December 9, 2008

Statement by Joseph M. O'Keefe, S.J.

Dean, Lynch School of Education at Boston College

I am delighted to participate in the release of IEA's TIMSS 2007 International Mathematics and Science Reports, an international assessment of students' achievement in mathematics and science at the fourth and eighth grades. Today, we are releasing the fourth cycle in this on-going project undertaken by the TIMSS and PIRLS International Study Center at the Lynch School of Education at Boston College, in cooperation with IEA (International Association for the Evaluation of Educational Achievement).

Let me begin by expressing my admiration and gratitude to all of those who have worked with such diligence and skill on this very important initiative, especially my colleagues Dr. Ina Mullis and Dr. Michael (Mick) Martin. The TIMSS and PIRLS International Study Center, which they direct, makes an invaluable contribution to the intellectual life of Boston College and its research profile. I am also grateful to the IEA for providing the resources that allow this work to go forward.

In an ever more globalized world, international comparative studies of educational achievement are increasingly important. TIMSS 2007 includes a wide variety of countries across the world, 59 in number, along with eight benchmarking entities. The breadth of the sample offers countless opportunities for nations and states to compare the math and science achievement of their children with others.

Comparison of scores across nations is but one aspect of TIMSS 2007. The major purpose of TIMSS is the improvement of teaching and learning, by providing data that help countries identify strengths and weaknesses in achievement, monitor trends over time, and identify factors associated with high student achievement.

Before I hand the microphone on to Ina Mullis and Mick Martin, who will provide a summary of the major findings of TIMSS 2007, I want to confirm Boston College's unwavering commitment to the vital work of the TIMSS and PIRLS International Study Center and to reiterate my expression of gratitude and congratulations.

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Overview of TIMSS 2007 Results

Statement by Dr. Ina V.S. Mullis and Dr. Michael O. Martin
Executive Directors, TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Presentation of TIMSS 2007 International Results

Good morning. We are pleased to release the results of TIMSS 2007, which is IEA's international assessment of students' achievement in mathematics and science at the fourth and eighth grades. Fifty-nine countries and eight benchmarking entities participated in TIMSS 2007. Most have trend data from one or more of the three previous cycles of TIMSS in 1995, 1999, and 2003. TIMSS is an enormous endeavor and all of those involved deserve tremendous credit, especially the teams of researchers in each of the participating countries.

Achievement Results

- At the **fourth grade**, in mathematics Hong Kong SAR and Singapore were the top performing countries. They were followed by Chinese Taipei and Japan, with these four countries having higher achievement than all of the remaining countries. Kazakhstan, the Russian Federation, England, Latvia, and the Netherlands also performed very well.
- In science, Singapore was the top performing country, followed by Chinese Taipei and Hong Kong SAR. Next came Japan, the Russian Federation, Latvia, England, the United States, Hungary, Italy, and Kazakhstan that also had high achievement.
- Countries tended to have similar rankings in mathematics and in science. For example, Singapore was a top-performing country in both mathematics and science. However, many countries had relatively higher achievement in one subject or the other, including Hong Kong SAR that had relatively higher achievement in mathematics than in science.
- At the **eighth grade**, in mathematics Chinese Taipei, Korea, and Singapore had the highest achievement, followed by Hong Kong SAR and Japan. There was a substantial gap in achievement between the five Asian countries and the next group of countries, led by Hungary, England, the Russian Federation, and the United States.
- In science, Singapore and Chinese Taipei had the highest achievement, followed by Japan and Korea. England, Hungary, the Czech Republic, Slovenia, Hong Kong SAR, and the Russian Federation also performed well.

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- Countries' rankings were similar in mathematics and science, although the majority of countries had relatively higher achievement in science than in mathematics. This was in contrast to the high-achieving Asian countries, which tended to perform relatively better in mathematics. TIMSS also has a wealth of information about countries' strengths and weaknesses within mathematics and science content areas, for example, algebra compared to geometry, or biology compared to physics.

Trends Over Time

One of the great strengths of TIMSS is the ability to monitor progress in educational improvement over time. Such trend information is crucial in helping policy makers understand the impact of decisions about investment in education, curricular reform, and initiatives to improve instruction.

- At the **fourth grade**, in both mathematics and science, more countries showed improvement in 2007 than declines. TIMSS showed that a range of countries made progress in improving children's academic achievement.
- At the **eighth grade**, the pattern was less pronounced. Although close to a dozen countries showed improvements, most countries either showed little change or declined.

Gender

- At the **fourth grade**, the differences in achievement between boys and girls were negligible in approximately half the countries in both mathematics and science. In the remaining countries, girls had higher achievement in about half and boys had higher achievement in the other half.
- At the **eighth grade**, the differences in achievement between boys and girls were negligible in about one third of the countries. In the remaining countries, girls had higher achievement than boys in more countries, especially in mathematics.

Student Attitudes

Developing positive attitudes toward mathematics and science are important goals of the curriculum in many countries. Students may be more attracted to these subjects and more motivated to learn if they consider proficiency in mathematics and science to be advantageous to their future education and the world of work.

- At both grades, students with higher achievement in mathematics and science had more positive attitudes toward these subjects, reported a higher level of self-confidence in learning mathematics and science, and placed a higher value on them as important to future success.

School Environments Fostering Learning

Successful schools have ambitious but reasonable goals and work toward implementing them. A supportive school climate helps to build better morale among teachers and students, leading to higher student achievement.

- At both fourth and eighth grades, mathematics and science achievement was highest where principals and teachers had a positive view of the school climate, including high levels of teacher job satisfaction, expectations for student achievement, and parental support.
- For students to have the opportunity to learn, they need to attend school regularly. Also, student learning can be more difficult in schools where students are frequently absent or late for class. Achievement was highest among students attending schools with few attendance problems. Problems with students arriving late, absenteeism, and missing class were more serious at the eighth grade.

Resources to Support Mathematics and Science Learning

- Access to facilities, equipment, and materials can enhance curriculum implementation and instruction. At both grades, achievement was highest in schools where principals reported that resource shortages were not a problem.
- Teachers can be considered the most important resource of all and are becoming in short supply in many countries. At both the fourth and eighth grades, relatively few students were taught by younger teachers. The majority of students were taught by teachers in their 30s and 40s, and about one-fourth by teachers aged 50 years or older.
- Supplying schools with teachers well prepared to teach mathematics and science appears to be an increasing problem, especially at the fourth grade. At the eighth grade, most teachers had studied mathematics or science and reported feeling very well prepared to teach the topics in the TIMSS assessment. In contrast, teachers at the fourth grade reported little specific training or specialized education, especially in science. Just half the students had teachers who reported feeling very well prepared to teach the TIMSS science topics.

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December 9, 2008

IEA – International Association for the Evaluation of Educational Achievement

Statement by
Dr. Seamus Hegarty, IEA Chair
Dr. Hans Wagemaker, IEA Executive Director

There are few people in any society who are not affected by the education on offer in that society. Individual wellbeing, economic prosperity and social cohesion all depend on high-quality education that is available to every child and young person.

The importance of education is clear, but how much do we know about how well our schools are doing? Are our young people learning what they need to become fulfilled, productive and responsible adults? Are there groups of children, or sections of society, that are missing out? Are there things that teachers, schools, administrators and policy makers could be doing better? And how do our schools, and our students' achievements, compare with schools and students in other countries?

Today we are pleased to launch a report which addresses these questions. For four years we have been carrying out a very ambitious study in more than 60 countries. We gathered detailed information on the mathematics and science achievements of students at the fourth and eighth grades in these countries, as well as a great deal of background explanatory information. It has been a complex and demanding study: we have had to take account of differences in language, curriculum, school system and teaching approach around the world. But we are confident that we are offering robust – and unique – data on young people's learning in maths and science.

This study, Trends in International Mathematics and Science Study (TIMSS), builds on fifty years' scientific study of student learning in an international context. In its current form TIMSS 2007 is part of a series of studies that we have conducted every four years since 1995, so in addition to the contemporary picture of student achievement we can offer increasingly powerful information on trends in learning in maths and science.

TIMSS, inevitably, provides league tables – who is top and who is bottom, who has improved and who has fallen back. It is natural that this aspect of our report excites a lot of interest: we all want to see how we compare with our neighbours, and whether we have gone up or down since last time.

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But our report contains much more than these national comparisons. It provides a host of data on student, teacher, school, curriculum and system backgrounds. Thus, there is information on student attitudes to maths and science, the amount of time they spend doing homework, their use of computers and the internet, on teachers and how well they feel prepared to teach maths or science, on school and classroom environments including resources, parental involvement and the role of principals. These and many other factors impact on student learning, and our reports clarify the complex relationships between them for the benefit of educational policy makers and practitioners.

The study has been conducted under the auspices of IEA, the International Association for the Evaluation of Educational Achievement. IEA was founded 50 years ago, in 1958, by a group of farsighted individuals who recognised that providing high-quality education depends critically on systematic research. If we are serious about enabling our children and young people to learn better, we have to understand the barriers that hold some children back, what steps are most effective in promoting learning, and how we can ensure that all of our young people gain maximum benefit from their time at school.

Only a small number of countries were involved in IEA studies at the outset, but we have grown steadily and now more than 90 countries are involved in one or more of our studies. Besides TIMSS, we also conduct PIRLS, a global study of reading literacy at the fourth grade, and other studies encompassing teacher education, civics and citizenship education, and ICT in education. All of these studies have the common objective of increasing our understanding of the provision of education and, through the insights gained, enabling policy makers and practitioners to maximise student learning. Our studies have also made a significant contribution to the science of educational measurement.

As an independent, not-for-profit cooperative of research institutions and government departments representing the interests of 66 countries, IEA relies heavily on the collaboration and enthusiasm of researchers, students, teachers and governments around the world. TIMSS, in particular, would not have been possible without the generous support we have received form the US National Center for Education Statistics, the World Bank and UNDP. We are extremely grateful to all of these bodies for their continued support, as well as to the participating countries who also contributed financially.

TIMSS is a significant achievement in large-scale assessment of student learning in mathematics and science. It builds on the experience and skills that have been developed over many years at Boston College and brings to bear state-of-the-art applications in scaling, analysis and reporting. A dedicated and expert team at Boston College, capably led by Drs Ina Mullis and Michael Martin, have coordinated the diverse contributions of colleagues from Statistics Canada, Educational Testing Service in the USA, IEA Data Processing and Research Center in Hamburg, IEA Secretariat in Amsterdam and specialist consultants from around the world to ensure the successful completion of the study. The efforts of individuals in research bodies around the world have also been critical to the study's success. Finally, we want to acknowledge the cooperation of the thousands of school principals, teachers and students who gave generously of their time to make the study possible.

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