

TIMSS & PIRLS International Study Center
TIMSS and PIRLS 2011 Data Release—11 December 2012
Video Release Presentation

Segment 1—Welcome to the TIMSS and PIRLS 2011 Data Release

DR. HANS WAGEMAKER, EXECUTIVE DIRECTOR, IEA
(INTERNATIONAL ASSOCIATION FOR THE EVALUATION OF EDUCATIONAL ACHIEVEMENT)

Welcome – thank you for joining us.

On behalf of IEA—the International Association for the Evaluation of Educational Achievement—I am pleased to announce the data release from the TIMSS and PIRLS 2011 assessments.

Reflecting IEA’s goal of learning from individual country’s educational systems in a worldwide community, TIMSS and PIRLS regularly provide participating countries with reliable high-quality data on students’ academic achievement in mathematics, science, and reading.

TIMSS—the Trends in International Mathematics and Science Study—and PIRLS—the Progress in International Reading Literacy Study—are conducted by the TIMSS & PIRLS International Study Center at Boston College, under the direction of Drs. Ina Mullis and Michael Martin. During their 18-year leadership, TIMSS and PIRLS data have become integral to educational policy making in a global context.

DR. MICHAEL O. MARTIN, EXECUTIVE DIRECTOR,
TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE

TIMSS and PIRLS are designed to measure trends over time in student achievement in mathematics, science, and reading. This enables countries to use the TIMSS and PIRLS data to monitor progress in their educational systems in an international context. The assessment results often stimulate policy discussion, and recommendations for improving achievement outcomes.

DR. INA V.S. MULLIS, EXECUTIVE DIRECTOR,
TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE

For example, countries use TIMSS and PIRLS data and procedures to inform curriculum development, as well as to inform teacher education initiatives, or the preparation of instructional materials.

In addition, many participating counties have developed research programs to analyze TIMSS and PIRLS data, and then disseminate the findings to teachers, parents, and policy makers.

DR. HANS WAGEMAKER

Ensuring that a nation’s children are well educated is challenging, and by focusing on students’ learning outcomes, TIMSS and PIRLS help countries make informed evidence-based decisions for educational policy.

As you reflect on the data as described in the following presentations, and in the TIMSS and PIRLS 2011 reports, I would like you to consider the potential impact of these data in your country’s educational context.

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Segment 2—TIMSS and PIRLS 2011 International Results

DR. HANS WAGEMAKER, EXECUTIVE DIRECTOR, IEA

IEA believes that effective evaluation of a country's educational system requires examining not only the inputs to education but also, more importantly, the outcomes of educational provision.

As IEA's core studies in mathematics, science, and reading, TIMSS and PIRLS are particularly salient for educational improvement. The assessments provide valuable information on student achievement at international benchmarks to assist policy-makers in identifying the relative strengths and weaknesses of their education systems.

DR. INA V.S. MULLIS, EXECUTIVE DIRECTOR, TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE

In 2011, TIMSS was administered to students in 63 countries and 14 benchmarking participants, and PIRLS was administered to students in 49 countries and 9 benchmarking participants. Overall, nearly 900,000 students were assessed in TIMSS and PIRLS 2011. The assessments also involved over 250,000 parents and 60,000 teachers from almost 30,000 schools worldwide.

DR. MICHAEL O. MARTIN, EXECUTIVE DIRECTOR, TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE

TIMSS and PIRLS are huge endeavors and all of those involved deserve tremendous credit. In particular, the teams of researchers in each of the participating countries should be congratulated on their excellent work.

NARRATOR

Both TIMSS and PIRLS report results on achievement scales of 0 to 1,000. There was a great range of performance in the 2011 assessments, with most countries' achievement typically falling between 300 and 700.

The TIMSS **fourth grade mathematics** assessment included 172 items measuring students' knowledge and understanding of number, geometric shapes and measure, and data display.

- At the fourth grade, in **mathematics** the top-performing countries were Singapore, Korea, and Hong Kong, followed by Chinese Taipei and Japan. These five East Asian countries had higher achievement than all of the remaining countries. Northern Ireland, the Flemish Community of Belgium, Finland, England, and the Russian Federation also performed very well.

The TIMSS **fourth grade science** assessment also included 172 items, covering content in life science, physical science, and earth science.

- Korea and Singapore were the top-performing countries in science at the fourth grade, followed by Finland, Japan, and the Russian Federation. Next came Chinese Taipei and the United States.

PIRLS assesses two purposes of **reading**—literary and informational— that account for most reading done by students in and out of school.

Performance on PIRLS represents the “gold standard” internationally for reading comprehension at the fourth grade. Students with high performance in PIRLS can read, comprehend, and interpret relatively complex information in stories and articles of around 800 words

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- In PIRLS 2011, at the fourth grade, in **reading**, the four top-performing countries were Hong Kong, the Russian Federation, Finland, and Singapore. Northern Ireland, the United States, Denmark, Croatia, and Chinese Taipei also had higher achievement than the majority of other participants.

The TIMSS 2011 **eighth grade mathematics** assessment had more than 200 items measuring students' understanding of number, algebra, geometry, and data and chance.

- At the eighth grade, East Asian countries continue to lead the world in **mathematics** achievement. Korea, Singapore, and Chinese Taipei had the highest achievement, followed by Hong Kong and Japan. There was a substantial gap in achievement between the five East Asian countries and the next highest performing countries, including the Russian Federation, Israel, Finland, the United States, and England. For example, the gap in average achievement between Korea and England is more than 100 points.

The TIMSS **science** assessment at the **eighth grade** comprised more than 200 items in biology, chemistry, physics, and earth science.

- Singapore had the highest achievement in science at the eighth grade, followed by Chinese Taipei, Korea, and Japan. Finland, Slovenia, the Russian Federation, Hong Kong, and England also performed well.

DR. INA V.S. MULLIS

Both TIMSS and PIRLS report achievement at four international benchmarks, or four points on the TIMSS and PIRLS scales: 625 marks the Advanced International Benchmark, 550 marks the High Benchmark, 475 marks the Intermediate Benchmark, and 400 marks the Low International Benchmark.

DR. MICHAEL O. MARTIN

To interpret the achievement results, TIMSS and PIRLS describe what performance at each of the four benchmarks means in terms of what students know and can do in mathematics, science, and reading.

For example, at the fourth grade in mathematics and science, students reaching the highest level—the Advanced International Benchmark—could apply understanding of relatively complex mathematical situations and scientific processes, and explain their reasoning.

NARRATOR

- In **mathematics**, at the **fourth grade**, students in the East Asian countries had the largest percentages of students reaching the TIMSS International Benchmarks, with gaps between these countries and all others at the Advanced and High levels. Singapore, for example, had 43 percent of their students reach the Advanced International Benchmark, followed by Korea, Hong Kong, Chinese Taipei, and Japan (with from 39 to 30%). The next highest country was Northern Ireland, with 24 percent reaching the advanced level. In addition, from 80 to 70 percent of students in these five countries also attained the High Benchmark.
- The results at the benchmarks in **science** at the **fourth grade** were similar to mathematics; the two countries with the highest average science achievement—Singapore and Korea—also were the countries with the largest percentages of students reaching the TIMSS Advanced International Benchmark (with 33 and 29%, respectively), followed by Finland with 20 percent,

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and then the Russian Federation, Chinese Taipei, the United States, and Japan, each with between 16 and 14 percent.

DR. INA V.S. MULLIS

In reading, students reaching the highest level—the PIRLS Advanced benchmark—were excellent readers for being only in the fourth grade. They could comprehend and integrate ideas and information across texts to provide reasons and explanations.

NARRATOR

- Among the top-performing countries in PIRLS, Singapore had the largest percentage of students reaching the Advanced Benchmark (24%), followed by the Russian Federation, Northern Ireland, Finland, England, and Hong Kong (with between 18 and 19%).

Impressively, the majority of the PIRLS 2011 countries were able to educate 95 percent of their fourth grade students to a basic level (that is, reach the PIRLS Low International Benchmark); six countries had essentially all of their fourth grade students reading at that level—led by the Netherlands with 100%, the Russian Federation, Finland, Hong Kong, Denmark, and Croatia.

DR. MICHAEL O. MARTIN

In TIMSS at the eighth grade, students reaching the Advanced Benchmark in mathematics could reason mathematically, draw conclusions, make generalizations, and solve linear equations. In science, they communicate an understanding of complex and abstract concepts.

NARRATOR

- To an even greater degree than at the fourth grade, in eighth grade **mathematics**, the same five East Asian countries had by far the largest percentages of students reaching the Advanced International Benchmark: Chinese Taipei, Singapore, and Korea led with nearly half, followed by Hong Kong with about one-third, and Japan with over one-fourth. The country with the next highest percentage of students achieving this level was the Russian Federation, with 14 percent.
- In **science**, Singapore by far had the largest percentage of students reaching the Advanced Benchmark, with 40 percent, followed by three other East Asian countries: Chinese Taipei, Korea, and Japan (with between 24 and 18%). The Russian Federation again was the country with the next highest percentage of students achieving this level, with 14 percent.

DR. INA V.S. MULLIS

Looking at both student achievement overall and the percentages of students reaching the highest benchmarks, the dominance of the East Asian countries truly is quite remarkable, especially in mathematics.

NARRATOR

Because Singapore was only the country a top performer in all five assessments, we have asked Ho Peng, Singapore's Director-General of Education to reflect on this remarkable achievement.

Ho Peng—Singapore has raised substantial numbers of students to impressively high levels of performance, what do you see as major contributors to Singapore's success?

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HO PENG, DIRECTOR-GENERAL OF EDUCATION, SINGAPORE

Well, we think that improvements are due to a few key factors. Notably, a strong and well-designed curriculum. We review the curriculum, on average, once every six years. And so, I think this is something that is important, because with every curriculum review, in fact, we provide professional learning for our teachers. The second factor is really about the teachers that we have in the system. By and large, I believe that our teachers are committed and, in fact, all of them have a hunger for professional learning. The third factor really would be about enlightened and progressive school leaders, who place an emphasis on instructional leadership within their own schools. And the last, but not least, factor would be supportive homes and parents.

NARRATOR

At the primary grades, countries have the goal of educating all students. However, raising all students to basic levels of literacy and numeracy is challenging. The Netherlands had 100 percent of their fourth graded students reaching the basic level in PIRLS reading and 99 percent in TIMSS mathematics and science.

Mr. Jos de Groen, Policy coordinator for reading and mathematics primary education in the Dutch Ministry of Education, Directorate Primary Education, reflects on his country's landmark accomplishment of ensuring that essentially all fourth grade students reach at least a basic level.

MR. JOS DE GROEN, DUTCH MINISTRY OF EDUCATION, DIRECTORATE PRIMARY EDUCATION

The educational ambition in the Netherlands is very high. And the government is striving to be in the top 5 of the world.

It's a huge investment. We are investing on that, I think, for at least 4 or 6 years already. I think it's been, well, hundreds of millions of Euros.

We are looking at a kind of risk calculation, that children from families in a disadvantaged position are getting more attention from nurseries, from early childhood institutions, and all that, to see how the development is going on.

Teachers put a lot of effort [in] to the pupils who are underachieving. And it's a kind of cultural thing that Dutch teachers are triggered by a few pupils who can't follow the program. In that case, we did a lot of special programs for disadvantaged pupils, like efficient organization of pre-teaching and after-teaching. Teachers have been trained to organize three or more levels of performance in groups. We try we put a lot of effort in early identification of disadvantaged pupils with help centers and nurseries, but also [with] the teachers at their primary education school themselves, because it often takes a few years to come to the same level as the other pupils.

And, we have a support program for disadvantaged pupils at preschool age already, which involves also a combination with parents to help them help their children, and all that.

NARRATOR

This concludes the presentation of the 2011 TIMSS and PIRLS achievement results. The other three presentations address trends in TIMSS and PIRLS achievement, the importance of an early start in education, and school factors for academic success.

Segment 3—TIMSS and PIRLS 2011: Trends in Student Achievement

DR. HANS WAGEMAKER, EXECUTIVE DIRECTOR, IEA

Through TIMSS and PIRLS, IEA provides countries with data about their long terms trends in educational achievement. This enables countries to make informed decisions about strategies for educational improvement.

TIMSS and PIRLS are designed to measure trends in achievement and to show growth or decline over time. TIMSS has assessed mathematics and science at the 4th and 8th grades every four years since 1995, and PIRLS has assessed reading at the 4th grade every five years since 2001. As a result, many countries and benchmarking participants have comparable data from previous assessments that allow them to monitor system-level trends in a global context.

**DR. INA V.S. MULLIS, EXECUTIVE DIRECTOR,
TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE**

At the fourth grade, looking at achievement trends over time, there have been more increases than decreases in overall mathematics, science, and reading achievement, and at the International Benchmarks. This is encouraging because a number of countries have been working hard to improve their educational achievement, by raising standards for teacher certification, for example, or by increasing the number of years of schooling.

In comparison, at the eighth grade there was more balance between achievement growth and decline, particularly in mathematics.

NARRATOR

In TIMSS at the **fourth grade**, 17 countries have data measuring trends in mathematics and science achievement over the 16-year period from 1995 to 2011.

- Since 1995, twelve of these countries have raised their levels of average **mathematics** achievement: Australia, England, Hong Kong, Iran, Japan, Korea, New Zealand, Norway, Portugal, Singapore, Slovenia, and the United States. Only three countries had decreases in mathematics since 1995.

Remarkably, nine countries have been able to improve at all four International Benchmarks since 1995, including Australia, England, Hong Kong, Iran, Japan, Korea, Portugal, Slovenia, and the United States.

- Since 1995, eight countries have raised their levels of **science** achievement: Hong Kong, Hungary, Iran, Japan, Korea, Portugal, Singapore, and Slovenia. Just one country showed a decrease in science achievement.

Six countries improved at all four International Benchmarks during this same period: Hong Kong, Iran, Korea, Portugal, Singapore, and Slovenia.

- Over the 10 years of PIRLS assessments, 21 countries have comparable data measuring trends in **reading** achievement. From 2001 to 2011, ten counties raised their reading achievement: Colombia, the Czech Republic, Hong Kong, Iran, Norway, the Russian Federation, Singapore, the Slovak Republic, Slovenia, and the United States. Only four countries showed declines over the past decade.

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In reading, there were also more improvements across the International Benchmarks than declines. Six countries showed increases at all four benchmarks: Hong Kong, Iran, the Russian Federation, Singapore, Slovenia, and the United States.

At the **eighth grade** in TIMSS, 25 countries have trend data spanning from 1995 or 1999 to 2011.

- Of these 25 countries, nine had increases in **mathematics** achievement: Chile, Chinese Taipei, Hong Kong, Italy, Korea, Lithuania, the Russian Federation, Slovenia and the United States. During this same period, however, eleven countries had decreases in mathematics achievement at the eighth grade.

In addition, just three countries improved at all four International Benchmarks: Korea, Lithuania, and the United States.

- In **science**, eleven countries had increases from 1995 or 1999 to 2011: Chile, Hong Kong, Iran, Japan, Korea, Lithuania, the Russian Federation, Singapore, Slovenia, Tunisia, and the United States. Six countries had decreases in achievement during this period.

Similar to mathematics at the eighth grade, just three countries improved at all four International Benchmarks since 1995: Korea, Lithuania, and Slovenia.

**DR. MICHAEL O. MARTIN, EXECUTIVE DIRECTOR,
TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE**

It is very impressive that so many countries have been able to improve student performance since 1995.

It is all the more impressive that some countries have managed to raise achievement at all four International benchmarks, for the lowest- as well as the highest-performing students

NARRATOR

Hong Kong is a country that has shown net gains in student achievement in mathematics and science in both grades since 1995, while also dramatically increasing reading achievement since 2001. Professor Frederick Leung of Hong Kong University reflected on the educational policies and practices in Hong Kong for increasing mathematics, science, and literacy excellence.

DR. FREDERICK LEUNG, UNIVERSITY OF HONG KONG

The ministry in Hong Kong, of course, they are very happy with the results, and they always point to the significant curriculum changes in the past decade or so, as an explanation of this good test score. For example, in language education we have a major revamp of the curriculum in the past decade or so; the teaching approach is quite different from what it used to be. I think it turns learner's attention more to really language and to the literature appreciation.

Also in science, there is, I think about two decades or around that time ago, there is also change in the whole approach in studying science. The curriculum change is such that there [are] more experiments for example, and [it is] more investigative. There are also some changes in math, but not as significant changes as language and science curricula.

But, actually, what I wanted to say is that I think this picture is actually more complicated than that. For example, cultural values in Hong Kong, I think it plays a very strong role in terms of encouraging

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students to achieve. So that may be another factor. So I think we have to be more comprehensive when we try to locate factors in explanation of student achievement, and not just simplistically point to one thing, for example curriculum change, as the only cause for student achievement.

NARRATOR

Similar to Hong Kong, the Russian Federation also has been able to raise student performance over the past decade—in reading, mathematics, and science. Here now to discuss educational policies and practices for increasing excellence in Russian education is Galina Kovaleva, Head of Department for General Education Quality Assessment at the Institute of Content and Teaching Methods, Russian Academy of Education.

**DR. GALNINA KOVALEVA, INSTITUTE OF CONTENT AND TEACHING METHODS,
RUSSIAN ACADEMY OF EDUCATION**

The Russian results may be explained by the very similar factors which take place in other countries. They include, state support on education, more resources, more contribution, and more expenses. Then, special national projects directed on the realization of the system. Structural resources, teacher training, special projects on gifted children, special projects on supporting good practices, best schools, and supporting the weak schools. Then, more autonomy to the schools in making decisions in the area of instruction and using resources. Then, introduction of new educational standards, orientated on the new results in subject, metacognitive, and personal area[s]. Then, transformation of the primary school system to four-year schooling; so, one year was added. Then, more intensive preparation in primary/pre-primary education, more support or effort from the parents, and more introduction of reading literary assessment in primary school, related to PIRLS' good model.

In Grade 8, introduction of the new curriculum with the new standards—a new interdisciplinary program on reading and working with the information.

Introduction of external national examination in Grades 11 and 9, with compulsory mathematics orientated on algebra, and new topics in the national curriculum for mathematics, probability, and statistics.

In the end, I'd like to emphasize that the children that participated in TIMSS 2011 in Grade 8 were the children that had, in 2006, very high results in reading—so, children that were more prepared to successfully study in the secondary school.

NARRATOR

The United States is one of the few countries to have raised both mathematics and reading achievement across all four international benchmarks. Here to consider the nation's progress in improving its students' performance in these critical subjects is Jack Buckley, Commissioner of the National Center for Education Statistics in the United States Department of Education.

**DR. JACK BUCKLEY, COMMISSIONER, NATIONAL CENTR FOR EDUCATIONAL STATISTICS,
UNITED STATES DEPARTMENT OF EDUCATION**

In fourth grade reading, in PIRLS the US average score rose 16 points between 2006 and 2011—from 540 to 556. That's well over a tenth of a standard deviation over a five-year period. And, if we look at the International Benchmarks in 2006, the US had 47% of our fourth graders reaching the High benchmark and 12% at Advanced; while in 2011, we had 56% of fourth graders—more than half—reaching the High benchmark and 17% at Advanced. Among the nations that participated, only Singapore had a statistically higher percentage of Advanced fourth graders reading in 2011. We think

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our PIRLS results reflect some real improvement in elementary reading, although there is clearly still plenty of room to grow.

In mathematics and science, TIMSS shows us only one measureable increase in average scores across either subject or grade since the last assessment. Again at Grade 4, where average math scores went from 529 in 2007 to 541 in 2011—an increase of 12 points. Again, this is about a tenth of a standard deviation gain over a four-year period. This roughly parallels a trajectory that we have observed for Grade 4 mathematics on our own National Assessment of Educational Progress, although the relative magnitude of the growth is greater on TIMSS. In terms of International Benchmarks, the US had 40% of fourth graders reaching the High benchmark and 10% the Advanced in Grade 4 math in 2007; while in 2011, these grew to 47% at the High benchmark and 13% reaching the Advanced.

However, we did not see measurable gains in science at fourth or eighth grade or in mathematics at eighth grade. The US average did remain above TIMSS scale average in both subjects and at both grade levels though.

I also would like to note, the United States had number of our individual states participating independently in PIRLS and TIMSS. I won't go into their results in detail here, but PIRLS and TIMSS confirm something that we know from our own national assessment—that there is considerable variation in performance among our states. But the PIRLS and TIMSS report show us this in an international context, and we are able to see some of the US states rank among the top education systems in the world, while some clearly do not. This sort of international benchmarking is of great interest to our policy makers and the public, and we appreciate the opportunity PIRLS and TIMSS are giving US states to make these kinds of comparisons.

NARRATOR

This concludes the presentation of the trends in TIMSS and PIRLS achievement. The other three presentations address the 2011 TIMSS and PIRLS achievement results, the importance of an early start in education, and school factors for academic success.

Segment 4—An Early Start: The Importance of Home Environment and Preprimary Education

DR. HANS WAGEMAKER, EXECUTIVE DIRECTOR, IEA

One of IEA's central aims over the past 50 years has been to increase our understanding of key school- and non-school-based factors that influence teaching and learning.

A unique feature of TIMSS and PIRLS in 2011 is that the parents of students were surveyed about each child's early literacy and numeracy experiences.

**DR. MICHAEL O. MARTIN, EXECUTIVE DIRECTOR,
TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE**

Results from the TIMSS and PIRLS *Parent's Questionnaire* show that, in every country, an early start is critical for children's mathematics and literacy development.

Across the countries, the results emphasized that children who had been engaged in literacy and numeracy activities before beginning school had higher achievement in reading and mathematics in the fourth grade.

NARRATOR

Internationally, mathematics achievement at the fourth grade was higher if children's parents...

- Engaged them in early numeracy activities (for example, counting rhymes or songs, playing with number toys and games with shapes, and counting different things);
- Similarly, children's reading achievement was higher when parents engaged their children in early literacy activities (such as, reading books, telling stories, singing songs, and playing word games);

**DR. INA V.S. MULLIS, EXECUTIVE DIRECTOR,
TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE**

Parents' reports about their children having basic numeracy and literacy skills at the start of school corresponded very well with how the children achieved at the fourth grade.

NARRATOR

- Mathematics achievement at the fourth grade was higher when parents reported that children could do early numeracy tasks upon starting primary school (for example, counting by him/herself, recognizing different shapes/written numbers from 1 to 10, and writing numbers from 1 to 10); and
- Likewise, reading achievement was higher when parents reported that children could do early literacy tasks upon starting primary school (such as, recognizing most of the letters of the alphabet, reading some words and sentences, and writing letters of the alphabet and some words).

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DR. INA V.S. MULLIS

In addition, TIMSS and PIRLS 2011 results indicate that attending preprimary education is associated with higher mathematics, science, and reading achievement internationally, and the more years of preprimary education, the greater the benefit.

Some TIMSS and PIRLS 2011 countries already have mandatory preprimary education, and some have nearly 100 percent enrollment, even though attendance is not mandatory. Also, a number of the remaining countries are working to increase enrollment in preprimary programs.

DR. MICHAEL O. MARTIN

Early learning opportunities, whether in the home or in preschool, give students an edge in mastering mathematics, science, and reading later in school. Beginning school equipped to do basic literacy and numeracy tasks (like some basic reading, writing, addition, and subtraction) places students on a trajectory for success.

NARRATOR

This concludes the presentation of the importance of an early start in education. The other three presentations address the 2011 TIMSS and PIRLS achievement results, the trends in TIMSS and PIRLS achievement, and school factors for academic success.

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Segment 5—Factors for Academic Success: Schools, Teachers, and Student Attitudes

DR. HANS WAGEMAKER, EXECUTIVE DIRECTOR, IEA

For more than 50 years, IEA has studied school factors that are related to educational outcomes.

One of the most important features of TIMSS and PIRLS is the extensive set of contextual data collected by the *Student, Teacher, School, and Curriculum Questionnaires*. The contextual data collected from these 2011 surveys have yielded new scales summarizing information about learning and teaching across mathematics, science, and reading. This can improve our understanding of the various school and classroom factors that are related to achievement.

DR. INA V.S. MULLIS, EXECUTIVE DIRECTOR, TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE

TIMSS and PIRLS results underscore the significant role played by a number of school factors in fostering achievement in mathematics, science, or reading, including adequate school resources for teaching these subjects, a school climate for academic success, teacher preparation in content and pedagogy, and engaging classroom instruction.

NARRATOR

TIMSS and PIRLS 2011 show that the students with high achievement attend schools which exhibit the following characteristics:

- Students with higher achievement attended schools with more affluent student bodies and that did not suffer from resource shortages—having sufficient buildings, space, and staff. Moreover, achievement was higher when teachers reported hardly any problems with overcrowding, or inadequate workspace or supplies to conduct lessons.
- Higher achieving students attend schools that emphasize academic success. That is, these schools establish rigorous curricular goals, and have students that desire to do well, parental support, and teachers that understand and are effective in implementing the curriculum.
- Higher achieving students also attend schools that are safe and orderly, having hardly any problems with disciplinary safety, and where students are almost never bullied. Unfortunately, bullying does have a negative impact on achievement—as the frequency of bullying behavior increases, student achievement in reading, mathematics, and science decreases.

DR. MICHAEL O. MARTIN, EXECUTIVE DIRECTOR, TIMSS & PIRLS INTERNATIONAL STUDY CENTER, BOSTON COLLEGE

Student achievement can be positively affected by a well prepared teaching force—that is, teachers who are well educated in content and instructional methods, are experienced in teaching, and are satisfied with their careers.

NARRATOR

TIMSS and PIRLS 2011 found that, across countries, students who had teachers with at least ten years of experience had higher achievement in reading at the 4th grade, and in mathematics and science at the 4th and 8th grades. In addition, students with teachers who had greater career satisfaction had higher achievement across these subjects.

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DR. INA V.S. MULLIS

Teachers' instructional skills also play a role in affecting student achievement. Good teaching practice—specifically, instruction that engages students—can bring the student and the subject matter together in a way that sparks interest and stimulates learning.

NARRATOR

Internationally, students who reported being “engaged” in their lessons had higher mathematics, science, and reading achievement.

That is, higher achieving students knew what their teacher expected, had a teacher who is easy to understand, were interested in what the teacher said, and were given interesting things to do.

DR. MICHAEL O. MARTIN

Lastly, the TIMSS and PIRLS 2011 data reveal that, within every country, students with more positive attitudes toward learning have higher achievement in mathematics, science, and reading. However, by the 8th grade, attitudes were less positive towards mathematics and science.

NARRATOR

Specifically, TIMSS and PIRLS 2011 found that the following attitudes were related to higher achievement:

- Liking mathematics, science and reading;
- Feeling motivated to read;
- Feeling confident in mathematics, science, and reading; and
- At the eighth grade, valuing mathematics and science.

DR. INA V.S. MULLIS

For the most part, students around the world are very positive about learning mathematics, science, and reading. However, in an environment where countries are trying to attract students into future mathematics and science-related careers, it is a matter of some concern that, by the eighth grade, there is an erosion of positive attitudes towards mathematics learning and instruction

NARRATOR

This concludes the presentation of school factors for academic success. The other three presentations address the 2011 TIMSS and PIRLS achievement results, the trends in TIMSS and PIRLS achievement, and the importance of an early start in education.