Exploring the World of Assessments From a State Perspective: NAEP, PISA, TIMSS, and PIRLS

National Conference on Student Assessment
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Presentation Outline

- Overview of NAEP, PIRLS, TIMSS, and PISA
  - Why are they important?
  - Assessments at a Glance
  - Additional Resources

- Items
  - Compare and Contrast
  - Practice

- State Perspective
  - Kentucky
  - Arkansas
  - Minnesota
Background:

Why are we doing this presentation?
What do we have to share?

“WE TRAINED HARD….
…but every time we began to
form up teams we would be
REORGANIZED. …

I was to learn later in life that we tend to meet any new situation by
reorganizing: and a wonderful method it can be for creating the illusion of
progress while producing confusion, inefficiency, and demoralization.”

Usually attributed to Petronius Arbiter (Roman satirist), often to Charlton Ogburn, Jr. in Harpers Magazine.

WE HOPE TODAY’S PRESENTATION WILL CHANGE THE ABOVE PERSCEPTIVE AND
ADD VALUE TO WHAT THE WORLD OF ASSESSMENTS HAS TO OFFER.
Our Goals

- Create more than the illusion of progress
  - Build understanding about these assessments and what they mean to us, with our different contexts as we work not only with NAEP and our state assessments, but the world of assessments that we are exploring
  - Provide resources to use to find more information

- Keep in mind that
  - We are not experts in every aspect of these assessments, and you’ll have to look elsewhere to answer complex questions and
  - You will probably leave this session with more questions than answers
Why are these assessments important?

• Growing prominence of international assessments
• Interest in the states, US, and internationally
  • Data from these assessments are used by
    • Policymakers
    • Researchers
    • The media
    • At the federal level
    • At the state level?
Policy makers, researchers, and the media showing increased attention to results of international assessments

Concern over U.S. performance on international assessments is growing

The rankings are emphasized, as is progress over time, gaps, and inferences about future economic competitiveness

Many look to top performers for lessons on success
International test score data show U.S. firmly mid-pack

By Nick Anderson
Washington Post Staff Writer
Tuesday, December 7, 2010, 6:00 AM

PISA results show U.S. students lag behind in math

Despite attempts to improve STEM education in the United States, a report from the Organization for Economic Cooperation and Development shows the U.S. lags behind a dozen other countries in academic achievement.

The report shows that 15-year-old American students had average scores in reading and science and below average scores in math, ranking behind Korea, Finland, Canada, Japan, Singapore, New Zealand and two provinces in China.

Why American students lag behind

December 17, 2010 | By Miles Honda, Special to CNN

One of the greatest lessons to be learned from the Program for International Student Assessment report released this month is that equity matters.

The New Republic: The U.S. Could Learn From Finland

January 20, 2011 | by SAMUEL E. ABRAMS

Samuel E. Abrams is a visiting scholar at Teachers College, Columbia University, and he is writing a book on school reform.

While observing recess outside the Island Comprehensive School on the eastern edge of Helsinki on a chilly day in April 2009, I asked Principal Timo Heikkinen if students go out when it's very, very cold. Heikkinen said they do. I then asked Heikkinen if they go out when it's very, very cold. Heikkinen smiled and said, "If minus 15 [Celsius] and windy, maybe not, but otherwise, yes. The children can't learn if they don't play. The children must play."

Education Spending and Those International Test Scores

By CATHERINE RAMPOLL

As my colleague Sam Dillon reported on Tuesday, China gave the rest of the world a run for its money in the Program for International Student Assessment, a test administered to 15-year-olds around the world. But how might money actually have affected these test scores?
Leaders at the state and national levels have entered the discussion
- U.S. performance
- International competitiveness
- Standards
  - Curricular
  - Performance
- Quality of assessments
- Quality of data
Benchmarking for Success:
Ensuring U.S. Students Receive a World-Class Education

A report by the National Governors Association, the Council of Chief State School Officers, and Achieve, Inc.

Governors recognize that new economic realities mean it no longer matters how one U.S. state compares to another on a national test; what matters is how a state’s students compare to those in countries around the globe. America must seize this moment to ensure that we have workers whose knowledge, skills, and talents are competitive with the best in the world.

March 27, 2011

South Korean Official Advises Caution in Following His Country’s Model

A former top education official in academically high-flying South Korea has warned against U.S. officials attempting to copy his nation’s approach, saying it has grown too test-centered and often detracts from students’ love of learning.
# NAEP, PISA, TIMSS, and PIRLS At a Glance

<table>
<thead>
<tr>
<th></th>
<th>State NAEP</th>
<th>PISA</th>
<th>TIMSS</th>
<th>PIRLS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Information</strong></td>
<td>National Assessment for Educational Progress</td>
<td>Program for International Student Assessment</td>
<td>Trends in International Mathematics and Science Study</td>
<td>Progress in International Reading Literacy Study</td>
</tr>
<tr>
<td><strong>Primary Purpose</strong></td>
<td>Benchmark for national standards; national and state estimates of student achievement in key subjects at key grades; reports results relative to nationally established benchmarks. Designed to mirror U.S. educational objectives and curricula.</td>
<td>Measure how well students near the end of compulsory education are prepared for life beyond the classroom. Focuses on “yield” of education systems, or what competencies students have acquired in and outside of school and can apply to problems with real-world contexts.</td>
<td>Provide countries with information to improve teaching and learning in mathematics and science. Conducted every four years on a regular cycle, TIMSS is designed to measure progress in educational achievement in mathematics and science and provide empirical information about the contexts for schooling.</td>
<td>Provide policy-relevant information about how to improve teaching and learning and help children become accomplished and self-sufficient readers; measure trends in the associated home and school contexts for reading. Focuses on experiences learning to read at school and at home.</td>
</tr>
<tr>
<td><strong>Subject Areas Tested</strong></td>
<td>Reading, mathematics, writing, science, other subjects</td>
<td>Reading, mathematics, science, and problem solving</td>
<td>Mathematics, science</td>
<td>Reading</td>
</tr>
<tr>
<td><strong>Responsible Organization</strong></td>
<td>National Center for Education Statistics (NCES), National Assessment Governing Board (NAGB)</td>
<td>Organisation for Economic Cooperation and Development (OECD)</td>
<td>International Association for the Evaluation of Educational Achievement (IEA)</td>
<td>International Association for the Evaluation of Educational Achievement (IEA)</td>
</tr>
<tr>
<td><strong>History of Program</strong></td>
<td>Began in 1969, expanded to some assessment every 3 years since 2000</td>
<td>Every 3 years since 2000</td>
<td>Every 4 years since 1995</td>
<td>Every 5 years, with first administration in 2001</td>
</tr>
</tbody>
</table>
General Information

- National Assessment of Educational Progress (NAEP)
  - http://nces.ed.gov/nationsreportcard
  - National Assessment Governing Board

- Program for International Student Assessment (PISA)
  - Organization for Economic Cooperation and Development (OECD)

- Trends in International Mathematics and Science Study (TIMSS)
  - International Association for the Evaluation of Educational Achievement (IEA)

- Progress in International Reading Literacy Study (PIRLS)
  - International Association for the Evaluation of Educational Achievement (IEA)
## General Information

<table>
<thead>
<tr>
<th>Purpose</th>
<th>State NAEP</th>
<th>PISA</th>
<th>TIMSS</th>
<th>PIRLS</th>
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</thead>
<tbody>
<tr>
<td>Compare student achievement in states and other jurisdictions; track changes in achievement of key grades and content areas</td>
<td>Measure how well exiting students are prepared for life beyond the classroom; apply competencies to problems with real-world contexts</td>
<td>Measure progress in educational achievement in mathematics and science and provide empirical information about the contexts for schooling</td>
<td>Provide policy-relevant information and measure trends, focusing on experiences learning to read at school and at home</td>
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<table>
<thead>
<tr>
<th>Participating Jurisdictions</th>
<th>State NAEP</th>
<th>PISA</th>
<th>TIMSS</th>
<th>PIRLS</th>
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</thead>
<tbody>
<tr>
<td>53 “states” and 21 urban districts</td>
<td>60 countries and 5 subnational entities in 2009</td>
<td>66 countries and 14 subnational entities in 2011</td>
<td>55 countries and 7 subnational entities in 2011</td>
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## Assessment Timeline: Subjects Assessed

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</table>
Cognitive testing time ranges from 50 minutes on NAEP to 120 minutes on PISA.

All are administered in the spring except PISA, which is administered in the fall.
- TIMSS and PIRLS are most likely to overlap with state testing window, with late spring administration.

Sampling: probability proportional to size sampling for schools.
- NAEP and PISA sample students within sampled schools.
- TIMSS and PIRLS sample intact classrooms within sampled schools.
Population Assessed

- **Grade/Age Assessed**
  - Grade 4: NAEP, TIMSS, PIRLS
  - Grade 8: NAEP, TIMSS
  - 15 year-olds: PISA
  - Grade 12: NAEP (national and pilot only)

- **Number of Students Assessed**
  - Varies by assessment
  - NAEP assesses far more U.S. students than others
    - Reports at national, state, and TUDA levels
- Exclusions can occur at three levels:
  - National
  - School
  - Student
- Also, not all children in target age are enrolled in school.

TIMSS 2007 Technical Report
NAEP provides presentation, response, and setting accommodations for students with disabilities and English language learners
  - Accommodations vary based on grade, subject assessed

PISA, TIMSS, and PIRLS do not offer accommodations
  - PISA, TIMSS, and PIRLS are offered only in the primary language of each participating country
Participation and Inclusion

Technical Reports provide additional data on sample and coverage

EIGHTH GRADE
Coverage and Exclusions
- Coverage is 100%
- No school-level exclusions
- Within-school exclusions consisted of special education classes, disabled students within regular classes, and students unable to be tested in English

Sample Design
- No explicit stratification
- Implicit stratification by school type (public, private), geographic location (northeast, southeast, mid-west, west), location indicator relative to populous areas (8 categories), and minority status (above/below 15% minority), for a total of 128 implicit strata
- Sampled two classrooms per school
- Small schools sampled with equal probabilities

TIMSS 2007 Technical Report
Overall (school + student) Exclusion Rate, PIRLS 2006
Grade 4
Participation and Inclusion

Overall (school + student) Exclusion Rate, TIMSS 2007
Grade 4

[Bar chart showing the overall exclusion rate for various countries and regions]
Participation and Inclusion

Overall (school + student) Exclusion Rate, TIMSS 2007
Grade 8
Participation and Inclusion

Overall (school + student) Exclusion Rate, PISA 2009 Age 15
Participation and Inclusion

Within-school Exclusion Rate with Reason for Exclusion
PISA 2009
(Within-school Exclusion Rate > 0)
Participation and Inclusion

School Enrollment Rate

Percent of 15-year-olds enrolled at grade 7 or above, PISA 2006
Development and Design

- Development Process
  - All go through extensive development processes involving content experts, stakeholders, and input from participating jurisdictions

- Noncognitive Data
  - NAEP, TIMSS, and PIRLS: students, teachers, principals
  - PISA: students and principals

- Skills measured
  - PISA is more process-oriented, with a focus on problem-solving and real world issues. NAEP and TIMSS are more curriculum-oriented.
  - NAEP and PIRLS are generally similar. However, PIRLS has more text-based tasks and shorter, less complex reading passages than NAEP.
Scoring and Reporting

- Scale and Scoring
  - NAEP scales vary by grade and subject
  - PISA, TIMSS, and PIRLS use a scale of 0 to 1,000 with a mean of 500 and standard deviation of 100
  - All use subscales
    - Vary by assessment, grade
    - Many subscales overlap amongst assessments, but distribution of items across scales varies between assessments and grades

- Reporting
  - All report average scale scores and achievement levels/benchmarks
  - Number and nomenclature of achievement levels varies by assessment
Need additional resources?

**International Studies/Comparison Assessment Resources:**


Description: This brief argues that the United States is displaying tunnel vision in the global schoolhouse. Other countries eagerly compare, or benchmark, their performance and standards against each other—and particularly against top performers. Other countries increasingly international assessment.
A Nation at Risk • 25 Years Later

International Exams Yield Less-Than-Clear Lessons
Differing Demographics, Politics, Cultural Norms, Complicate Understanding
By Sean Cavanagh and Kathleen Kennedy Manzo

Short Sighted: How America’s Lack of Attention to International Education Studies Impedes Improvement
For your interest, international data explorers like NAEP's

http://nces.ed.gov/surveys/international/ide/

**International Data Explorer (IDE)**

Do you have questions about U.S. students' knowledge and skills in comparison to their international peers?

With the International Data Explorer (IDE) you can create statistical tables and charts to help you find answers. Explore student performance in reading, mathematics, and science, as well as contextual data including student demographics, instructional experiences, and school characteristics.

**System Requirements:**

- Target screen resolution is 1024x768.
- Internet Explorer 6 or Higher, (IE7 recommended).
- Firefox 2.0 or higher, (FF 3.0 or higher recommended).
- Enable JavaScript and pop-ups in your browser.
- Adobe Flash Player 9.0.115 or higher, [download](#).

**Accessible version:**

- [ON](#)
- [OFF](#)
Let’s consider the items...

<table>
<thead>
<tr>
<th>Grade/Age</th>
<th>NAEP</th>
<th>TIMSS</th>
<th>PIRLS</th>
<th>PISA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades 4, 8, &amp; 12</td>
<td>Grades 4, 8</td>
<td>Grade 4</td>
<td>15-year-olds</td>
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<tr>
<td>9, 13, &amp; 17 years</td>
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<tr>
<td>Subjects</td>
<td>Reading</td>
<td>Mathematics</td>
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<td>Mathematics</td>
<td>Science</td>
<td>Problem Solving</td>
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<td>Additional</td>
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<td>Subjects</td>
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</table>
...while keeping the purpose in mind.

- **NAEP** - What do U.S. students **know** and what are they **able to do** in each of the content areas tested?

- **TIMSS/PIRLS** - Based on the country's school curricula in mathematics and science, what **knowledge** and skills have students acquired by grade 4 and grade 8?

- **PISA** - What can students **do** with the mathematics and science they have learned?
Item Discussion

- How are the questions similar?
- How do the questions differ?
  - Complexity
  - Difficulty
  - Depth of knowledge required
  - Bias
- Would a similar question be appropriate on your state assessment? Why or why not?
Reading

NAEP

Reading is an active and complex process that involves:
- Understanding written text;
- Developing and interpreting meaning;
- Using meaning as appropriate to type of text, purpose, and situation.

- authentic texts of highest quality drawn from a variety of contexts
- material must reflect our literary heritage
- word length varies by grade (4: 200-800, 8: 400-1,000, 12: 500-1,500)

PIRLS

Reading literacy is...the ability to understand and use those written language forms required by society and/or valued by the individual.

- collect potential stimulus texts from as many countries as possible
- excludes culture-specific knowledge
- generally less than 1,000 words
- translated without loss in meaning—poetry difficult

PISA

Reading literacy is understanding, using, reflecting on and engaging with written texts, in order to achieve one’s goals, to develop one’s knowledge and potential, and to participate in society.

- continuous and noncontinuous text
## Reading

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>NAEP</th>
<th>PIRLS</th>
<th>PISA</th>
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<tbody>
<tr>
<td><strong>Texts</strong></td>
<td><strong>Type</strong></td>
<td><strong>Purposes</strong></td>
<td><strong>Type</strong></td>
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<td>Literary</td>
<td>Literary experience</td>
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<td>-fiction</td>
<td>-narrative fiction</td>
<td>Exposition</td>
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<td>-literary nonfiction</td>
<td>Acquire and use information</td>
<td>Argumentation</td>
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<tr>
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<td>-poetry</td>
<td>-biographies and autobiographies</td>
<td>Instruction</td>
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<td>Informational</td>
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<td>-exposition</td>
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<td>Description</td>
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<td>-argumentation/ persuasive text</td>
<td>-procedural texts and documents</td>
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<td>-procedural texts and documents</td>
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<td><strong>Cognitive processes</strong></td>
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<td><strong>Processes</strong></td>
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<td>Locate and recall</td>
<td>Focus on and retrieve</td>
<td>Access and retrieve</td>
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<td>Integrate and interpret</td>
<td>Make inferences</td>
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<td>Critique and evaluate</td>
<td>Interpret and integrate</td>
<td>Reflect and evaluate</td>
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<td><strong>Situation</strong></td>
<td><strong>Category does not exist</strong></td>
<td><strong>Contexts</strong></td>
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<tr>
<td></td>
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<td>Home, Nation, Community, School</td>
<td>Personal, Public, Occupational, Educational</td>
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</table>
Stated that 50 percent of NAEP 8th grade
and 33 percent of 12th grade
fit PISA’s reading framework

And found that 57 percent of PISA
items fit the NAEP reading framework
# Mathematics

## NAEP

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Grade 4</th>
<th>Grade 8</th>
<th>Grade 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Properties and Operations</td>
<td>40%</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Measurement</td>
<td>20%</td>
<td>15%</td>
<td>30%</td>
</tr>
<tr>
<td>Geometry</td>
<td>15%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Data Analysis, Statistics, and Probability</td>
<td>10%</td>
<td>15%</td>
<td>25%</td>
</tr>
<tr>
<td>Algebra</td>
<td>15%</td>
<td>30%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Cognitive demand: Complexity (low, medium, high)

## TIMSS

<table>
<thead>
<tr>
<th>Content Domain</th>
<th>Grade 4</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>50%</td>
<td>30%</td>
</tr>
<tr>
<td>Geometry</td>
<td>35%</td>
<td>20%</td>
</tr>
<tr>
<td>Data Display</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Data and Chance</td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>Algebra</td>
<td></td>
<td>30%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognitive Domain</th>
<th>Grade 4</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowing</td>
<td>40%</td>
<td>35%</td>
</tr>
<tr>
<td>Applying</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>Reasoning</td>
<td>20%</td>
<td>25%</td>
</tr>
</tbody>
</table>

## PISA

### Overarching ideas
- Quantity
- Space and shape
- Change and relationship
- Uncertainty

### Mathematical literacy
- **The Reproduction Cluster**
  - Standard representations and definitions
  - Routine computations
  - Routine procedures
  - Routine problem solving

- **The Connection Cluster**
  - Modeling
  - Standard problem solving translation and interpretation
  - Multiple well-defined methods

- **The Reflection Cluster**
  - Complex problem-solving and posing
  - Reflection and insight
  - Original mathematical approach
  - Multiple complex methods
  - Generalisation
Framework Percentage Distribution Across Content Areas

- NAEP 2011 Grade 4
- TIMSS 2011 Grade 8
- PISA 15-year-olds

- Algebra
- Data analysis and probability
- Geometry
- Measurement
- Number properties and operations
PISA: Scientific literacy is the capacity to use scientific knowledge, to identify questions and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity.

THEMES – PROCESSES – APPLICATIONS
Resources


TIMSS: http://timss.bc.edu/TIMSS2007/items.html

PIRLS: http://timss.bc.edu/pirls2006/user_guide.html

PISA: http://www.pisa.oecd.org/pages/0,3417,en_32252351_32235918_1_1_1_1_1,00.html
http://pisa-sq.acer.edu.au/ (interactive)


From the Perspective of a State: Kentucky

NAEP Reading Grade 4 and 8 - 2007 to 2009 Results:
- Kentucky is **one of three states** that had a statistically significant increase in 4th-grade reading scores.
- Kentucky is also **one of nine states** that had a statistically significant increase in 8th-grade reading scores.
- Kentucky is the **only state** in the nation to report increases in both 4th- and 8th-grade reading scores.

NAEP Math Grade 4 – 2007 to 2009 Results:
- Kentucky is 1 of 8 States that had a statistically significant increase.
From the Perspective of a State: Kentucky

- Our primary focus is on data from our state assessments.
- Kentucky also places a lot of emphasis on NAEP and NAEP results.
- Kentucky leadership has increased emphasis on data from international assessments. These data inform our discussions on Board Initiatives.
  - Kentucky Board of Education
  - State Education Agency
    - Assessment and Accountability Division
    - Curriculum Consultants
    - Instruction Consultants
Our Vision embedded in the Strategic Plan:

Every child proficient and prepared for success
KDE’s MISSION is to prepare all Kentucky students for next-generation learning, work and citizenship by engaging schools, districts, families and communities through excellent leadership, service and support.

**VISION**
Every child proficient and prepared for success

- **Strategic Priorities**
  - Next Generation Learners
  - Next Generation Professionals
  - Next Generation Support Systems
  - Next Generation Schools/Districts

- **Strategies**
  - Common Core Standards
  - Balanced Assessments
  - Continuous Improvement Model
  - Data to inform instruction & policy decisions
  - District 180
  - Innovations

- **Indicators**
  - Proficiency
  - Growth
  - Gaps
  - Graduation
  - College/Career Readiness
  - % Effective Teachers
  - %Effective Leaders
  - Working Conditions Survey
  - Program Reviews
  - Revised Report Card
  - New Accountability System
CORE VALUES

Leadership

Customer Focus

Strategic Planning
Goals & Measures

Workforce Focus

Process Management

Performance Results

Measurement, Analysis & Knowledge Management

Adapted from BiE IN
Baldrige Model

Next Generation Learners

KEY GOALS/MEASURES

› Readiness/Proficiency
  • Pre-K – to be determined
  • 4th-grade NAEP
  • 8th-grade NAEP

› Gaps (ethnicity; gender; disabilities; income)
  • ACT
  • NAEP
  • ESEA
Next Generation Learner

KEY GOALS/MEASURES

♦ College & Career Readiness
  • ACT
  • Graduation Rate

♦ College Success
  • Enrollment
  • 1st year remediation rate
  • 1-year completion rate
Next Generation Learners

INDICATORS/TARGETS

Achievement/Growth

Indicator: By 2015, improve the percentage of students performing at or above basic on the National Assessment for Educational Progress (NAEP) in 4th- and 8th-grade reading and mathematics rank in the top 20% of states nationally.

4th-grade reading
Baseline: 72 (2009)
2-year target: 73
6-year target: 75

8th-grade reading
Baseline: 79 (2009)
2-year target: 80
6-year target: 82
Next Generation Learners

INDICATORS/TARGETS
Achievement/Growth

Indicator: By 2015, improve the percentage of students performing at or above basic on the National Assessment for Educational Progress (NAEP) in 4th- and 8th-grade reading and mathematics rank in the top 20% of states nationally.

4th-grade mathematics
Baseline: 81 (2009)
2-year target: 83
6-year target: 86

8th-grade mathematics
Baseline: 70 (2009)
2-year target: 73
6-year target: 78
Next Generation Learners

INDICATORS/TARGETS

Gap Closure

Indicator: By 2015, decrease the gap* by 50% on National Assessment of Educational Progress (NAEP) 4th- and 8th-grade reading and mathematics.

Gap to Goal Growth

<table>
<thead>
<tr>
<th>Grade</th>
<th>Baseline (2009)</th>
<th>1-year Target</th>
<th>5-year Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th</td>
<td>19.5</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>8th</td>
<td>17</td>
<td>20</td>
<td>26</td>
</tr>
</tbody>
</table>

*gap is based on the difference in at or above proficient performance between a composite of AA, F/R, LEP and ECE students and all students.
Next Generation Learners
INDICATORS/MEASURES/GOALS

- Growth
  - Scale score on NAEP-NATION’S REPORT CARD in Kentucky
Some Recommended Next Steps in Kentucky

- Ensure all stakeholders agree on customer focus areas
- Ensure knowledge management systems provide accurate data to identify gaps between customer focus and current performance
- Engage stakeholders in prioritizing gaps
- Engage stakeholders in setting strategic goals, measures, and specific strategies
- Align processes to strategic goals, measures, and strategies
- Align all workforce processes to strategies
- Identify process measures and measurement systems
- **Develop accountability system** to report progress on strategic goals
- Develop reward system
From the Perspective of a State: Kentucky

- Next Step: Researchers will use international assessment data for more detailed goal-setting and to provide overview/background to possibly integrate the discussion into the State Strategic planning process.

- Our overall long-term goal is for state-, district-, and school-level leadership to use state, national, and international data to help inform decisions and for goal-setting.
From the Perspective of a State: Arkansas

NAEP is one of the factors in determining Arkansas educational policies in the state.

- Arkansas frameworks are closely aligned to NAEP.
- Arkansas emphasizes progress over time.
  - Arkansas has shown growth in 4th grade reading in NAEP from 2003-2009 from 26% to 36% at or above proficient.
  - Arkansas has shown growth in 8th grade math in NAEP from 2003-2009 from 19% to 27% at or above proficient.
- Arkansas places emphasis on assessing all students who can meaningfully participate.
  - Arkansas has a state law that all schools will participate in NAEP testing.
  - Arkansas has one of the lowest exclusions rates in the country for NAEP.
New Governing Board Policy

- Jurisdictions excluding more than 5% of all students will be prominently reported in the NAEP 2011 Report Card.

- Effective with the 2011 assessment, jurisdictions excluding more than 15% of IEP or of ELL students will be reported in the NAEP 2011 Report Card.

- Arkansas was one of three states who met this criteria in 2009, and should meet this high standard in 2011.
Of Wal-Mart's 6,000 suppliers, 5,000 are in China

Source: National Academy of Science
Global Economics

- Software written in India . . .
- MRI’s read moments later by radiologist in Australia
- Pilots in U.S. guide unmanned aircraft in Afghanistan

Source: National Academy of Science
The World Economic Forum ranks the U.S. 48th in quality of mathematics and science education.

- Source: National Academy of Science
The U.S. ranks 27th among developed nations in the proportion of college students receiving undergraduate degrees in science or engineering.

Source: National Academy of Science
The total annual federal investment in research in mathematics, the physical sciences and engineering is now equal to the increase in U.S. healthcare costs every nine weeks.

Source National Academy of Science
U.S. International Test Scores 30 Most Industrialized Nations

Mathematics 25
Science 21

Source: National Academy of Science
China graduates more English-speaking engineers than the U.S.

Source: National Academy of Science
From the Perspective of a State: Arkansas

- The State Board of Education adopted the Common Core State Standards (CCSS) on July 12, 2010.
- Statewide ELA and Mathematics committees have completed an analysis between the CCSS and Arkansas Curriculum Frameworks.
Arkansas is one of the governing states in the Partnership for Assessment of Readiness for College and Careers (PARCC).

- More Meaningful Standards
- Higher Quality Testing
- Through-Course Testing
- Maximize Technology
- Cross-State Comparability
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>R.L</td>
<td>3</td>
<td>Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text (e.g., a character’s thoughts, words, or actions).</td>
<td></td>
<td></td>
<td>AR.5.R.9.20 (R.9.5.20) Evaluating: Evaluate a character’s decision/action</td>
<td>AR specifies story elements to mystery and realistic fiction</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AR.5.R.9.8 (R.9.5.8) Using inferences and interpretations: Analyze literary elements of character, plot, and setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>R.L</td>
<td>4</td>
<td>CC.4.R.L.4 Craft and Structure: Determine the meaning of words and phrases as they are used in a text, including those that allude to significant characters found in mythology (e.g., Herculean).</td>
<td></td>
<td></td>
<td>AR.4.R.11.1 (R.11.4.1) Meaning-based word recognition: Use context clues to determine the precise meaning of new words</td>
<td></td>
<td>uses content clues, the common core more specific. AR standard is not specific to mythology or skill</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AR.4.R.9.11 (R.9.4.11) Determining importance to make meaning: Read a text for a variety of purposes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AR.5.R.10.11 (R.10.5.11) Reading a variety of poetry for enjoyment, critical analysis, and evaluation: Read a variety of poetry, with emphasis on rhymed and patterned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AR.5.R.10.12 (R.10.5.12) Reading a variety of poetry for enjoyment, critical analysis, and evaluation: Describe the characteristics of rhymed and patterned poetry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AR.4.R.10.15 (R.10.4.15) Reading a variety of poetry for enjoyment and critical analysis: Read a variety of poetry, including simple free verse and limericks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AR.4.R.10.16 (R.10.4.16) Reading a variety of poetry for enjoyment and critical analysis: Discuss poetry to determine meaning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>R.L</td>
<td>5</td>
<td>CC.4.R.L.5 Craft and Structure: Explain major differences between poems, drama, and prose, and refer to the structural elements of poems (e.g., verse, rhythm, meter) and drama (e.g., parts of character, setting)</td>
<td></td>
<td></td>
<td>AR.4.R.10.17 (R.10.4.17) Reading a variety of poetry for enjoyment and critical analysis: Analyze poetry to identify the characteristics of diamantes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AR.8.R.10.9 (R.10.8.9) Reading a variety of literature for enjoyment, critical analysis, and evaluation: Read a variety of literature, including simple free verse and limericks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Codes | K-12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9-10 | 11-12 | CCR |
STATES IN THE PARTNERSHIP FOR
ASSESSMENT OF READINESS FOR COLLEGE AND CAREERS

Updated June 2011
Smarter Balance
**PARCC Timeline**

- **Oct. 2010**: Launch and design phase began
- **Sept. 2011**: Development phase begins
- **Sept. 2012**: First year field testing and related research and data collection begins
- **Sept. 2013**: Second year field testing begins and related research and data collection continues
- **Sept. 2014**: Full administration of PARCC assessments begins
- **Summer 2015**: Set achievement levels, including college-ready performance levels
How will the CCSS and PARCC benefit the students of Arkansas?
From the Perspective of a State: Minnesota

NAEP

- NAEP is highly regarded in MN
- School participation very high
- Exclusion rates low
- Achievement gap high
- Results becoming more in light and being used by other education divisions
  - Standards looked at them when updating
  - Governor’s council
  - Reading group
Minneapolis – State Context
TIMSS

- Participated as mini-nation in 1995, 2007
- TIMSS-NAEP linking study 2011

- Allows MN student performance to be compared to other nations
- Participation and analysis fees paid by business partners, MDE; SciMathMN, Michigan State University with Dr. William Schmidt performing analysis
- SciMathMN is a non-profit, statewide education and business coalition advocating for quality K-12 science, mathematics and technology education based on research, national standards and effective practices.

MINNESOTA SCIENCE AND MATH COMPARED INTERNATIONALLY IN TIMSS: REVIEWING THE CONTEXT

The 2007 TIMSS is referred to as the Trends in International Mathematics and Science Study. With over 60 participants and 425,000 students assessed, TIMSS 2007 is still the largest study of student math and science achievement in the world. Fourth and eighth grade students were the focus in 2007 and each participating country sampled approximately 4,000 students in 150 schools.

SciMathMN sponsored Minnesota’s 1995 participation as a ‘mini-nation’ in TIMSS, and was selected to analyze the 2007 Minnesota TIMSS results, where Minnesota again participated as a mini-nation.

Mini-nation status allows Minnesota to participate as if it were a nation, establishing our ranking among the other participating nations and providing insight into our students’ ability to compete on a global scale.
4th grade TIMSS results

Minnesota
United States

1997
2007
8th grade TIMSS results

Minnesota

United States

1997

2007
Grade 4 Mathematics Mean Teaching Emphasis

2007 TIMSS TEST EMPHASIS

NUMBER
GEOMETRY
DATA
OTHER

2007
Grade 8 Mathematics Mean Teaching Emphasis

2007 TIMSS TEST EMPHASIS

- NUMBER
- ALGEBRA
- GEOMETRY
- DATA
- OTHER

2007
Variables in the Gain Equation...

- MN had no math or science standards in 1995; now in third iteration
- Standards-based math curricula widely used
- MCA Testing in math since 1998 (high stakes); science started in 2008
- Frameworks for delivering the standards developed by SciMathMN and used in many districts
Variables in the Gain Equation...

- Legislation requiring Algebra I in grade 8 by 2011; Alg II for graduation in 2015
- Graduation requirements significantly increased in math and science since 1995
- Recommendations from 1995 TIMSS results used to guide change
The development of the 2003 mathematics standards was influenced by the international benchmarking data available through the 1995 TIMSS.

Mathematics instruction time at the elementary level for many districts has increased from as little as 30 minutes per day in 1995 to around 60 minutes or more per day in 2007.
At 8th grade, Minnesota teachers reported a substantial increase in the amount of time devoted to Algebra over what was reported in 1995.

- 1995 8th grade teachers reported spending only 11 percent of their instructional time on Algebra
- 2007 8th grade teachers reported spending over four times as much instructional time on Algebra (48 percent).

The TIMSS 8th grade test had a strong focus on Algebra, which is what is most typically targeted for all 13 year-old students around the world.
In 2007, 4th grade teachers reported devoting substantially less time to mathematics topics often covered at higher grades in other countries and more time on number – computation with whole numbers, fractions, decimals, and number patterns – which is the major focus of grade 4 mathematics internationally.

The amount of instructional time devoted to number at 4th grade in 1995 as reported by teachers was about one-third of the school year.

In 2007, the amount of time spent on number topics increased substantially to almost 60 percent.
For more information

- [http://www.scimathmn.org/](http://www.scimathmn.org/) for Minnesota’s TIMSS results as well as other initiatives related to science and math instruction in Minnesota
- [http://education.state.mn.us/](http://education.state.mn.us/) for Minnesota’s standards, assessments, and accountability

**Featured Speakers:** Dr. William H. Schmidt, Distinguished Professor and Internationally Recognized Education Researcher and Natalie Rasmussen, Minneapolis North Community High School

- This briefing was held on February 12, 2010 and featured new TIMSS information regarding the status of Science at grades 4 and 8 in Minnesota as well as the achievement gap in both math and science. The analysis showed a very strong link between poverty (as measured by Free/Reduced Price Lunch status) and low achievement. This topic will be the focus of further analysis and potential solution proposals as our work progresses.
- Please watch for the 5th Annual Policymaker Briefing to occur in late January or February, 2011.
- Download Dr. Schmidt’s February 12, 2010 presentation in [ppt](#) or [pdf](#) format.

SciMathMN would like to recognize 3M as the primary sponsor of this event.

Note: The [presentation slides](#) and [final report](#) from the Oct. 21 event are available from our [publications page](#).
Questions to Ponder…

- Should classroom teachers, principals and superintendents consider NAEP/TIMSS/PISA/PIRLS data results, *in addition to their state data results*, when making data driven decisions in their classrooms, schools and/or districts?

- At what level is this data looked at?

- At what level should it be looked at?

- Why do we want this data and what are we going to do with it?

- Are we gaining value by giving our students more assessments?

- What are policy makers and educational leaders doing with the data?
Thank you for attending!