Academic Content Standards Revision

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Ohio Mathematics and Science Coalition
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Purposes for Revision

- Conform to Governor's reform plan
  - Core Subjects
  - Learning and Innovation Skills
  - Information, Media and Technology Skills
  - Life and Career Skills
- Blend 21st century skills with academic content
- Apply best practices throughout the world in Ohio's schools

Purposes for Revision

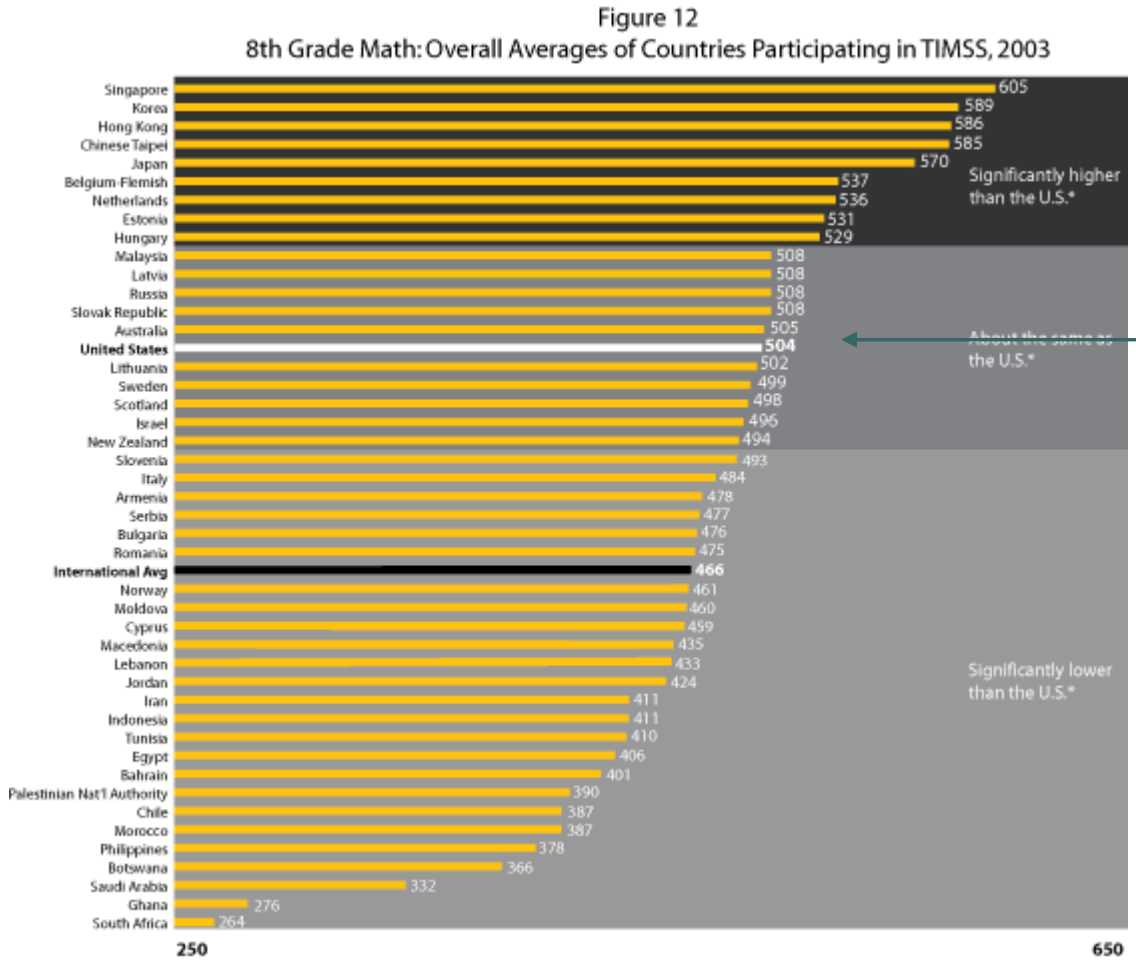
- Make standards more manageable for teachers and promote depth over breadth
- More tightly align the written, taught and tested curriculum
- Assure college and career readiness upon graduation

What Goes Into Standards Revision

- Framework for 21st century skills
- Results from international benchmarking study
- Expert reviews of current standards by professional associations
- Models of national learned societies
- Seamless transition between high school graduation and college and career

International Benchmarking

Statistical Significance



Significantly higher

United States

Significantly lower

Jim Hall, Center for Public Education

Selected Countries

Region	Math	Science
Australia		✓
England	✓	✓
Finland	✓	✓
Hong Kong	✓	✓
Japan	✓	
New Zealand		✓
The Netherlands	✓	
Ontario		✓
Singapore	✓	✓

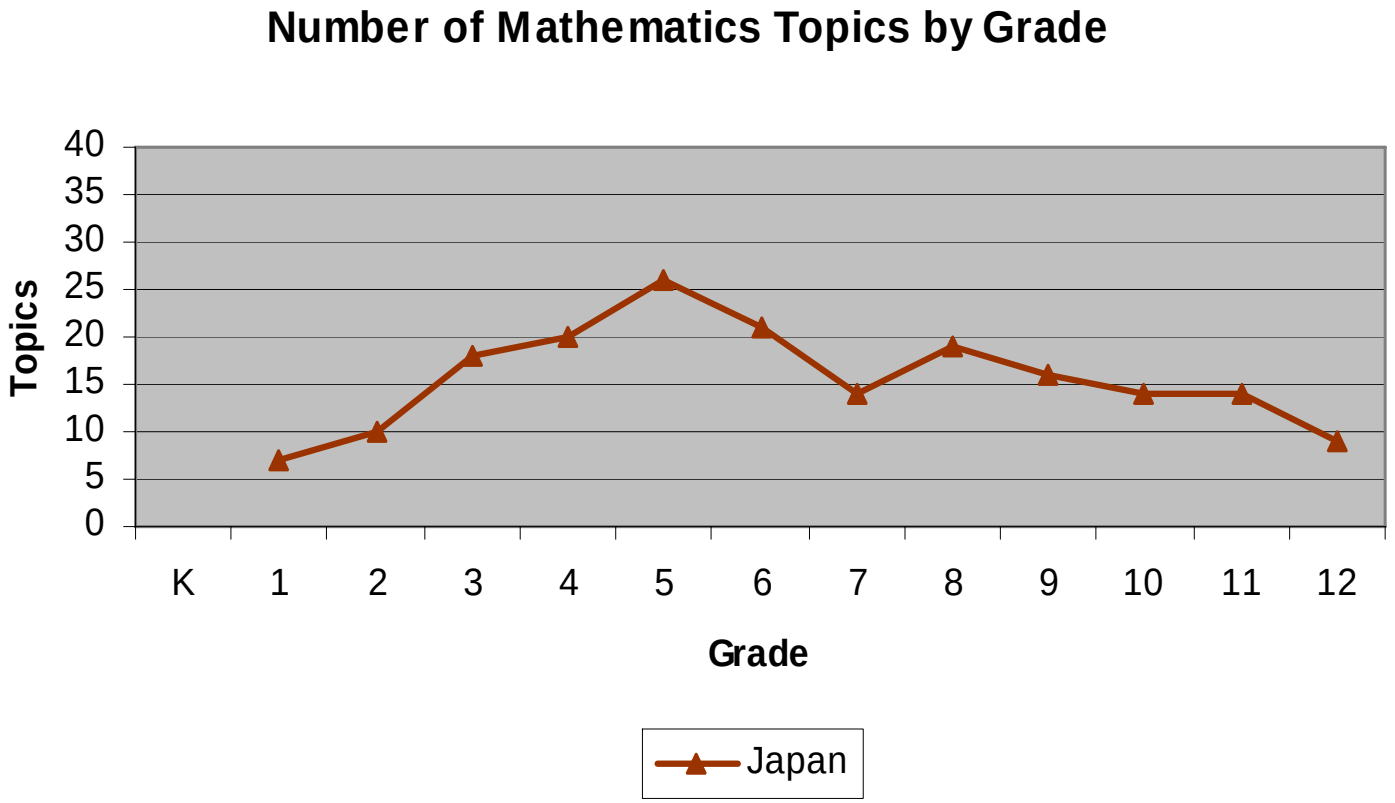
Three Comparative Lenses

1. Curriculum
   - Articulated content
   - Instructional delivery
   - Distribution of cognitive demands on assessments
2. Social and Cultural Differences
3. Status of Teaching

Findings

- Ohio generally aligns with other nations' standards, but …
- Other nations provide:
  - Greater *focus*, *rigor*, *coherence*
  - Clearer learning progressions

Mile Wide, Inch Deep



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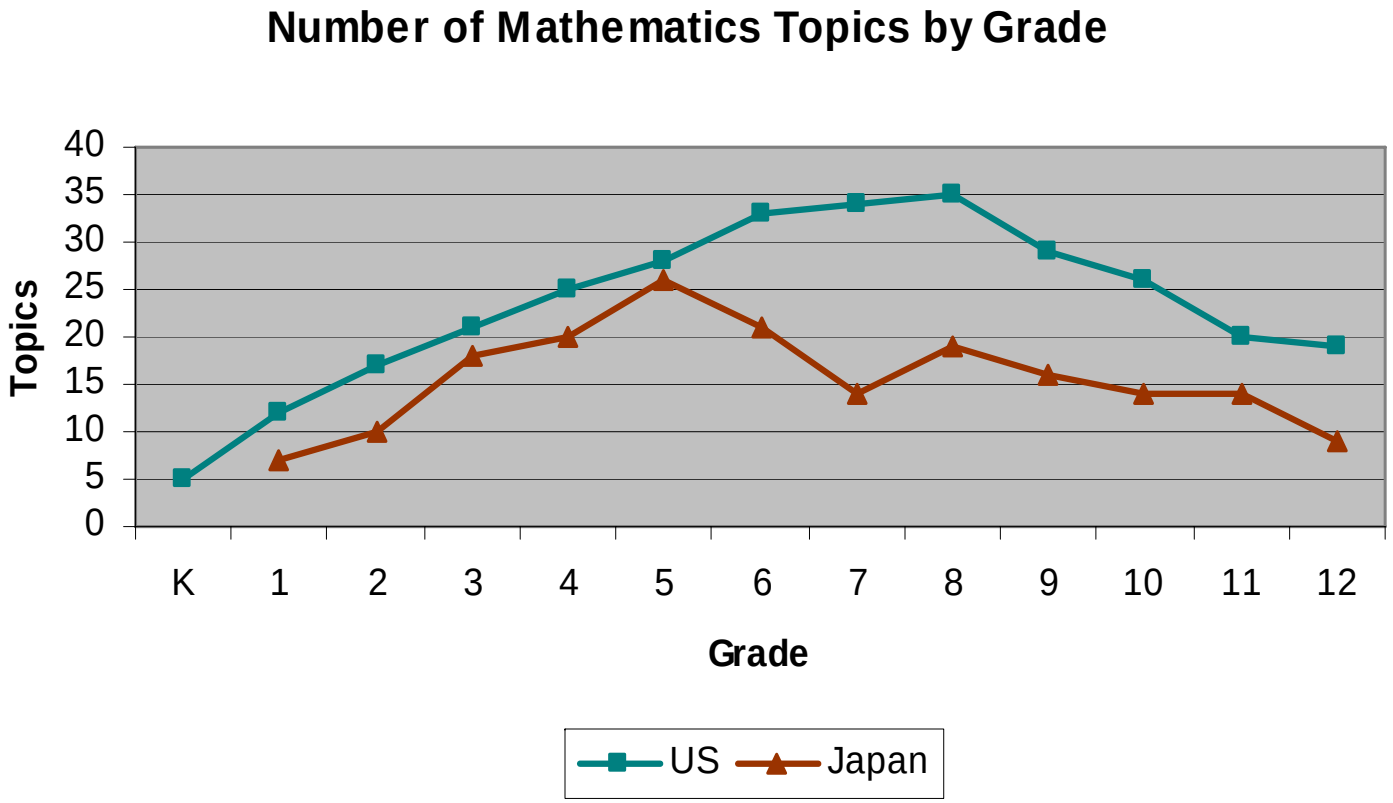

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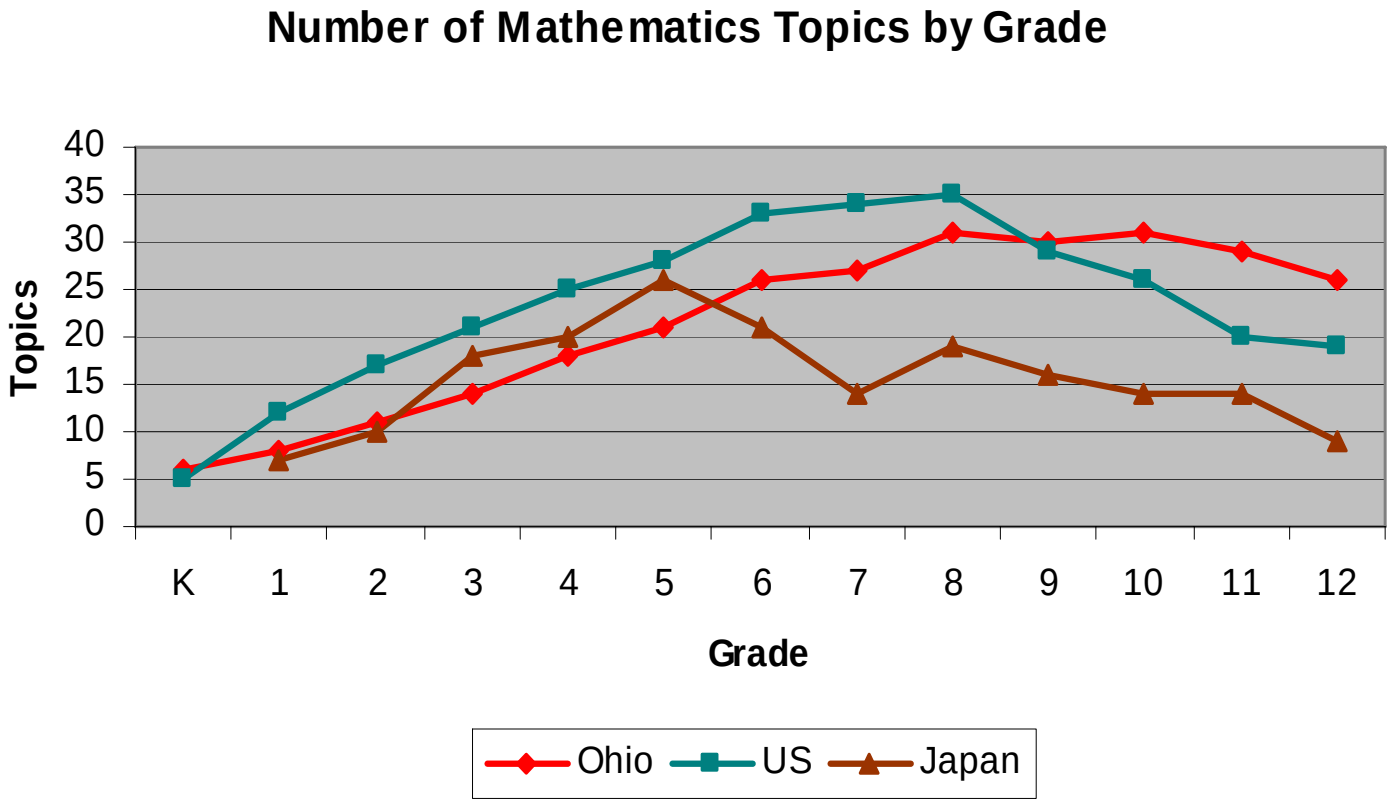

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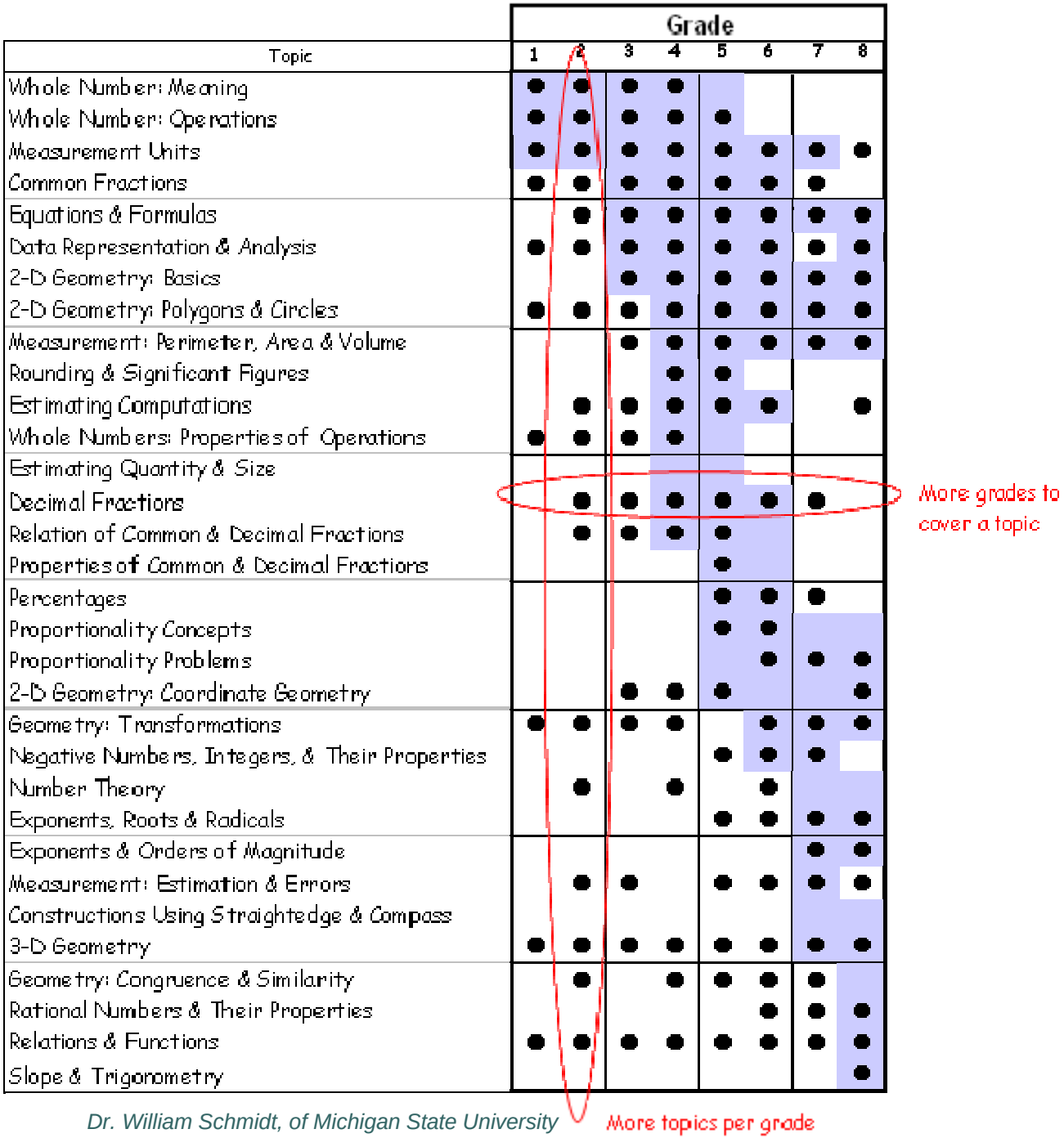
Findings

- In Ohio’s standards, topics are more spread out than in other countries
  - More grades to complete a topic, more topics per grade
  - More evident in mathematics

- Intended in the State's Content Standards
- Top-achieving countries' intended-topics profile



Dr. William Schmidt, of Michigan State University

Findings

- Some nations explicitly include basic and higher-order thinking skills in their standards
- Other countries embed teaching strategies in the standards

Survey of Enacted Curriculum Findings

- International assessments:
  - Place more emphasis on higher cognitive expectations
  - Focus on subject matter not assessed on Ohio's tests
  - Frequently ask students to work with data displays

What the Standards Will Look Like

Grades K - 8

- Web-based production
- Retain vertical articulations
  - Illustrate learning progression
- Accompany with instructional guides
  - Technology applications
  - Library media applications
  - Instruction at different cognitive levels

What the Standards Will Look Like

Grades 9 - 12

- Web-based production
- Course Syllabi
  - Curriculum embedded content and skills
  - Articulated course sequencing
- Back map from college and career readiness standards
- End-of-course exams

Science

		The Physical Setting		The Living Environment
Themes		**Earth and Space Science**	**Physical Science**	**Life Science**
Observations of The Environment	**P**	Observations of day sky	Observations of household items	Observations of living things
	K	Daily and seasonal changes	Observations of Everyday Material	Living vs. Non-living
	1	Thermal energy and water	Sources of Energy	Basic Needs of Living Things
	2	Air, water, weather (Atmosphere, Hydrosphere)	Simple Motion (Light, Sound and Objects)	Interactions within Habitats
Interconnections within Systems	**3**	Earth's resources	Nature/States of Matter (Physical and Chemical Changes)	Life Cycles (Environmental Impact on Organisms)
	4	Earth's surface	Types of Energy (Sound, electrical, thermal)	Fossils
	5	Cycles and patterns in the universe (Solar System)	Forces and Motion (Solar system, gravity, magnetism)	Interactions within Ecosystems
Order/Organization	**6**	Rocks, minerals, and soil	Structure of Matter (Atomic Structure)	Cells to Multicellular
	7	Biogeochemical cycles	Energy Transformations	Matter and Energy Cycles
	8	Plate tectonics	Forces and Motion	Species and Reproduction
	9	The universe		
	10	Environment		

Mathematics

Pre-K	K	1	2	3	4	5	6	7	8
	Meaning of Number								
	Numbers, place value, numeration, ordering and comparing numbers								
		Whole number operations							
		Addition, Subtraction, Multiplication and Division							
				Common Fractions					
				Meaning, representation, operations, and relationships of common fractions,					
					Decimal Fractions				
					Meaning, representation operations and relationships of decimal fractions,				
						Percentages			
						Meaning and representation operations and relationships of percentages			
								Integers, Rationales and real numbers	
								Integers, rational, properties of the operations, Scientific notation	

Standards Revision Process

- Invite expert groups to assist in drafting revisions and to produce proposed models
  - Advisory Committees
  - Working Groups
  - National Expert Reviewers
- Draft presented to content experts and stakeholder groups for review and critique
- Expert judgment will apply feedback to successive iterations of the draft

Standards Revision Process

- Revised draft presented to Achievement Committee and State Board of Education for approval
- Instructional guides and model curricula will be:
  - Put on IMS
  - Involve teachers in the process
- Revised standards will drive revisions to the blueprints for Ohio's new tests

Standards Revision Process

Phase 1

Standards

Mathematics
Science
English Language Arts/Literacy
Social Studies

Phase 2

Model Curricula

Mathematics
Science
English Language Arts/Literacy
Social Studies

Standards Revision Process

Phase 3

Standards and Model Curricula

Computer Literacy
Wellness Literacy
Financial Literacy/Entrepreneurship
World Language
Fine Arts

There is currently no timeline for completing phase 3

Physical education standards will be adopted in June 2009

Timelines

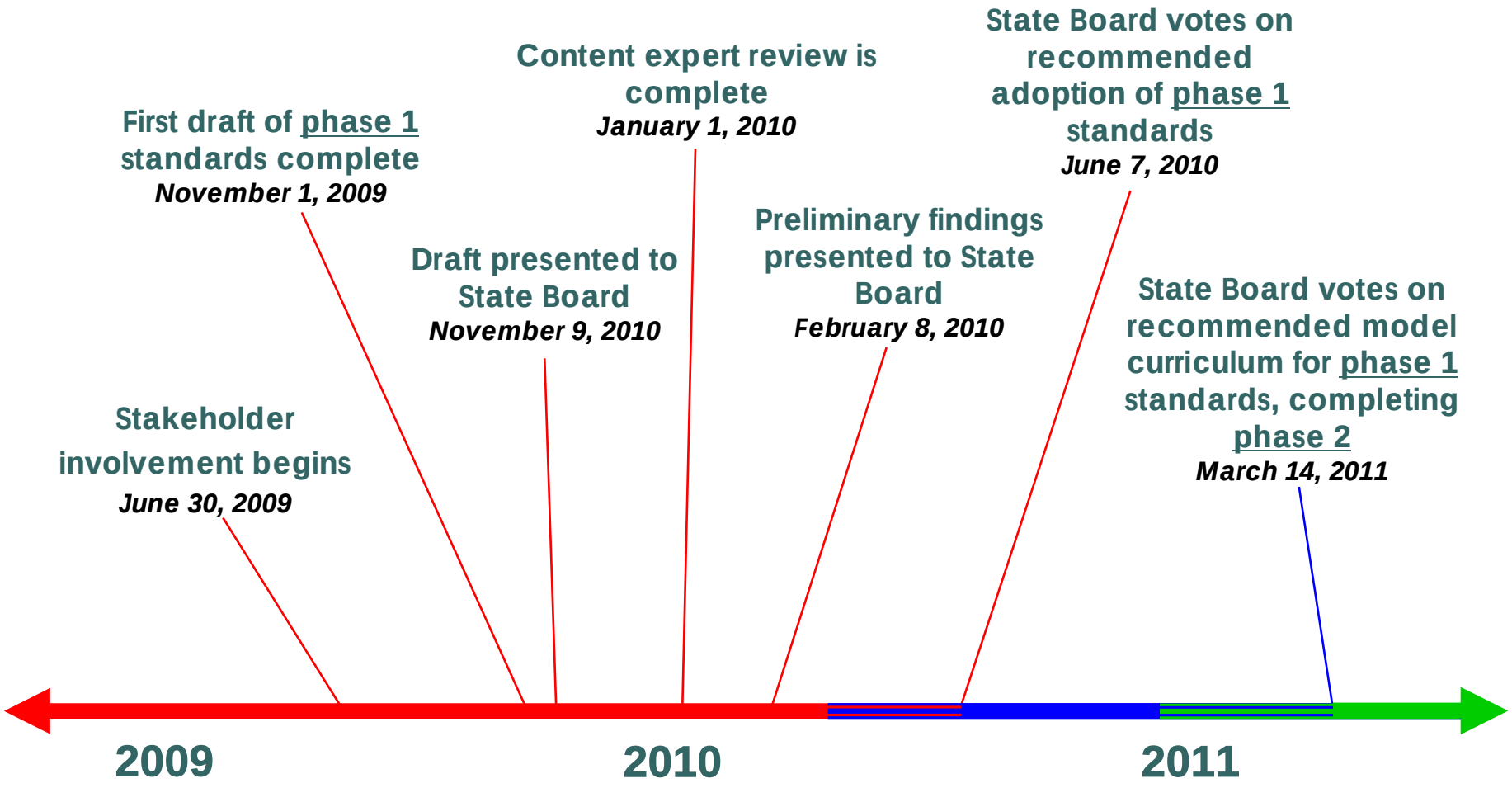
Phase 1

June 30, 2009	Stakeholder involvement begins
November 1, 2009	First draft complete
November 9, 2009	Draft presented to the State Board
January 1, 2010	Content expert review is complete
February 8, 2010	Preliminary findings presented to State Board
June 7, 2010	State Board votes on recommended adoption

Phase 2

March 14, 2011	State Board votes on recommended model curriculum for phase 1 standards

Phases 1 & 2 Timeline



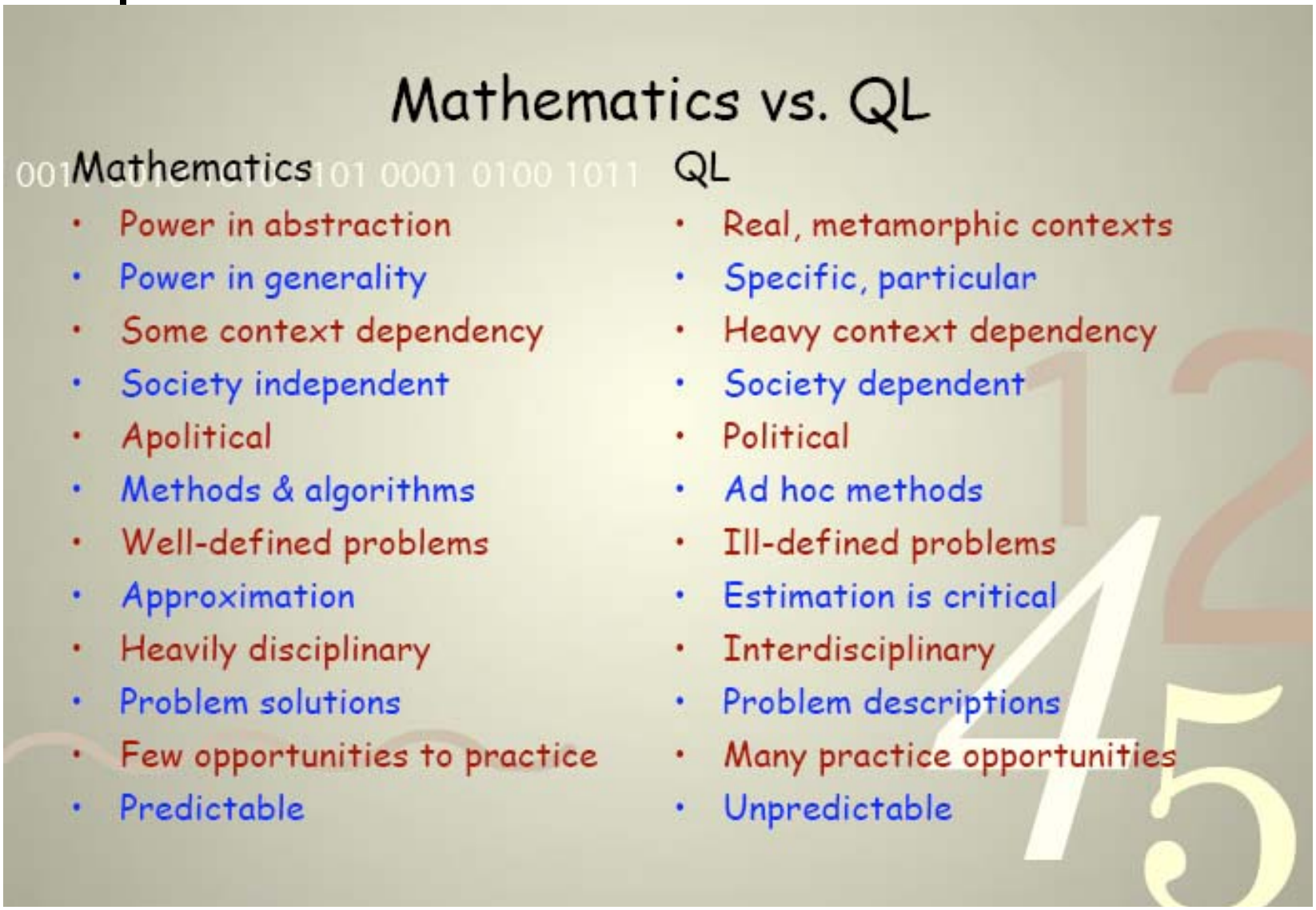
Quantitative Literacy?

What does all this have to do with Quantitative Literacy?

Quantitative Literacy

- Involves interdisciplinary thinking
- Is a reciprocal relationship across the disciplines
- Requires attention to context

Bernie Madison's View



Interdisciplinary Approaches

- Integration **after** attention to disciplinary content
  - Integration is often postponed until students are deemed “ready”
- Integration **alongside** attention to disciplinary content
  - Students might not know what content they learned
- Integration **before** (or **without**) attention to disciplinary content
  - This approach is empty and without substance
  - … despite flashy PowerPoint presentations

Interdisciplinary Approaches

What is needed, then, is

a strategic combination of integration *alongside and after* attention to disciplinary content.

Interdisciplinary Challenges

- Integrating disciplines is hard
- Integration requires knowledge of multiple disciplines
- Integration requires collaboration with and deference to the expertise of others
- We can’t even convince many teachers to integrate algebra and geometry!

Mathematical Literacy and Quantitative Literacy

With typical mathematics curriculum and instruction:

- Many students develop neither ML nor QL
- Some students develop ML without QL
- Some students develop QL without ML, in spite of their schooling
  - Street mathematics vs. school mathematics
- Few students develop both

- QL without ML is limiting
- ML without QL is impotent

Overarching Questions

- How can standards, curriculum, instruction, and assessments promote both QL and ML?
- How might QL be threaded through the standards across all content areas?

This is an opportunity for input!

Table Discussions