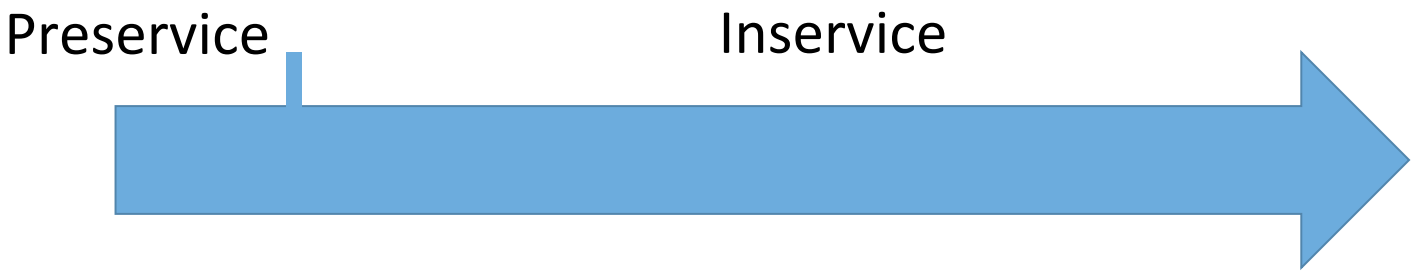
The **Who**, **Where**, and **What** *but Not the* ***How*** of Professional Development for Math and Special Education

John Woodward
Dean and Professor Emeritus
School of Education
University of Puget Sound

A Policy View of Professional Development



Promises to Keep:

Transforming Educator Preparation to Better Serve a Diverse Range of Learners

Leveraging the Policy Recommendations of CCSSO's Our Responsibility, Our Promise Report

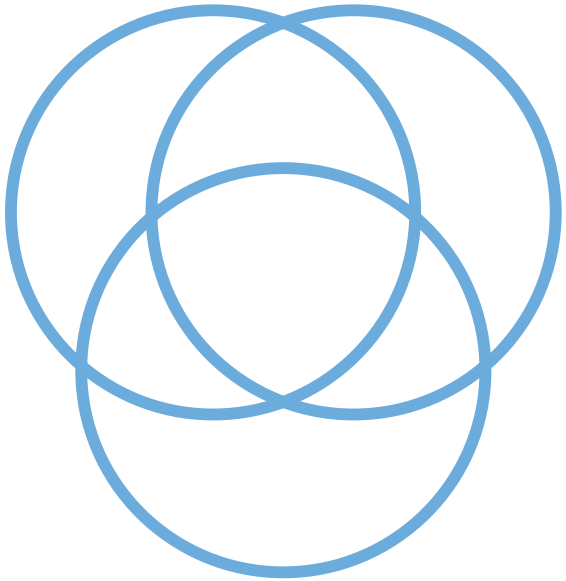
CEEDAR CENTER

CCSSO
Council of Chief State School Officers

May 2015

- Tighten Preservice Licensure Requirements and Candidate Outcomes
- The Usual for Special Educators
- "Clarify expectations for base content knowledge for all teachers at the elementary and secondary levels within a tiered system of support."

The Case of Math Instruction



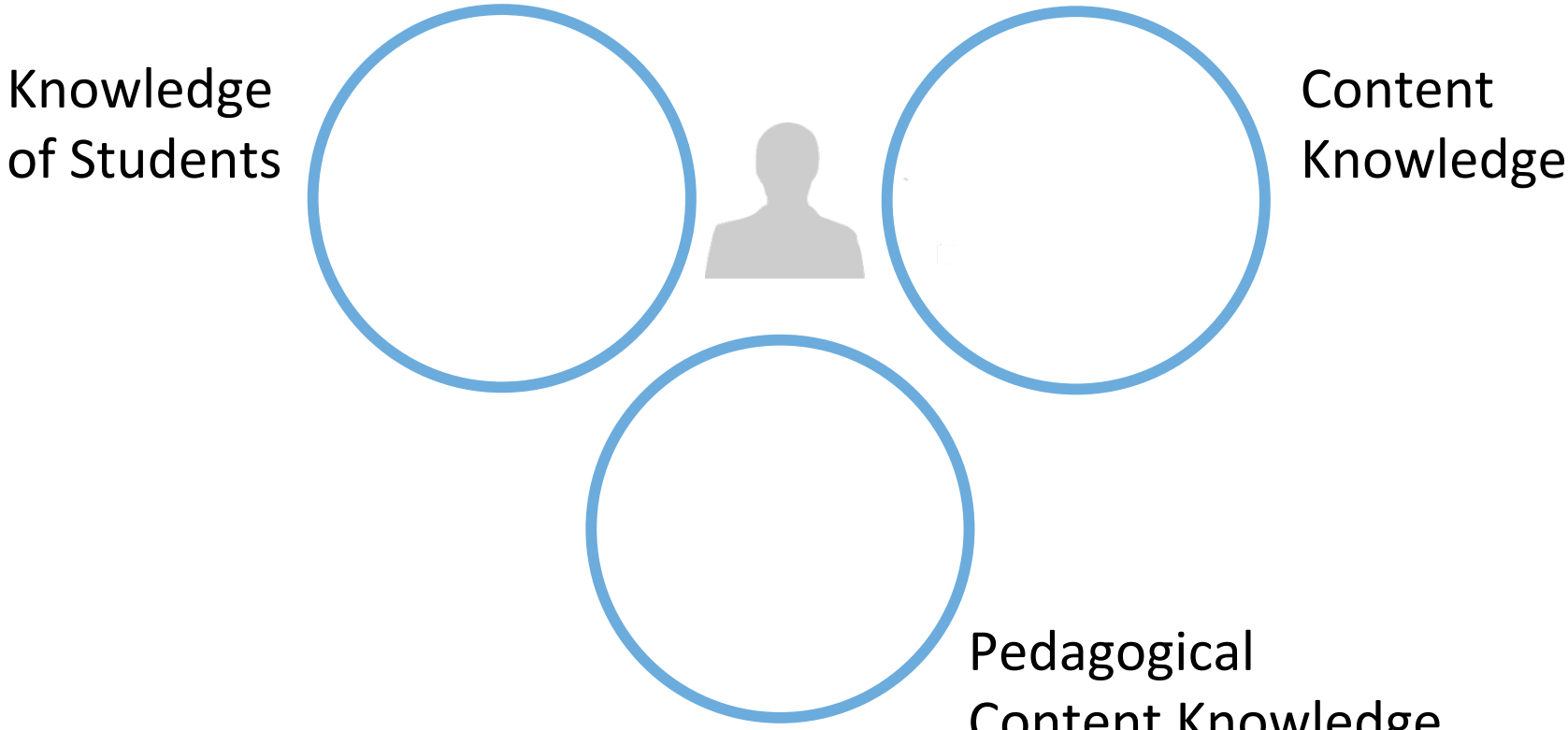
Knowledge of Students

Content Knowledge

Pedagogical Content Knowledge

Who

The Case of Math Instruction



RESEARCH TREND: COMMON TRAITS OF GREAT TEACHERS

When it comes to choosing the right candidate, it is always helpful to know the characteristics that predict future success. Great teachers share a number of characteristics, including:

PERSONALITY TRAITS

- Patience and persistence
- Fallibility
- Extraversion
- Conscientiousness
- General self-efficacy
- Teaching self-efficacy
- Positive affectivity

DISPOSITIONS

- Value students' learning
- Respect and value for diversity
- Open to self-learning
- Caring about students
- Commitment and dedication

SKILLS & ABILITIES

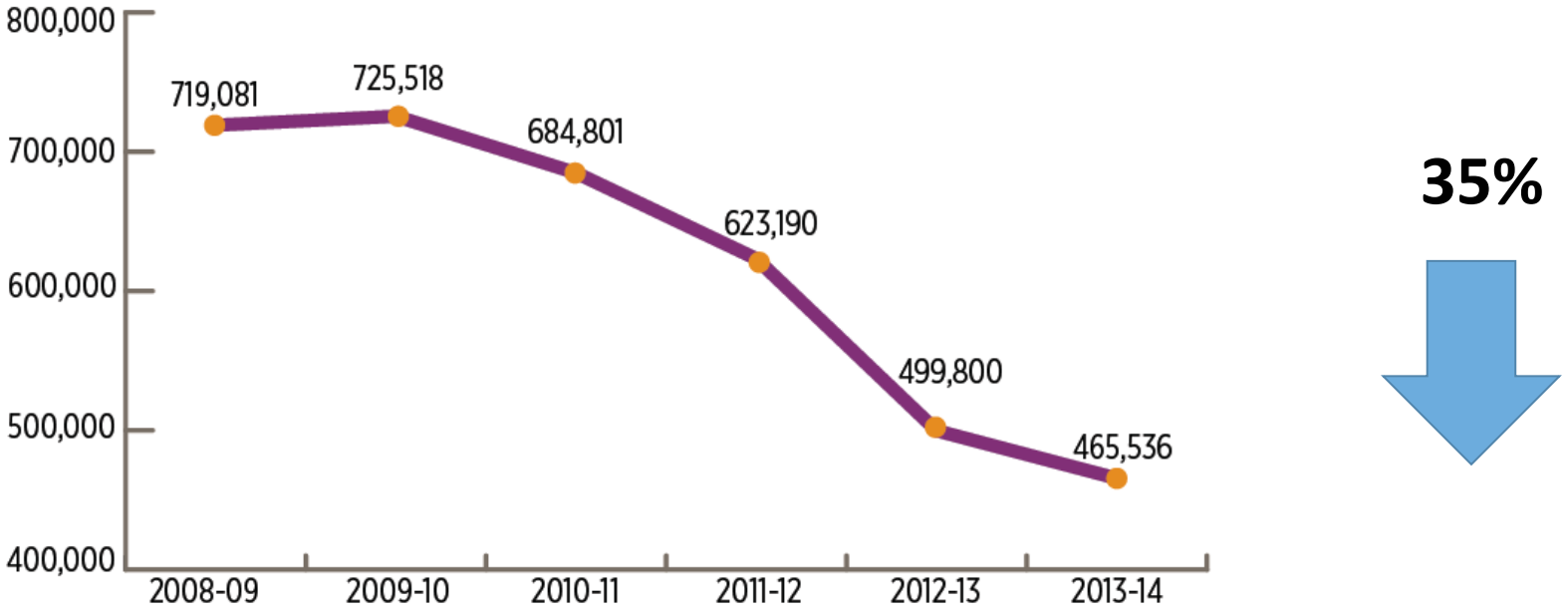
- Organization and planning
- Ability to connect theory to practice
- Ability to survive in a bureaucracy
- Concept development
- Quality of feedback
- Language modeling
- Richness of instructional methods
- Classroom management
- Behavior management

COGNITIVE FACTORS

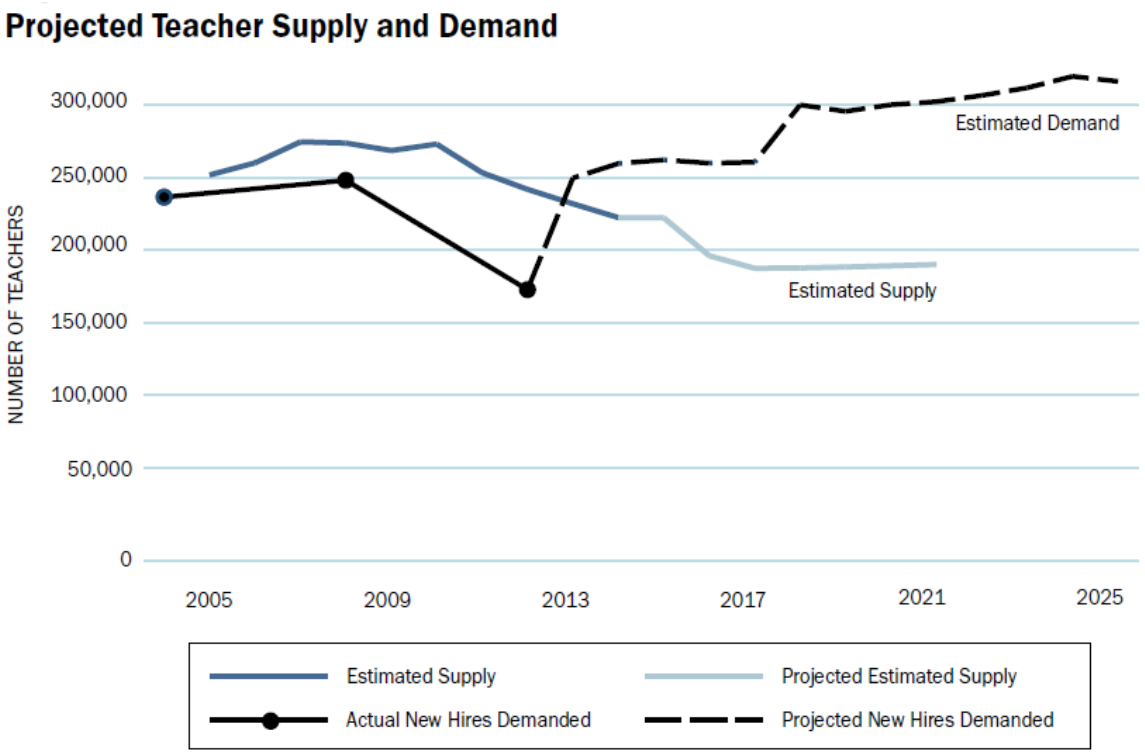
- SAT scores (math & verbal)
- Cognitive ability
- Content knowledge and expertise

Becker et al. (2003), Hamre et al. (2012), Jamil et al. (2015), Masunaga & Lewis (2011), Metzger & Wu (2008), Mueller & Hindin (2011), Rockoff et al. (2011)

ENROLLMENT IN TEACHER PREPARATION PROGRAMS: 2008-2009 THROUGH 2013-2014



Source: U.S. Department of Education, Office of Postsecondary Education, ***Enrollment in Teacher Preparation Programs*** *(Washington, D.C.: U.S. Department of Education, 2015), 5-6, https://title2.ed.gov/Public/44077_Title_II_Issue_Brief_Enrollment_V4a.pdf (accessed April 7, 2016). States first began reporting the number of individuals enrolled in teacher preparation programs in AY 2008-09.*

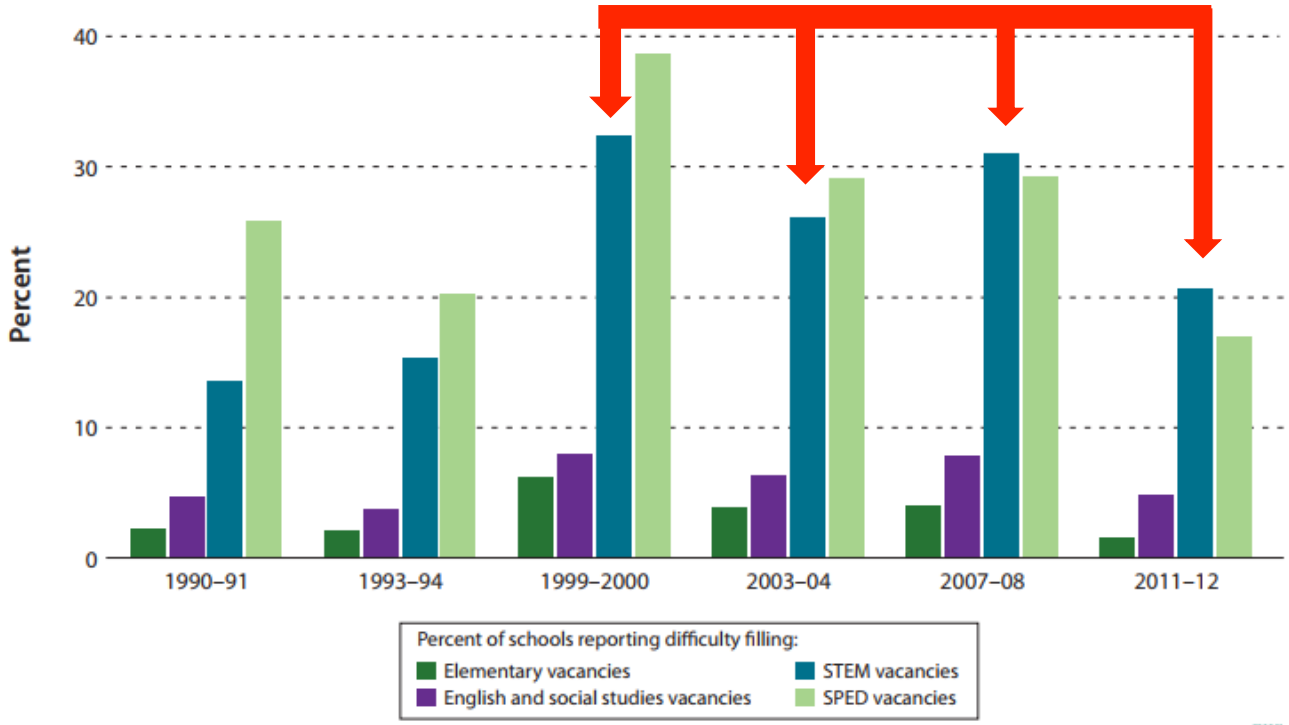


Note: The supply line represents the midpoints of our upper- and lower-bound teacher supply estimates (see Figure 10 for full analysis).

Source: U.S. Department of Education, multiple databases (see Appendix A).

Sutcher, L., Darling-Hammond, L., & Carver-Thomas, D. (2016). *A coming crisis in teaching? Teacher supply, demand, and shortages in the U.S.*. Palo Alto, CA: Learning Policy Institute.

Percentage of Difficult-to-Fill Teacher Vacancies, Select School Years

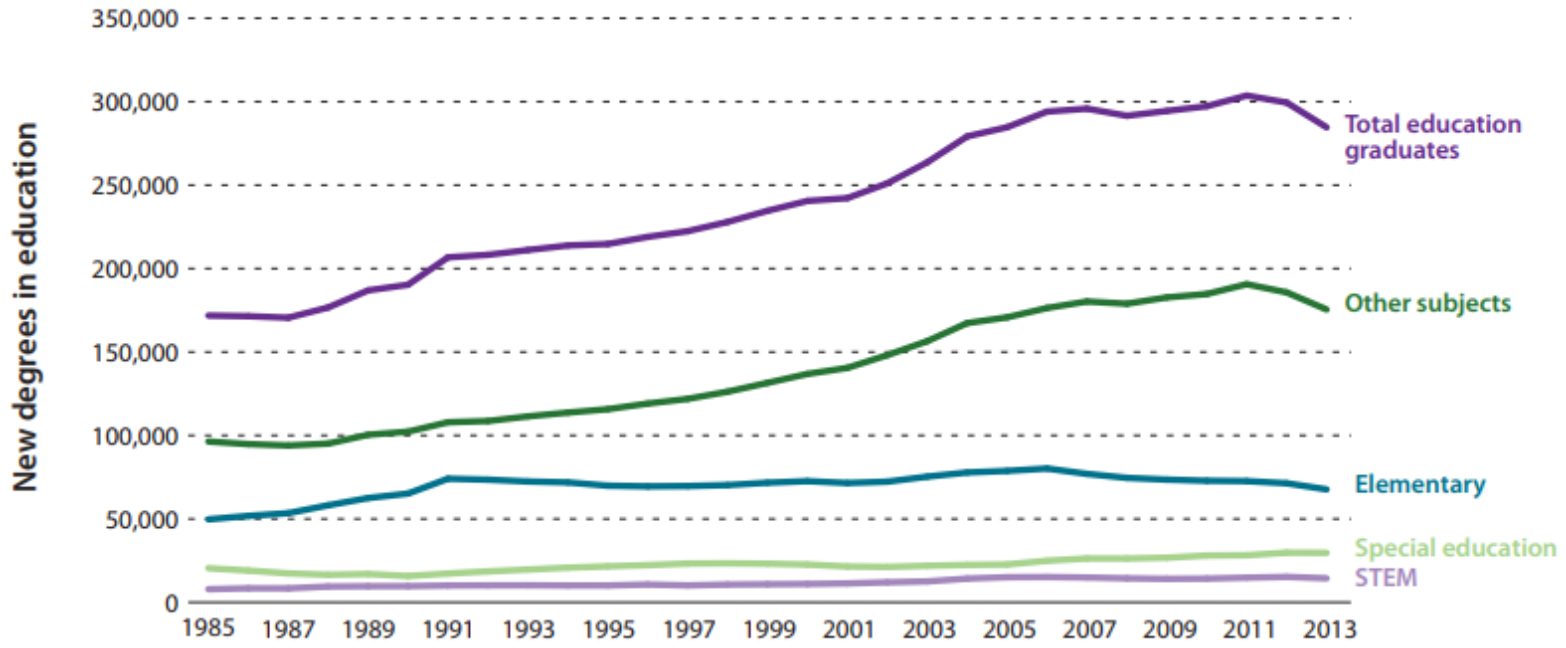


Source: James Cowan, Dan Goldhaber, Kyle Hayes, and Roddy Theobald (2016), "Missing Elements in the Discussion of Teacher Shortages," *Educational Researcher* 45 (8): 460–62.
Note: SPED = special education.

THE HAMILTON PROJECT
BROOKINGS

***Understanding and Addressing Techer Shortages in the United States*. April 2017.**

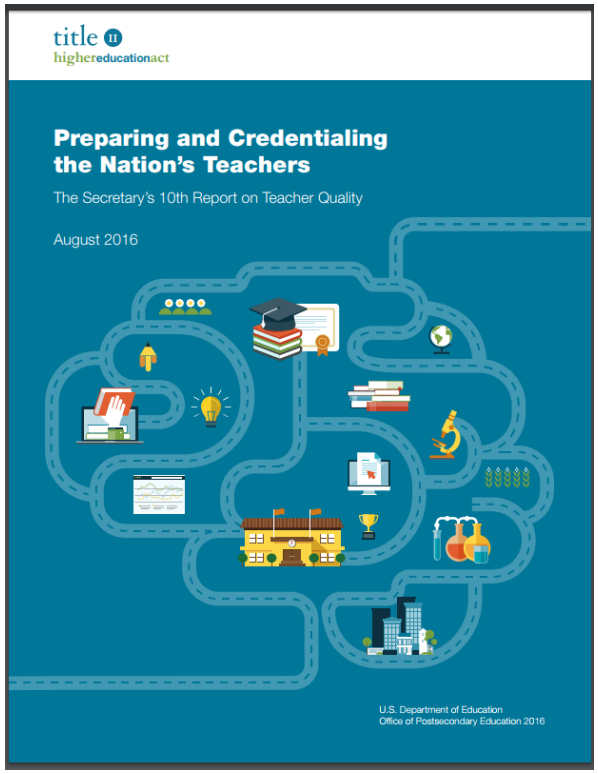
Annual Education Graduates, 1985–2013



Source: James Cowan, Dan Goldhaber, Kyle Hayes, and Roddy Theobald (2016), "Missing Elements in the Discussion of Teacher Shortages," *Educational Researcher* 45 (8): 460–62.

THE HAMILTON PROJECT
BROOKINGS

***Understanding and Addressing Techer Shortages in the United States*. April 2017.**



- Types of Teacher Prep Providers
  - Traditional IHE (69%)
  - Alternative Route IHE (22%)
  - Alternative Route Not IHE (9%)

Where

	Traditional IHE	Alternative Route IHE	Alternative Route Not IHE
Special Education	16%	20% **37%**	17%
Mathematics	7%	8% **20%**	12%

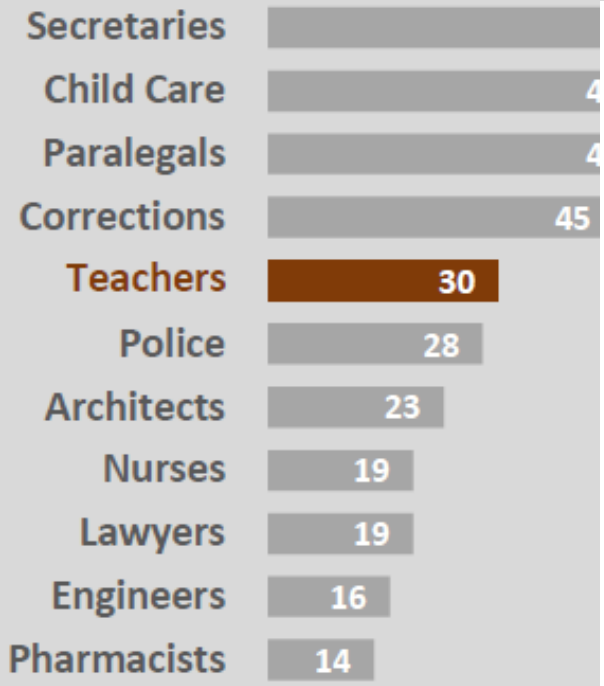
Preparing and Credentialing the Nation's Teachers August 2016 (US Dept of ED Title II Report)

Attrition Rates for Sped Teachers within 3 Years:

- Traditional Routes: 30%
- Alternative Routes: 60%

HECSE
Higher Education Consortium for Special Education

TURNOVER BY OCCUPATION



Source: Ingersoll & Perda (forthcoming)

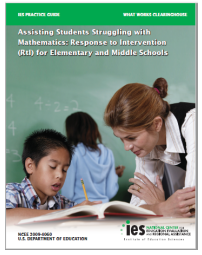
THE COST OF TEACHER TURNOVER

Cost of teacher turnover in 2014 based on information from the Alliance for Excellent Education (2014) and the Professional Educator Standards Board of Washington.

If You Can Find Them and Keep Them

Focus on Those Who Provide Direct Instructional Services

- **Rethink the Machine-Human Roles in Teaching**
- **Use Robust Curriculum**
  - **Materials that Take Students beyond 1970s Special Ed Math**
- **Narrow the PD to Common Grade Level Issues**
  - **Operations on Whole Numbers**
  - **Rational Numbers**
  - **Problem Solving**



What

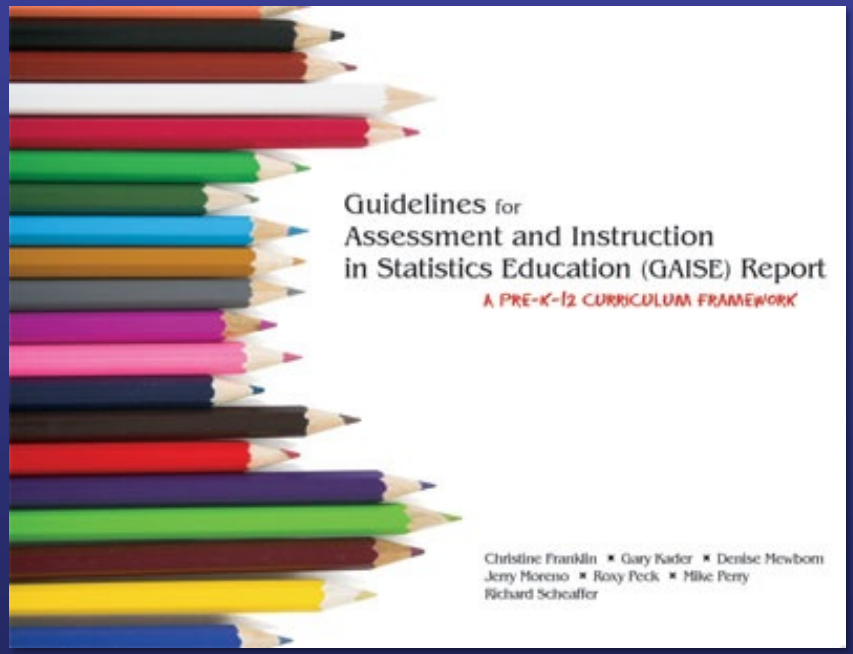
Teaching Statistics, Probability, and Data Science

September 27, 2017

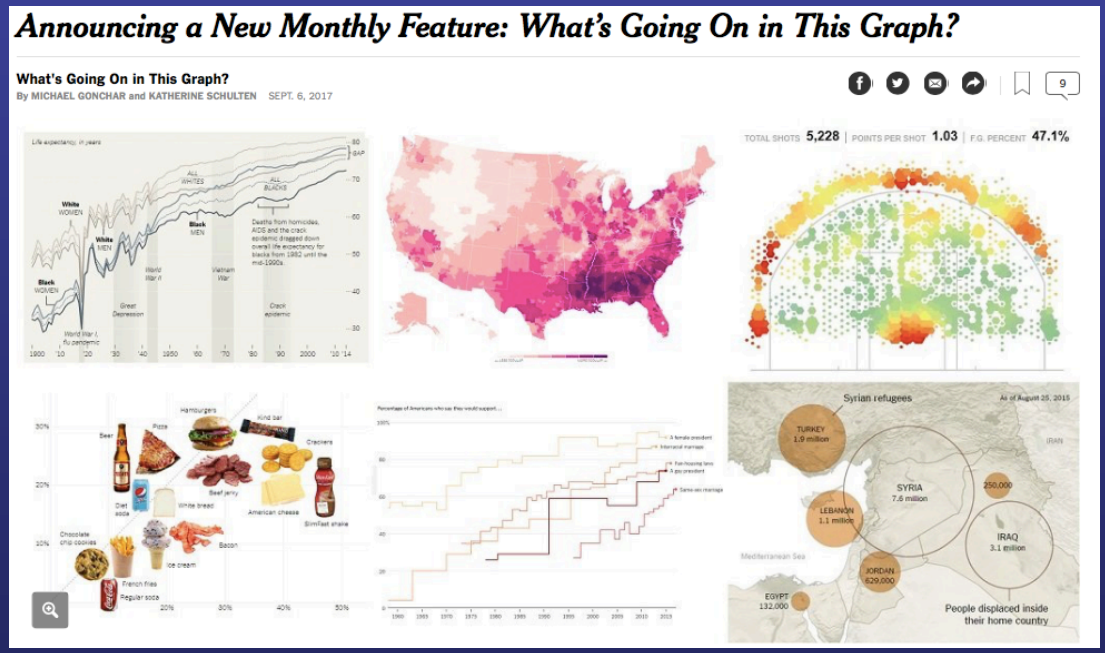
Tim Jacobbe
jacobbe@coe.ufl.edu

UF | UNIVERSITY of FLORIDA

Where did the Standards come from?



NY Times – 9/6/2017

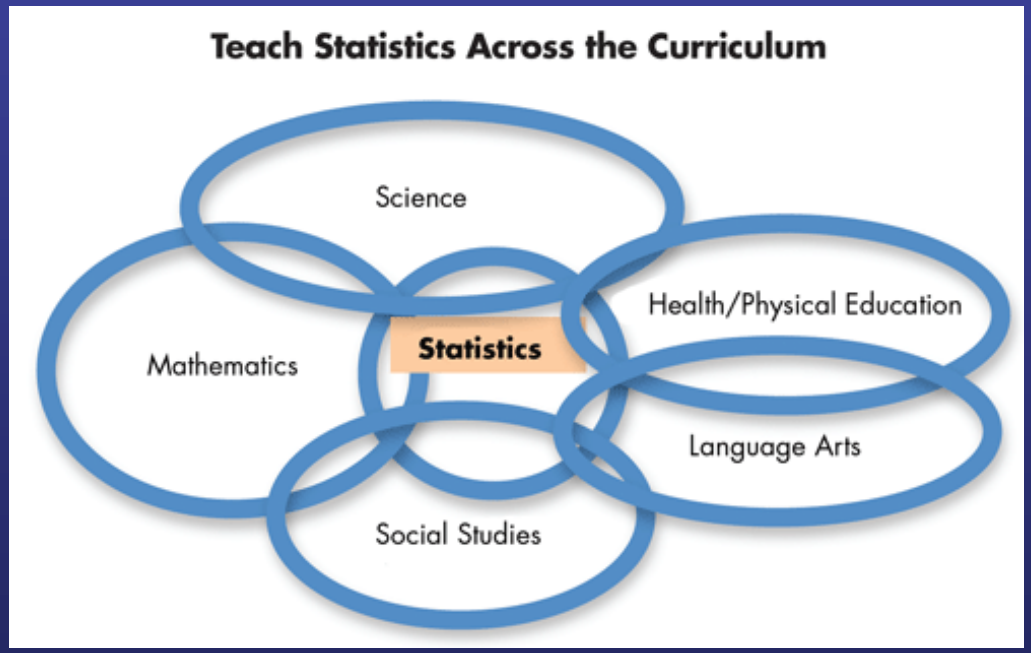


Announcing a New Monthly Feature: What's Going On in This Graph?

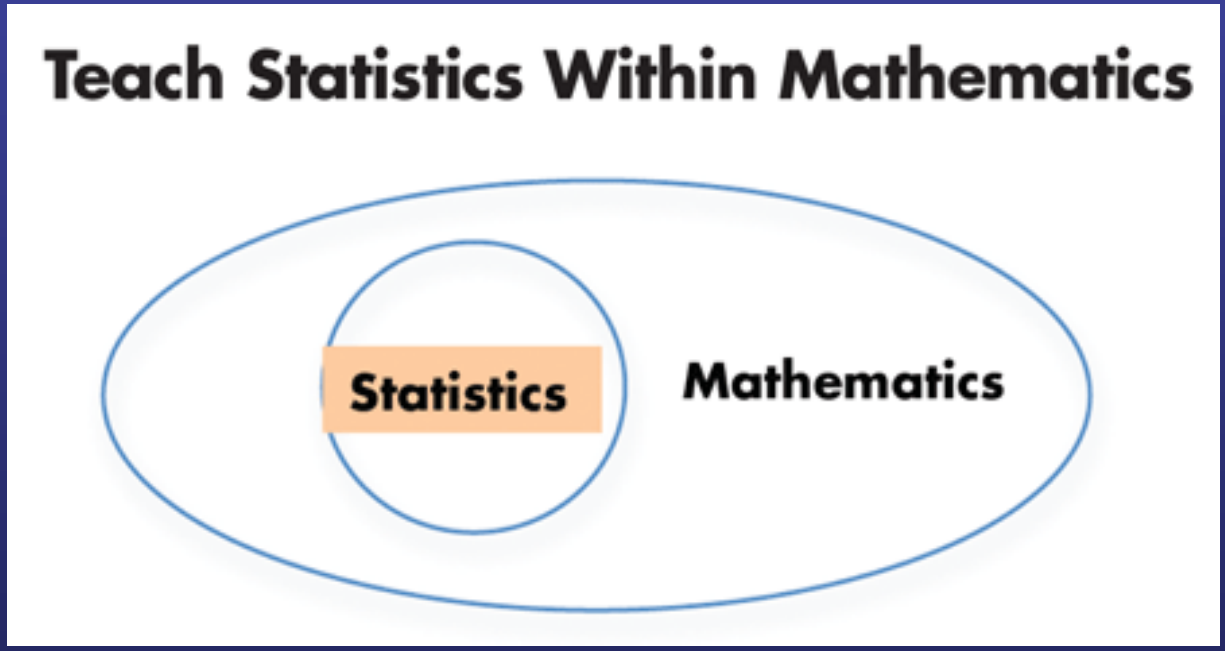
What's Going On in This Graph?

By MICHAEL GONCHAR and KATHERINE SCHULTEN SEPT. 6, 2017

Usiskin (2015)



Usiskin (2015)



Mathematics vs. Statistics

- In mathematics, context obscures structure. Like mathematicians, data analysts also look for patterns, but ultimately, in data analysis, whether the patterns have meaning, and whether they have any value, depends on how the threads of those patterns interweave with the complementary threads of the story line. In data analysis, context provides meaning.
  - Moore & Cobb, 1997

Mathematics vs. Statistics

- In mathematics, context obscures structure. Like mathematicians, data analysts also look for patterns, but ultimately, in data analysis, whether the patterns have meaning, and whether they have any value, depends on how the threads of those patterns interweave with the complementary threads of the story line. In data analysis, context provides meaning.
  - Moore & Cobb, 1997

Face Reality of the Role Testing Plays

The booster club is planning to buy peanuts to serve at its meetings. The cost of the peanuts depends on the amount purchased, as shown in the table below.

Total Number of Pounds Purchased	Cost of Peanuts Per Pound
0–5	$2.50
6–10	$2.25
11–20	$2.00
Over 20	$1.75

10. How much will 18 pounds of peanuts cost?

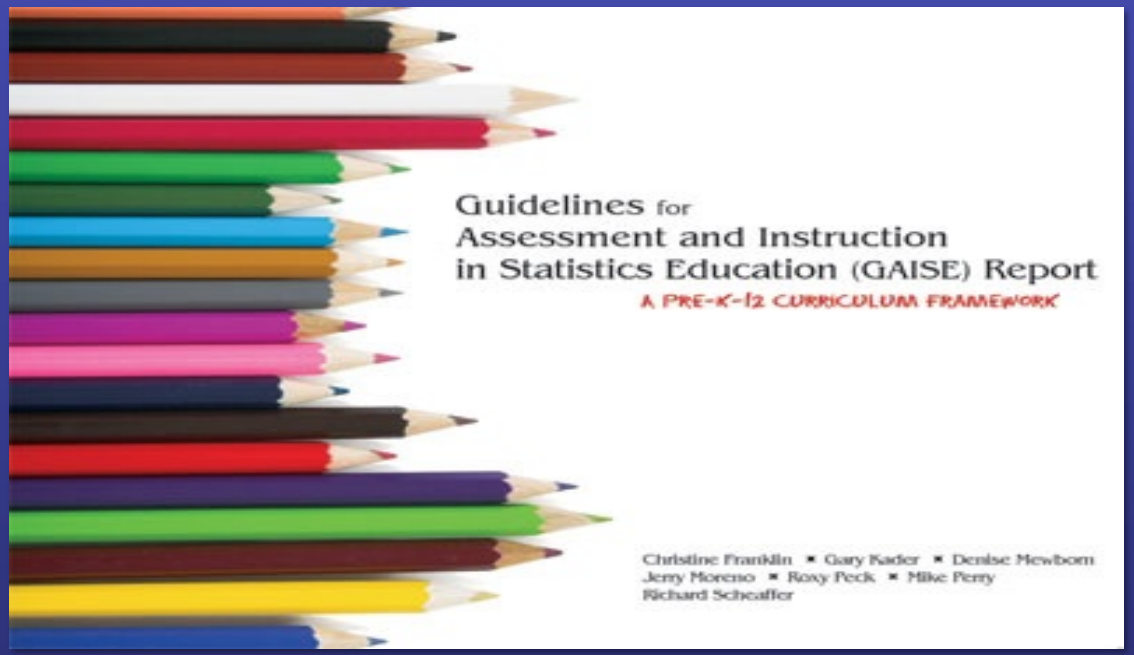
A. $31.50
B. $34.00
C. $36.00
D. $40.50
E. $45.00

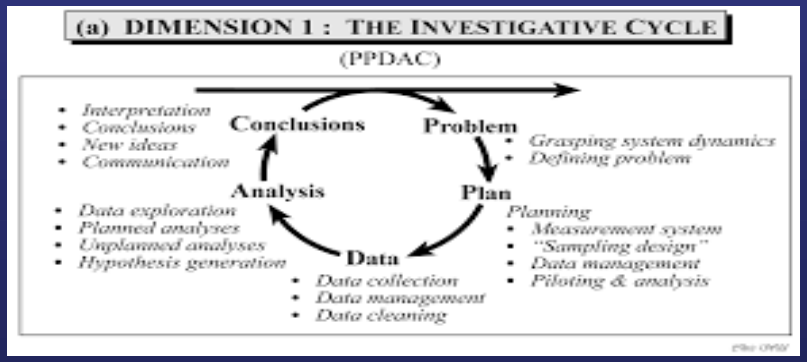
ASA NCTM NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

Learn About LOCUS | Manage Tests & Reports | View Items & Resources

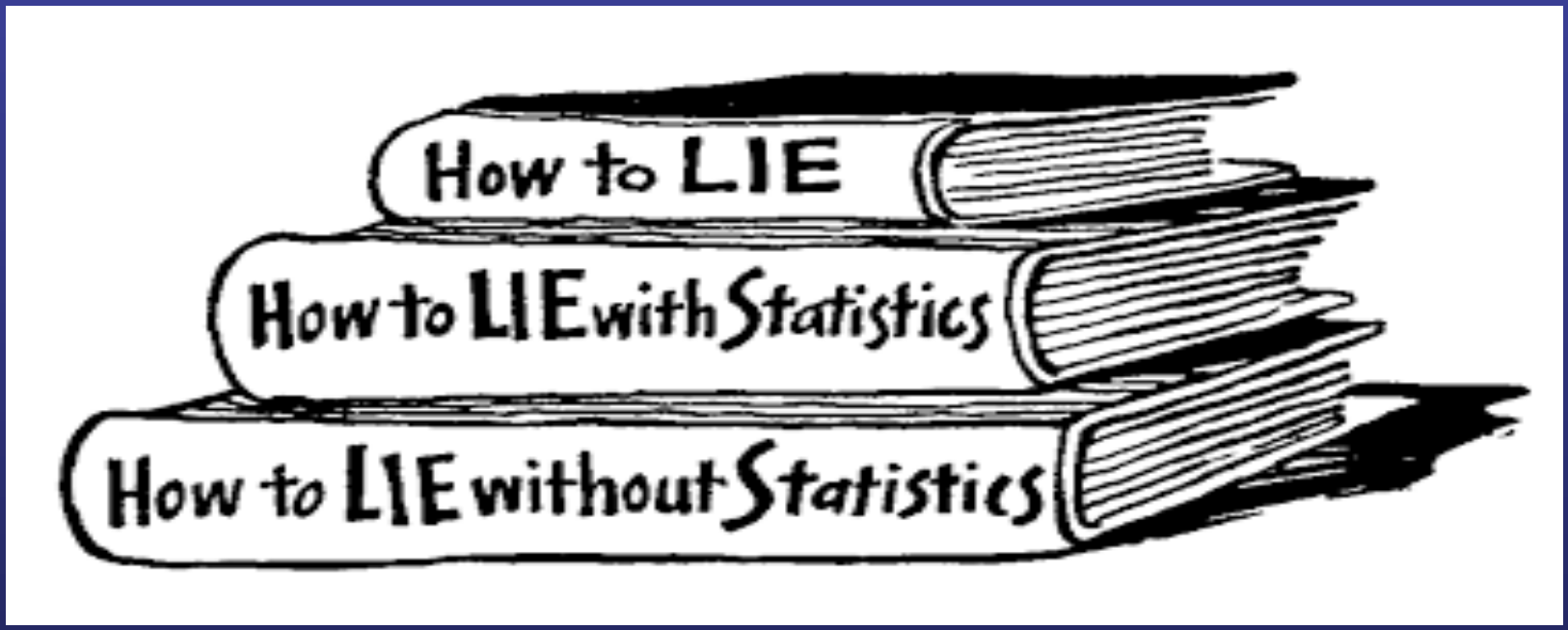
Looking to give a test?

DRL-1118168

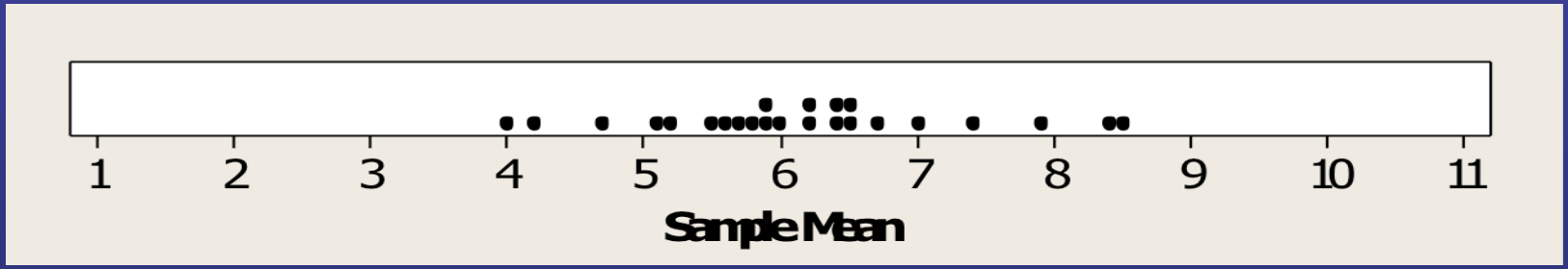

Guidelines for
Assessment and Instruction
in Statistics Education (GAISE) Report
A PRE-K-12 CURRICULUM FRAMEWORK
Christine Franklin • Gary Kader • Denise Mewborn
Jerry Moreno • Roxy Peck • Mike Perry
Richard Scheaffer

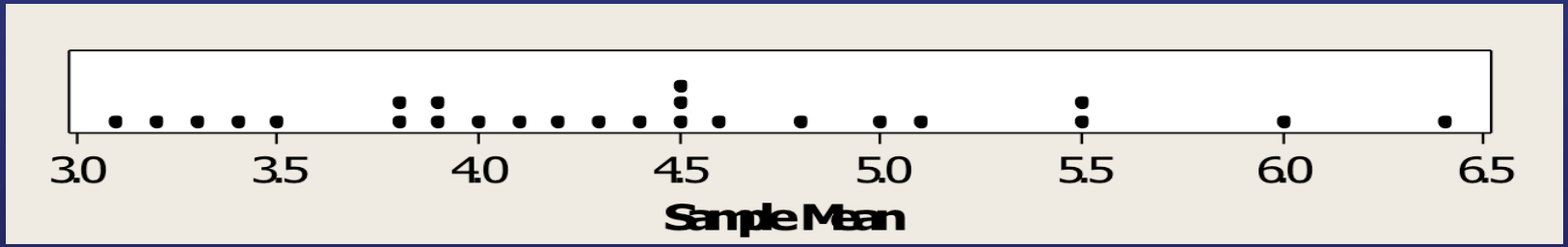

(a) DIMENSION 1 : THE INVESTIGATIVE CYCLE
(PPDAC)
Problem
Plan
Data
Analysis
Conclusions
• Grasping system dynamics
• Defining problem
Planning
• Measurement system
• "Sampling design"
• Data management
• Piloting & analysis
• Data collection
• Data management
• Data cleaning
• Data exploration
• Planned analyses
• Unplanned analyses
• Hypothesis generation
• Interpretation
• Conclusions
• New ideas
• Communication

Lies, Damned Lies, and Statistics

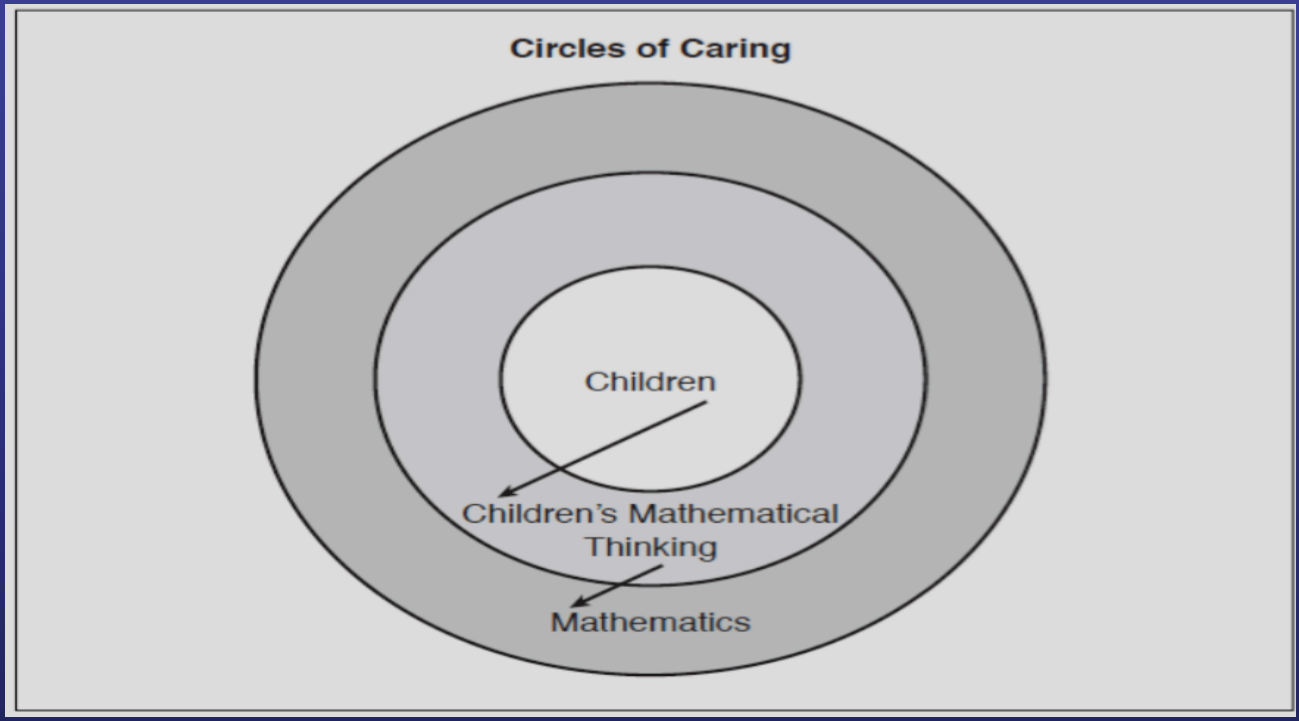


Rock Their World!
Hit Them in The Face with Bias





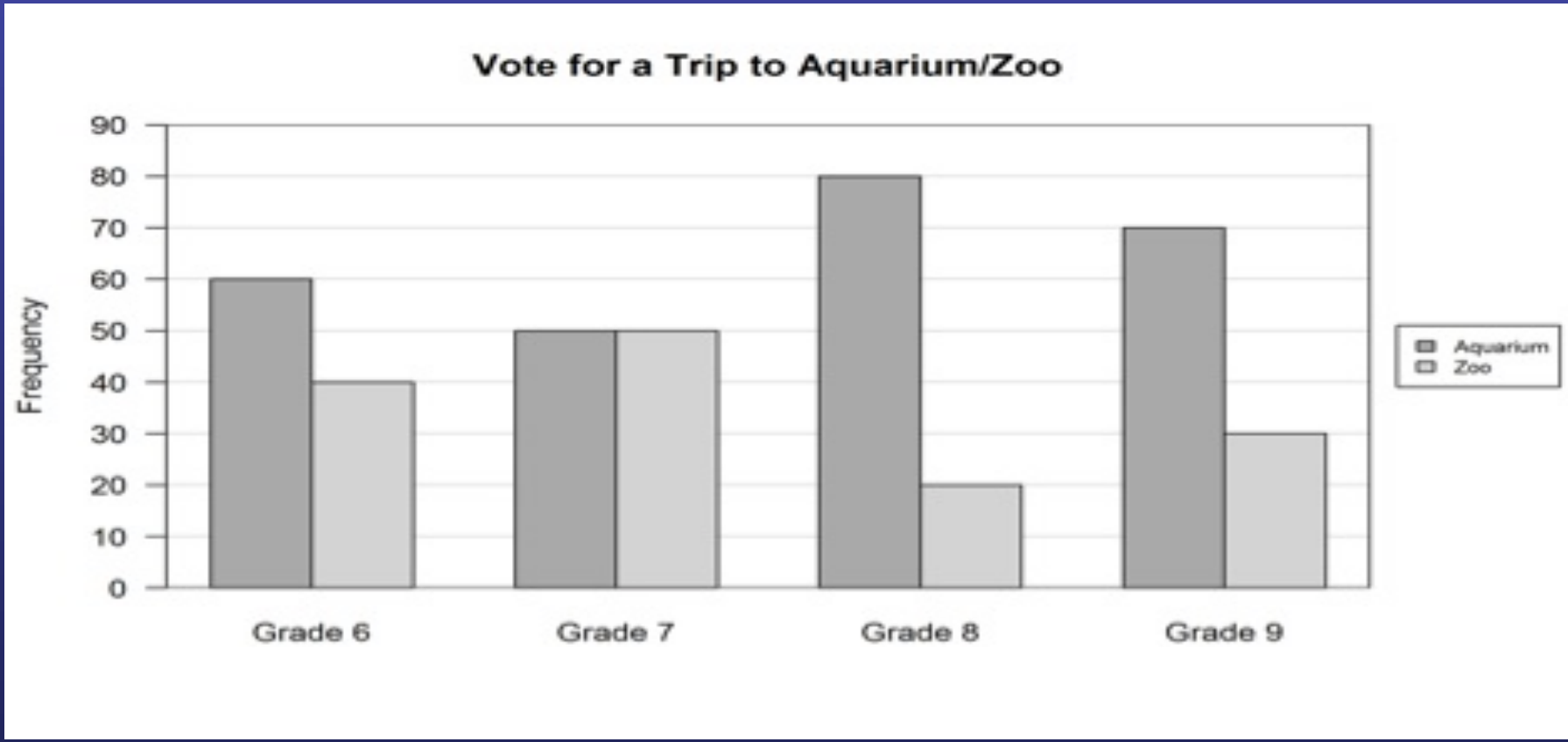
Noddings (1984); Philip et al. (1997)



It's All New

- "Statistics, however, is a relatively new subject for many teachers, who have not had an opportunity to develop sound knowledge of the principles and concepts underlying the practices of data analysis that they now are called upon to teach." (Franklin, et al.,2007, p. 5)

Walk the Line

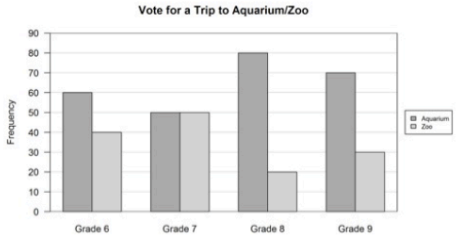


Walk the Line

‹ previous 6 of 24 next ›

Question:

A school is planning a field trip to the aquarium or to the zoo for students in grades 6 through 9. There are 100 students in each grade level and every student was asked which place he or she would prefer to visit. The bar graphs for the four grade levels are shown below.



In which grade level were the responses most consistent?

Standards

Correct answer and commentary

The correct answer to this item is option C. Only 21% of students chose the correct answer to this item. The item asks students to identify the grade level for which the responses to the survey question were the most consistent. A high level of consistency means that a large number of the students responded to the survey question the same way. In Grade 8, 80 out of 100 students chose the aquarium over the zoo, which is a higher percentage of students than selected either of the two trips in the othergrade levels. Thus, Grade 8 had the most consistent responses because a relatively large number of the students chose the same trip, while the other grades were more divided in their choices.

This item tests the ability to read bar graphs and compare the consistency of responses in different groups. The most popular choice on this item was option B. In Grade 7, exactly half of the survey respondents chose the zoo and half chose the aquarium. Therefore, the heights of the bars are exactly the same in the bar graph. While the heights of the bars are consistent, this grade level represents the least consistent responses from the survey since the students are divided evenly and there is no consensus among seventh-graders about which trip to take.

We Are All In This Together

Students with Learning Disabilities

- Concrete – Semi-Concrete – Abstract
- Technology
- READING
- Ripe for Research as the role of statistics and data science expands

Questions?