International Benchmarking Toolkit

Education Commission of the States
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For more information, please see the ECS International Benchmarking Web site at: www.ecs.org/IB/toolkit.html.
Welcome to the *International Benchmarking Toolkit*, a unique resource for state policymakers, school district officials, principals and classroom teachers. The *International Benchmarking Toolkit* is the next generation of “From Competing to Leading: International Benchmarking Blueprint,” released by the Education Commission of the States (ECS) in July 2008.

The Toolkit starts with an Introduction, which clearly states the need for U.S. educators and states to align their standards to international benchmarks. It also states the purpose of the toolkit and explains where to begin in using it.

The next component — How Does the United States Compare? — includes information about U.S. students and how they compare to students in other countries. Also included are examples of international standards and what other states are doing to benchmark to these standards and increase academic expectations.

The four Toolkit sections conclude by outlining strategies, policies, information and other resources to help start the international benchmarking process in schools, districts and states. These tools are grouped under either School and District Level or State Level, and under the following four sections that correspond to the original Blueprint document:

- International Standards
- Quality Instruction
- Professional Development
- Assessment.

Some educators already have begun the benchmarking process and have a full understanding of its significance and necessity. Others are unaware of how much the United States must do to produce students who will be competitive in the world’s workforce. Regardless of one’s experience and understanding, any educator may begin in any section of this Toolkit, with any tool listed, to get started with international benchmarking. Please note, however, that all sections of the Toolkit are important and offer assistance in achieving the ultimate goal.
In July of 2008, at the National Forum on Education Policy in Austin, Texas, the Education Commission of the States (ECS) released *From Competing to Leading: An International Benchmarking Blueprint.* This blueprint was created in response to growing concerns about the quality of education students in the United States are receiving and the lack of workforce competitiveness our students face, in comparison to students in other countries around the world. According to the 2006 report, *Tough Choices or Tough Times,* (the National Center on Education and the Economy), one conclusion in the executive summary states that if the United States wanted to continue to compete in the worldwide market again, “... it would have to adopt internationally benchmarked standards for educating its students and its workers, because only countries with highly skilled workforces could successfully compete in that market.”

“The best employers the world over will be looking for the most competent, most creative, and most innovative people on the face of the earth and will be willing to pay them top dollar for their services. This will be true not just for top professionals and managers, but up and down the length and breadth of the workforce. Those countries that produce the most important new products and services can capture a premium in world markets that will enable them to pay high wages to their citizens.”

The United States once enjoyed the position of global leader in education, but now is struggling to compete. In measuring progress, most states compare themselves to other states rather than to international benchmarks. Because of the nation’s diminished international standing, continuing to engage in interstate comparisons risks perpetuating regionally low standards and achievement, and ignores the necessity to adequately prepare a workforce that is mobile across both state and national boundaries. To move from competing to leading, states should spend less time comparing to one another and spend more time comparing to high-performing countries.

A necessary foundation in this move is leadership. Committed and capable leadership for public education has always been critical, and effective leadership sets the tone and conditions for schools to serve students well. Social, technological and workforce changes are producing unparalleled challenges. Today, it may be more important than at any other time in history to address challenges facing states, districts and schools. Navigating such change requires leaders who are willing to examine their existing education systems and continuously improve them for the future. To that end, ECS encourages America’s education leaders and policymakers to consider, adopt and/or adapt the International Benchmarking Blueprint.

The International Benchmarking Blueprint is based on two broad principles: (1) U.S. students can and must succeed and achieve in a knowledge-based global society and economy; (2) the United States can and must lead again. Yet, many challenges and barriers exist in developing a world-class education system and implementing an International Benchmarking Blueprint. The Blueprint serves as an action guide, recommending essential policy components that would enable states, districts and schools to craft new and adjust existing policies proven to demonstrate world-class performance.
Purpose of the Toolkit

“In an economy driven by innovation and knowledge ... in marketplaces engaged in intense competition and constant renewal ... in a world of tremendous opportunities and risks ... in a society facing complex business, political, scientific, technological, health and environmental challenges ... and in diverse workplaces and communities that hinge on collaborative relationships and social networking ... the ingenuity, agility and skills of the American people are crucial to U.S. competitiveness.”

The purpose of the International Benchmarking Toolkit is to provide strategies, policies, information and other resources that educators and policymakers at any level — school, district or state — can use to move toward benchmarking to international standards. These tools may be adopted in total, or adapted or implemented in phases that make sense to the user.

With the proper tools, any educator or policy leader can begin the benchmarking process from any starting point. No one need wait for a full-blown national or state initiative on international benchmarking to get started on what needs to be done to increase the skills of our students and increase their competitiveness in the global workforce.

International Benchmarking tools are listed for school, district and state levels, under four major components that correspond to the Blueprint:

- International Standards
- Quality Instruction
- Professional Development
- Assessment.

Where to Begin?

In using this Toolkit, perhaps the most difficult task will be determining where to begin. The Toolkit contains four sections of more than 100 possible strategies, policies, information and other resources to help reach the goal of benchmarking to international standards. In which section and with which tool should you begin?

First, read the original International Benchmarking Blueprint, as well as the Introduction, Purpose and How Does the United States Compare? components of the Toolkit.

Second, you will need to do a self-assessment of school, district or state readiness in moving toward international benchmarking. While you can start in any section of the Toolkit and with any tool, you will want to determine what will yield the best, fastest or most needed result at this point in time and build on the strengths of your current system.

Keep in mind that some of the tools in the Toolkit can be used by individuals, without involving anyone else; however, most of the tools require some form of collaboration with fellow school, district or state staff. Some tools involve collaboration with parents, external education groups, local or state school boards, state policymakers and the business sector. Many tools represent major change initiatives that will require state policy support, focus and attention over time.

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Examples of how to begin using the Toolkit:

**School and District Level**
If you or your colleagues know very little about the international benchmarking movement and why it is important, you might want to start in Section IV – Assessment, International Practice Assessments. If you would like to see how your own students compare to international standards, there are sample online assessments in a variety of content areas available. The Toolkit provides direct links to these assessments. You will be able to see how competitive your students or your school’s students are with students around the world.

School and District Level
If your school or district already has explored or implemented Professional Learning Communities (PLCs), you might want to start in Section II – Quality Instruction, Professional or Teacher Learning Communities. Establishing a PLC related to international standards and the benchmarking process could be the next step forward for your school. The work of Dr. Dylan Wiliam or the Center for Teaching Quality could help you reach your goals. The Toolkit provides information about PLCs, as well as Dr. Wiliam’s work and direct links to more of his work.

School and District Level
If your school and district already are aware of the positive impact high rigor coursework has on students’ preparedness for college and the workforce, you might want to start in Section II – Quality Instruction, High Rigor Coursework Benchmarked to International Standards. Perhaps you are ready to create an action plan for how to increase Advanced Placement®, International Baccalaureate® or Cambridge AICE courses and exams. The plan should include the identification of existing funding sources or grant possibilities for increasing course availability and also for the teacher training related to the delivery of these courses.

**State Level**
If your state already has laid the groundwork for a statewide STEM initiative, you might want to start in Section III – Professional Development, Professional Development Content. Collaborating with higher education, teacher preparation programs and school districts might be a next step for increasing STEM-ready teachers who are ready to teach to international standards. This will require high-level collaboration and attention.

After assessing where you currently stand with regard to international benchmarking, begin using the toolkit where it makes sense for you.

Your first steps might seem small, but they will become bigger, more collaborative and more strategic as you learn more about the need for and importance of international benchmarking.

The goal is for our students to be prepared for postsecondary education, training and to be competitive in the global workforce of the 21st century.
Endnotes


3 Ibid 7.


Podcast: What it takes to transform public education for a global economy
This podcast was recorded at the University of Delaware conference, Delaware Education for a Global Economy: Making Vision 2015 Work, October 2, 2008. Sir Michael Barber (adviser to former British Prime Minister Tony Blair, now with McKinsey & Company) clearly explains the need for public education transformation to address the needs of the new global economy. This podcast provides an excellent history of where U.S. education has been and where it now needs to go: http://www.ums.udel.edu/podcast/watch?c=162.

Regardless of the report, study or chart cited, it is clear that the United States ranks below many other countries in providing a world-class education in mathematics and science. For example:

- On the 2006 PISA, the average U.S. score in mathematics literacy was 474, lower than the Organisation for Economic Co-operation and Development (OECD) average score of 498. Thirty-one OECD non-OECD jurisdictions/countries scored higher, on average, than the United States in mathematics literacy. In contrast, 20 jurisdictions scored lower than the United States in mathematics literacy in 2006. Some of the countries ahead of the United States include: Finland, Republic of Korea, Switzerland, the Netherlands, Poland, Spain, Chinese Taipei, Estonia, Slovenia, Lithuania and Latvia.

- Along with scale scores, the 2006 PISA uses six proficiency levels to describe student performance in science literacy, with level 6 being the highest. The United States had greater percentages of students below and at level 1 (25%) than the OECD average percentages on the combined science literacy scale (19%).

- In the United States, only 6% of 8th-grade students reached the advanced benchmark for international mathematics standards compared with: 45% for Chinese Taipei, 40% for the Republic of Korea, 40% for Singapore, 31% for Japan, 10% for Hungary, 8% for England and 8% for the Russian Federation.

In the Highlights from TIMSS 2007 (Trends in Mathematics and Science Study) report, released in December 2008 by the National Center for Education Statistics, Institute of Education Sciences, data confirms that while 4th-and 8th-grade students in the United States have made some gains in math since 1995, students in other countries have made much higher gains in comparison. The size of the gap in math scores between the United States and other countries is cause for concern.

To monitor the impact of their work, students in Massachusetts and Minnesota recently participated in a special TIMSS study that resulted in TIMSS scores for these states, as if they were individual countries. In math, students, on average, scored higher than or equal to students in all countries, except Singapore and Taiwan. In Minnesota, 4th-grade students performing at the advanced level doubled from 9% in 1995 to 18% in 2007 — one of the largest gains. Both Massachusetts and Minnesota have worked to benchmark their mathematics standards to international standards and/or higher rigor.

In the American Institutes for Research (AIR) 2005 report, What the United States Can Learn From Singapore’s World-Class Mathematics System, interesting and startling findings were made:

- Singapore has a world-class mathematics system with quality components aligned to produce students who learn mathematics to mastery; the U.S. mathematics system does not have similar features.

- A mathematically logical, uniform national framework that develops topics in depth at each grade guides Singapore’s mathematics system. The U.S system, in contrast, has no official national framework. State frameworks differ greatly — some resemble Singapore’s, whereas others lack Singapore’s content focus.

- Singapore recognizes that some students may have more difficulty in mathematics and provides them with an alternative framework; the U.S. frameworks make no such provisions.

- Singapore’s textbooks build deep understanding of mathematical concepts through multistep problems and concrete illustrations that demonstrate how abstract mathematical concepts are used to solve problems from different perspectives. Traditional U.S. textbooks rarely get beyond definitions and formulas, developing only students’ mechanical ability to apply mathematical concepts.
The questions on Singapore’s high-stakes grade 6 Primary School Leaving Examination (PSLE) are more challenging than the released items on the U.S. grade 8 National Assessment of Education Progress (NAEP) and the items on the grade 8 state assessments.

Singaporean elementary school teachers are required to demonstrate mathematics skills superior to those of their U.S. counterparts before they begin teacher training. At every phase of preservice and postservice training, they receive more rigorous instruction both in mathematics content and in mathematics pedagogy.

Areas of strengths in the U.S. mathematics system according to the 2005 AIR report include:

- The U.S. frameworks give greater emphasis than Singapore’s framework does to developing important 21st century mathematical skills such as representation, reasoning, making connections and communications. However, to develop these skills in students, the U.S. frameworks need to do a better job of integrating them with rigorous mathematics content.
- The United States places a greater emphasis on applied mathematics, including statistics, probability and real-world problem analysis.

The Asia Society, Business Roundtable, Council of Chief State School Officers, September 2005 report, Education in China: Lessons for U.S. Educators, compares the U.S. education system with China’s and presents the following recommendations for U.S. Leaders:

- Make learning about China and other world regions a top priority. Business, political and education leaders urgently need to stimulate a national discussion on the skill set American students will need to compete and cooperate in the interconnected world of the 21st century.

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., includes a section on Myths and Realities about International Comparisons (see Additional Resources). This information, along with the work of Dr. Andreas Schleicher, Head of the Indicators and Analysis Division of the OECD Directorate for Education, explains how international comparisons can be used to improve the U.S. education system to meet the needs of students in a global economy and why there is a need to confront these issues before America falls further behind other countries.
To get an idea of what international standards look like, a good place to start is to review the OECD report *Assessing Scientific, Reading and Mathematical Literacy: A Framework for PISA 2006*. This report presents the conceptual framework underlying the PISA 2006 survey. With regard to PISA, this report defines the content that students need to acquire, the processes that need to be performed, and the contexts in which knowledge and skills are applied. Sample tasks also are included that are helpful in comparing how the PISA is different from other state and national assessments.

Please note that this document takes a little time to download and review. It is arranged in the following domain areas: Chapter 1: “Scientific Literacy,” Chapter 2: “Reading Literacy” and Chapter 3: “Mathematical Literacy.” You can find it at: [http://browse.oecdbookshop.org/oecd/pdfs/browseit/9806031E.pdf](http://browse.oecdbookshop.org/oecd/pdfs/browseit/9806031E.pdf).

**Singapore**

Recently, much has been written about the successes of Singapore’s students in the area of mathematics. Singapore’s mathematics system includes: highly logical national mathematics standards; mathematically rich problem-based textbooks; challenging mathematics assessments; highly qualified mathematics teachers whose pedagogy centers on teaching to mastery; and special assistance from an expert teacher to its mathematically slower students, along with an alternative framework.

The National Council for Teachers of Math (NCTM) created a comparison chart of the NCTM focal points with the Singapore Math Syllabus, pre-K through grade 8. The comparison for grades 1-4 is included on the following pages and illustrates significant differences. The Singapore math syllabus is clear and specific in comparison to the NCTM focal points, at times.

The full chart is available online at: [www.edinformatics.com/math_science/nctm_singapore_math.htm](http://www.edinformatics.com/math_science/nctm_singapore_math.htm).
### Grade 1 Curriculum Focal Points

**Number and Operations and Algebra**

Develop an understanding of addition and subtraction and strategies for basic addition facts and related subtraction facts.

- Develop strategies for adding and subtracting whole numbers
- Understand the connections between counting and the operations of addition and subtraction
- Use properties of addition (commutativity and associativity)
- Understand the sequential order of the counting numbers and their relative magnitudes and represent numbers on a number line

**Number and Operations**

Develop an understanding of whole number relationships, including grouping in tens and ones.

- Compare and order whole numbers (at least to 100)

**Geometry**

Compose and decompose geometric shapes.

- Compose and decompose plane and solid figures
- Initial understandings of such properties as congruence and symmetry

Source: The National Council for Teachers of Math (NCTM), NCTM focal points with the Singapore Math Syllabus, pre-K through grade 8
http://www.edinformatics.com/math_science/nctm_singapore_math.htm
### NCTM FOCAL POINTS

#### Grade 2 Curriculum Focal Points

**Number and Operations**
Develop an understanding of the base-10 numeration system and place-value concepts.
- Count in units and multiples of hundreds, tens, and ones, as well as a grasp of number relationships
- Understand multi-digit numbers in terms of place value

**Number and Operations and Algebra**
Develop quick recall of addition facts and related subtraction facts and fluency with multi-digit addition and subtraction.
- Develop, discuss and use efficient, accurate and generalizable methods to add and subtract multi-digit whole numbers
- Develop fluency with efficient procedures, including standard algorithms, for adding and subtracting whole numbers

**Measurement**
Develop an understanding of linear measurement and facility in measuring lengths.
- Standard units of measure (centimeter and inch), and the inverse relationship between the size of a unit and the number of units

### SINGAPORE MATH SYLLABUS

#### Primary 2:

**Whole Numbers**
- Number notation and place values
- Addition and subtraction of two numbers up to three digits
- Multiplication and division within the 2, 3, 4, 5 and 10 times table
- Word problems (solving one-step word problems involving the four operations)

**Money and Measures**
- Measurement of length, mass and volume: estimate and measure using metric system of measures
- Addition and subtraction of length, mass and volume
- Time: tell and write time from the clock
- Addition and subtraction of money
- One-step word problems involving length, mass, volume and money

**Statistics**
- Pictures and graphs using scale representations; solve problems using information in picture graphs
Grade 3 Curriculum Focal Points

Number and Operations and Algebra
Develop an understanding of multiplication and division and strategies for basic multiplication facts and related division facts.

- Use properties of addition and multiplication (e.g., commutativity, associativity, and the distributive property) to multiply whole numbers

Number and Operations
Develop an understanding of fractions and fraction equivalence.

- Solve problems that involve comparing and ordering fractions

Geometry
Describe and analyze properties of two-dimensional shapes.

- Investigate, describe and reason about decomposing, combining, and transforming polygons to make other polygons

Primary 3:
Whole Numbers
- Number notation and place values: read and write numbers up to 10,000
- Addition and subtraction of number up to four digits
- Multiplication tables up to 10 x 10
- Multiplication and division by a one-digit number
- Odd and even numbers
- Word problems using two steps and the four operations on whole numbers

Money and Measures
- Units of measures: standard numbers and measuring in compound units for length, mass, time, area and volume, conversions of units
- Addition and subtraction of length, mass, volume and time
- Addition and subtraction of money and measures in compound units using decimal notation
- Word problems using two steps involving money and measures
- Perimeter of a rectilinear figure
- Area and perimeter of a square and a rectangle

Statistics
- Bar graphs

Fractions
- Equivalent fractions
- Comparing and ordering fractions

Geometry
- Concepts of angles
### NCTM FOCAL POINTS

#### Grade 4 Curriculum Focal Points

**Number and Operations and Algebra**

Develop quick recall of multiplication facts and related division facts and fluency with whole number multiplication.

- Develop fluency with efficient procedures (including the standard algorithm) for multiplying whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems

**Number and Operations**

Develop an understanding of decimals, including the connections between fractions and decimals.

- Relate the understanding of fractions to reading and writing decimals that are greater than or less than 1, identifying equivalent decimals, comparing and ordering decimals, and estimating decimal or fractional amounts in problem solving

**Measurement**

Develop an understanding of area and determining the areas of two-dimensional shapes.

- Select appropriate units, strategies (e.g., decomposing shapes) and tools for solving problems that involve estimating or measuring area

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#### Singapore Math Syllabus

### Primary 4:

**Whole Numbers**

- Number and notation and place value up to 100,000
- Approximation and estimation to nearest 10 and 100, estimations involving addition, subtraction and multiplication
- Factors and multiples up to 100
- Multiplication by a number up to two digits
- Division by a one-digit number and by 10
- Word problems using three steps involving whole numbers

**Money and Measures**

- Multiplication and division of length, mass, volume and time
- Multiplication and division of money
- Units of measure for volume
- Volume of a cube/cuboid and liquid
- Area and perimeter of a square, rectangle and related figures
- Word problems involving volume

**Statistics**

- Tables
- Bar graphs
- Word problems using data from bar graphs

**Fractions**

- Addition and subtraction
- Product of a proper fraction and a whole number
- Mixed numbers and improper fractions
- Word problems: two-step word problems involving fractions

**Decimals**

- Number notation and place value
- Addition and subtraction
- Multiplication and division decimals up to two decimal places and one-digit whole numbers
- Conversion between decimals and fractions
- Approximation and estimation
- Word problems involving decimals

**Geometry**

- Perpendicular and parallel lines
- Angles in degrees
- Symmetry
- Geometric figures: understanding different triangles and quadrilateral figures
- Properties of a square and rectangle
- 2-D representation of a 3-D solid
State Efforts

Some states already have begun benchmarking to international standards with interesting results.

Massachusetts, New Hampshire and Utah

Massachusetts, New Hampshire and Utah agreed to participate in a high-profile effort to establish pilot programs aimed at creating new, world-class approaches to public education. These pilots are funded by The New Commission on the Skills of the American Workforce, based on the recommendations generated in the Commission’s report, Tough Choices or Tough Times. The following example was taken from the Michigan English Language Arts Content Standards.

<table>
<thead>
<tr>
<th>Early Elementary</th>
<th>Later Elementary</th>
<th>Middle School</th>
<th>High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrate listening, speaking, viewing, reading and writing skills for multiple purposes and in varied contexts. Examples include using more than one of the language arts to create a story, writing a poem or letter, or preparing and presenting a unit project on their community.</td>
<td>Integrate listening, speaking, viewing, reading and writing skills for multiple purposes and in varied contexts. An example is using all the language arts to prepare and present a unit project on a selected state or country.</td>
<td>Integrate listening, viewing, speaking, reading and writing skills for multiple purposes and in varied contexts. An example is using all the language arts to complete and present a multimedia project on a national or international issue.</td>
<td>Integrate listening, viewing, speaking, reading and writing skills for multiple purposes and in varied contexts. An example is using all the language arts to complete and present a multimedia project on a national or international issue.</td>
</tr>
</tbody>
</table>

Michigan

Michigan is well into the international benchmarking process. Their standards were compared to standards from other states and nations that are considered to be of high quality, and were evaluated for:

- Rigor: What intellectual level is demanded by the standard?
- Clarity: Is the standard clearly expressed and easy to understand and use?
- Specificity: Is the expected level of performance specific enough?
- Focus: Has the determination been made about what is important for students to learn?
- Progression: Is there a clear path from one level of learning and intellectual achievement to the next?

Content Standard 3: All students will focus on meaning and communication as they listen, speak, view, read and write in personal, social, occupational and civic contexts.

Florida

Florida has embarked on creating World Class Education Standards (WCES) to prepare students to compete at the highest levels internationally.

When Florida’s mathematics grade-level expectations (GLEs) for grades 1-7 were compared with Singapore’s, the average number of GLEs per grade in Florida was 83.3, while Singapore’s average number of GLEs per grade equaled 15. In other words, the mile-wide and inch-deep syndrome. As measured by the Trends in International Math and Science Study (TIMSS), Singapore is the highest-performing nation.

When researchers reviewed Florida’s mathematics standards, they made the following findings and recommendations. There is a need to:

- Vertically align topics and address current system of too many topics, not enough depth and little coherence
- Improve on the vague, not sufficiently detailed curriculum; standards should be expressed succinctly, coherently and with optimum brevity
- Enhance rigor from grade 5 on
- Define GLEs for grades 9-12
- Increase rigor of middle through high school standards
- Increase specificity of standards, showing a progressive development across grade levels
- Increase the depth of knowledge required as grades progress.

To view Florida’s recent math standards, adopted in 2007, as well as the new science standards, adopted in 2008, visit their website at: www.fldoestem.org/page221.aspx.

To review recommendations from researchers, visit: http://www.fcrstem.org/uploads/1/docs/Math%20Standards%20FINALC%20Aug%20%2007%202007.ppt.

Ohio

Ohio recognized that its education system was falling short when compared to world-class or international standards. To help improve the entire education system, Ohio enlisted support from Achieve, Inc. and McKinsey and Company to internationally benchmark Ohio’s K-12 system and identify best practice implications for the state. The resulting report on this effort, Creating a World-Class Education System in Ohio, was released in 2007 by Achieve, Inc.

During this effort, Ohio learned that “the world’s highest-performing educational systems exhibit three common attributes, which reinforce each other to ensure system alignment and focus on delivering high levels of student achievement.” A high-performing system includes:

1. **High Challenge** – Sets high expectations for student achievement for those people most responsible for student achievement (students, teachers, principals and superintendents)
2. **High Support** – Provides the necessary resources and builds the capabilities of those same people to ensure they can meet those high expectations of student achievement
3. **Aligned Incentives** – Includes both positive incentives and negative consequences for meeting (or failing to meet) expectations for student achievement.

Benchmarking Ohio’s K-12 system against high-performing international systems resulted in seven recommendations:

1. Ensure readiness for college and the global economy by continuing to raise Ohio’s standards and improve assessments.
2. Empower principals to function as instructional leaders.
3. Align clear expectations for teachers with evaluation, professional development and consequences.
4. Motivate and holistically support students to meet high expectations by addressing their unique needs.
5. Ensure that funding is fairly allocated and linked to accountability.
6. Increase effectiveness of school and district ratings and interventions.
7. Provide all students with access to high-quality, publicly funded school options.

The full report, Creating a World-Class Education System in Ohio, provides detailed strategies and policies to achieve all seven implications and is available online at: www.achieve.org/files/World_Class_Edu_Ohio_FINAL.pdf.
Endnotes


2 Ibid, iv and 6.


8 Massachusetts General Laws Title XII. Education, Chapter 69, 1D.

9 Jacobson, 13.

10 Jacobson, 13.


12 Ibid, 4-6.
Presented in this section are strategies, policies, information and other resources to help start or continue the process of international benchmarking in schools, districts and states. These tools are grouped by level — School and District or State — under the following headings:

- International Standards – Examples
- Practice Assessments for Comparison Purposes
- Standards Comparison and Alignment Methods
- Miscellaneous
- Additional Resources and Endnotes.

There is some overlap with the information in the School and District Level and the State Level, as well as unique items for each of these levels.

Links to resources are provided whenever possible and will be located either in the bulleted item itself or in the Additional Resources and Endnotes at the end of each section.

Any section of this toolkit can be considered an entry point to international benchmarking. Each section of the toolkit is important and offers assistance in reaching the ultimate goal.

**School and District Level**

**International Standards – Examples**

- Participate in PISA (Programme for International Student Assessment), when possible. These global assessments are unique because they measure student progress compared to international standards and student’s competitiveness in the global workforce, in which all students now compete.
  - PISA is a global assessment administered every three years to 15-year-olds in approximately 60 OECD (Organization for Economic Co-Operation and Development) countries, including the United States, which covers roughly 90% of the world economy. (62 countries have already signed up for the 2009 administration).
  - Representative samples of between 3,500 and 50,000 students are drawn in each country.
  - The test covers reading, mathematics or science each year it is given. In 2009, reading will be assessed.
  - PISA assesses how well students, near the end of compulsory education, have acquired some of the knowledge and skills essential for meeting the challenges of today’s knowledge societies.
  - The assessment focuses on young people’s ability to use their knowledge and skills to meet real-life challenges, rather than on simply mastering a specific school curriculum. PISA test items are organized in groups, based on a real-life situation. PISA documents not only student performance results, but also includes information about students’ attitudes on learning and their learning behavior, along with contextual data from students, parents, schools and systems to identify policy levers.
  - For more information about PISA, visit the Web site at [www.pisa.oecd.org](http://www.pisa.oecd.org).
- Sign up to participate in TIMSS (Trends in Mathematics and Science Study) assessments, which are given every four years, with the next round of testing to occur in 2011.
  - The schools asked to participate in TIMSS are randomly drawn, based on certain characteristics. If school administrators are interested in participating in upcoming TIMSS assessments, it would be best for the school district as a whole to volunteer to participate. The administration of TIMSS requires a large number of students take the test to ensure stable estimates and reliable data.
• Districts interested in learning more about participation in TIMSS can direct questions to the TIMSS & PIRLS (Progress in International Reading Literacy Study) Student Center at Boston College (617.552.1600). This is the international coordinating center for TIMSS. This center also coordinates the participation of U.S. states and school districts in TIMSS.
• For more information about TIMMS, visit the Web site at http://nces.ed.gov/timss.

♦ Teach the seven “survival skills” required in a 21st century global workforce. Included in those are:
1. Critical thinking and problem solving
2. Collaboration and leadership
3. Agility and adaptability
4. Initiative and entrepreneurialism
5. Effective oral and written communication
6. Accessing and analyzing information
7. Curiosity and imagination.

♦ Review the findings from the OECD project, The Definition and Selection of Key Competencies (DeSeCo). This project identified competencies that are demanded of individuals in the highly interconnected and competitive world in which we live. The resulting competencies are grouped into three categories: 1) Using Tools Interactively, 2) Interacting in Heterogeneous Groups and 3) Acting Autonomously. This framework of competencies is helping the OECD with its long-term plans to assess these competencies in young people though assessments such as the PISA.

Practice Assessments for Comparison Purposes

♦ Use online practice tests to see how students compare to international standards.
♦ TIMSS Challenge in Math and Science: www.edinformatics.com/timss/timss_intro.htm. These online assessments provide sample TIMSS assessments in math and science, for grades 3, 4, 7, 8 and 12.
♦ Use Dare to Compare: http://nces.ed.gov/timss, or http://nces.ed.gov/nceskids/eyk/ (direct link to test). These online assessments have been created using TIMSS, National Assessment of Educational Progress (NAEP) and CivEd questions. Sample assessments can be found in the following subject areas and grades:
  • Math – grades 4, 8 and 12
  • Science – grades 4 and 8
  • Civics – grades 4, 8 and 9
  • Geography – grades 4, 8 and 12
  • Economics – grade 12
  • History – grades 4, 8 and 12.

Standards Comparison and Alignment Methods

♦ Compare state standards to international standards and identify gaps. One possible process to use is outlined below:
  • Identify educators with depth of knowledge in the standards area to be compared. These educators look at both sets of standards side by side to identify similarities and differences; determine if similar standards address the same content; and look at the verbs that describe how the content is to be understood by the student to determine the depth of knowledge required (think of Bloom’s Taxonomy). Is the content the student is being asked to know at the “knowledge” level, or is it at a higher level, such as comprehension, application, analysis, synthesis or evaluation?) For information on Bloom’s Taxonomy, visit the Web site at: www.officeport.com/edu/blooms.htm.
  • At the end of the comparison, ask and answer: 1) Is there a gap in content (present in one set of standards and missing from the other) and 2) when the standards look like they match, do they really match at a greater depth of knowledge (Bloom’s Taxonomy)? Districts and state departments of education usually have identified processes for aligning standards and can serve as a resource for local schools.
Review the work of Norman Webb, Wisconsin Center for Education Research (WCER), as a resource for alignment processes and models. He has developed models for aligning standards and assessments and his models have been used in more than 10 states. ([www.wcer.wisc.edu](http://www.wcer.wisc.edu), 608.263.4200)

Review the work from Surveys of Enacted Curriculum (SEC) as another alignment methodology. A methodology was developed by Andrew Porter, Vanderbilt University and John Smithson from WCER. ([www.wcer.wisc.edu](http://www.wcer.wisc.edu), 608.263.4200)

Review the work of Achieve, Inc. This organization developed an alignment model in which a panel of content experts judge the degree of alignment between assessment items and standards using five criteria (Jean Slattery, Director of Benchmarking Initiative, [www.achieve.org](http://www.achieve.org), 202.419.1540):

1. Content centrality
2. Performance centrality
3. Challenge
4. Balance
5. Range.

Align K-12 and postsecondary standards to international standards in gap areas. This may result in developing new standards, amending existing standards or augmenting existing standards at the local level.

Miscellaneous

Develop a communications strategy in collaboration with the business sector, to inform parents, students, school staff and/or local school boards of the need to focus on international benchmarking.

State Level

International Standards – Examples

Participate in PISA (Programme for International Student Assessment) and/or TIMSS (Trends in International Mathematics and Science Study) assessments with students, when possible. These global assessments are unique because they measure student progress compared to international standards and student’s competitiveness or lack thereof in the global workforce, in which all students now compete. (Refer to the School and District Level of Section I - International Standards for more detailed information about PISA and TIMSS assessments).

Review the findings from the OECD’s project *The Definition and Selection of Key Competencies* (DeSeCo). This project identified competencies that are demanded of individuals in the highly interconnected and competitive world in which we live. The resulting competencies are grouped into three categories: 1) Using Tools Interactively, 2) Interacting in Heterogeneous Groups and 3) Acting Autonomously. This framework of competencies is helping the OECD with its long-term plans to assess these competencies in young people through assessments such as the PISA.
Practice Assessments for Comparison Purposes

- Provide incentives and/or other support for schools and districts that choose to use online practice tests to see how students compare to international standards.
- **TIMSS Challenge in Math and Science:** www.edinformatics.com/timss/timss_intro.htm. These online assessments provide sample TIMSS assessments in math and science, for grades 3, 4, 7, 8 and 12.
- Use Dare to Compare: http://nces.ed.gov/timss, or http://nces.ed.gov/nceskids/eyk/ (direct link to test). These online assessments have been created using TIMSS, NAEP and CivEd questions. Sample assessments can be found in the following subject areas and grades:
  - Math – grades 4, 8 and 12
  - Science – grades 4 and 8
  - Civics – grades 4, 8 and 9
  - Geography – grades 4, 8 and 12
  - Economics – grade 12
  - History – grades 4, 8 and 12.

Standards Comparison and Alignment Methods

- Fund a study to compare state standards to international standards. Identify gaps and then align K-12 and postsecondary standards to international standards. This may result in developing new standards, amending existing standards or augmenting existing standards at state level.
- Require a statewide alignment process to include K-12, postsecondary education, and workforce development standards and expectations.
- Create formative or summative assessments aligned to international standards and provide fiscal and/or other support for schools and districts to administer them.

Miscellaneous

- Develop a communications strategy, in collaboration with the business sector, to inform educators, parents, students, legislators, governors and other policymakers of the need for international benchmarking. Create and share sample information that can be useful to different audiences.

**ADDITIONAL RESOURCES**


**Endnotes**

Presented in this section are strategies, policies, information and other resources to help start or continue the process of international benchmarking in schools, districts and states. These tools are grouped by level — School and District or State — under the following headings:

- High Rigor Coursework Benchmarked to International Standards
- Professional or Teacher Learning Communities (PLCs, TLCs)
- Teacher and Administrator Mentoring and Coaching
- Teaching Standards and Preparation
- Miscellaneous
- Additional Resources and Endnotes.

There is some overlap with the information in the School and District Level and the State Level, as well as unique items for each of these levels.

Links to resources are provided whenever possible and will be located either in the bulleted item itself or in the Additional Resources and Endnotes at the end of each section.

Any section of this toolkit can be considered an entry point to international benchmarking. Each section of the toolkit is important and offers assistance in reaching the ultimate goal.

School and District Level

Increasing Coursework Benchmarked to International Standards

- Increase the availability of Advanced Placement® (AP) courses, International Baccalaureate® (IB) courses, Cambridge AICE (British A-Level) Examinations and/or other dual credit courses that are aligned to international standards.
- Identify and use existing courses already benchmarked to international standards. These may be offered on-site, off-site or through distance delivery by local school districts, state departments of education, state and local colleges, universities, private nonprofit and for-profit educational agencies, and state and national professional education organizations. These organizations often are willing to enter into agreements to share high-rigor courses that have already been created.
- In schools or districts where textbook adoption occurs at the local level, create policies for adopting only those materials that are aligned to international standards and have been evaluated and validated by an external source.
- Create and provide after-school and youth programs that are aligned to international standards and 21st century skills. These skills include: thinking critically and making judgments; solving complex multidisciplinary, open-ended problems; creativity and entrepreneurial thinking; communicating and collaborating; making innovative use of knowledge; and taking charge of financial, health and civic responsibilities.¹

Professional or Teacher Learning Communities (PLCs, TLCs)

- Ensure adequate non-instructional time for teacher collaborative and other professional learning.
- Establish learning communities for professional development, instructional improvement, group problem solving and collaboration at local level that are related to international standards and the benchmarking process — Professional Learning Communities (PLCs) or Teacher Learning Communities (TLCs).
Review the work of Dr. Dylan Wiliam, Director of the Institute of Education London. According to Dr. Wiliam, Teacher Learning Communities (TLCs) work best when they adhere to the following key principles:2

- **Gradualism**: Gradually identify and address changes over time (two or three at a time) and as these are mastered, add changes.
- **Flexibility**: Teachers should feel free to modify new techniques, so they work in their classrooms — they often improve them!
- **Choice**: Teachers select what they will change, but within a framework of accountability. They are accountable for changing something.
- **Accountability**: Teachers need to be held accountable for making changes by their colleagues at monthly TLC meetings. At each meeting, each teacher describes what he/she worked on and how well it worked.
- **Support**: There needs to be training for those who lead the TLCs. This leader doesn’t “make” others change, but creates situations in which teachers can change. The TLC leaders must understand their roles. Teachers also need to conduct peer observations of each other. Professional collaboration and improvement, absent supervisory repercussions, will result.
- **Balanced Assessment**: TLCs that focus on the use of minute-to-minute and day-to-day assessment (formative classroom assessments) to adjust teaching to meet student needs, result in greater student achievement. Teachers need to have reliable formative assessments (minute-to-minute and day-to-day classroom assessments) that help teachers to keep learning on track.
- **TLCs are structured meetings with clear agendas that require accountability and engagement of all participants. Dr. Dylan Wiliam has posted information about TLCs and other topics on his Web site, www.DylanWiliam.net.**

Review the work of the Center for Teaching Quality, *From Isolation to Collaboration: Promoting Teacher Leadership Through PLCs* (see Additional Resources). This document contains updated research and information about PLCs.

**Teacher and Administrator Mentoring and Coaching**

- Create and/or participate in school, district or state-based teacher mentoring, and principal and teacher leadership opportunities. Mentoring, coaching and leadership training will lead to higher retention, more effective teachers and administrators, and increased student achievement in the classroom. (See Additional Resources at the end of this section.)
- Ensure that leaders are truly instructional leaders and receive training, support and coaching to perform that role.

**Miscellaneous**

- School leaders periodically should review personnel policies and practices relating to recruitment, selection, evaluation and promotion of personnel based on teachers’ capacity to teach to international standards.
- Adopt teacher (and administrator) placement policies that ensure the most skilled professionals work where they are most needed.
State Level

Increasing Coursework Benchmarked to International Standards

- Increase the availability of Advanced Placement® (AP) courses, International Baccalaureate® (IB) courses, Cambridge AICE (British A-Level) Examinations and/or other dual credit courses by establishing a funding source or seeking grant funds for expanding districts’ dual credit programs aligned to international standards.

- Introduce a STEM (Science, Technology, Engineering and Mathematics) initiative that includes alignment of STEM standards to international standards, through a state-funded alignment study.

- Identify and provide courses already benchmarked to international standards. These may be offered on-site, off-site or through distance delivery by local school districts, other state Departments of Education, state and local colleges and universities, private nonprofit and for-profit educational agencies, and state and national professional education organizations. These organizations often are willing to enter into agreements to share high-rigor courses that already have been created.

- In states with statewide textbook adoption, create policies for adopting only those materials that are aligned to international standards and have been evaluated and validated by an external source. Where adoption is local, encourage or provide incentives that support this.

- Create and/or fund after-school and youth programs that are aligned to international standards and 21st century skills. These skills include: thinking critically and making judgments; solving complex multidisciplinary, open-ended problems; creativity and entrepreneurial thinking; communicating and collaborating; making innovative use of knowledge; and taking charge of financial, health and civic responsibilities.3

Teacher and Administrator Mentoring and Coaching

- Create and/or promote school, district or state-based teacher mentoring, and principal and teacher leadership opportunities. Mentoring, coaching and leadership training can lead to higher retention, more effective teachers and administrators, and increased student achievement in the classroom. (See Additional Resources at the end of this section.)

Teaching Standards and Preparation

- Articulate a framework for the teaching profession that is clear, compelling and performance-based.

- Revise requirements for teacher preparation programs and licensure and certification to promote competencies aligned to international standards.

- Establish criteria for excellence and effectiveness of quality teacher-preparation programs in the state.

- Adopt teacher and administrator placement policies that ensure the most skilled professionals work where they are most needed.

- Provide support and incentives for benchmarking state teacher preparation program standards to international teacher preparation standards.

- Review the report, How the World’s Best-Performing School Systems Come out on Top. An examination of 25 world school systems found that the top 10 high-performing school systems had the following commonalities:
  - “The experiences of these top school systems suggest that three things matter most: 1) getting the right people to become teachers, 2) developing them into effective instructors and 3) ensuring that the system is able to deliver the best possible instruction for every child.”4
  - These three commonalities were found to be successful in each of the high-performing school systems, “irrespective of the culture in which they are applied.”5
Advanced Placement® (AP) http://www.collegeboard.com/student/testing/ap/about.html
International Baccalaureate® (IB) http://www.ibo.org
Dr. Dylan Wiliam has also posted information about TLCs and other topics on his Web site, http://www.DylanWiliam.net. Once on this site, his presentations can be viewed by clicking on the “Presentations” link.
Mentoring/coaching resources:

Endnotes

2 King’s Assessment for Learning Group Web site, including work by Dr. Dylan Wiliam, http://www.kcl.ac.uk/schools/sspp/education/research/groups/assess.html (accessed Oct. 2008).
3 Partnership for 21st Century Skills, 10.
5 Ibid, 1 (in executive summary).
Presented in this section are strategies, policies, information and other resources to help start or continue the process of international benchmarking in schools, districts and states. These tools are grouped by level — School and District or State — under the following headings:

- Ensuring Professional Development Meets Standards
- Professional Development Planning and Delivery
- Professional Development Content
- Miscellaneous
- Additional Resources and Endnotes.

There is some overlap with the information in the School and District Level and the State Level, as well as unique items for each of these levels.

Links to resources are provided whenever possible and will be located either in the bulleted item itself or in the Additional Resources and Endnotes at the end of each section.

Any section of this toolkit can be considered an entry point to international benchmarking. Each section of the toolkit is important and offers assistance in reaching the ultimate goal.

**School and District Level**

**Ensuring Professional Development Meets Standards**

- Assess whether school- and district-level professional development includes a focus on standards, international standards, alignment of standards to instruction and assessment, use of formative assessments, differentiated instruction and targeting individual student needs, including the use of self-assessments, supervisor assessments/evaluations and school- or district-level assessments.

**Professional Development Planning and Delivery**

- Make benchmarking to international standards a professional development priority.
- Create individualized professional development plans for every teacher and administrator that are updated at least annually, supported by student achievement data and aligned to international standards.
- Utilize the professional development standards by the National Staff Development Council when planning professional development (see Additional Resources).
- Access existing professional development that fills the gaps identified in the individualized professional development plans and address alignment to international standards. These services can be offered by local schools, districts, state departments of education, private nonprofit or for-profit educational agencies, colleges and universities, and professional organizations (NEA, AFT, National Council for Teachers of Mathematics (NCTM), etc.).
- Develop and approve professional development plans for every school in the district and for the district as a whole that are updated at least annually, supported by student achievement data and aligned to international standards.
- Create a coordinated system of inservice strategies and practices that establish and enhance teachers’ ability to assist students to perform successfully when compared to international standards.
- Design and provide professional development to “re-tool” existing educators in content and instructional delivery, especially in gap areas.
- Establish school-based, quality professional learning communities (PLCs) by providing dedicated time and structures to promote adult growth directly linked to student learning (refer to PLC/TLC ideas and resources in Section II – Teaching Quality, School and District Level).
Establish a system that uses formative assessments of teacher knowledge and skills to better target professional development and support, professional advancement and sustained employment.

Establish a public-private partnership to develop, pilot and implement a district-wide academy to enhance the knowledge, skills and leadership of school and district administrators to more successfully integrate international benchmarks.

Professional Development Content

- Develop and/or consistently participate in professional development on the use of classroom formative assessments aligned to international standards to assess student progress and inform instructional changes that will address individual student learning needs.

- Assess each teacher’s professional development needs. The professional development should include a focus on standards, international standards, alignment of standards to instruction and assessment, use of formative assessments, differentiated instruction, and targeting individual student’s needs, including the use of self-assessments, supervisor assessments/evaluations and school- or district-level assessments.

- Ensure that professional development on differentiated instruction is provided. Differentiated instruction is a teaching approach that recognizes there are individual differences in student learning and adjusts teaching strategies to meet each student’s differences. In other words, “one size doesn’t fit all.” Differentiated instruction cannot be taught in an afternoon or a week. The basics of differentiated instruction can be learned, but then must be applied and honed through daily instruction that has been adapted to meet individual student needs over time.

- Review the work of Carol Ann Tomlinson, a former elementary teacher, Teacher of the Year, and current education professor at the University of Virginia, who is considered a leading expert in the field of differentiated learning. Tomlinson describes differentiated learning as occurring when a teacher takes into account each students’ learning needs, paying attention to different learning interests and learning styles. She also believes that while taking into account the varying needs of each student, differentiated instruction also must be based on sound instructional practices. For more information on Tomlinson's work, see the Additional Resources at the end of this section.
Ensuring Professional Development Meets Standards

- Policymakers and education leaders should evaluate their current teacher professional development systems for alignment with international standards. It is essential for professional development policies to provide clear standards of expectations, mechanisms for feedback on performance and a means for improvement thereby raising the standards of the profession.

Professional Development Planning and Delivery

- Make benchmarking to international standards a statewide priority for professional development.
- Provide high-quality technical assistance to schools and districts based on statewide best practices.
- Coordinate existing professional development that fills the gaps identified in the individualized professional development plans and that addresses alignment to international standards that may be offered by local schools, districts, state departments of education, other state agencies, private nonprofit or for-profit educational agencies, colleges and universities, and professional organizations (NEA, AFT, National Council for Teachers of Mathematics (NCTM), National Staff Development Council, etc.).
- Design and provide professional development to “re-tool” existing educators in content and instructional delivery, especially in gap areas.
- Use the professional development standards by the National Staff Development Council when planning and delivering professional development (see Additional Resources).
- Establish a public-private partnership to develop, pilot and implement a statewide academy to enhance the knowledge, skills and leadership of school and district administrators to more successfully integrate international benchmarks.

Professional Development Content

- Design, provide and require professional development for educators to ensure they understand how to align standards, instruction and assessments to international standards.
- Engage in a statewide STEM (Science, Technology, Engineering and Mathematics) initiative to strengthen instruction in these core areas and raise academic achievement, so that all would be aligned to international standards.
- Develop and/or provide professional development for teachers to learn how to use academic content aligned to international standards to teach the seven “survival skills” required in a global workforce which include:1
  - Critical thinking and problem solving
  - Collaboration and leadership
  - Agility and adaptability
  - Initiative and entrepreneurialism
  - Effective oral and written communication
  - Accessing and analyzing information
  - Curiosity and imagination.
- Develop and/or provide professional development for teachers and administrators on differentiated instruction. Differentiated instruction is a teaching approach that recognizes there are individual differences in student learning and adjusts teaching strategies to meet each student’s differences. In other words, “one size doesn’t fit all.” Differentiated instruction cannot be taught in an afternoon, or a week. The basics of differentiated instruction can be learned, but must then be applied and honed through daily instruction that has been adapted to meet individual student needs over time.
Support the dissemination of resources, such as the work of Carol Ann Tomlinson, a former elementary teacher, Teacher of the Year, and current education professor at the University of Virginia, who is considered a leading expert in the field of differentiated learning. Professor Tomlinson describes differentiated learning as occurring when a teacher takes into account each students’ learning needs, paying attention to different learning interests and learning styles. She also believes that while taking into account the varying needs of each student, differentiated instruction also must be based on sound instructional practices. For more information on Carol Tomlinson’s work, see the Additional Resources at the end of this section.

Miscellaneous

- Ensure district and school standards are aligned to international standards.
- Ensure that licensed teachers are competent enough in their academic subject areas to handle world-class-level content expectations, and that they demonstrate the knowledge and skills necessary to teach to international standards.
- Use formative assessments, differentiate instruction and target individual student’s needs.
- Ensure elementary teachers are thoroughly prepared enough in math, science and English to successfully handle the deeper concepts that are required internationally.
- Create a coordinated system of preservice and inservice strategies and practices that establishes and enhances teachers’ ability to assist students to perform successfully at a world-class level.

Additional Resources

- Dr. Dylan Wiliam has posted information about TLCs and other topics on his Web site, [www.DylanWiliam.net](http://www.DylanWiliam.net). Once on this site, his presentations can be viewed by clicking on the “Presentations” link.

Endnotes

Presented in this section are strategies, policies, information and other resources to help start or continue the process of international benchmarking in schools, districts and states. These tools are grouped by level — School and District or State — under the following headings:

- TIMSS/PISA – International Assessments
- International Practice Assessments
- Formative, Interim and Summative Assessments
- Additional Resources and Endnotes.

There is some overlap with the information in the School and District Level and the State Level, as well as unique items for each of these levels.

Links to resources are provided whenever possible and will be located either in the bulleted item itself or in the Additional Resources and Endnotes at the end of each section.

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**School and District Level**

**TIMSS/PISA – International Assessments**

- Sign up to participate in PISA (Programme for International Student Assessment). PISA is a global assessment administered every three years to 15-year-olds in approximately 60 OECD (Organization for Economic Co-Operation and Development) countries, including the United States. These countries make up roughly 90% of the world economy. (Sixty-two countries already have signed up for the 2009 administration.) Features include:
  - Representative samples of between 3,500 and 50,000 students are drawn in each country.
  - The test covers reading, mathematics or science each year it is given.
  - PISA assesses how well students, near the end of compulsory education, have acquired the knowledge and skills essential for meeting the challenges of today's knowledge societies.
  - The assessment focuses on young people's ability to use their knowledge and skills to meet real-life challenges, rather than on simply mastering a specific school curriculum. PISA test items are organized in groups, based on a real-life situation. PISA results document not only academic performance, but also provide information about student's attitudes about learning and their learning behavior, along with contextual data from students, parents, schools and systems.
  - For more information about PISA, visit their Web site at: [www.pisa.oecd.org](http://www.pisa.oecd.org).

- Participate in TIMSS (Trends in International Mathematics and Science Study) assessments. TIMSS is given every four years, with the next round of testing to occur in 2011.
  - Schools that are asked to participate in TIMSS are randomly drawn, based on certain characteristics. If school administrators are interested in participating in upcoming TIMSS assessments, it would be best for the school district as a whole to volunteer to participate. The administration of TIMSS requires a large number of students to take the test to ensure stable estimates and reliable data.
  - TIMSS is not designed to provide data at the individual school level.
  - If districts are interested in learning more about participation in TIMSS, questions should be directed to the TIMSS & PIRLS (Progress in International Reading Literacy Study) Student Center at Boston College (617.552.1600). This is the international coordinating center for TIMSS and also coordinates the participation of U.S. states and school districts in TIMSS.
  - For more information about TIMSS, visit their Web site at: [http://nces.ed.gov/timss](http://nces.ed.gov/timss).
International Practice Assessments

- Use online, internationally-benchmarked practice tests to see how students compare to international standards.
- TIMSS Challenge in Math and Science: www.edinformatics.com/timss/timss_intro.htm. These online assessments provide sample TIMSS assessments in math and science, for grades 3, 4, 7, 8 and 12.
- Use Dare to Compare: http://nces.ed.gov/timss, or http://nces.ed.gov/nceskids/eyk/ (direct link to test). These online assessments have been created using TIMSS, NAEP and CivEd questions. Sample assessments can be found in the following subject areas and grades:
  - Math – grades 4, 8 and 12
  - Science – grades 4 and 8
  - Civics – grades 4, 8 and 9
  - Geography – grades 4, 8 and 12
  - Economics – grade 12
  - History – grades 4, 8 and 12.

Formative, Interim and Summative Assessments

- Redesign and align school and/or district formative and interim assessments to international standards in reading, math and science.
- Create and provide formative assessments for use in the classroom that are aligned to international standards to assess student progress and inform instructional changes that will address individual student needs.
- Ensure all students in public schools have an equal opportunity to demonstrate grade-level international proficiency through the application of knowledge and skills in the core academic areas.
- Align assessments with international standards to measure students’ mastery of core content or basic skills and knowledge and align with skills necessary for success in the 21st century, such as: evaluating and analyzing information; thinking creatively; problem-solving; applying information to real-life situations; effective communication; and collaboration and teamwork. The Education Sector released a report, Measuring Skills for the 21st Century, that focuses on “… the need for better tests that measure more of the skills students need to succeed today,” and not more tests to measure advanced skills.1
- Develop assessments and supporting instructional materials that interpret the findings from international assessments in ways that are useful for teachers.
- Use TIMSS practice tests or other practice assessments to compare existing student knowledge and skills with those of high-performing countries.
- Incorporate PISA and TIMSS assessments into accountability systems.
- Establish a program and funding source for the district to administer international assessments to students in the district. This would allow a comparison of the performance of their students to students of the same grade level in other countries.
- Use the work of other states related to high-quality assessments, such as the National Assessment of Educational Progress (NAEP). One such body of work comes from Alaska and is titled, NAEP Assessment Toolbox for Teachers: Easy-to-Use Classroom Activities Using Questions and Data from the National Assessment of Educational Progress. This publication gives examples of how classroom teachers can use released NAEP questions in the following ways:2
  - Improve students' abilities for self-assessment
  - Teach reasoning skills and strategies
  - Analyze mathematical misconceptions
  - Teach test-taking strategies and use state performance data and NAEP questions to focus instruction
  - Use as a springboard for classroom activities.
Adapt the tools and strategies found in this “Toolbox.” Both the TIMSS and the PISA periodically release test items from past assessments and these can be found on their respective Web sites. These international test items can be compared to state standards and assessments (see Additional Resources).

State Level

TIMSS/PISA – International Assessments

- Participate at the state level in PISA and/or TIMSS assessments, or support district participation.
- Incorporate PISA and TIMSS standards into state accountability and assessment systems.
- Establish a program and funding source for the state or districts to administer international assessments to students (allowing the chief state school officer to compare the performance of their state’s students to students of the same grade level in other countries).

International Practice Assessments

- Encourage schools and districts to use online practice tests to see how students compare to international standards.
- TIMSS Challenge in Math and Science: www.edinformatics.com/timss/timss_intro.htm. These online assessments provide sample TIMSS assessments in math and science, for grades 3, 4, 7, 8 and 12.
- Use Dare to Compare: http://nces.ed.gov/timss, or http://nces.ed.gov/nceskids/eyk/ (direct link to test). These online assessments have been created using TIMSS, NAEP and CivEd questions. Sample assessments can be found in the following subject areas and grades:
  - Math – grades 4, 8 and 12
  - Science – grades 4 and 8
  - Civics – grades 4, 8 and 9
  - Geography – grades 4, 8 and 12
  - Economics – grade 12
  - History – grades 4, 8 and 12.
Formative, Interim and Summative Assessments

- Create and provide formative assessments for use in the classroom that are aligned to international standards to assess student progress and inform instructional changes that will address individual student needs.
- Align state assessments to international standards in reading, math and science.
- Align formative, interim or model assessments to international standards in reading, math and science.
- Redesign or adjust assessments in math, reading and science for all grades and align with international assessments.
- Align state assessments and student accountability with international standards.
- Ensure all students in public schools have an equal opportunity to demonstrate grade-level international proficiency through the application of knowledge and skills in the core academic areas.
- Align assessments with international standards to measure a student’s mastery of core content or basic skills and knowledge and with skills necessary for success in the 21st century, such as: evaluating and analyzing information; thinking creatively; problem-solving; applying information to real-life situations; effective communication; and collaboration and teamwork. The Education Sector released a report, *Measuring Skills for the 21st Century*, that focuses on “… the need for better tests that measure more of the skills students’ need to succeed today,” and not more tests to measure advanced skills.¹
- Adopt statewide assessments aligned to international standards, appropriate for all students, including students with special needs and make adjustments according to assessment results.
- Develop assessments and supporting instructional materials that interpret the findings from international assessments in ways that are useful for teachers.
- Compare existing student knowledge and skills with those of high-performing countries (TIMSS practice tests, or other practice assessments).
- Identify international competency frameworks and assess samples of students’ work.
- Review the work of other states related to high quality assessments, such as the National Assessment of Educational Progress (NAEP). One resource comes from Alaska and is titled, *NAEP Assessment Toolbox for Teachers: Easy-to-Use Classroom Activities Using Questions and Data from the National Assessment of Educational Progress*.² This publication gives examples of how classroom teachers can use released NAEP questions in the following ways:
  - Improve students’ abilities for self-assessment
  - Teach reasoning skills and strategies
  - Analyze mathematical misconceptions
  - Teach test-taking strategies and use state performance data and NAEP questions to focus instruction
  - Use as a springboard for classroom activities.
- Adapt the tools and strategies found in this “Toolbox” for international standards and assessments. Both the TIMSS and the PISA periodically release test items from past assessments and these can be found on their respective Web sites. These international test items can be compared to state standards and assessments (see Additional Resources).


### Endnotes
