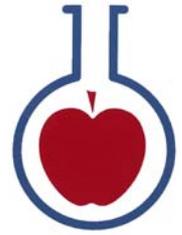
- Frederick MacKenzie
- Toured the USA
- Wrote alarmed dispatches
- *The American Invaders* (1901)



The American Invaders

Frederick Arthur Mackenzie

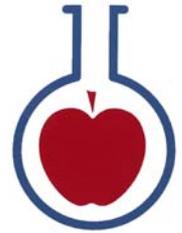
The American Invaders



- “England has slept while commercial rivals went ahead. She has been too content to rest satisfied with the great accomplishment of past generations. In short, Britons have been a little too prosperous, far too easy going. Master and men alike have been too readily contented. But those who know anything of the great reserve of strength of England are best aware that the nation needs only to rouse herself in earnest to recover much of the lost ground.”



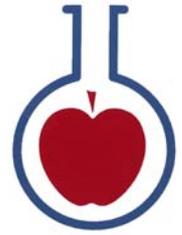
The American Invaders



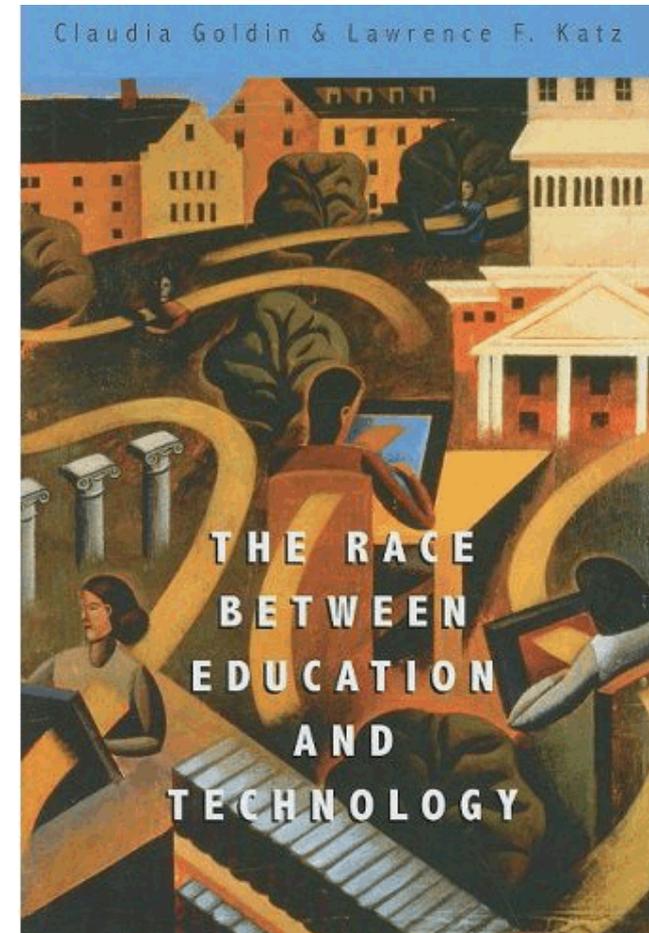
- “Americans are succeeding today largely because of their climate, their better education, their longer working hours, their willingness to receive new ideas... and perhaps most of all, their freedom from hampering traditions. ... The American workman is on the whole much better educated than his English rival.”

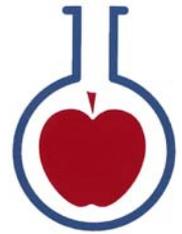


The Race Between Education and Technology

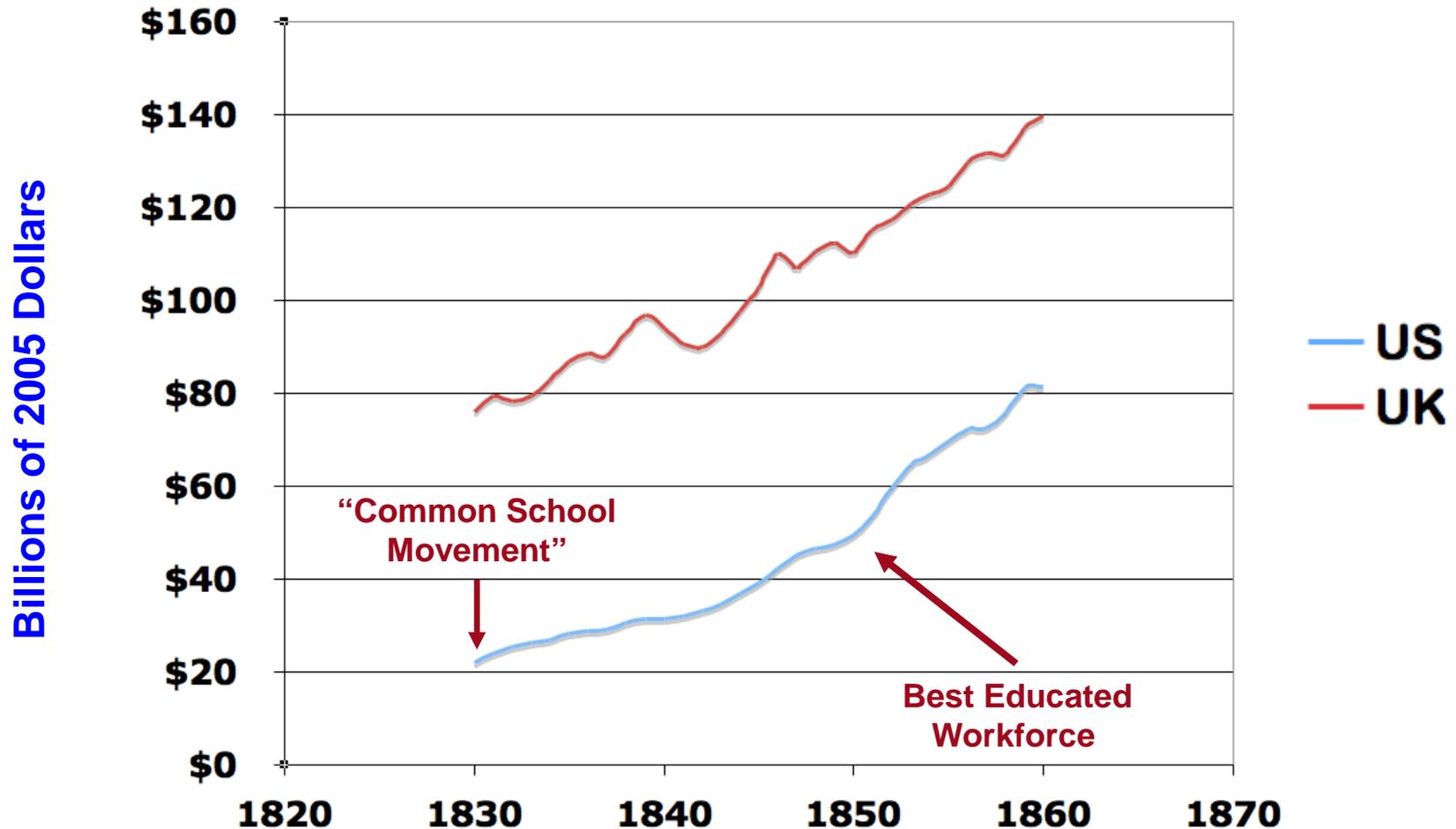


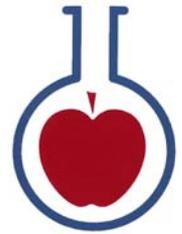
- **Claudia Goldin & Lawrence Katz**
- **Early U.S. emphasis on education**
- **Best educated workforce (1850)**
- **The high school movement (1910)**
- **Lost momentum (1970s–present)**





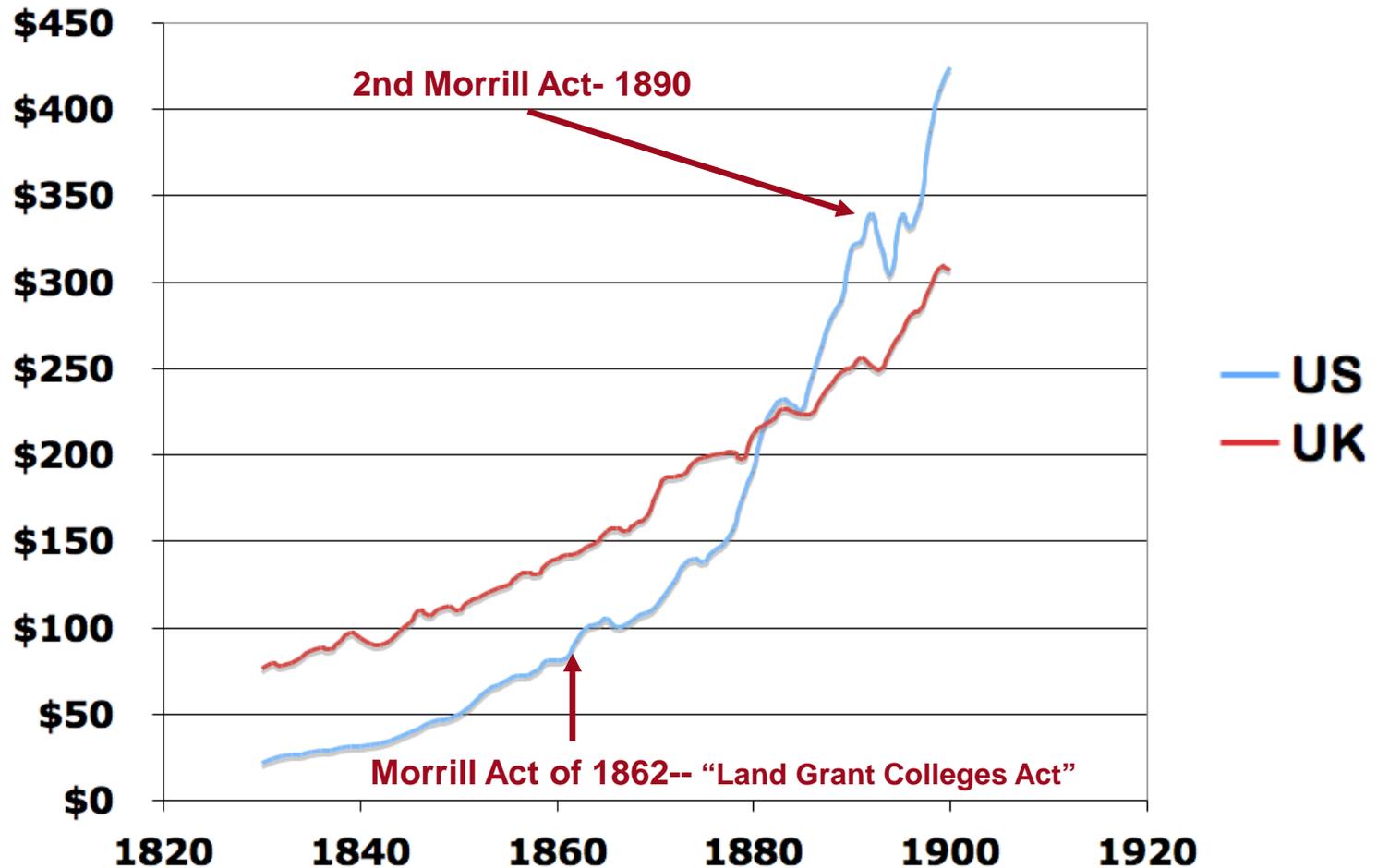
U.S. and U.K. GDP 1830-1860

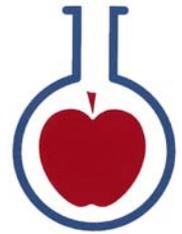




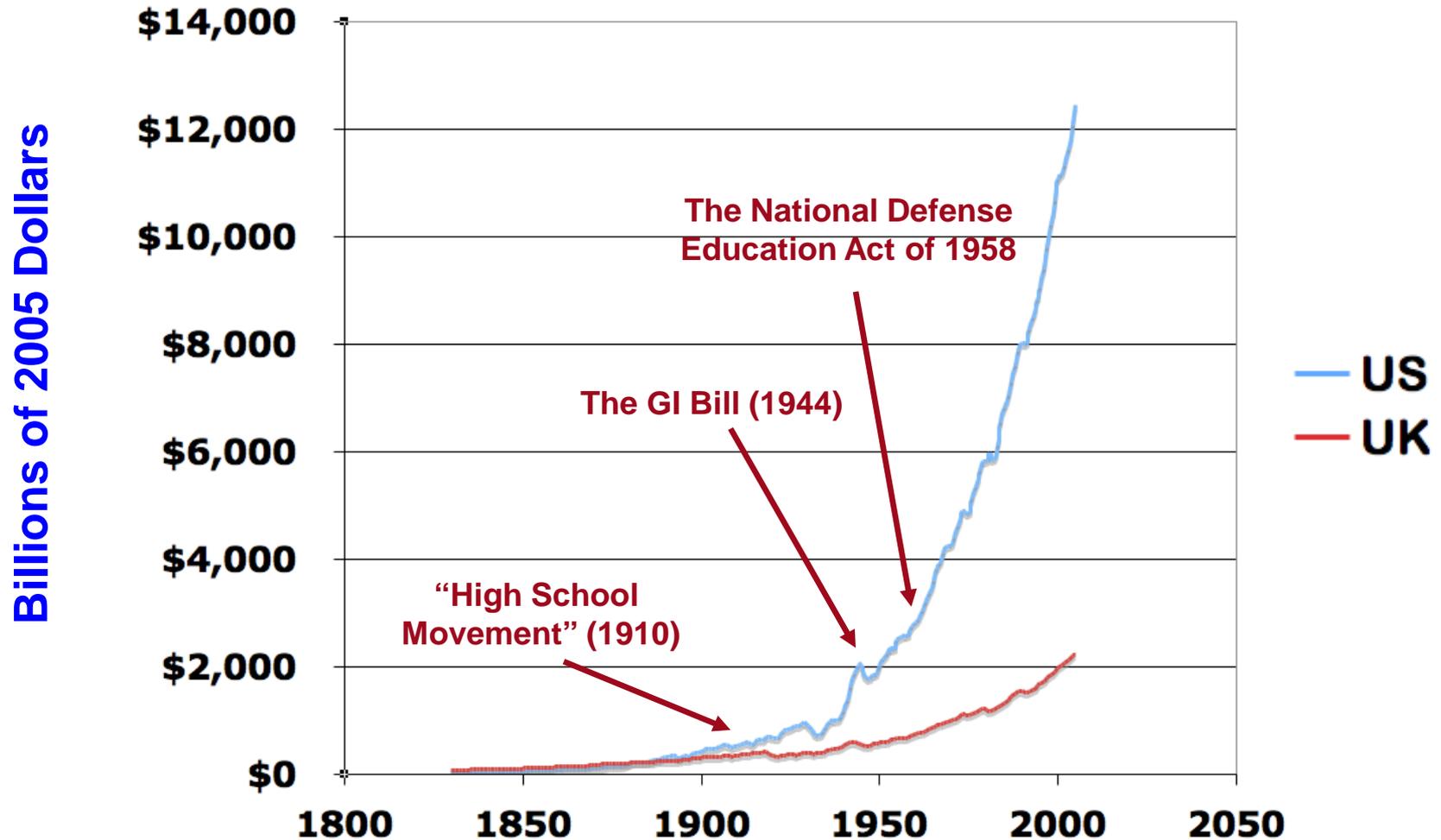
U.S. and U.K. GDP 1830-1900

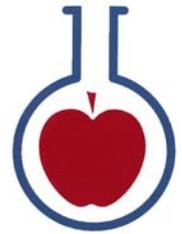
Billions of 2005 Dollars



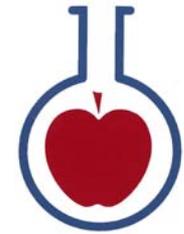


U.S. and U.K. GDP 1830-2005



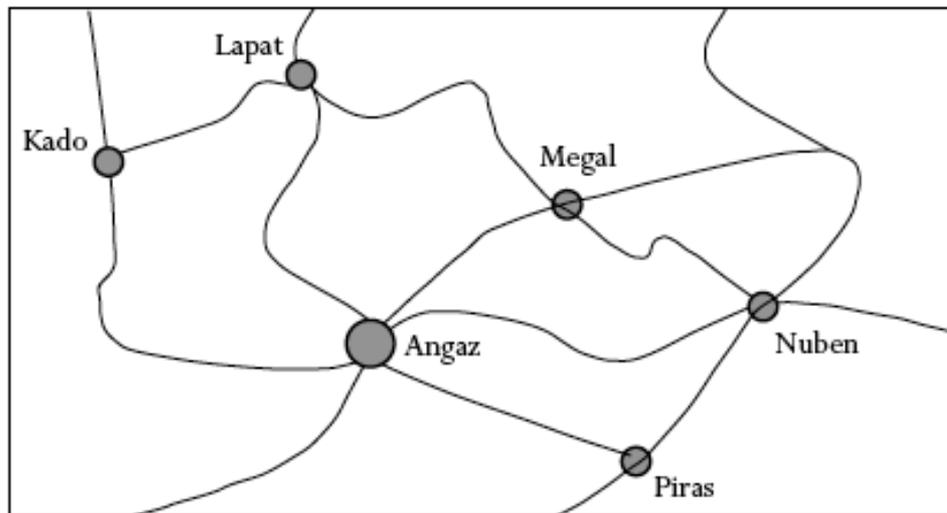


- **How Do U.S. K–12 Students Perform Compared with Their International Peers?**



Problem Solving Example

Figure 1. Map of roads between towns



HOLIDAY – Question 1

Calculate the shortest distance by road between Nuben and Kado.

Distance: kilometres.

HOLIDAY – Question 2

Zoe lives in Angaz. She wants to visit Kado and Lapat. She can only travel **up to 300 kilometres** in any one day, but can break her journey by camping overnight anywhere between towns.

Zoe will stay for two nights in each town, so that she can spend one whole day sightseeing in each town.

Show Zoe's itinerary by completing the following table to indicate where she stays each night.

Day	Overnight Stay
1	Camp-site between Angaz and Kado.
2	
3	
4	
5	
6	
7	Angaz

Figure 2. Shortest road distance of towns from each other in kilometres.

Angaz						
Kado	550					
Lapat	500	300				
Megal	300	850	550			
Nuben	500		1000	450		
Piras	300	850	800	600	250	
	Angaz	Kado	Lapat	Megal	Nuben	Piras

PISA 2003 Problem Solving

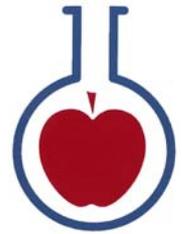
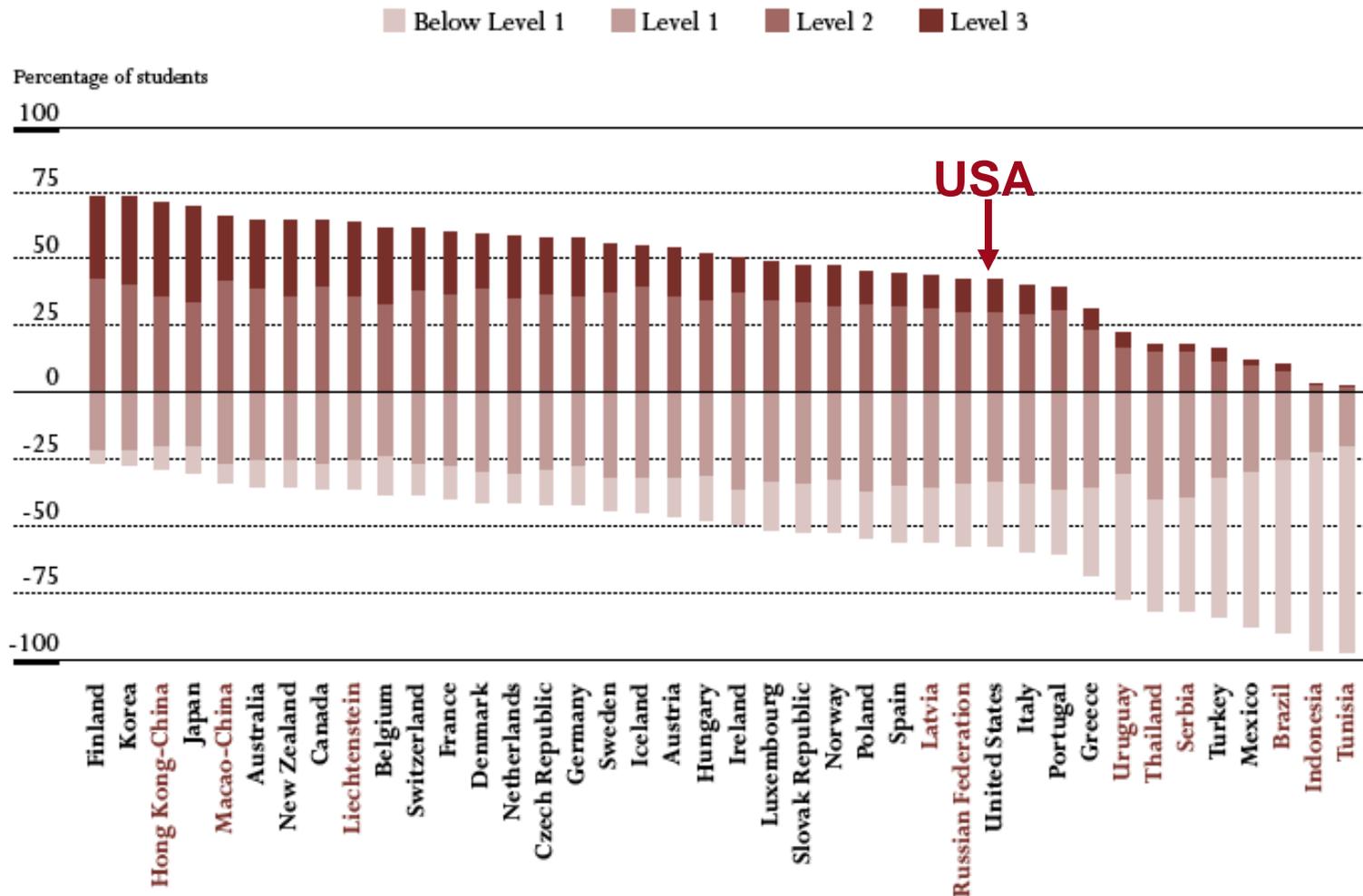
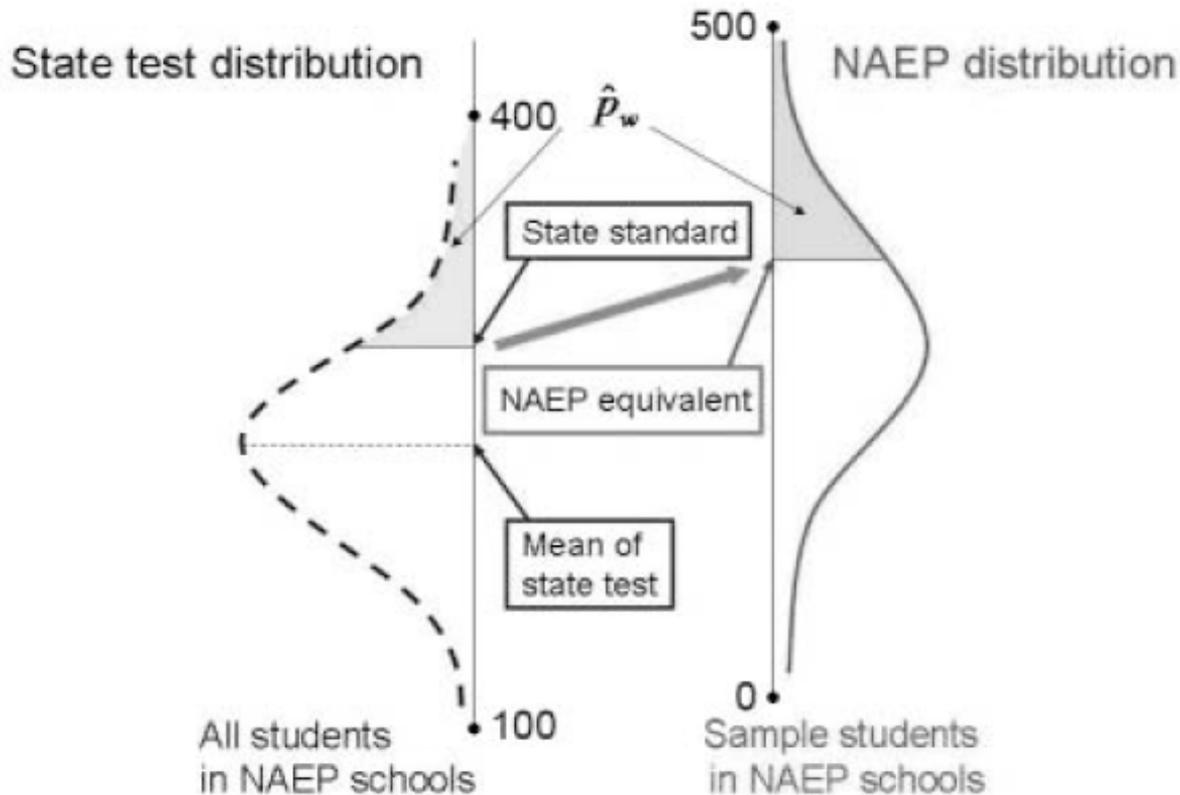
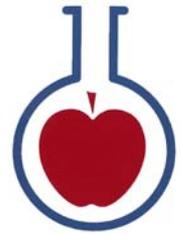


Figure 2.3 ■ Percentage of students at each level of proficiency on the problem-solving scale



Mapping State Proficiency Standards to NAEP Scales



ies NATIONAL CENTER FOR EDUCATION STATISTICS

U.S. Department of Education
Institute of Education Sciences
NCS 2007-402

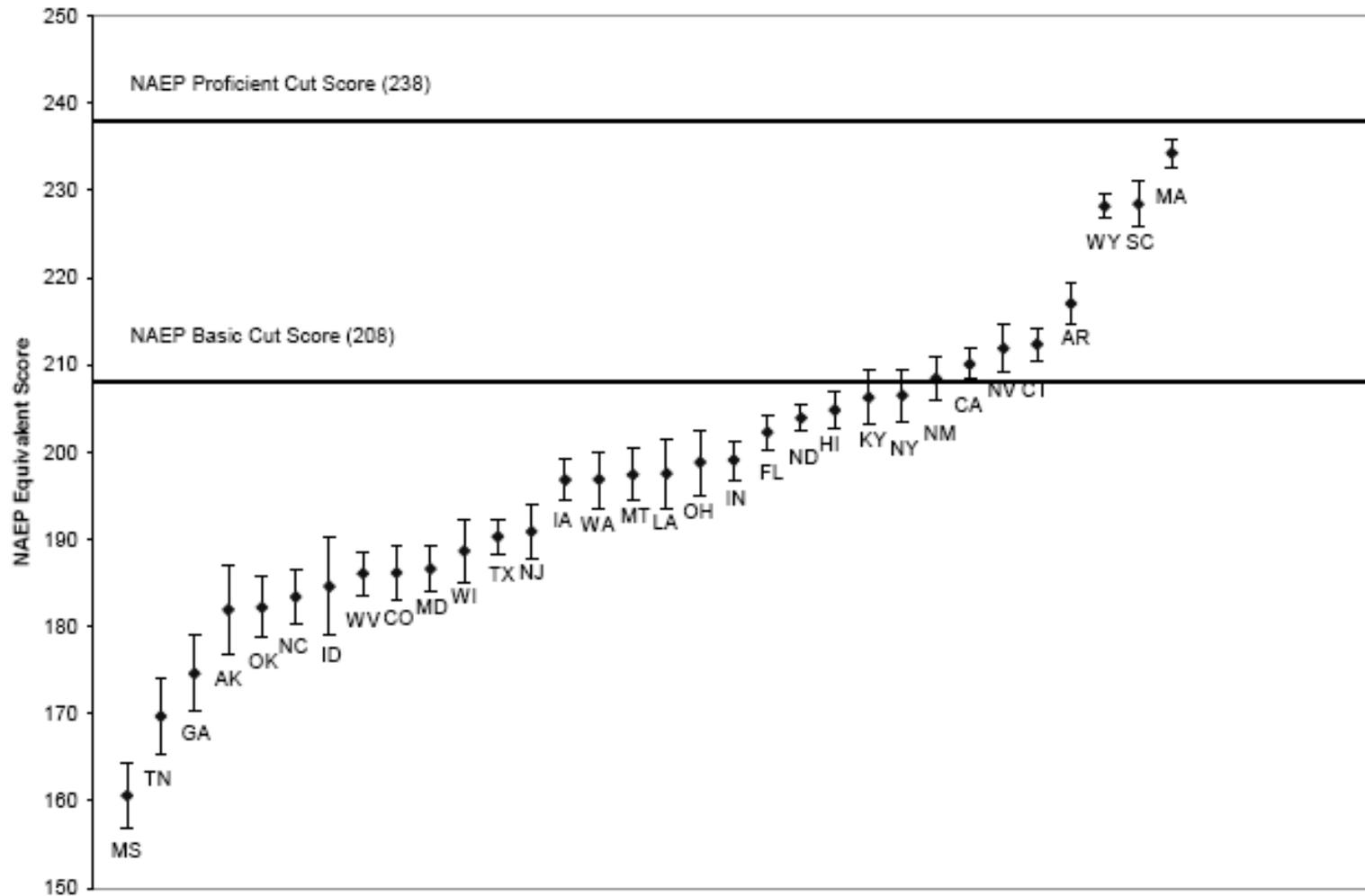
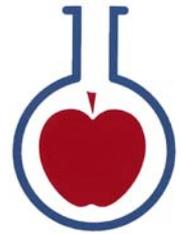
Mapping 2005 State Proficiency Standards Onto the NAEP Scales

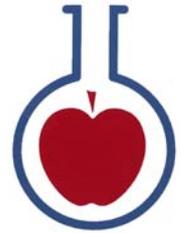
Research and Development Report



NAEP Score Equivalents

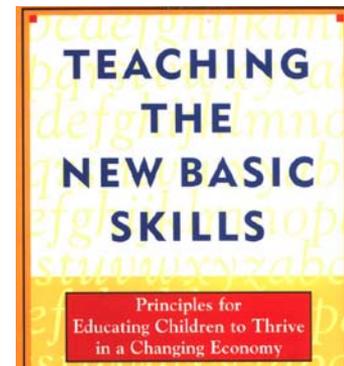
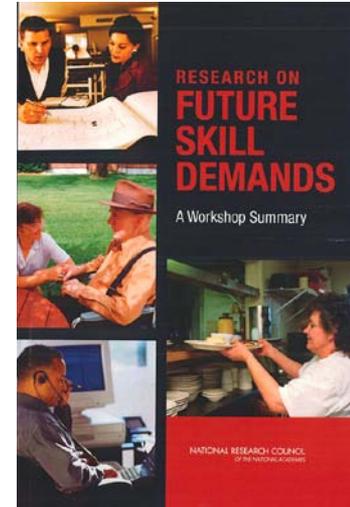
Fourth Grade Reading

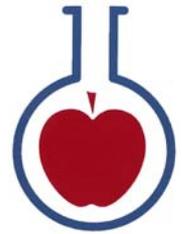




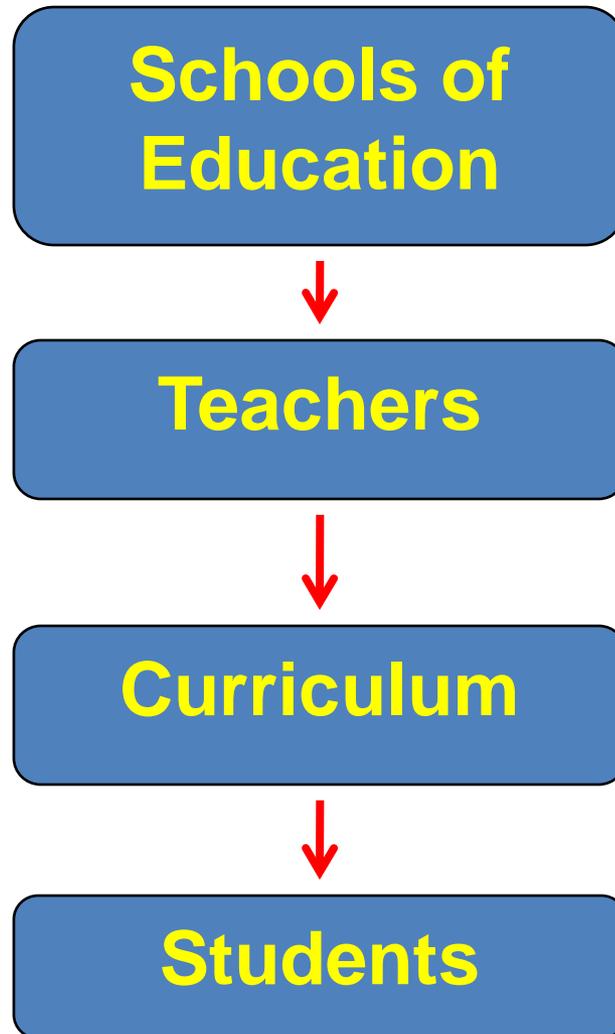
Future Skills Demands

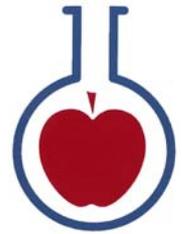
- **David Autor- A two tiered economy?**
 - Knowledge economy (high wage) for the skilled
 - Service economy (low wage) for the unskilled
- **Dick Murnane-Skills for a Middle Class Job**
 - Read at a 9th grade level
 - Math at a 9th grade level
 - Solve problems where hypotheses required
 - Ability to work in groups with diverse people
 - Ability to communicate effectively (oral & written)
 - Ability to use personal computers for basic tasks



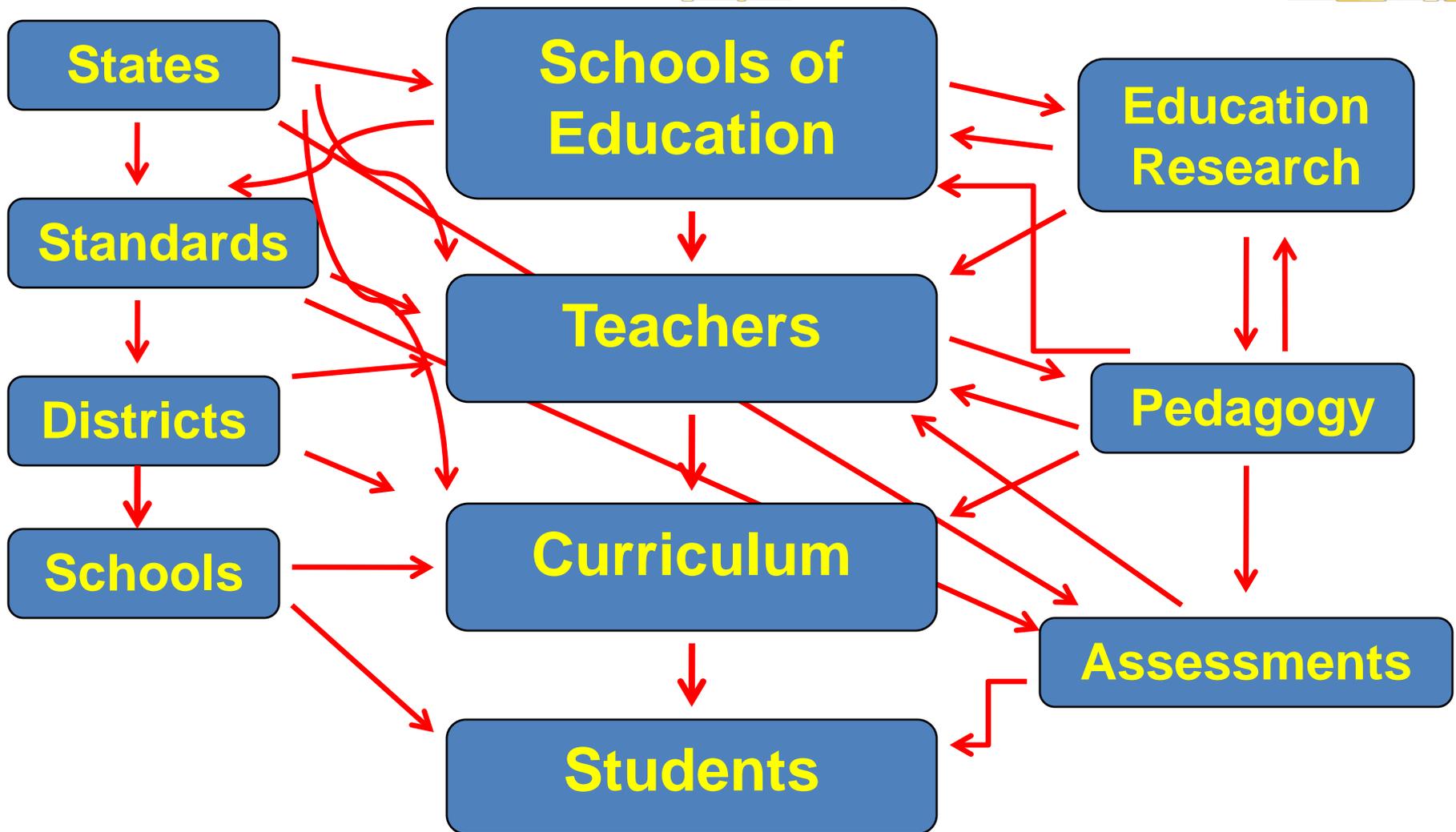


STEM Education as a System

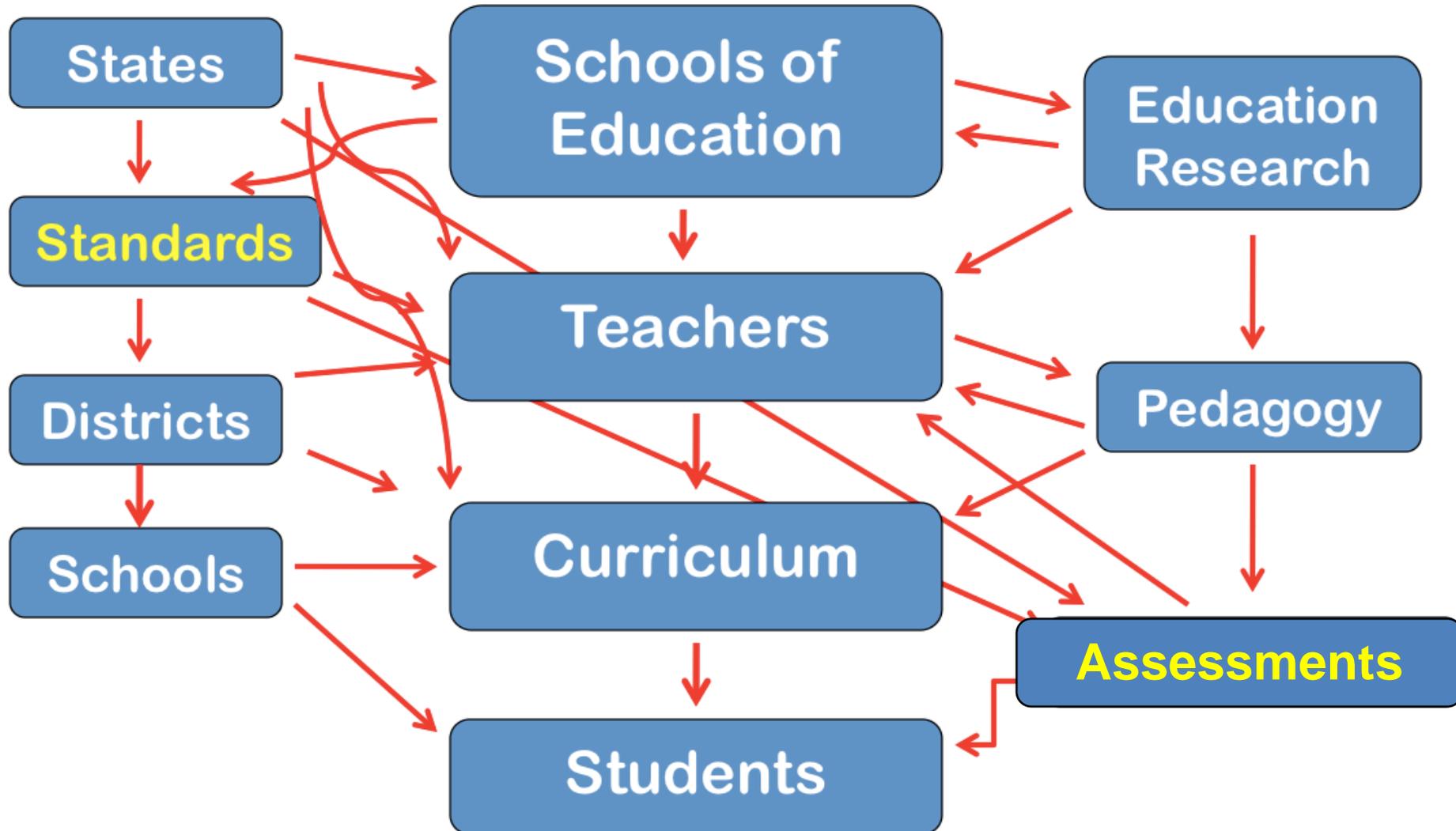
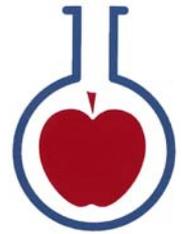


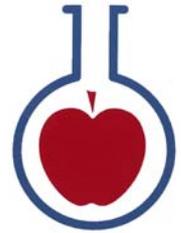


STEM Education as a Complex System



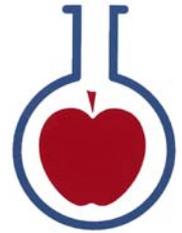
Assessments: A Role for PCAST?





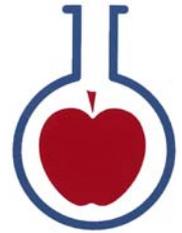
Why Assessments?

- Tests signal “what to take seriously”
- Tests drive instructional practices
 - (Probably more than standards)
- We need to measure what we *value*
 - (Not just what is cheap and easy)
- Measure what students can *do* with knowledge



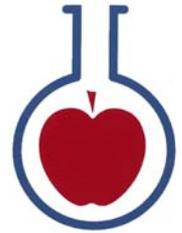
PCAST's Contribution

- PCAST members understand what it takes to compete in the STEM world today.
- Make a **strong recommendation** regarding the importance of measuring what we value
- Set a high standard—other nations have
- Let evaluation experts focus on the “How?”



Funding New Assessments

- Secretary Duncan
- “...on June 15, during an address at the 2009 Governors Education Symposium in North Carolina, the Secretary urged the nation's governors and state education leaders to continue the movement toward adopting internationally benchmarked standards for K-12 education.”
- “...Department will commit up to **\$350 million** of the "Race to the Top" Fund to support the states in the **creation of rigorous assessments** that are linked to those common standards.”
- <http://www.ed.gov/news/newsletters/edreview/2009/0619.html>



Resources

- **NRC Board on Testing and Assessment**
- **PISA- Andreas Schleicher, Rodger Bybee, etc.**
- **Educational Testing Service (ETS)**
- **Partnership for 21st Century Skills**
- **Education Sector- Elena Silva**



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