

# Strengthening STEM in Virginia

Insights from the 2008  
*Technology Counts Report*

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Presentation for the Virginia General Assembly  
Joint Subcommittee Studying  
Science Math and Technology Education  
Richmond, Virginia – September 30, 2008

## Overview

- Framing of STEM policy discussion
- Focus on K-12 education
- State leadership in technology
- Teacher-focused policy
- Student-focused policy
- Programmatic strategies

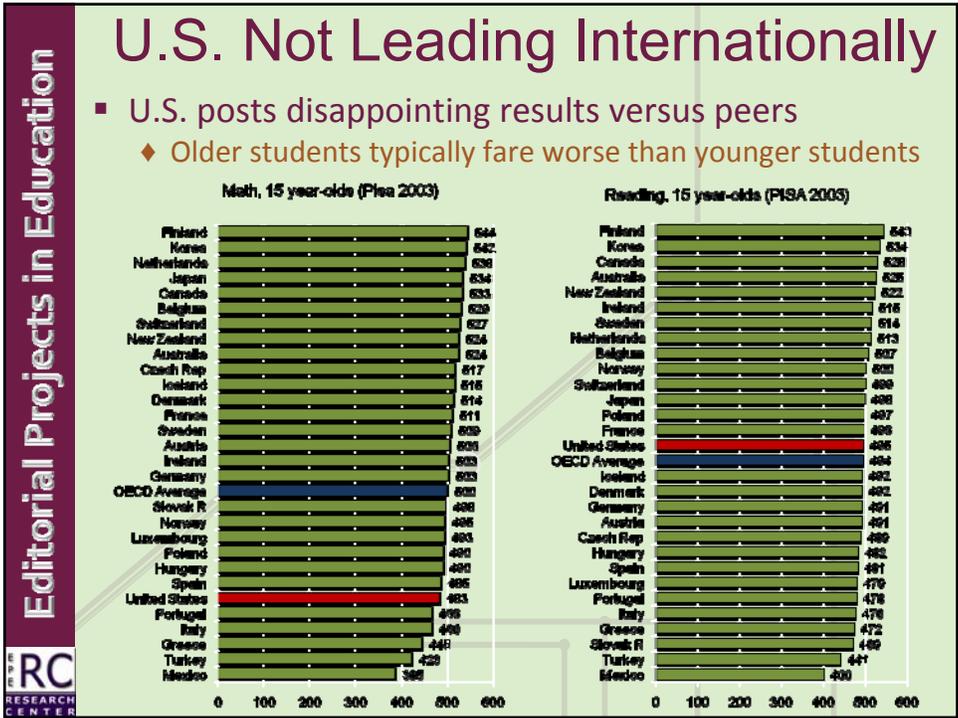
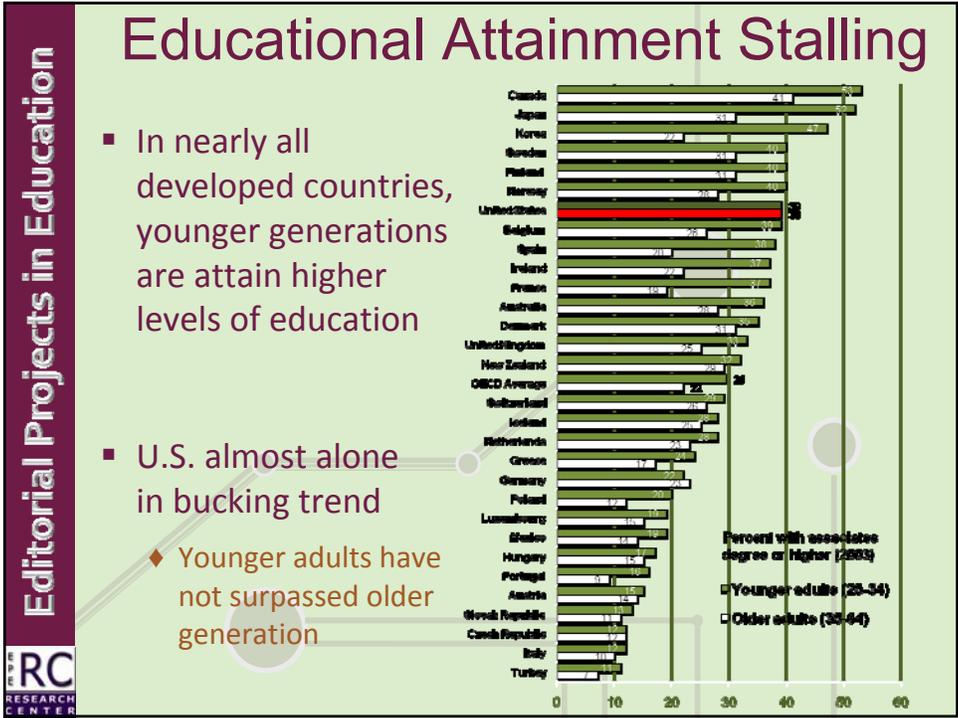


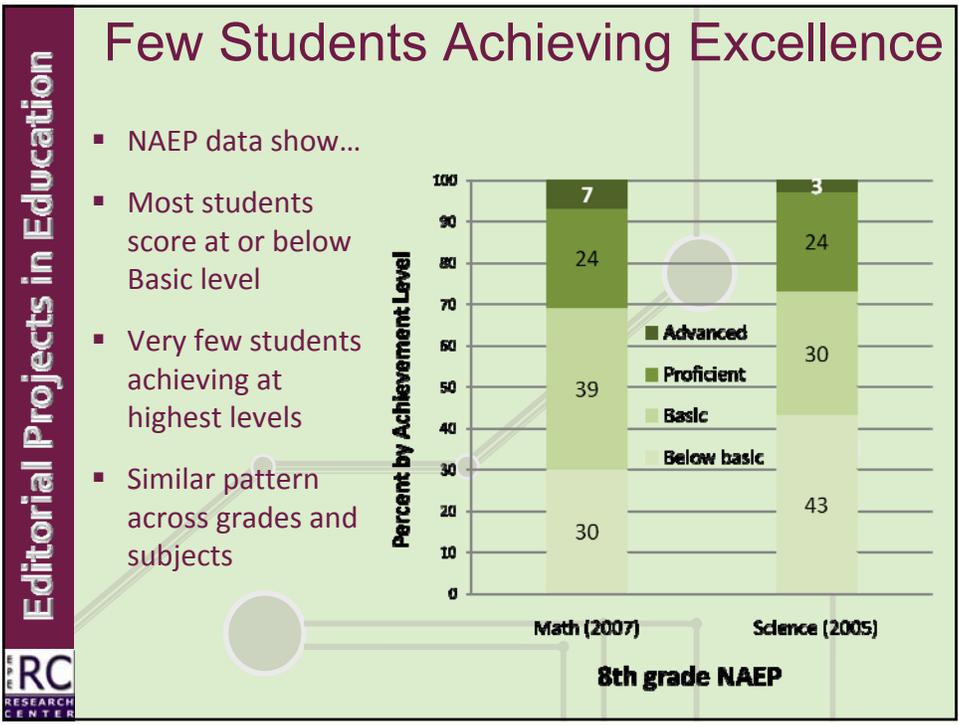
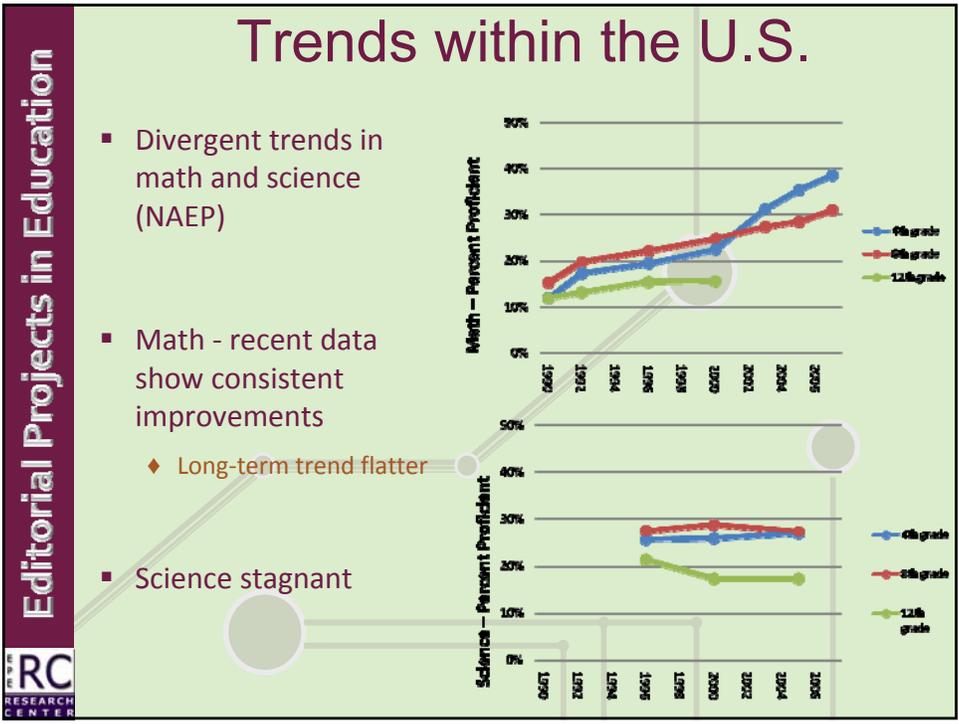
# From SMET to STEM

## Renewed Attention and Heightened Stakes

# The Heat Behind the Hot Topic

- STEM at the heart of numerous policy debates
  - ◆ Educational
  - ◆ Economic
  - ◆ Other – national security
- Flat-World View
- U.S. falling behind internationally
  - ◆ Educational performance
  - ◆ Educational attainment
  - ◆ Producing technically skilled workers
- Nation at increasing disadvantage against global competitors
  - ◆ Implications for state and regional economies







# Spotlight on Virginia

## Student Performance in STEM Subjects

	Virginia		National Average
	State Average	State Rank	
<b>Achievement Levels</b>			
4th grade math – Percent proficient on NAEP (2007)	41.9%	18	38.6%
8th grade math – Percent proficient on NAEP (2007)	37.5%	11	31.0%
4th grade science – Percent proficient on NAEP (2005)	39.7%	1	27.0%
8th grade science – Percent proficient on NAEP (2005)	34.5%	14	27.3%
<b>Achievement Gains</b>			
4th grade math – Scale score change on NAEP (2003-2007)	+4.3	36	+5.1
8th grade math – Scale score change on NAEP (2003-2007)	+5.9	9	+4.1
4th grade science – Scale score change on NAEP (2000-2005)	+6.1	4	+4.3
8th grade science – Scale score change on NAEP (2000-2005)	+4.4	4	-0.6
<b>Poverty Gap (National School Lunch Program, noneligible vs. eligible)</b>			
Math gap – 8th grade NAEP scale score (2007)	26.8	41	26.0
Science gap – 8th grade NAEP scale score (2005)	27.8	32	28.1
Math-gap change – 8th grade NAEP (2003-2007), negative value = closing gap	-0.6	32	-2.4
Science-gap change – 8th grade NAEP (2000-2005), negative value = closing gap	-1.1	18	-3.5
<b>Achieving Excellence</b>			
4th grade math – Percent advanced on 4th grade NAEP (2007)	6.6%	12	5.5%
8th grade math – Percent advanced on 8th grade NAEP (2007)	8.9%	8	6.6%
4th grade science – Percent advanced on 4th grade NAEP (2005)	4.9%	1	2.3%
8th grade science – Percent advanced on 8th grade NAEP (2005)	4.4%	4	2.9%

What can states do to improve STEM?

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## Policy Leadership

- Technology Counts grades states on leadership in education technology
- Access to Technology**
  - Access to computers (4th grade)
  - Access to computers (8th grade)
  - Students per instructional computer
  - Students per high-speed Internet computer
- Capacity to use Technology**
  - Teacher standards
  - Administrator standards
  - Initial teacher licensure
  - Initial administrator licensure
  - Teacher recertification
  - Administrator recertification
- Use of Technology**
  - Student technology standards
  - Students tested on technology
  - State has virtual school
  - State offers computer-based assessments

Letter graded based on number of policies state has in place.

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## Overall State Grade

- Nation as a whole earns a C+
  - Virginia earns a B+ and ranks 4th in nation

Overall grade

- A- to A (3)
- B- to B+ (13)
- C- to C+ (28)
- D- to D+ (7)

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# Grading Breakdown for Virginia

STATE TECHNOLOGY REPORT CARD 2008		
	Virginia	How did the average state score?
<b>Access</b> to technology	<b>A-</b>	C
<b>Use</b> of technology	<b>A-</b>	B-
<b>Capacity</b> to use technology	<b>B</b>	C
<b>Overall grade</b>	<b>B+</b>	C+

## Technology Counts Grading Breakdown

This table reports the detailed scoring behind the grades for the three major areas of state policy examined in *Technology Counts*.

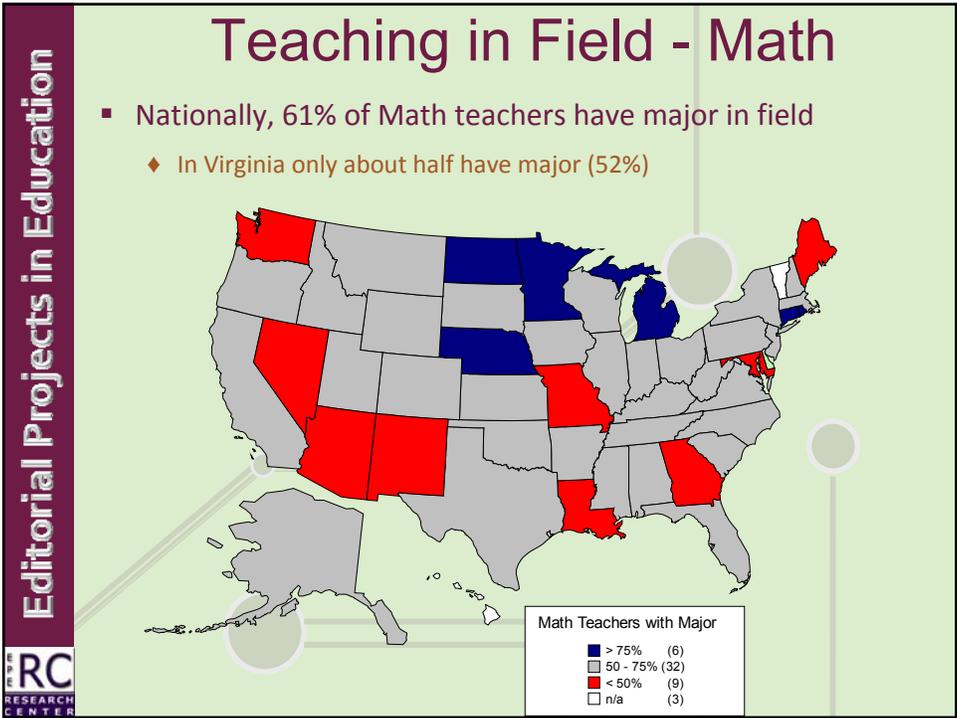
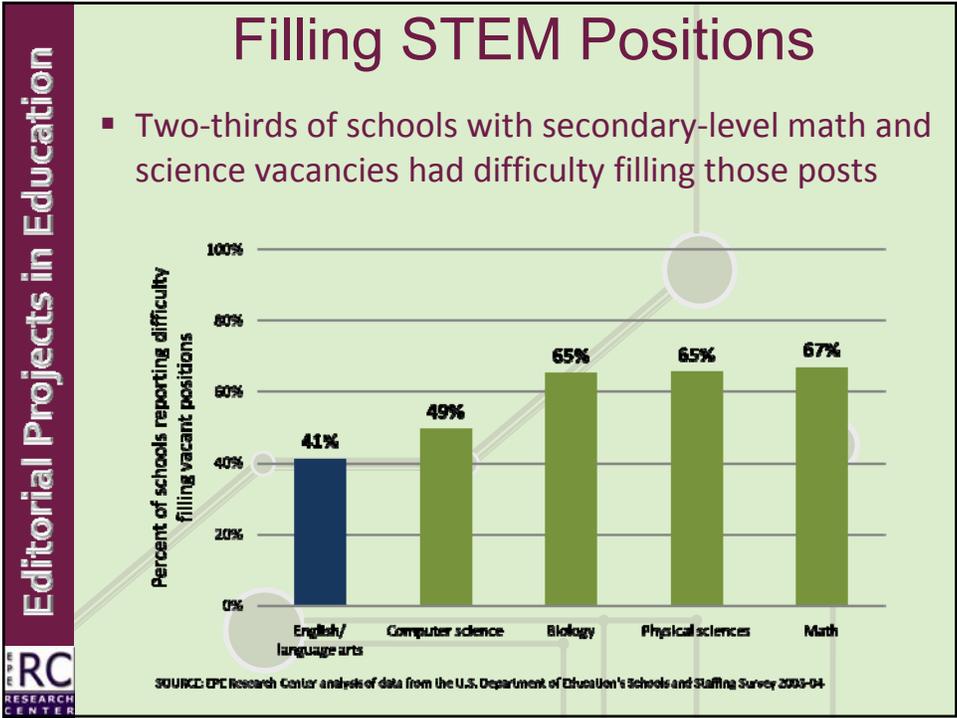
Access to Technology			Capacity to Use Technology		
	Virginia	U.S.	Does state have policy?	Number of states with policy	
<b>Percent of students with ...</b>			<b>State includes technology in its ...</b>		
Access to computers (4 <sup>th</sup> grade)	<b>96%</b>	95%	Teacher standards	<b>Yes</b>	44
Access to computers (8 <sup>th</sup> grade)	<b>95%</b>	83%	Administrator standards	<b>Yes</b>	35
<b>Number of students per ...</b>			Initial teacher-license requirements	<b>Yes</b>	19
Instructional computer	<b>3.1</b>	3.8	Initial administrator-license requirements	<b>Yes</b>	9
High-speed Internet-connected computer	<b>3.0</b>	3.7	Teacher-recertification requirements	<b>No</b>	10
			Administrator-recertification requirements	<b>No</b>	6
Use of Technology			Overall Technology Score		
	Does state have policy?	Number of states with policy	Virginia points awarded	Average state points awarded	
Student standards include technology	<b>Yes</b>	48	Access to technology	<b>90.0</b>	75.3
State tests students on technology	<b>No</b>	5	Use of technology	<b>89.8</b>	80.1
State has established a virtual school	<b>Yes</b>	25	Capacity to use technology	<b>86.3</b>	<b>75.5</b>
State offers computer-based assessments	<b>Yes</b>	27	<b>Total score (average of three categories)</b>	<b>88.7</b>	<b>76.9</b>

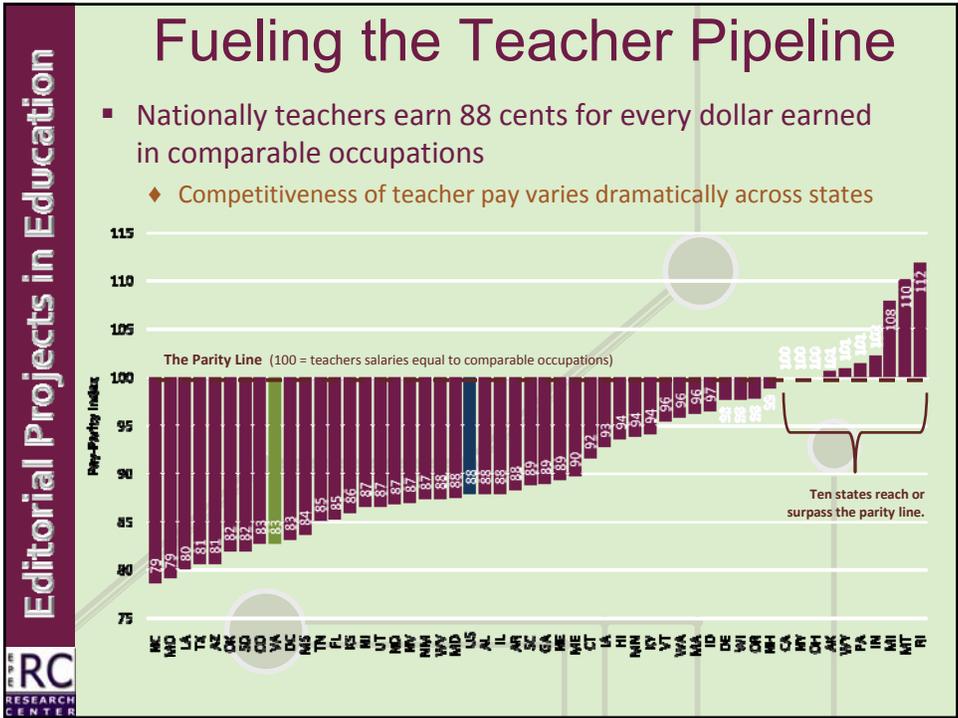
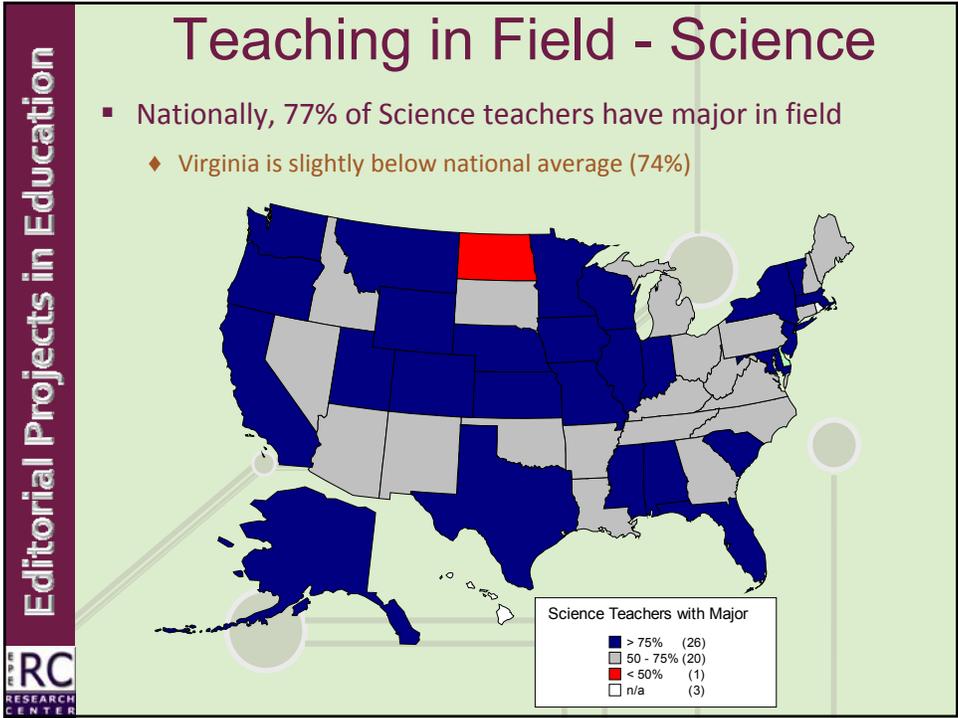


# Teacher-Focused Policy

## Building the STEM Teaching Workforce





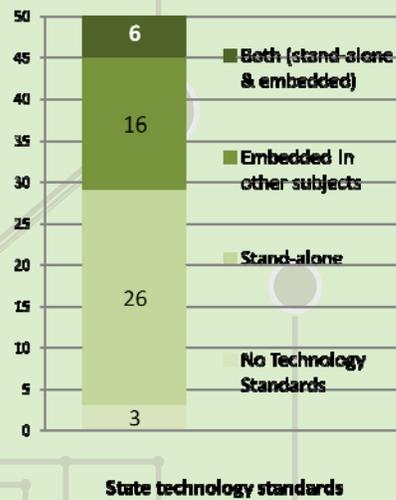


# Student-Focused Policy

## Raising Standards and Expectations

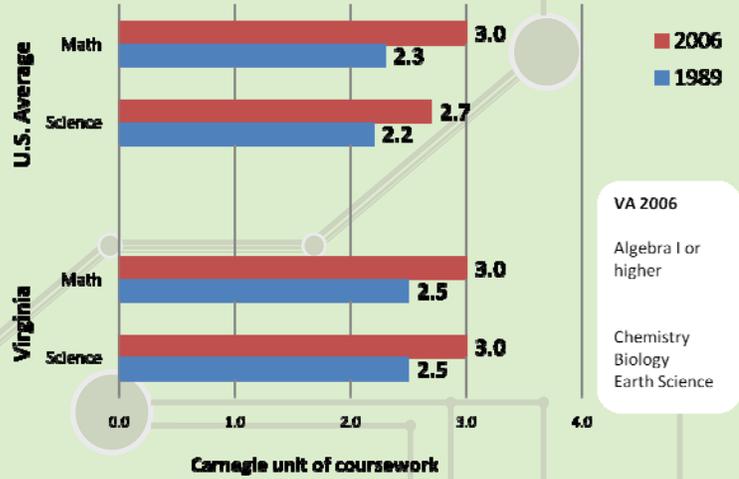
# Academic Standards

- All states now have K-12 academic standards in math and science
  - ◆ Quality may be a different matter
- 48 states have standards for technology
  - ◆ States have taken different approaches for embedding technology into the curriculum
- Virginia has stand-alone technology standards



# Graduation Requirements

- Math and science course-taking required for a high school diploma has risen over past two decades



# Programmatic Leadership

State Role(s)

## From Policy to Program

- States can ...
- Establish and fund STEM programs in local schools on a statewide basis
- Support local innovation and novel programs
- Identify and scale-up best practices
- Provide financial (and other) support to teacher workforce development
- ... and much more

## Examples from *Technology Counts*

- Promising approaches highlighted in *TC* journalism
  - ◆ New schools with specialized STEM focus
  - ◆ Strengthening career and technical education
  - ◆ Expansion of online instruction
  - ◆ Integration of S – T – E – M elements
  - ◆ Real-world applications – e.g., projects
  - ◆ Serving non-elite students
  - ◆ Student competitions
  - ◆ Enhanced instructional practices in STEM classes, especially through better use of technology
  - ◆ Pre-service and in-service teacher training
  - ◆ Additional school-level technical and support staff



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# Contact the EPE Research Center

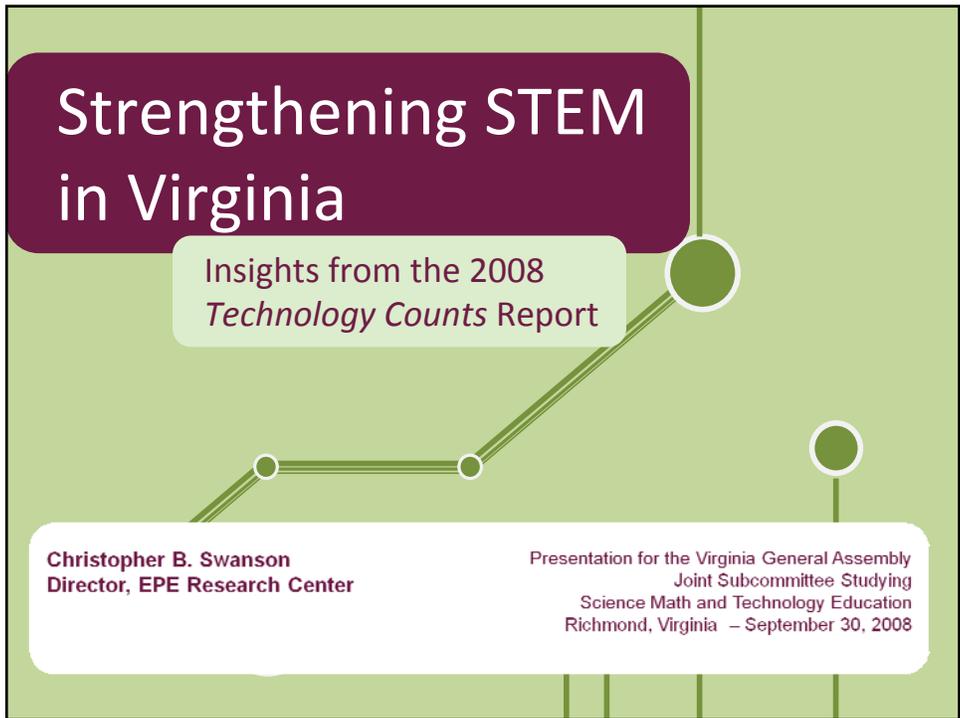
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