



# **A Tale of Two Washingtons**



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**Bill & Melinda Gates Chair in  
Computer Science & Engineering**  
**University of Washington**

**January 2014**



# **Two Tales** **~~A Tale~~ of Two** **Washingtons**

- **Washington then vs. Washington now**
- **The Washington of those who move here from elsewhere vs. the Washington of those who are born and raised here**

1977 **Seattle Mariners**  
BASEBALL CLUB



Then

Now



# ***BOEING***

**FLUKE®**

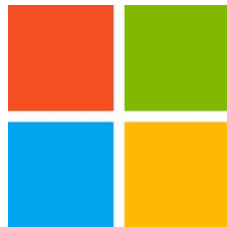


***BOEING***

**FLUKE®**



***We created***



**Microsoft**

**PC software**

# ***BOEING***

**FLUKE®**



***We created***



**ALDUS®**

***Desktop publishing***



# ***BOEING***

**FLUKE®**



***We created***



**Streaming media**

***BOEING***

**FLUKE®**



***We created***

**amazon.com®**

**E-tailing**



# BOEING

FLUKE®



*We created*



Travel



**REDFIN**  
Your New Way Home™

Real estate



Drugs & personal care



Imagery



Deals for moms,  
babies, and kids



E-tailing



HomeGrocer.com



Groceries



Jewelry

# ***BOEING***

**FLUKE®**



***We created***



**McCAW CELLULAR, INC.**

***Modern cellular services***

# ***BOEING***

**FLUKE®**



***We created***



***Cloud computing***

# BOEING

FLUKE®



We own



Windows Azure™



**amazon**  
web services™



TIER 3  
Century**Link**

Cloud computing

# BOEING

FLUKE®



We have the *potential*  
to own



TRIFACTA  
PEOPLE DATA COMPUTATION

INRIX



“Big data” analytics and applications

***BOEING***

FLUKE®



We have a  
*strong position in*

**Microsoft**  
*game studios™*

BUNGIE®

VALVE®



Games



# ***BOEING***

FLUKE®



We have a  
*strong position in*

buuteeq™

Concur®



SAAS

# ***BOEING***

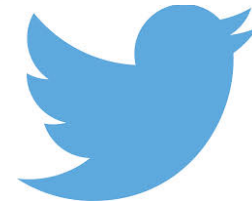
FLUKE®



***Our workforce and  
culture attract  
others***



Google



**Established companies**



# ***BOEING***

**FLUKE®**



***Our workforce and  
culture attract  
others***



**Startups**

# ***BOEING***

FLUKE®



And there's



FRED HUTCHINSON  
CANCER RESEARCH CENTER  
A LIFE OF SCIENCE

Life Sciences / Global Health



Clean Tech

≡ MODUMETAL Advanced Manufacturing

# ***BOEING***

FLUKE®



And that was just  
technology! There's



**COSTCO**  
WHOLESALE



NORDSTROM

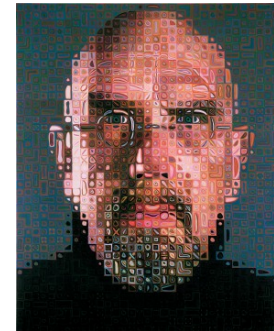
Distinctive retail

# ***BOEING***

## FLUKE®



And that was just  
technology! There's



Distinctive art

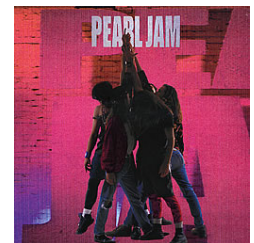
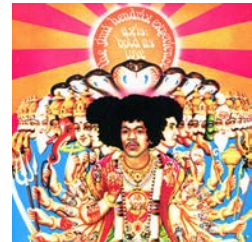
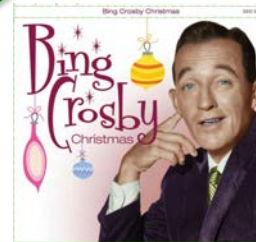


# BOEING

## FLUKE®



And that was just  
technology! There's



Distinctive music





**The Washington of  
those who move here  
from elsewhere**

**The Washington of  
those who are born  
and raised here**

**MADE • IN  
WASHINGTON**





**We are the #1 importer, per capita,  
of bachelors-educated individuals**

(National Center for Higher Education Management Systems and  
U.S. Census Bureau)



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of bachelors-educated individuals**

(National Center for Higher Education Management Systems and  
U.S. Census Bureau)

**Our strategy**





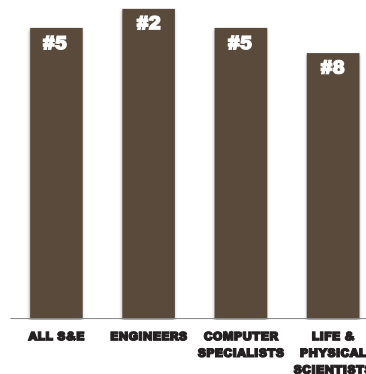
## We are the #1 importer, per capita, of bachelors-educated individuals

(National Center for Higher Education Management Systems and U.S. Census Bureau)

### A TALE OF TWO WASHINGTONS

NATIONAL RANKS: TALENT VS. DEGREE PRODUCTION

#### OUR INNOVATIVE TALENT



RANK AMONG THE 50 STATES

**BENCHMARKING  
OUR COMPETITIVENESS**





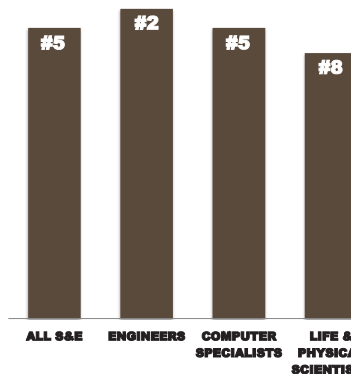
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### A TALE OF TWO WASHINGTONS

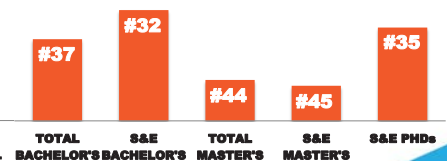
NATIONAL RANKS: TALENT VS. DEGREE PRODUCTION

#### OUR INNOVATIVE TALENT



#### OUR HIGHER EDUCATION CAPACITY

RANK AMONG THE 50 STATES



**BENCHMARKING  
OUR COMPETITIVENESS**

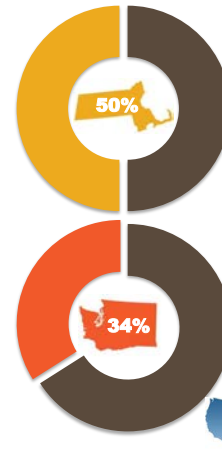


## We are the #1 importer, per capita, of bachelors-educated individuals

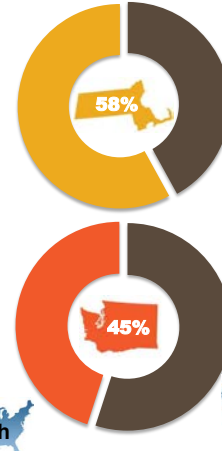
(National Center for Higher Education Management Systems and U.S. Census Bureau)

### EARLY INDICATORS OF STUDENT SUCCESS

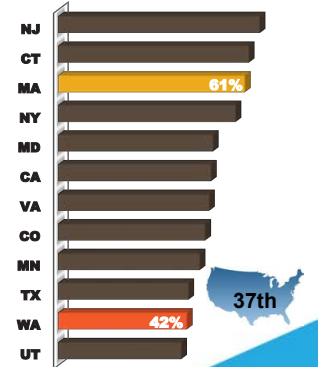
4TH GRADE READING (NAEP)



4TH GRADE MATH (NAEP)



PRE-SCHOOL ENROLLMENT (NCES)



**BENCHMARKING  
OUR COMPETITIVENESS**



## We are the #1 importer, per capita, of bachelors-educated individuals

(National Center for Higher Education Management Systems and U.S. Census Bureau)

### HIGH SCHOOL TO COLLEGE PIPELINE

ON-TIME GRADUATION & COLLEGE CONTINUATION RATE

100 STUDENTS ENTER 9<sup>TH</sup> GRADE...



**BENCHMARKING  
OUR COMPETITIVENESS**





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## HIGH SCHOOL TO COLLEGE PIPELINE

ON-TIME GRADUATION & COLLEGE CONTINUATION RATE

**BENCHMARKING  
OUR COMPETITIVENESS**

100 STUDENTS ENTER 9<sup>TH</sup> GRADE...



**83 GRADUATE HIGH SCHOOL  
ON TIME...**



**77 GRADUATE HIGH SCHOOL  
ON TIME...**





## We are the #1 importer, per capita, of bachelors-educated individuals

(National Center for Higher Education Management Systems and U.S. Census Bureau)

### HIGH SCHOOL TO COLLEGE PIPELINE

ON-TIME GRADUATION & COLLEGE CONTINUATION RATE

100 STUDENTS ENTER 9<sup>TH</sup> GRADE...



61 ENROLL DIRECTLY IN COLLEGE



37 ENROLL DIRECTLY IN COLLEGE



46th

**BENCHMARKING  
OUR COMPETITIVENESS**





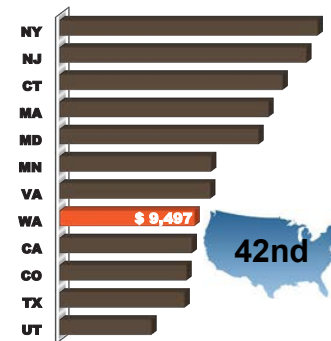
## We are the #1 importer, per capita, of bachelors-educated individuals

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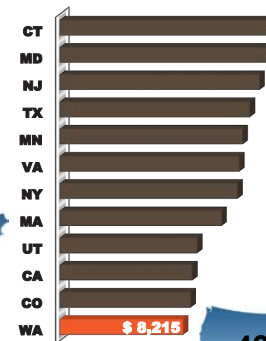
## INVESTMENT IN OUR EDUCATION SYSTEM

## BENCHMARKING OUR COMPETITIVENESS

### K-12 PER PUPIL EXPENDITURES



### HIGHER EDUCATION REVENUES PER FTE



HIGHER EDUCATION \$  
PEER: #12  
NATION: #49



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of bachelors-educated individuals**

(National Center for Higher Education Management Systems and  
U.S. Census Bureau)



Physical



Physical + Intellectual



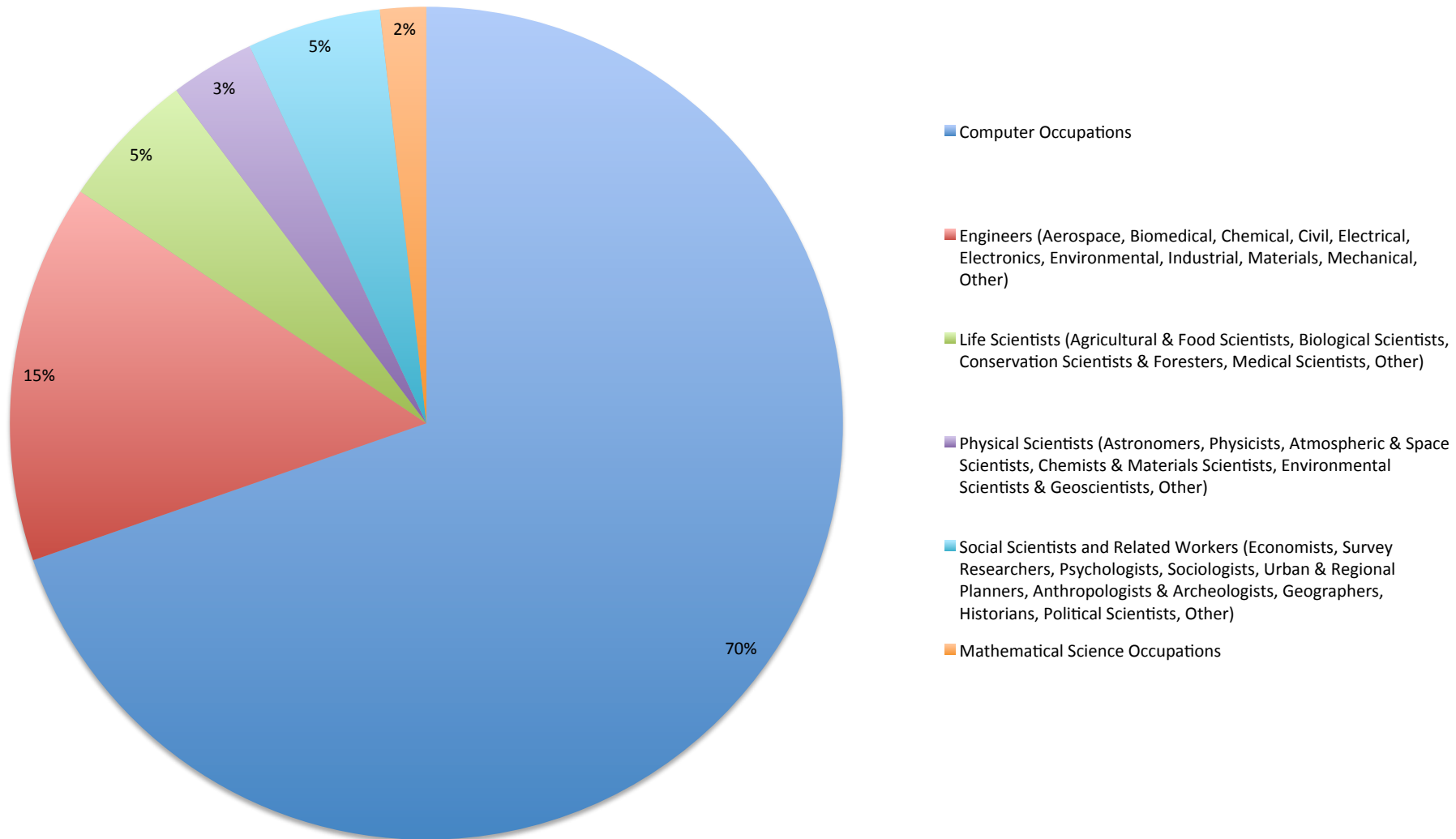
Intellectual

**Our education system is appropriate for our economy of 40 years ago**

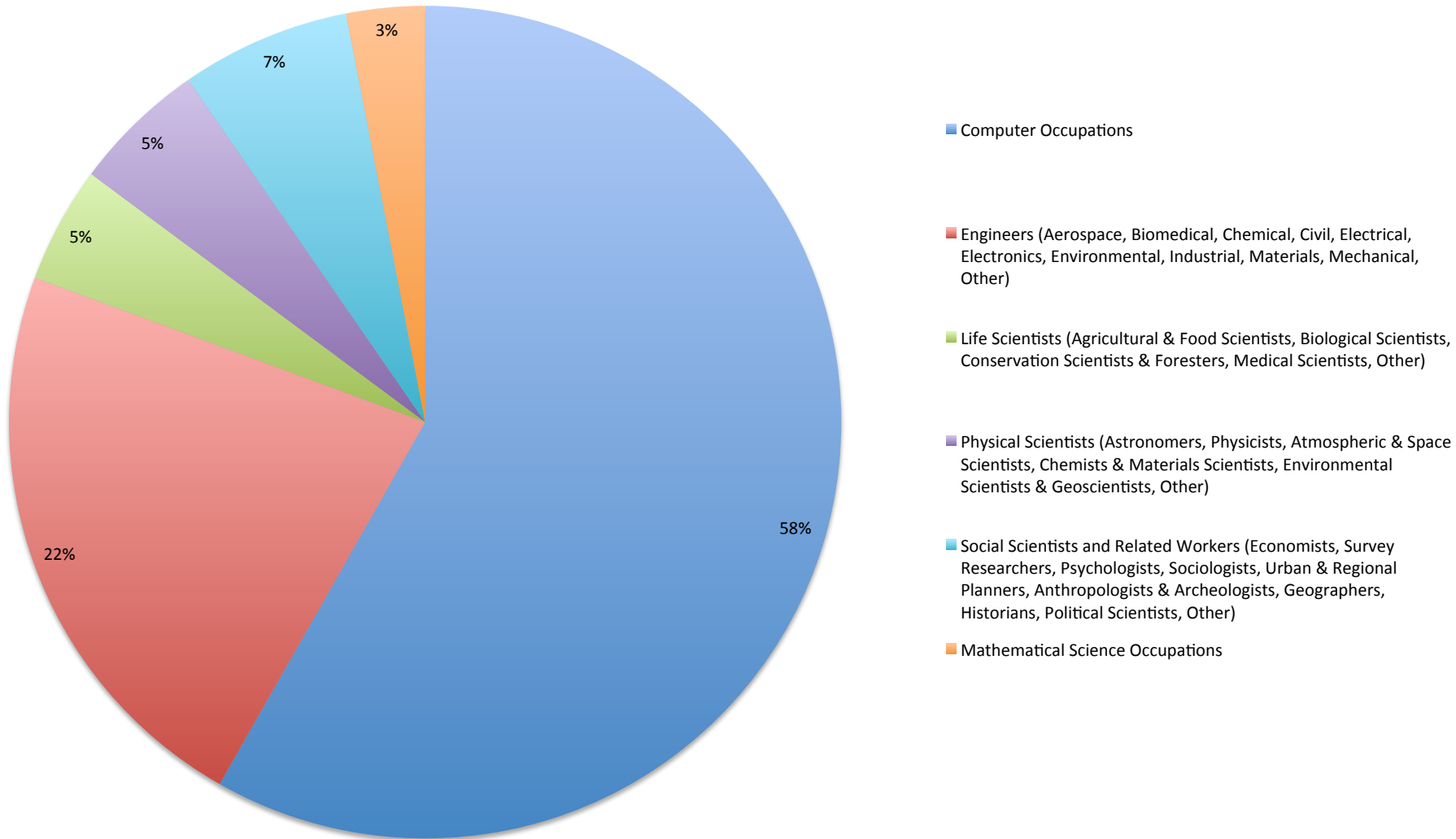
A hand holding a red apple in front of a chalkboard with math equations. The text "Let's put the vowel back in STEM!" is overlaid on the image, with the letter 'E' in "STEM" highlighted in red.

**Let's put the vowel  
back in STEM!**

# NEW JOBS IN ALL STEM FIELDS DURING THIS DECADE: 70% COMPUTER SCIENCE (BLS)



# AVAILABLE JOBS IN ALL STEM FIELDS DURING THIS DECADE: 60% COMPUTER SCIENCE (BLS)

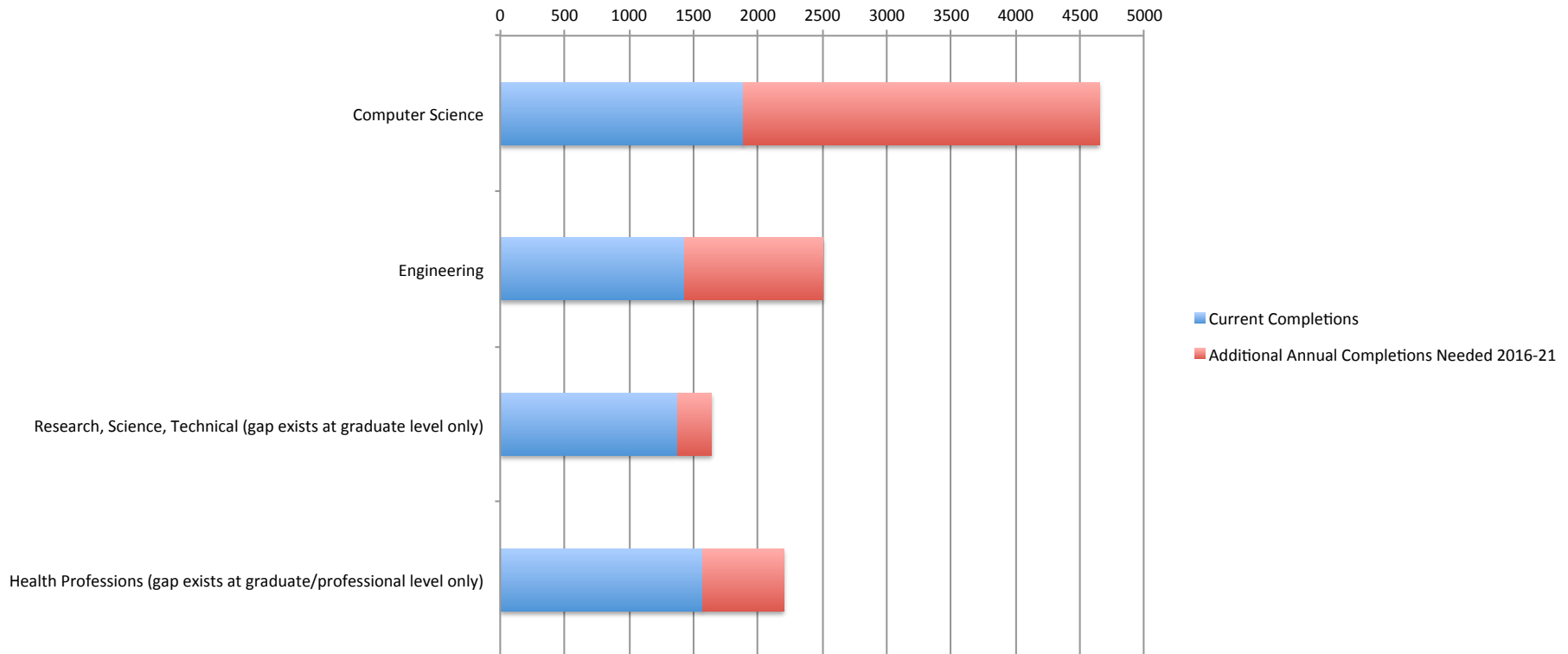




# WASHINGTON STATE: ONLY FOUR FIELDS HAVE PROJECTED GAPS AT THE BACHELORS AND GRADUATE LEVEL; THE COMPUTER SCIENCE GAP IS GREATER THAN ALL OTHERS COMBINED

(WSAC, SBCTC, WTECB)

**High Demand Fields at Baccalaureate Level and Above**  
Washington Student Achievement Council, October 2013



# **EVEN MORE THAN THIS: “COMPUTATIONAL THINKING” IS AN ESSENTIAL 21<sup>ST</sup> CENTURY CAPABILITY FOR EVERYONE!**

- Problem analysis and decomposition (stepwise refinement)
- Abstraction
- Algorithmic thinking
- Algorithmic expression
- Stepwise fault isolation (debugging)
- Modeling

**EVERY FIELD IS  
BECOMING AN  
INFORMATION FIELD**



# Computer Science in K-12: 1983

## A Nation At Risk

Our Nation is at risk. Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world. This report is concerned with only one of the many causes and dimensions of the problem, but it is the one that undergirds American prosperity, security, and civility.

If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. As it stands, we have allowed this to happen to ourselves.

### Recommendation A: Content

*We recommend that State and local high school graduation requirements be strengthened and that, at a minimum, all students seeking a diploma be required to lay the foundations in the Five New Basics by taking the following curriculum during their 4 years of high school: (a) 4 years of English; (b) 3 years of mathematics; (c) 3 years of science; (d) 3 years of social studies; and (e) one-half year of computer science.*



IBM PC XT  
4.77 MHz 8088  
128 KB RAM  
PC DOS 2.0

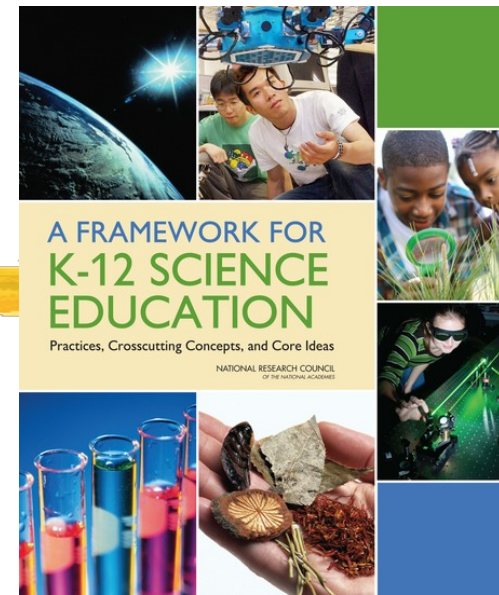
# Computer Science in K-12: 2013

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401 page report  
 15 page index



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# Computer Science in K-12: 2013

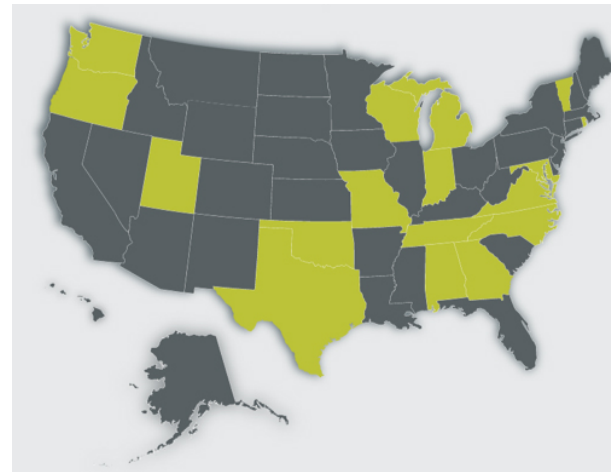


Elementary (K–5)			
Storylines: <a href="#">K–2</a> <a href="#">3–5</a>		PDFs: <a href="#">K</a> <a href="#">1</a> <a href="#">2</a> <a href="#">3</a> <a href="#">4</a> <a href="#">5</a>	
<b>K. Forces and Interactions: Pushes and Pulls</b> <b>K. Interdependent Relationships in Ecosystems:</b> Animals, Plants, and Their Environment <b>K. Weather and Climate</b> 1. Waves: Light and Sound 1. Structure, Function and Information Processing 1. Space Systems: Patterns and Cycles 2. Structure and Properties of Matter		2. Interdependent Relationships in Ecosystems 2. Earth's Systems: Processes that Shape the Earth <b>K-2. Engineering Design</b> 3. Forces and Interactions 3. Interdependent Relationships in Ecosystems 3. Inheritance and Variation of Traits 3. Weather and Climate 4. Energy  4. Waves 4. Structure, Function, and Information Processing 4. Earth's Systems: Processes that Shape the Earth 5. Structure and Properties of Matter 5. Matter and Energy in Organisms and Ecosystems 5. Earth's Systems 5. Space Systems: Stars and the Solar System 3-5. Engineering Design	
PS: Physical Sciences			
Middle School (6–8) <a href="#">Storyline</a> <a href="#">PDF</a>		High School (9–12) <a href="#">Storyline</a> <a href="#">PDF</a>	
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LS: Life Sciences			
Middle School (6–8) <a href="#">Storyline</a> <a href="#">PDF</a>		High School (9–12) <a href="#">Storyline</a> <a href="#">PDF</a>	
<b>MS. Structure, Function, and Information Processing</b> <b>MS. Matter and Energy in Organisms and Ecosystems</b> <b>MS. Interdependent Relationships in Ecosystems</b> <b>MS. Growth, Development, and Reproduction of Organisms</b> <b>MS. Natural Selection and Adaptations</b>		<b>HS. Structure and Function</b> <b>HS. Matter and Energy in Organisms and Ecosystems</b> <b>HS. Interdependent Relationships in Ecosystems</b> <b>HS. Inheritance and Variation of Traits</b> <b>HS. Natural Selection and Evolution</b>	
ESS: Earth and Space Sciences			
Middle School (6–8) <a href="#">Storyline</a> <a href="#">PDF</a>		High School (9–12) <a href="#">Storyline</a> <a href="#">PDF</a>	
<b>MS. Space Systems</b> <b>MS. History of Earth</b> <b>MS. Earth's Systems</b> <b>MS. Weather and Climate</b> <b>MS. Human Impacts</b>		<b>HS. Space Systems</b> <b>HS. History of Earth</b> <b>HS. Earth's Systems</b> <b>HS. Weather and Climate</b> <b>HS. Human Sustainability</b>	
ETS: Engineering, Technology, and Applications of Science			
Middle School (6–8) <a href="#">Storyline</a> <a href="#">PDF</a>		High School (9–12) <a href="#">Storyline</a> <a href="#">PDF</a>	
<b>MS. Engineering Design</b>		<b>HS. Engineering Design</b>	



# Computer Science in K-12: 2013

- In 9 out of 10 high schools nationwide, computer science is not offered
- In only 17 of the 50 states does computer science count towards the high school math or science graduation requirement



Yet computer science - "computational thinking" - is a key capability for just about every 21<sup>st</sup> century endeavor



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