

A B C D E F

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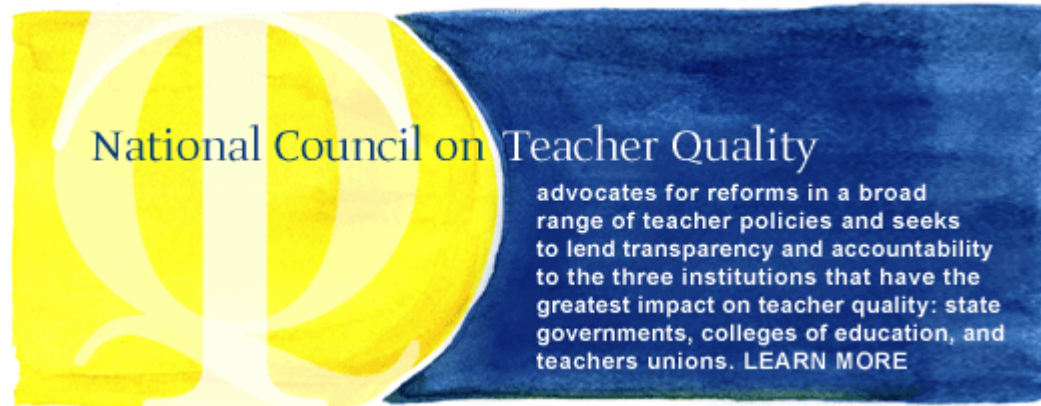
# Rating Pre-service Mathematics Programs for Elementary Teachers

An NCTQ Study

Andrew Chen  
EduTron / M.I.T.



# NCTQ = ?



- **The National Council on Teacher Quality** advocates for reforms in a broad range of teacher policies at the federal, state, and local levels in order to increase the number of effective teachers.

# State Teacher Policy Yearbook 2007

Progress on Teacher Quality

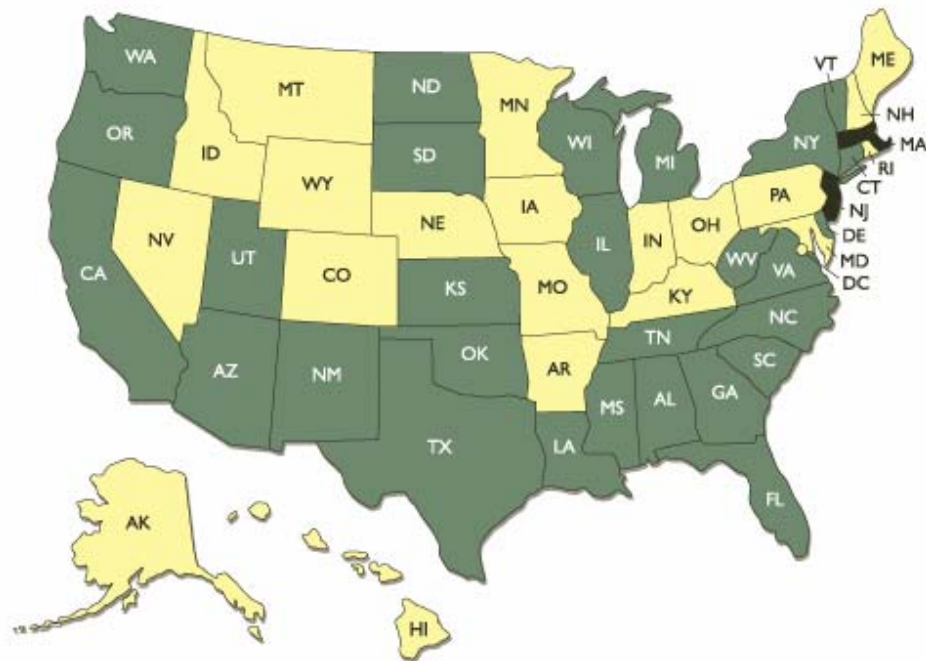
## How the States are Faring

CLICK ON ARROW TO VIEW GOALS. SELECT AN AREA OR GOAL TO VIEW THE NATIONAL RATINGS ON THE MAP.

- ▶ Area 1 Meeting NCLB Teacher Quality Objectives ■ **B**
- ▶ Area 2 Teacher Licensure ■ **B**
- ▶ Area 3 Teacher Evaluation and Compensation □ **D**
- ▶ Area 4 State Approval of Teacher Preparation Programs □ **D**
- ▶ Area 5 Alternate Routes to Certification ■ **C**
- ▶ Area 6 Preparation of Special Education Teachers ■ **C**

## Download National Report | [Massachusetts Report](#)

CLICK ON A STATE TO VIEW THE AREA AND GOAL RATINGS TO BE ABLE TO DOWNLOAD THE STATEMENT.



"...it's almost impossible to find teachers who are HQT in two content areas."

- Sharon VanDyke, Principal

### Key for Areas

■ **A** ■ **B** ■ **C** □ **D** □ **F**

### Key for Individual Goals within Each Area

- Best Practices
- State meets goal
- State nearly meets goal
- State partially meets goal
- State meets a small part of goal
- State does not meet goal

# State Teacher Policy Yearbook 2007

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<http://www.nctq.org/stpy/>



STEM Summit IV

Presentation by Andrew Chen October 17, 2007 Sturbridge, MA





What Education Schools **Aren't Teaching**  
*about Reading*  
and What Elementary Teachers **Aren't Learning**

May 2006

# Next Study: Mathematics!

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- **Goal: to examine the appropriateness and rigor of the mathematics preparation provided to aspiring elementary teachers in American colleges of education.**
- **NCTQ has collected syllabi and textbooks from across the country**





What Education Schools **Aren't Teaching**  
*about Mathematics*  
and What Elementary Teachers **Aren't Learning**

# NCTQ Advisory Board

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- **Richard Askey**
- **Andrew Chen**
- **Douglas Clements**
- **Michael Goldenberg**
- **Roger Howe**
- **Jim Milgram**
- **Yoram Sagher**
- **Mark Thames**



# The Need for Two Rubrics

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- **Viable Rubric**
- **“Visionary” Rubric**



# I. QUANTITY OF COURSES

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Assertion 1: A high quality program should require **3 or more courses** dealing explicitly with elementary and middle school topics.



# I. QUANTITY OF COURSES

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Assertion 3: The instructor of math content courses should have adequate professional preparation in math.



# II. RELATIVE DISTRIBUTION OF MATH CONTENT

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Assertion 4: Elementary teachers need more instruction in some content areas and an appropriate distribution of these can be identified.



# II. RELATIVE DISTRIBUTION OF MATH CONTENT

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Proposed rough breakdown of time dedicated to topics for elementary teachers:

- 35-45% Numbers and Operations
- 25-35% Algebra
- 20-30% Geometry and Measurement
- 5%-10% Data Analysis, Probability



# III. CONTENT OF INDIVIDUAL MATH COURSES

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Assertion 5: Any effective program preparing elementary teachers should devote sufficient time to key topics.



# III. CONTENT OF INDIVIDUAL MATH COURSES

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## Key topics

### Numbers and Operations

- Topic A: Whole numbers
- Topic B: Fractions and Integers
- Topic C: Decimals
- Topic D: Estimation and rounding



# III. CONTENT OF INDIVIDUAL MATH COURSES

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## Algebra

- Topic E: Constants and variables; writing and reading algebraic expressions, including those with parentheses
- Topic F: Equations
- Topic G: Analytic geometry



# III. CONTENT OF INDIVIDUAL MATH COURSES

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## Geometry

- Topic H: Measurement and units of measurement
- Topic I: Basic concepts of plane geometry
- Topic J: Polygons and circles
- Topic K: Perimeter and area; surface area and volume



# III. CONTENT OF INDIVIDUAL MATH COURSES

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## Data Analysis and Probability

- Topic L: Probability and data characteristics



# IV. TEXTBOOK REVIEW

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Assertion 7: Textbooks should contain the content that meets the basic needs of the elementary teacher.



# V. ACCOUNTABILITY

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Assertion 8: Students should be held accountable against rigorous standards for their knowledge of math content in coursework.



# VI. PRACTICING PEDAGOGY

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Assertion 11: Teacher candidates should have to practice their knowledge under close supervision by an instructor.



# “Viable” EVALUATION RUBRIC

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- I. QUANTITY OF COURSES
- II. RELATIVE DISTRIBUTION OF MATH CONTENT
- III. CONTENT OF INDIVIDUAL MATH COURSES
- IV. TEXTBOOK REVIEW
- V. ACCOUNTABILITY
- VI. PRACTICING PEDAGOGY



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# “*Visionary*” Rubric is in the Works



# Recommendations

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- Zoom out and think of your program as a whole
- Come to PM session (1:45 to 3:15 Sturbridge)

## The Symbiosis of Content and Pedagogy

### The Perfect Stew

*"The mathematics department offers us tough steak which we cannot chew and the school of education vapid soup with no meat in it."*

