MICHIGAN STATE UNIVERSITY

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2010 Teacher Education Study in Mathematics (TEDS-M)
Frequently Asked Questions

What is TEDS-M?

TEDS-M is a comparative study of teacher education with a focus on the preparation of teachers of mathematics at the primary and lower secondary levels. TEDS-M pays particular attention to the links among teacher education policies, practices and outcomes. The study will provide participating countries with a valuable opportunity to conduct research on their own teacher education system and to learn from approaches used in other countries. TEDS-M has three components; specifically, (i) studies of teacher education policy and its cultural and social context, (ii) studies of teacher preparation routes, programs, standards and expectations for teacher learning and (iii) studies of the mathematics and related teaching knowledge of future elementary and lower secondary school teachers.

What are the major findings of TEDS-M 2010?

- Related to mathematics knowledge, future middle school mathematics teachers were in the middle of the international distribution of countries – straddling the divide between those whose eighth grade students do better than the U.S. on international mathematics assessments and those who don't.
- U.S. future elementary teachers' mathematics knowledge isn't distinctively high or low but certainly isn't at the level we as a nation would like.
- There are no statistically significant differences in mathematics knowledge or mathematics knowledge related to teaching between U.S. future teachers prepared in public and private colleges and universities.
- U.S. future teachers are getting weak training mathematically and are not prepared to teach the demanding curriculum we need.
- This is especially true given that 48 states are currently considering the adoption of the more rigorous "Common Core" standards.
- Future middle school mathematics teachers educated in secondary preparation programs had significantly higher mathematics knowledge scores than future middle school mathematics teachers prepared in other types of programs including those focused only on middle school teacher preparation.
- This finding identifies an important policy issue for states regarding how they define what is acceptable or necessary to be certified to teach mathematics at the middle school level.
- Virtually all future middle school teachers in the top-achieving countries took a course in linear algebra as well as a basic calculus sequence. This was true for only about half of U.S. future teachers. They also took more advanced courses than was the case in the U.S.
- The mathematics courses taken by U.S. future elementary teachers do not appear much different from their peers in other countries.
- The mediocre performance of U.S. K-8 students on international mathematics assessments such as TIMSS suggest that the pool of future teachers in the U.S. enter teacher preparation with lower levels of mathematics knowledge than those in other countries such as Taiwan.
- This suggests that the U.S. solution may well be in some combination of recruitment of those with higher levels of mathematics knowledge with a more demanding teacher preparation curriculum, especially in mathematics.

What countries participated in the study?

In addition to the U.S. included Germany, Norway, Poland, the Russian Federation, Spain, Switzerland, Taiwan, Singapore, Thailand, Malaysia, Botswana, the Philippines, Chile, Georgia and Oman all participated in the study.

How was the Study funded?

The findings derived from research supported by the GE Foundation, Boeing, Carnegie Corporation of New York and the Bill & Melinda Gates Foundation.

What was the TEDS-M sample?

Future Teachers near the end of their final year of teacher preparation were the focus of the Study. Two different assessments were used to measure what future teachers know about mathematics: one for those who had been prepared to teach mathematics at the primary level and another for those who trained to teach mathematics at the lower secondary level.

The U.S. TEDS-M sampling frame focused on the 1,351 colleges and universities that have teacher preparation programs approved by the U.S. Department of Education. The sampling frame excluded a proportion of teachers prepared under "alternate routes" outside these institutions.

Three sampling approaches were used to obtain nationally representative data for each participating country. A few nations, such as Norway, Singapore and Thailand, obtained a census of all teacher preparation institutions in their country and a census of all future teachers fitting the TEDS-M target population definitions. Other countries like Poland, Switzerland and Taiwan, obtained a census of teacher preparation institutions and randomly sampled from eligible future teachers. The last set of countries, including the Philippines, the Russian Federation, Spain and the United States, obtained random samples of both teacher preparation institutions and eligible future teachers within each teacher preparation institution. In each case, the specific sampling plan was developed with the IEA sampling referee to represent that country's production of possible future math teachers.

No attempt was made to adjust the data obtained from the groups of potential future teachers to reflect who might actually end up teaching in the classroom. The national recruitment and training contexts in each country vary considerably. Therefore, the focus of TEDS-M must be understood to be directly on the preparation of potential future teachers of mathematics for either the primary/ lower secondary grades and not on characterizing the teaching force in general or necessarily those who enter the classroom for the first time.

Size of Analyzed Samples.[1]

Country	Number of Institutions	Number of Future Primary Teachers	Number of Future Lower Secondary Teachers	Total Number of Future Teachers
Botswana	4	86	53	139
Chile	33	657	746	1403
Georgia	9	506	78	584
Germany	14	1032	771	1803
Malaysia	23	576	389	965
Norway	28	551	550	1101
Oman	7	0	268	268
Philippines	48	592	733	1325
Poland	78	2112	298	2410
Russian Federation	49	2266	2141	4407
Singapore	1	380	393	773
Spain	45	1093	0	1093
Switzerland	14	936	141	1077
Taiwan	19	923	365	1288
Thailand	45	660	652	1312
USA – Private	30	895	293	1188
USA – Public	51	1501	607	2108
Totals	***498***	***14,766***	***8,478***	***23,244***

[1]All numbers are based on the preliminary data released by the IEA to the National Research Coordinator in each participating country.

What is the U.S. methodology of TEDS-M?

In the U.S., TEDS-M studied the performance of a sample of 81 public and private universities and colleges in 39 states that prepare middle school mathematics teachers and elementary teachers. Nearly 3,300 future teachers were surveyed about their coursework, knowledge of mathematics and knowledge of how to teach mathematics. The public colleges and universities were sampled and the data were collected in 2007, while the private data were collected in the spring of 2008. The U.S. TEDS-M sampling frame focused on the 1,351 colleges and universities that have teacher preparation programs approved by the U.S. Department of Education.

Because data collection spanned two academic years, for comparison, a second sample was collected in 2009 from eight of the participating public institutions. These eight institutions were selected randomly after the sample of participating public institutions was stratified according to the response rates.

The comparison revealed that there were no significant differences between institutional samples from the two years. The two samples were compared on a set of variables relating to the future teachers' background -- high school GPA, highest course taken in mathematics in high school, SAT and ACT scores -- mathematics courses taken in college. The analysis was performed controlling for differences among the institutions. There were no statistically significant differences between data collected from the two years.

The differences were not statistically significant if the comparisons were further controlled for high school GPA, highest course taken in mathematics in high school and courses taken in mathematics in college.

The resulting U.S. sampling frame includes 498 publicly controlled institutions and 853 privately controlled institutions. Based on the sampling frame, publicly controlled institutions represent 37% of all institutions, but account for 60% of the total institutional production.

What are "Common Core" standards?

The National Governors Association and the Council of Chief State School Officers are completing work on K-12 mathematics standards, called the "Common Core." These standards, soon to be released, are expected to be adopted by a majority of U.S. states. Internationally competitive, these standards address the problems identified through TIMSS. As a result, they require teachers at the elementary and middle school levels to have a deeper, more thorough understanding of mathematics.