

Curriculum Principle

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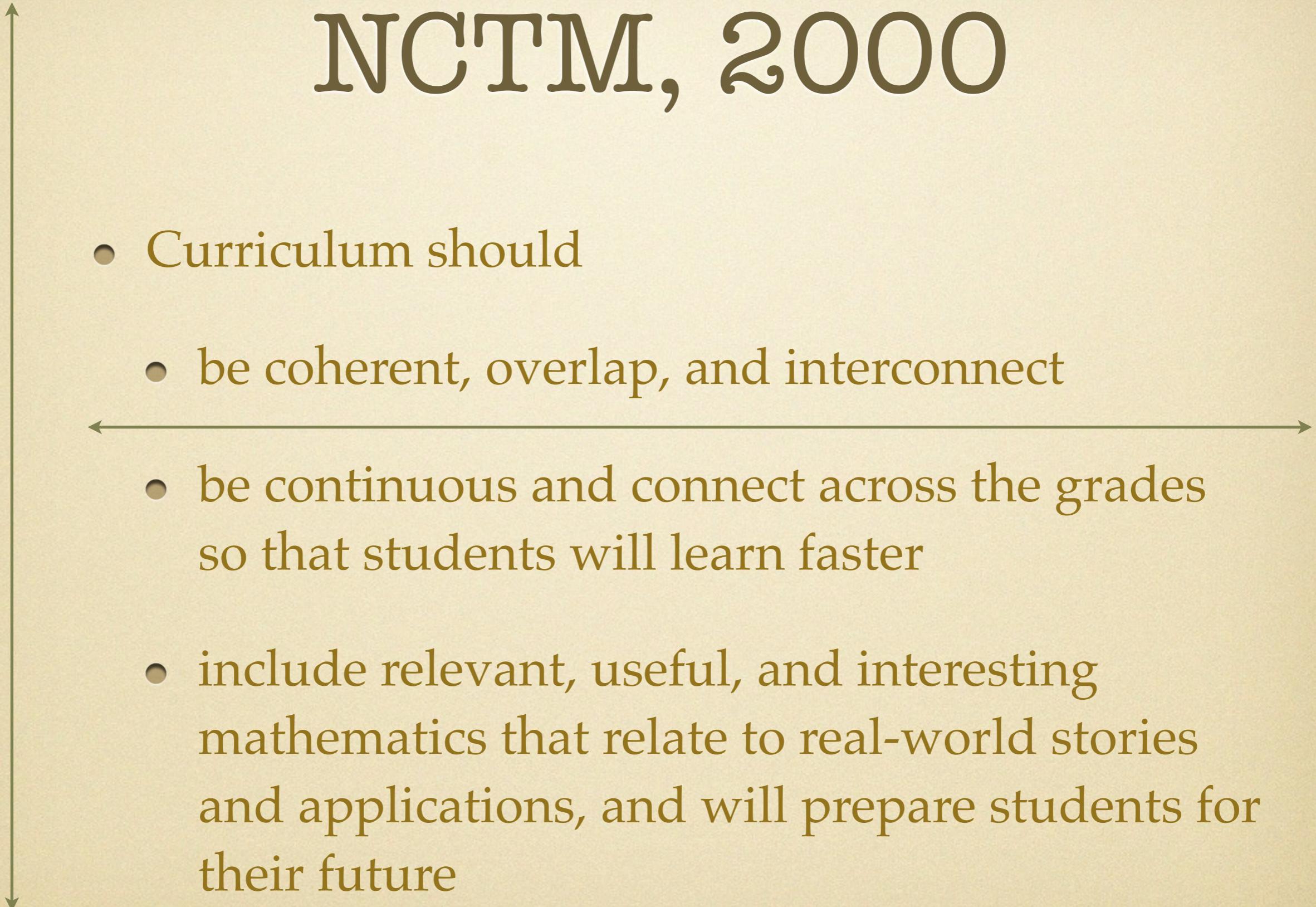
Introduction

- The following themes fit into which typical math courses?
 1. Factoring quadratic trinomials into binomials
 2. Criteria for triangle congruences
 3. Finding the amount of money in an interest-earning bank account

Research Question

- “Just what exactly is supposed to be in the Algebra II curriculum, and how do Algebra II teachers interact with those requirements?”

Literature Review



NCTM, 2000

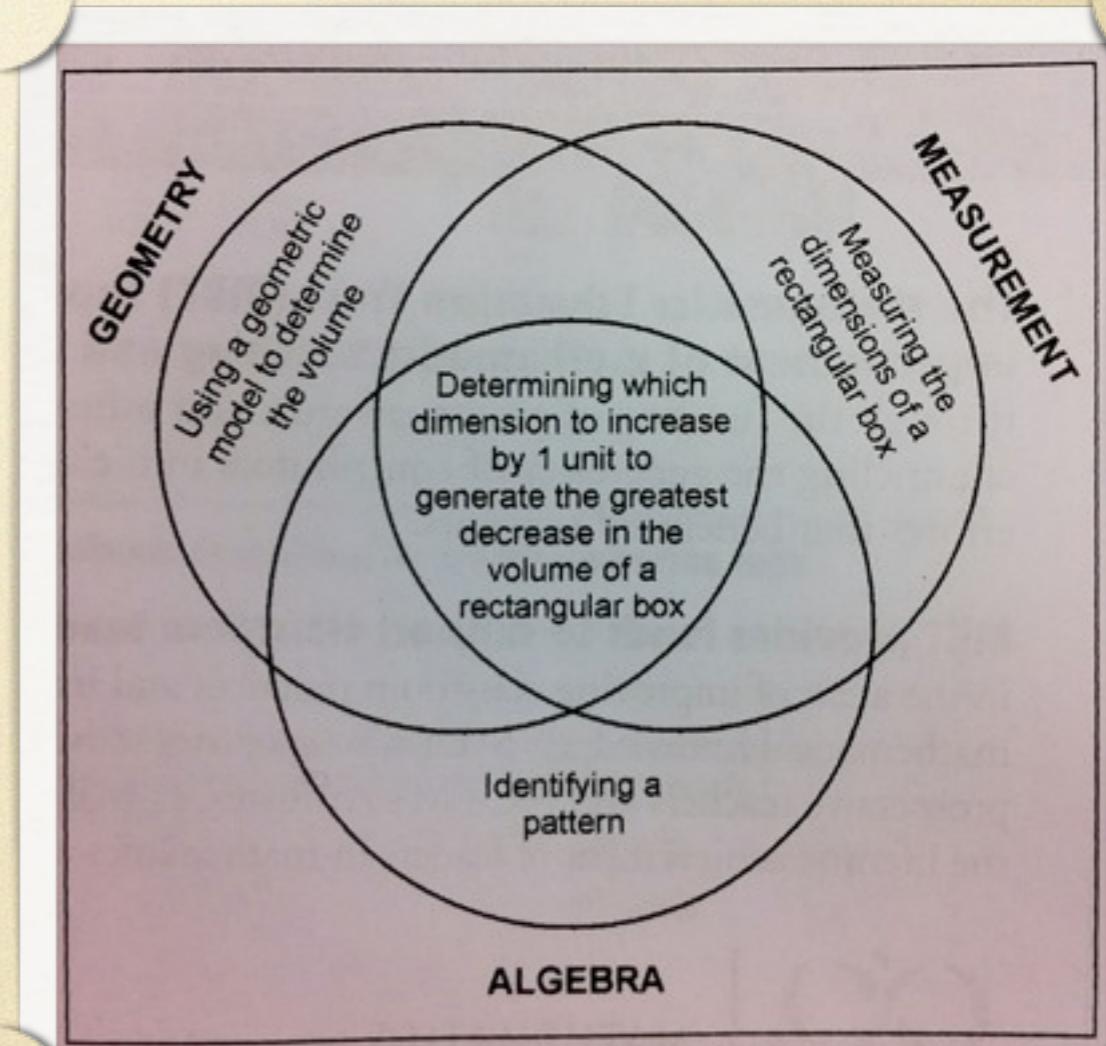
- Curriculum should
 - be coherent, overlap, and interconnect
 - be continuous and connect across the grades so that students will learn faster
 - include relevant, useful, and interesting mathematics that relate to real-world stories and applications, and will prepare students for their future

Vennebush, Marquez, & Larsen, 2005

- Algebra
 - symbolic manipulation
 - solutions of systems of equations
 - theorems about groups and other structures

Vennebush, Marquez, & Larsen, 2005 (cont.)

- “Algebra is where you find it” (p. 86)
- Can be stretched across all content strands
 - Number Sense
 - Geometry
 - Data Analysis
- Designing tasks with curricular goals in mind



“Fig. 11 The interconnection of three strands in one activity” (p. 92)

Lloyd, 2008

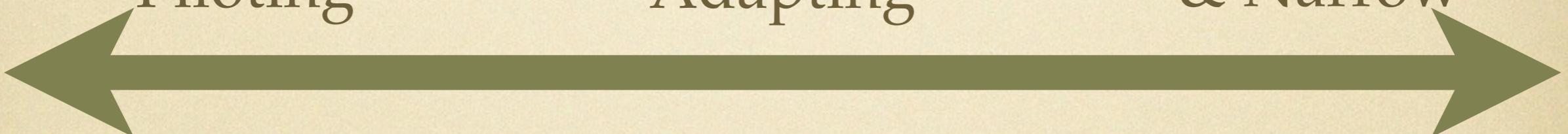
Teachers' Curriculum Use

(Remillard & Bryans, 2004)

Thorough
Piloting

Adopting &
Adapting

Intermittent
& Narrow



Offloading

Adaption

Improvisation

Types of Curriculum Use

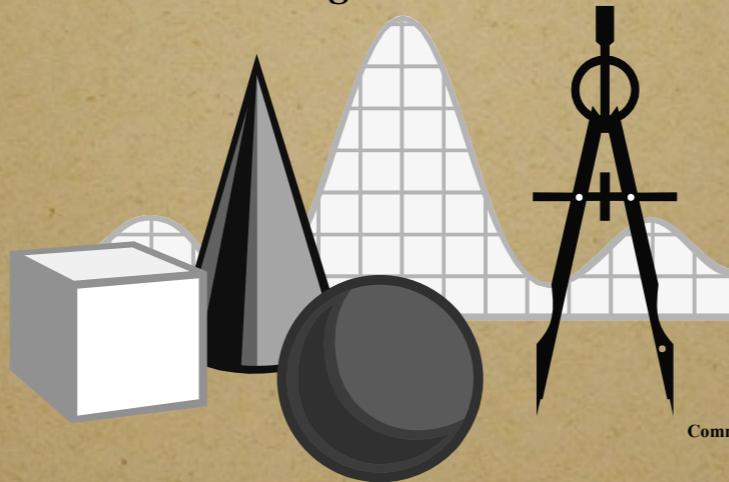
(Brown, 2004; Brown & Edelson, 2003)

"Figure 1. Categories of teachers' curriculum use"

As cited in Lloyd, 2008, p. 69

**MATHEMATICS STANDARDS OF LEARNING
CURRICULUM FRAMEWORK**

Algebra II



Commonwealth of Virginia
Board of Education
Richmond, Virginia
October 22, 2009

Virginia Department
of Education, 2009

What Stays the Same?

- addition, multiplication, simplification of rational algebraic expressions & radical [irrational] expressions with rational exponents
- analysis & computation of arithmetic & geometric sequences & series
- complex number operations & simplification
- solve equations & inequalities of the following type:
 - absolute value
 - quadratic
 - equations w/ rational expressions, radical expressions

What Stays the Same? (cont.)

- convert between graph / symbolic form:
 - linear, quadratic
 - absolute value
 - step
 - exponential
- transformational graphing
- analyze algebraically & graphically:
 - domain, range
 - y -intercepts
 - inverses
 - relationship among:
 - equation's solution
 - function's zeros
 - graph's x -intercepts
 - polynomial expression's factors

What Stays the Same? (cont.)

- Solve nonlinear systems of equations, algebraically and graphically, with HGT
- Statistics:
 - collect & analyze data
 - determine equation of curve of best fit
 - mathematical models w/ polynomial functions
 - identify, create, solve R-W problems w/ inverse variation, or combo. of direct & inverse

What is Inserted?

- Expressions & Operations:
 - factor polynomials completely
 - identify field properties of complex numbers
- Functions:
 - intervals of increase / decrease
 - asymptotes & end behavior
 - composites of multiple functions

What is Inserted?

(cont.)

- Statistics:
 - make predictions, solve R-W problems using mathematical models w/ exponential, logarithmic functions
 - identify, create, solve R-W problems w/ joint variation
 - identify, apply properties of normal distribution
 - compute, distinguish between permutations / combinations, using technology for applications

What is Deleted?

- axioms of equality, order properties [relations], field properties [operations]
- identify, sketch, transform circles, ellipses, parabolas, hyperbolas
- matrix multiplication to solve R-W problems
- solve systems of linear equations using inverse matrix method
- solve systems of linear equality, linear programming
- scatterplots with HGT

Methods

Data Collection

- Verbal interview between myself and three math teachers (separately) at Blacksburg High School

Interview Questions

1. “What can you tell me about the current Standards, regarding the content of the Algebra II curriculum? Were there any changes from last year?”
2. “What content have you purposefully included in your teaching of Algebra II that is not in the current Standards? Why do you include this material?”
3. “Is there any content that you have traditionally included, but have decided to sacrifice this year? Why have you decided so? Is that content required to be taught by the Standards?”

Findings

Teachers' Additions to Algebra II Curriculum

- Mr. Noble:
 - Exponential, logarithmic visualizations and meaning, and how to solve exp and log equations
 - Solving more difficult equations, e.g. more difficult radicals and absolute value
- Ms. M:
 - Cramer's Rule
- Ms. D:
 - Items necessary for higher level courses
 - More in-depth on same material for the Honors courses

Teachers' Subtractions from Algebra II Curriculum

- Mr. Noble:
 - Rational Root Theorem
 - Remainder and Factor Theorems
 - Completing the square
 - Story problems in linear programming
 - things to memorize rather than learn
- theory and practice problems rather than R-W application
- Ms. M:
 - Technique of transformational graphing is different, but not removed
- Ms. D:
 - Determinants
 - Logarithms

Conclusions

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- Teachers' responses were mostly consistent with the Curriculum Framework (VDOE, 2009).
- Extracurricular material added was under the intention of NCTM's (2000) three recommendations for Curriculum.
- Extracurricular material subtracted was a 'necessary evil'
- Mr. Noble's and Ms. M's additions to their classes are both subtractions from Ms. D's class. She seems to be teaching less material, but more in depth. She teaches Honors classes.

Future Research

- As the NCTM (2000) says, a curriculum is never static. With more information about how teachers interact with the standardized curriculum, and with cross-references to other literature on how students respond, we can get a better idea of how to change it in the interest of our students.

References

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