NATIONAL CENTER FOR EDUCATION STATISTICS
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U.S. Department of Education
Office of Educational Research and Improvement
NCES 98-499

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Suggested Citation:
U.S. Department of Education, National Center for Education Statistics. *Linking the National Assessment of Educational Progress (NAEP) and the Third International Mathematics and Science Study (TIMSS): A Technical Report*, NCES 98-499, by Eugene G. Johnson. Project Officer Eugene Owen. Washington, DC: Government Printing Office, September 1998.

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Foreword

The Research and Development series of reports has been initiated for the following goals:

1. To share studies and research that are developmental in nature. The results of such studies may be revised as the work continues and additional data become available.

2. To share results of studies that are, to some extent, on the cutting edge of methodological developments. Emerging analytical approaches and new computer software development often permit new, and sometimes controversial, analysis to be done. By participating in "frontier research," we hope to contribute to the resolution of issues and improved analysis.

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The common theme in all three goals is that these reports present results or discussions that do not reach definitive conclusions at this point in time, either because the data are tentative, the methodology is new and developing, or the topic is one on which there are divergent views. Therefore, the techniques and inferences made from the data are tentative and are subject to revision. To facilitate the process of closure on the issues, we invite comment, criticism, and alternatives to what we have done. Such responses should be directed to:

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Acknowledgments

This report benefited greatly from the contributions of many people.

My plans about linking NAEP and TIMSS and estimating the components of variance of the link were greatly clarified through conversations with Robert Mislevy, Don McLaughlin, and Juliet Shaffer, all of whom also made insightful comments on successive drafts of the report. Helpful comments on the report were also made by Susan Ahmed, Albert Beaton, James Chromy, Jon Cohen, John Dossey, Paul Holland, Richard Jaeger, Lyle Jones, Wayne Martin, Ingram Olkin, Senta Raizen, Douglas Rindone, Keith Rust, David Thissen, and Valerie Williams.

Data analysis was led by Minhwei Wang, with significant contributions by David Freund, Xuefei Hui, Edward Kulick, and Steve Wang. Gerry Kokolis and Jennifer Nelson created the graphics in the report. Sincere thanks also go to Eugenio Gonzalez and Stephen Roey for providing the needed TIMSS data.

This report was funded through the National Center for Education Statistics (NCES) in the Office of Educational Research and Improvement of the U.S. Department of Education. Pascal Forgione, NCES Commissioner, provided support and guidance. Advice and guidance was collegially provided by Mary Frase, Arnold Goldstein, Marilyn McMillen, Martin Orland, Eugene Owen, Lois Peak, and Gary Phillips. I am also grateful to Ramsey Selden, Karol Krotki, and Patrick Gonzales of the Education Statistics Services Institute for their help.

Thanks to Adriene Siegendorf of the Education Statistics Services Institute, and my co-author of the Results Report, for the tables comparing the states to the nations.

Special thanks go to Nancy Caldwell of Westat for her support, encouragement, and insight throughout the process of creating this report.

Finally, thanks go to Susan Crawford of Westat and Janet Johnson formerly of the Educational Testing Service for editorial support, and a particular thanks to Joan Murphy of Westat, who edited and oversaw the production of the many drafts, up to and including the final report.

Eugene Johnson

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1. INTRODUCTION

In 1989, the Nation's President along with its governors made clear that there was a keen interest in comparing the educational performance of United States' students with that of students in other countries. That year a National Education Summit adopted six education goals, one of which stated that by the year 2000, "U.S. students will be first in the world in science and mathematics achievement" (National Education Goals Panel, 1991, p. 16).

The Third International Mathematics and Science Study (TIMSS), conducted in 1995, provides the most recent information about our country's progress toward this goal. The U.S. TIMSS results describe student mathematics and science achievement for several grades (including grade 4, 8, and 12) both for the country as a whole and for various subgroups of the population. These U.S. results are directly comparable to TIMSS results from many other countries. However, with the exception of a few states that chose to participate in the state-level TIMSS program, equivalent TIMSS results are not available at the state level.

Because education in the United States is largely determined at the state and local levels, there has been considerable interest in how the performance of students in individual states compare with each other, with the United States, and with other nations. The comparison of state performance with other states and with the United States is made possible by the National Assessment of Educational Progress (NAEP). In 1996, NAEP assessed mathematics and science in the United States as a whole. Additionally, results for the individual states that chose to participate in the state NAEP assessment are available at grades 4 and 8 for mathematics and at grade 8 for science. Thus, while it is directly possible to compare the participating states with each other and with the United States, policymakers and the general public cannot directly know how the students in the various states would perform relative to students in other countries.

Since TIMSS and NAEP were administered within a year of each other, there has been considerable interest in attempting to link the two assessments. Such a linkage would, for example, allow states who participated in the state component of the NAEP mathematics or science assessments to compare their predicted TIMSS results with results from countries participating in TIMSS. Specifically, predicted means on TIMSS could be estimated for each state that participated in NAEP, with the prediction based on an application of a linking function to that state's NAEP data. Additionally, the percentages of students in the states who would score above selected points on the TIMSS scale, such as the international marker levels, had they participated in the TIMSS assessment, could be predicted from their NAEP proficiency distributions based on a linking function.

The success of the link between the 1992 NAEP mathematics results with those from the 1991 International Assessment of Educational Progress (IAEP) in mathematics (Pashley and Phillips 1993) provided encouragement that a link between TIMSS and NAEP was possible.

The purpose of this report is to describe the methods used to undertake such a link using the available data. The specific direction of the link will be to link NAEP to TIMSS, thereby providing predicted TIMSS results for given NAEP results. Since a major goal of the link is to enable comparisons between states and countries, links were intended to be established for those grades and subjects where there are both state NAEP data and international TIMSS data. The links were to be based on the data from the U.S. TIMSS national sample and from the NAEP national sample. The linkages provided in this report are for mathematics and science at grade 8. An additional link is being attempted for grade 4 mathematics but is still undergoing NCES review.

While developing the links is straightforward, the real challenge is in identifying the various sources of error that are associated with linking together two assessments and in developing components of variance attributable to as many of these as is possible. This report estimates components of variance due to four sources: (1) sampling, (2) measurement error, (3) model misspecification, and (4) temporal shift. These components are used to derive standard errors for predicted TIMSS state means and percentages and then used to construct confidence intervals around these estimates for each state.

The quality of the link between NAEP and TIMSS was evaluated using data from the states for whom representative data were available from both assessments. Specifically, the predicted TIMSS results, based on the state's NAEP data, were compared with the actual results for the state. In the 1995 administration of TIMSS, one state, Minnesota, elected to participate in the grade 8 TIMSS assessments of mathematics and science. As is shown in this report, the predicted results for that state are quite close to the actual results for the grade 8 mathematics and science assessments. In addition, two states, Missouri and Oregon, participated in a special assessment of the TIMSS in their states in 1997. While the results of these assessments have not yet been publicly released, the predicted TIMSS results for these states were consistent (within acceptable statistical bounds) with their actual TIMSS results.

This is heartening, since as discussed in the next section, the type of linking required for the available data requires caution in its use. Based on a number of studies, the moderation type of linking, as is used in this report, is adequate for the approximate comparisons of the relative rankings of individual states versus other countries, but is likely not adequate for extensive analyses based on the point estimates of scores.

2. NAEP AND TIMSS DATA

NAEP is an ongoing, congressionally mandated survey designed to measure what students know and can do. The goal of NAEP is to estimate educational achievement and changes in that achievement over time for American students of specified grades as well as for subpopulations defined by demographic characteristics and by specific background characteristics and experiences. In 1996, NAEP collected mathematics and science data from nationally representative samples of students in public and private schools in grades 4, 8, and 12. Additionally, directly comparable state assessments were conducted in public and private schools in participating states and jurisdictions at grade 4 for mathematics and at grade 8 for mathematics and science. For many of the states and jurisdictions the sample of private school students was not adequate to support reporting of private school results. Accordingly, state-level results were reported by NAEP for the public schools samples only. State-level NAEP mathematics and science results are available for grade 8 public school students in 44 states and jurisdictions.

TIMSS is the largest and most ambitious study ever conducted by the International Association for the Evaluation of Educational Achievement (IEA). TIMSS is an international comparative study designed to provide information about educational achievement and learning contexts for the participating countries. Each participating country assessed mathematics and science in the two grades with the largest proportion of 13-year-olds (grades 7 and 8 in most countries, including the United States). Mathematics and science results are available for 41 countries for the higher of these grade levels--which, for convenience, will be referred to as the grade 8 level in this report.

The U.S. results are based on a sample of students from public and private schools. In addition, three states opted to collect grade 8 TIMSS data from representative samples of their students. Minnesota participated in a state-level administration of grade 8 TIMSS mathematics and science in 1995, while Missouri and Oregon participated in state-level administrations of grade 8 TIMSS in 1997. All three states also participated in the 1996 State NAEP. Thus, released public school NAEP results are available for all three states, as well as released TIMSS results for Minnesota. However, the TIMSS results for Missouri and Oregon cannot be explicitly included in this report since those results have not yet been publicly released.

A number of key characteristics of the NAEP and TIMSS results have a bearing on the adequacy of any link between the two assessments. These include the following:

- Both NAEP and TIMSS are based on complex probability samples of the student population. Both U.S. samples include public and private students in grade 8. The sample sizes for the two assessments in the United States are similar, being 7,146 and 7,087 for NAEP and TIMSS grade 8 mathematics, and 7,774 and 7,087 for NAEP and TIMSS grade 8 science.

- TIMSS was conducted in the United States (and in most Northern Hemisphere countries) in April and May 1995. NAEP was conducted January through March 1996. Thus, the TIMSS results are applicable to the achievement of the 1995 student population at the end of the school year, while the NAEP results are applicable to the achievement of the 1996 student population some months before the end of the school year.

- The frameworks that defined the NAEP and TIMSS assessments are not identical but appear similar. Both assessments include multiple-choice and short- and extended-constructed response questions, but NAEP has a higher proportion of constructed response items than does TIMSS. The two assessments have no items in common. (Appendix A contains the results of a content analysis of the NAEP and TIMSS assessments.)

- In TIMSS, the same students participated in both the mathematics and science testing, with 90 minutes total testing time across the two subjects or 45 minutes for each. Both mathematics and science were mixed within each booklet. In NAEP, each sampled student received either a mathematics or a science instrument. Total testing time for the mathematics instrument was 45 minutes, comparable to TIMSS mathematics. Total testing time for NAEP science was 90 minutes at grade 8, including 30 minutes of hands-on tasks.

- Both NAEP and TIMSS scaled their data using Item Response Theory (IRT) techniques. TIMSS used a Rasch partial credit model to create a single scale for each subject, while NAEP used a variety of scaling models (two and three parameter logistic and generalized partial credit) to develop subscales for mathematics and science. NAEP mathematics and science composites were then created as weighted averages of the mathematics and science subscales. Both NAEP and TIMSS used methodology to account for the imprecision of measurement of individual students' abilities (plausible values). These allow for appropriate estimates for any subgroups contained in the conditioning model. However, grade 8 TIMSS only conditioned for grade within country, while NAEP conditioned on several hundred variables.

Clearly, while similar, the NAEP and TIMSS assessments do differ in ways that will impact the link between the two. The next section reviews the types of linking available and indicates what the NAEP-TIMSS link will be.

3. TYPES OF LINKAGE

As described by Mislevy (1992) and Linn (1993), the central problems of "linking assessments" are determining the relationships between the evidence that two measures give about performance of interest and interpreting such evidence correctly. For the purposes of discussion, assume that there are two assessments, Assessment X and Assessment Y, and that the data produced by Assessment X can provide answers, properly qualified, to various questions involving student achievement. Further assume that there is a desire to "link Assessment Y to Assessment X." This means that one hopes to be able to answer these same questions, but using students' performance on Assessment Y. A specific example is linking the results of NAEP to the results of TIMSS to enable the prediction of state-level TIMSS means, based on state-level NAEP data.

How well linking will work and the necessary procedures to accomplish a link depend on how similar the two assessments are in terms of their goals, content coverage, and measurement properties. Mislevy and Linn defined four types of linking: equating, calibration, projection, and moderation. These are listed in decreasing order in terms of the assumptions required, with equating requiring the strongest assumptions and moderation the weakest. The ordering of the four types is also in decreasing order in terms of the strength of the link produced.

3.1 Equating

The strongest link occurs if the two assessments are built to the same specifications. Requirements include complete matches in content coverage, difficulty, type of questions used, mode of administration, test length, and measurement accuracy at each score point. Under such carefully controlled circumstances, the assessment results are essentially interchangeable and, by matching up score distributions, it is possible to construct a one-to-one correspondence table of scores on X and scores on Y so that any question that could be addressed using scores from Assessment X can be addressed in exactly the same way with transformed scores from Assessment Y, and vice versa. When equating is possible, it is because of the way the assessments were constructed, not simply because of the way the linking data were collected or the linking function constructed.

3.2 Calibration

A somewhat weaker kind of linking is possible if Assessment Y has been constructed to the same framework as Assessment X, but with different precision or level of difficulty. In this case, equating is not possible, but the results of the two assessments can be adjusted so that the expected score of a given student is the same on both assessments. As a consequence of different measurement characteristics in the X and Y data, the procedures needed to permit Y data to answer certain questions that could be addressed from X data will depend on the specific questions. Thus, Y data might be used to answer X data questions, but generally not by means of a single linking function as would be sufficient for assessments built to support equating.

3.3 Projection

A yet weaker linking obtains if the two assessments use different types of tasks, different administration conditions, or otherwise do not measure the same trait. Projection uses statistical methodology (often regression) to derive predictions from Y data about characteristics of the X distribution, in terms of a probability distribution for expectations about the possible outcomes. As the similarity between the two assessments decreases, the value of the Y data to answer X data questions also decreases and projections become increasingly sensitive to other sources of information. For example, the relationship between X and Y might vary across subpopulations of students and might change over time because of changes in policy or instruction.

3.4 Moderation

The weakest linking occurs when the two assessments are not assumed to be measuring the same construct, but scores that are comparable in some sense are still desired. Often, the two assessments are administered to nonoverlapping sets of students. Statistical moderation matches X and Y score distributions by simply applying the formulas of equating, while recognizing that the assessments have not been constructed to support equating. The procedures of statistical moderation can produce markedly different links among tests if carried out with different samples of students.

3.5 Linear Moderation Procedures

Because they are the only data available, a link between TIMSS and NAEP will be based on the reported results from the 1995 administration of TIMSS in the United States and the results from the 1996 NAEP. Since TIMSS and NAEP differ to varying degrees in terms of the assessment specifications, the numbers and kinds of tasks presented to students, and administration conditions, and since the TIMSS data and the NAEP data come from distinct administrations conducted one year apart, it is clear that the type of linking that can be accomplished will fall into the realm of statistical moderation.

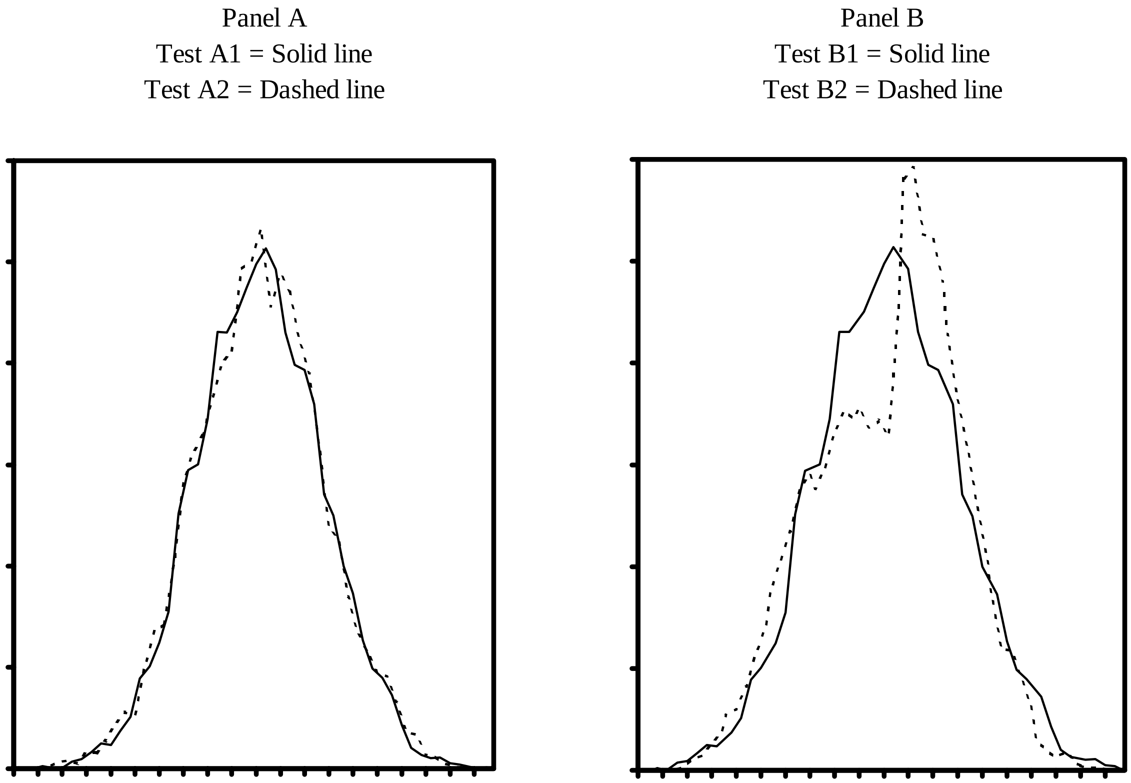
The link between the two assessments will be established by applying formal equating procedures to match up characteristics of the score distributions for the two assessments. The next section establishes that linear moderation procedures (see, e.g., Peterson, Kolen, and Hoover 1989 who call it linear equating) provide an acceptable link between the two assessments. Linear moderation adjusts the distributions of the two assessments so that they have the same mean and standard deviation. This was the procedure used by Beaton and Gonzalez (1993) with the 1991 IAEP data for the U.S. sample of 13-year-olds and the 1990 NAEP data for public school students in grade 8 to express the 1991 IAEP results on the 1990 NAEP scale. This is also the procedure used by NAEP to link the results from the Trial State Assessment to those of the national assessment.

3.6 The Importance of Matching Content Coverage

Naturally, even though the type of link between NAEP and TIMSS has been relegated to the weakest category, moderation, there is the expectation that the two assessments are more or less measuring the same thing, so that it makes sense to assume that the linked results are supplying useful information. While this is hopefully true, the following example demonstrates the danger of conducting a linking study when no one student has taken forms of both assessments.

The two panels in Figure 1 give marginal distributions for pairs of tests to be linked. It is stressed that these are completely fictional data generated to make a point. The solid line in Panel A gives the frequency distribution of scores on a hypothetical test (Test A1) while the dashed line in Panel A gives the frequency distribution for another hypothetical test (Test A2). Consider the possibility of building a useful link between Test A1 and Test A2. Panel B provides hypothetical marginal frequency distributions for two other tests (Test B1 and Test B2) that are also to be linked together.

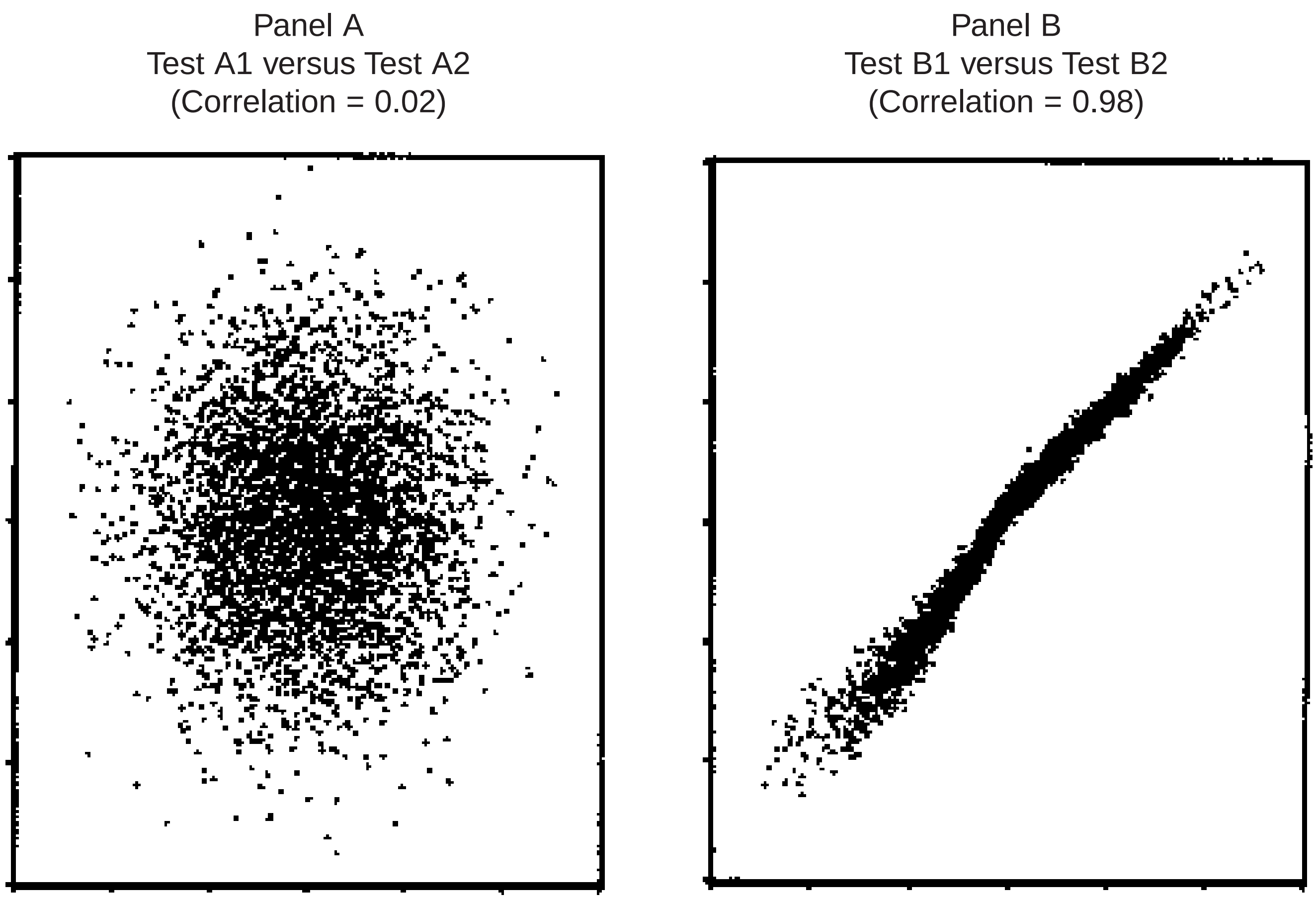
Figure 1. -- Marginal distributions for pairs of hypothetical tests



Note that the two distributions in Panel A are quite similar to each other. With no other information, one would be inclined to expect that the similarity of the marginal distributions for Test A1 and Test A2 indicates a pair of tests that are strongly related to each other and that would provide a strong and reliable linking--a linking accomplished through, for example, matching percentiles or moments of the two distributions. The pair of distributions shown in Panel B are much less similar. On the face of it, one might be much less confident about the possibilities of linking together Test B1 and Test B2.

However, consider Figure 2. Panel A of the figure gives a scatter plot of the scores on Test A1 versus the scores on Test A2. Clearly there is little relation between the scores on one test and the scores on the other--in fact, the between test correlation is 0.02. Tests A1 and A2 are examples of data that have roughly the same marginal distributions but are essentially unrelated to each other. An example might be two tests that have been scaled to have approximately normal marginal distributions but that measure roughly independent abilities (such as physical strength and mathematical achievement). On the other hand, Panel B shows a much tighter relationship (correlation of .98) between scores on Test B1 and Test B2. These two tests are examples of instruments that largely measure the same underlying construct. An example of this might be two mathematics tests built to the same content specifications that have somewhat different marginal distributions.

Figure 2. – Scatter plots of the hypothetical test score pairs (F2.xls)



In the current situation of linking NAEP and TIMSS, it is likely that the two assessments are, to a large extent, measuring comparable constructs. However, if the content match is not perfect, there could be potential problems with the linking.

Several recent studies have established instability of distributional matching procedures and have attributed at least some of the blame to differences in content coverage. For example, Ercikan (1997) used equipercentile equating procedures to link state level results from standardized tests (California Achievement Tests) published by CTB MacMillan/McGraw-Hill to the 1990 NAEP mathematics scale. Four states that participated in the 1990 Trial State Assessment of grade 8 mathematics were included in the study. Various links were established, including within-state linkings for each state and a linking using the combined data from all four states. Ideally, the results from all linkings should be identical, apart from sampling error. Instead, the results showed considerable divergence. In one case, two state-level linkings produced predicted NAEP scores, for the same standardized test score, which differed by 20 NAEP scale points, nearly two-thirds of a within-grade standard deviation on the NAEP scale. At least part of the problem was in terms of the content coverage--the various forms of the standardized tests covered around one-half of the NAEP objectives. As noted by Ercikan: "It is not surprising for CTB's tests to have a smaller set of objectives since NAEP is aimed at surveying a large set of skills and does not test every student on these skills, whereas these tests are used for student-level achievement testing."

Linn and Kiplinger (1994) also investigated the adequacy of distributional matching procedures for linking state-level test results to NAEP. Their study used four states that participated in the 1990 and 1992 grade 8 Trial State Assessments of mathematics. Equipercentile methods were used within each state to convert standardized test results to the NAEP scale using data from 1990. The resulting conversion tables were then used to convert the standardized test results from 1992 to estimated 1992 results for the state on NAEP. The predicted results were then compared to the actual 1992 NAEP results for the state. Additionally, separate equating functions were developed for male and female students for the two states where gender identification was available from the state test data. The results for the gender-based equatings showed differences larger than expected based on sampling error, being as large as one-third of a NAEP within-grade standard deviation of proficiencies. The differences between the estimated and actual 1992 results were small at the median for three of the four states but were larger, and more variable across states, for the lower and upper ends of the distribution. Results from content studies suggested that the content coverage of the NAEP and the statewide tests differ, and this discrepancy might produce some of the between-group and between-time instability of the equating functions. Accordingly, the equating studies were repeated, linking the statewide tests to the NAEP mathematics scale, Numbers and Operations, felt to be in closest match with the content coverage of the statewide tests. However, the between-group and across-time equating functions showed similar instabilities, even with a tighter content match. Linn and Kiplinger concluded that the displayed instability of the linking functions suggested that such linkings are not sufficiently trustworthy to use for other than rough approximations.

Recognizing the importance of overlap of content coverage on the quality of a link, the National Center for Education Statistics (NCES) commissioned a study on the similarity of coverage of the NAEP and TIMSS instruments. Appendix A contains a synopsis of the results of the report by McLaughlin, Dossey, and Stancavage (May 1997) on the content comparisons for mathematics and the report by McLaughlin, Raizen, and Stancavage (April 1997) on the content comparisons for science. Both reports conclude that the NAEP and TIMSS instruments both covered the same subareas of mathematics or science and were "generally sufficiently similar to warrant linkage for global comparisons…but not necessarily for detailed comparisons of areas of student achievement or processes in classrooms."

4. ESTABLISHING THE LINK

As was mentioned earlier, the link between TIMSS and NAEP is based on applying formal equating procedures to match up characteristics of the score distribution of the 1996 NAEP with the characteristics of the score distribution of the 1995 administration of TIMSS in the United States. The simplest link is linear linking, where the NAEP distribution is adjusted so that the mean and standard deviation of the adjusted NAEP proficiencies for the 1996 U.S. population match the mean and standard deviation on the 1995 U.S. TIMSS population.

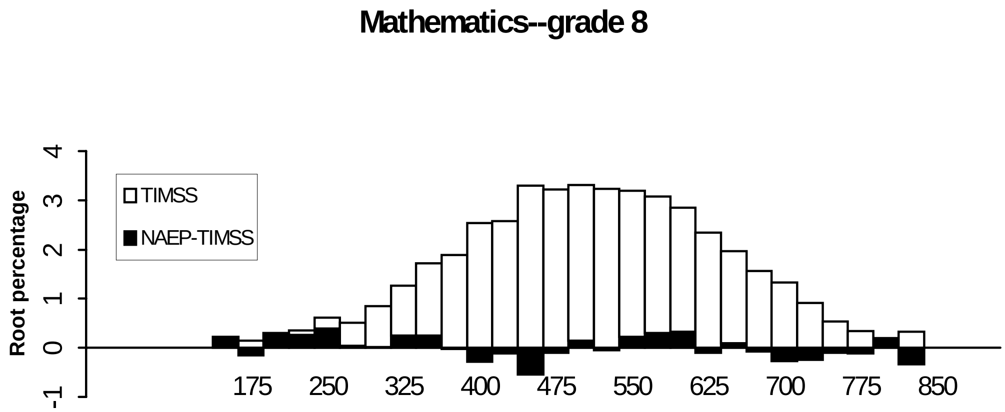
Linear linking assumes that the two distributions have the same characteristics apart from their means and standard deviations. In particular, if linear linking is valid, then after adjustment of the means and standard deviations, the percentiles of the two distributions will be similar. If this assumption is not true, such as when one distribution is more skewed than the other, linear linking may not provide an adequate linking between the two populations.

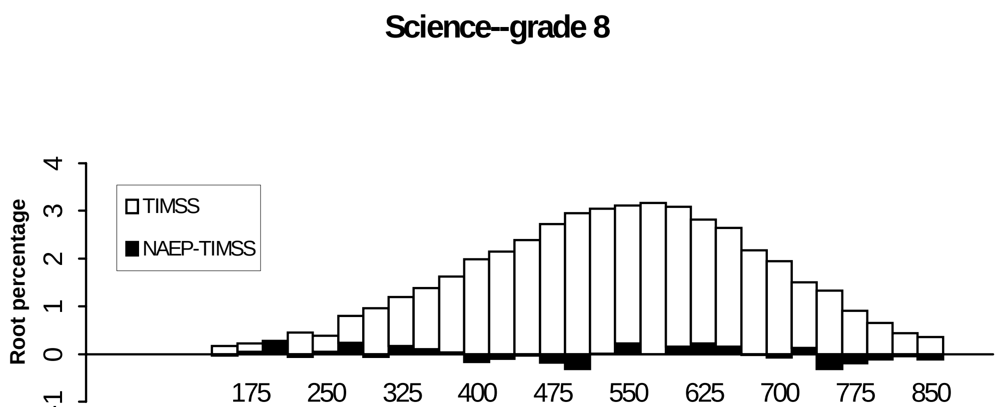
However, comparisons of the distributions of NAEP and TIMSS shows that the two distributions have a similar shape for both mathematics and science at grade 8. The panels in Figure 3 show comparisons of the NAEP and TIMSS distributions for grade 8 mathematics and grade 8 science based on a graphical technique called suspended rootograms (Wainer 1974). The TIMSS scale for a given subject was divided into 25-point intervals, and the percentage of students in each interval was estimated. The matching NAEP scale for that subject was transformed to have the same mean and standard deviation as the TIMSS scale, and the percentage of students with transformed NAEP plausible values within each of the 25-point intervals was estimated. Following Tukey (1977), the square root of these two percentages were compared.[1]

The heights of each of the unshaded bars in each panel of Figure 3 correspond to the square root of the percentage of students in the TIMSS sample in each 25-point interval.

[1] The square root transformation allows for more effective comparisons of percentages when the percentage expected is to vary over the range of intervals.

Figure 3.--Rootograms comparing proficiency distributions for 1995 TIMSS and 1996 NAEP (NAEP distributions adjusted to have same mean and standard deviation as TIMSS)





The shaded bars show the difference in root percentages between the TIMSS and the transformed NAEP distributions. Positive differences indicate intervals where the percentages from the transformed NAEP are lower than those from the TIMSS, while negative differences indicate the reverse. In both cases, the differences in root percentages are small, suggesting that the shape of the NAEP and TIMSS distributions are similar enough to warrant a linear linking.

The linking of TIMSS to NAEP can be expressed by the following equation:

$$\hat{y} = f_T(x, \hat{A}, \hat{B}) = \hat{A} + \hat{B}x, \quad (1)$$

where x is a value on the NAEP scale, $\hat{y}$ is the transformed value of x onto the TIMSS scale and

$$\hat{B} = \frac{\hat{\sigma}_T}{\hat{\sigma}_N} \text{ and } \hat{A} = \hat{\mu}_T - \hat{B}\,\hat{\mu}_N ,$$

where $\hat{\mu}_N$ and $\hat{\sigma}_N$ are, respectively, the mean and standard deviation of the NAEP U.S. sample and $\hat{\mu}_T$ and $\hat{\sigma}_T$ are the mean and standard deviation of the matching TIMSS U.S. sample. The functional notation f_T is meant to stress that $\hat{y}$ is a function of $\hat{A}$ and $\hat{B}$, derived from the U.S. samples, as well as of *x*, determined from some other sample, such as from data from some state that participated in State NAEP.

Table 1 gives the values of the linking functions for the two subjects. As is appropriate for such data, the estimates of the mean and standard deviation for the NAEP and TIMSS samples took the sample design into account by using the sampling weights for estimation. Additionally, as is discussed later, neither NAEP nor TIMSS provide individual proficiencies for students. Rather, both assessments provide five plausible values, each providing a separate, and equivalently good, estimate of the mean and standard deviation. Following accepted NAEP practice (see Mislevy, Johnson, and Muraki 1992), the five estimates of $\hat{\mu}_N$ and $\hat{\sigma}_N$ were paired with the five estimates of $\hat{\mu}_T$ and $\hat{\sigma}_T$ (with the pairing arbitrarily in the order in which the sets of plausible values were on the database). Five values of $\hat{A}$ and $\hat{B}$ were then computed, one set for each pair of plausible values. The final values of $\hat{A}$ and $\hat{B}$ are the average of the five values.

Table 1.--Parameter estimates for the linking of NAEP to TIMSS for grade 8

Subject	$\hat{B} = \hat{\sigma}_T / \hat{\sigma}_N$	$\hat{A} = \hat{\mu}_T - \hat{B}\,\hat{\mu}_N$
Mathematics	2.498	-180.13
Science	3.087	70.62

The difference in the values of the $\hat{A}$ and $\hat{B}$ statistics for the two subjects is partly an artifact of the differences in the metrics used in the NAEP and TIMSS scales. The TIMSS scales for grade 8 mathematics and grade 8 science were set to have a mean of 500 and a standard deviation of 100 across the participating countries. On the other hand, the NAEP mathematics and science scales differed from each other. The NAEP 1996 mathematics scale for grade 8 was linked to a 500-point scale established in 1990 across the grades 4, 8, and 12. The $\hat{A}$ parameter for grade 8 science having a different sign than the parameter for mathematics reflects that the grade 8 NAEP science scales are expressed on a 300-point within-grade metric rather than a 500-point across-grade metric.

5. VARIANCE OF THE LINKING FUNCTION

If the means and standard deviations used to construct the linking function in Equation (1) were known without error, the transformed value $\hat{y}$ could be used in the same manner as an observed value from the TIMSS assessment. That is, one could ignore the fact that $\hat{y}$ was based on a transformation. Thus, for example, if x were the mean proficiency of some state on NAEP, the predicted mean proficiency for that state on the TIMSS would be $\hat{y}$, from Equation (1), and the variance of that predicted TIMSS mean proficiency would be simply

$$Var(\hat{y}) = \hat{B}^2 Var(x). \qquad (2)$$

However, the means and standard deviations used to construct Equation (1) are based on sample data and hence are subject to various sources of variability. This implies that the linking function also is subject to variability and that the variance of $\hat{y}$ given in Equation (2) is too small. There are (at least) four sources of variability that will affect the variance of the linking function. These include the following:

- **Sampling.** NAEP and TIMSS are presented to samples of students.
- **Measurement error.** Both assessments are subject to imprecision in the measurement of proficiencies for individual students.
- **Model misspecification.** The linking function might differ by demographic subgroup.
- **Temporal shift.** TIMSS was conducted in 1995 while NAEP was conducted in 1996.

Each of these components will be considered in turn. Prior to that, however, a general equation needs to be developed for the variance of $\hat{y}$ in terms of the observed data. This equation will serve as a basis for the application of the various components of variance listed earlier.

Equation (1) expressed the linked value $\hat{y}$ as a function f_T of the statistics $\hat{A}$ and $\hat{B}$, determined from the U.S. samples, and of the term *x*, assumed to be a statistic determined from the TIMSS data from a sample different from the U.S. NAEP and TIMSS samples.

Since f_T is a nonlinear function of the various means and standard deviations, a precise derivation of the variance of $\hat{y}$ is not practical. However, since both the NAEP and TIMSS samples are large, Taylor series linearization provides a convenient large sample approximation to the variance:

$$\left[\frac{\partial f_T}{\partial x}\ \frac{\partial f_T}{\partial \hat{A}}\ \frac{\partial f_T}{\partial \hat{B}}\right] \Sigma \left[\frac{\partial f_T}{\partial x}\ \frac{\partial f_T}{\partial \hat{A}}\ \frac{\partial f_T}{\partial \hat{B}}\right]^T,$$

where the partial derivatives are evaluated at x, $\hat{A}$ and $\hat{B}$ respectively, the superscript T denotes matrix transpose, and $\sum$ is the matrix

$$Var([x\,\hat{A}\,\hat{B}]) = \begin{bmatrix} \Sigma_{xx} & 0 & 0 \\ 0 & \Sigma_{AA} & \Sigma_{AB} \\ 0 & \Sigma_{AB} & \Sigma_{BB} \end{bmatrix},$$

where $\Sigma_{xx} = Var(x), \Sigma_{AA} = Var(\hat{A}), \Sigma_{BB} = Var(\hat{B}), \Sigma_{AB} = Cov(\hat{A}, \hat{B}),$ and where the covariances between x and $\hat{A}$ and x and $\hat{B}$ are both zero since x is from a sample independent of those used to construct the estimates of $\hat{A}$ and $\hat{B}$.

Since

$$\left[\frac{\partial f_T}{\partial x}\ \frac{\partial f_T}{\partial \hat{A}}\ \frac{\partial f_T}{\partial \hat{B}}\right] = [\hat{B}\ 1\ x],$$

one has

$$Var(\hat{y}) \approx \hat{B}^2 \Sigma_{xx} + \Sigma_{AA} + 2x\Sigma_{AB} + x^2 \Sigma_{BB}. \tag{3}$$

Estimates of $\Sigma_{AA}, \Sigma_{AB},$ and Σ_{BB} can be obtained by expressing $\hat{A}$ and $\hat{B}$ in terms of $\hat{\mu}_T, \hat{\sigma}_T, \hat{\mu}_N,$ and $\hat{\sigma}_N$ and applying the delta method to the result.

Let $\Xi = \left[\hat{\mu}_T\ \hat{\sigma}_T\ \hat{\mu}_N\ \hat{\sigma}_N\right]$ and $\sum_{\Xi\Xi} = Var\left(\left[\hat{\mu}_T\ \hat{\sigma}_T\ \hat{\mu}_N\ \hat{\sigma}_N\right]\right)$. Since the mean and standard deviation from the NAEP sample is independent of those from the TIMSS sample, and since a sample mean and a sample standard deviation are independent assuming normality, $\sum_{\Xi\Xi}$ can be conveniently and credibly taken as a diagonal matrix with diagonal elements $\left\{Var(\hat{\mu}_T), Var(\hat{\sigma}_T), Var(\hat{\mu}_N), Var(\hat{\sigma}_N)\right\}$. As

$$\begin{bmatrix} \Sigma_{AA} & \Sigma_{AB} \\ \Sigma_{AB} & \Sigma_{BB} \end{bmatrix} \approx \begin{bmatrix} \frac{\partial \hat{A}}{\partial \Xi} \\ \frac{\partial \hat{B}}{\partial \Xi} \end{bmatrix} \Sigma_{\Xi\Xi} \begin{bmatrix} \frac{\partial \hat{A}}{\partial \Xi} \\ \\ \frac{\partial \hat{B}}{\partial \Xi} \end{bmatrix}^T$$

and

$$\frac{\partial \hat{A}}{\partial \Xi} = \begin{bmatrix} 1 & -\frac{\hat{\mu}_N}{\hat{\sigma}_N} & -\frac{\hat{\sigma}_T}{\hat{\sigma}_N} & \frac{\hat{\mu}_N}{\hat{\sigma}_N}\frac{\hat{\sigma}_T}{\hat{\sigma}_N} \end{bmatrix}$$

$$\frac{\partial \hat{B}}{\partial \Xi} = \begin{bmatrix} 0 & \frac{1}{\hat{\sigma}_N} & 0 & -\frac{1}{\hat{\sigma}_N}\frac{\hat{\sigma}_T}{\hat{\sigma}_N} \end{bmatrix},$$

some algebra produces

$$Var(\hat{y}) \approx \hat{B}^2\left\{Var(x) + Var\left(\hat{\mu}_N\right)\right\} + Var\left(\hat{\mu}_T\right)$$
$$+\left(x - \hat{\mu}_N\right)^2 \hat{B}^2\left\{\frac{Var\left(\hat{\sigma}_T\right)}{\hat{\sigma}_T^2} + \frac{Var\left(\hat{\sigma}_N\right)}{\hat{\sigma}_N^2}\right\}. \tag{4}$$

Since $Var(\hat{y})$ depends on x and $Var(x)$, it is convenient to reexpress $Var(\hat{y})$ as

$$Var(\hat{y}) \approx \hat{B}^2 Var(x) + K_0 + K_1 x + K_2 x^2 , \tag{5}$$

where

$$K_0 = \hat{\Sigma}_{AA} = \hat{B}^2 Var\left(\hat{\mu}_N\right) + Var\left(\hat{\mu}_T\right) + \hat{\mu}_N^2 \hat{B}^2\left\{\frac{Var\left(\hat{\sigma}_T\right)}{\sigma_T^2} + \frac{Var\left(\hat{\sigma}_N\right)}{\sigma_N^2}\right\},$$

$$K_1 = 2\hat{\Sigma}_{AB} = -2\hat{\mu}_N \hat{B}^2\left\{\frac{Var\left(\hat{\sigma}_T\right)}{\sigma_T^2} + \frac{Var\left(\hat{\sigma}_N\right)}{\hat{\sigma}_N^2}\right\}, \text{ and}$$

$$K_2 = \hat{\Sigma}_{BB} = \hat{B}^2\left\{\frac{Var\left(\hat{\sigma}_T\right)}{\sigma_T^2} + \frac{Var\left(\hat{\sigma}_N\right)}{\hat{\sigma}_N^2}\right\}.$$

Equation (4) and the equivalent Equation (5) form the basis of the variance estimate of $\hat{y}$. In the subsequent discussion, estimates of the successive components of $Var(\hat{y})$ due to sampling, measurement error, model misspecification, and temporal shift will be derived, accompanied by a comparison of how the standard error of a linked estimate $\hat{y}$ changes.

As observed, the variance of $\hat{y}$ depends on the value of x and the value of $Var(x)$. For convenience, the comparisons of the components of $Var(\hat{y})$ will be for a typical value of $Var(x)$, equal to the variance of the mean for the U.S. NAEP population. Additionally, two values of x will be used. The first, setting x equal to the U.S. overall NAEP mean, provides the smallest possible variance. The second, setting x equal to the 90th percentile of the NAEP proficiency distribution, provides an indication of how large $Var(\hat{y})$ could get. The specific values to be used are shown in Table 2.

Table 2.--Values of *Var(x)* and *x* used for comparing variances of the linked estimate $\hat{y}$ for grade 8

Subject	*Var(x)* of U.S. mean	*x* U.S. mean	*x* U.S. 90th percentile
Mathematics	1.1256	272.0	317.5
Science	0.7826	150.0	191.7

5.1 Component of $Var(\hat{y})$ Due to Sampling

Because both NAEP and TIMSS are samples, the estimates of the statistics $\hat{\mu}_T, \hat{\sigma}_T, \hat{\mu}_N$, and $\hat{\sigma}_N$ are subject to sampling variability. Estimates of sampling variability quantify the stability of the sample-based statistics by estimating how much each statistic would likely change had it been based on a different, but equivalent, sample of students selected in the same manner as the achieved sample.

Traditional analysis procedures often assume that the observed data come from a simple random sample. That is, it is assumed that the observed values from different respondents are independent of each other and that these values are identically distributed. Such assumptions do not hold for data from complex sampling designs such as those used by NAEP and TIMSS. In fact, the complex sample designs of NAEP and TIMSS lead to variance estimates that are larger than the simple random sampling values.

Both assessments use the jackknife procedure (see, e.g., Johnson and Rust 1992) to estimate the variance due to sampling. The aim of the jackknife is to simulate the repeated drawing of samples of individuals according to the specified sample design. Once the various replicate samples are available, it is straightforward to compute the statistic of interest, t, on each sample and from these, obtain a variance estimate. Pairs of first-stage sampling units (FSSUs) are defined to model the sample design as one in which two first-stage units are drawn within each of a number of strata. The sampling variability of any statistic t is estimated as the sum of the components of variability that may be attributed to each of the FSSU pairs. The variance attributed to a particular pair of FSSUs is measured by recomputing the statistic of interest, t, on an altered sample. The i^{th} altered sample is created by randomly designating the two members of the i^{th} FSSU pair as the first and second respectively, eliminating the data from the first FSSU, and replacing the lost information with that from the second FSSU of the pair. The statistic of interest is then recomputed producing the pseudoreplicate estimate t_i.

The component of sampling variability attributable to the i^{th} pair of FSSUs is $(t_i-t)^2$. The estimated sample variance of the statistic t is the sum of these components across the M FSSU pairs:[2]

$$Var_{JK}(t) = \sum_{i=1}^{M} \left(t_i - t\right)^2. \tag{6}$$

To estimate the sampling variance of the linking function, the jackknife procedure is applied to estimate the sampling variance for each of $\hat{\mu}_T, \hat{\sigma}_T, \hat{\mu}_N$, and $\hat{\sigma}_N$.[3] These variance estimates are then plugged into the $Var(\hat{y})$ formula of Equation (4). The results are shown in Table 3, which gives the sampling variance values of the components of $Var(\hat{y})$ in Equation (5).

Table 3.--Components of $Var(\hat{y})$ due to sampling for grade 8

Subject	Component:	K_0	K_1	K_2
	Multiplies:	1	x	x^2
Mathematics		222.63	-1.4284	2.6263E-3

[2] The variance of a statistic based on a stratified sample is the sum of the variances within each stratum, each multiplied by constants reflecting the degrees of freedom of the within-stratum variance and various weighting factors. There is no further division by degrees-of-freedom adjustments. In the case of NAEP and TIMSS, the paired FSSU estimates each have a single degree-of-freedom, and the jac kknife estimates are derived so that the weighting factors are identical to 1. See Wolter (1985, Section 4.5) and Johnson (1989, pages 315-316, 321-322).

[3] Following accepted practice, the jackknife variance estimates were based only on the first plausible value (see Mislevy, Johnson, and Muraki 1992).

Science	120.28	-1.2096	4.0320E-3

Table 4 provides a comparison between the naive estimate of the variance of $\hat{y}$ from Equation (2) and the current estimate, which also accounts for the effect of sampling, for the values of *Var(x)* and *x* given in Table 2. Column headed "Percentage increase" gives the amount by which the addition of the sampling component increases the variance estimate.

Table 4.--Comparison of the naive estimate of $Var(\hat{y})$ with the estimate including sampling error for grade 8

Subject	*x* = U.S. Mean			*x* = U.S. 90th Percentile		
	Naive *Var*	Variance including sampling	Percentage increase	Naive *Var*	Variance including sampling	Percentag e increase
Mathematics	7.02	35.41	404%	7.02	40.85	482%
Science	7.46	37.01	396%	7.46	44.03	490%

These results show that the inclusion of the sampling variability as a component of the variance of the linked estimate can substantially increase that variance estimate. The increases shown here are in accord with similar findings presented by Johnson, Mislevy, and Zwick (1990) who report a study where the traditional estimate of the standard error of a linked estimate of the mean underestimated by a factor of 1.6 a standard error that properly took the sampling variance into account.

5.2 Component of *Var(ŷ)* Due to Measurement Error

Both NAEP and TIMSS use IRT scaling models to summarize their data (see, e.g., Mislevy, Johnson, and Muraki 1992). IRT was developed in the context of measuring individual examinees' abilities. In that setting, each individual is administered enough items to permit a reasonably precise estimation of his or her ability, θ. Because the uncertainty associated with each θ is negligible, the distribution of θ, or the joint distribution of θ with other variables, can then be approximated using individuals' estimated abilities, $\hat{\theta}$, as if they were the true abilities. This approach breaks down in NAEP and TIMSS where each respondent is administered relatively few items in a scaling area. The problem is that the uncertainty associated with individual θs is too large to ignore, and the features of the $\hat{\theta}$ distribution can be seriously biased as estimates of the θ distribution (see Mislevy, Beaton, Kaplan, and Sheehan 1992). "Plausible values" were developed as a way to estimate key population features consistently.

The essential idea of plausible value methodology is to represent what the true proficiency of an individual might have been, had it been observed, with a small number of random draws from an empirically derived distribution of proficiency values that is conditional on the observed values of the assessment items and on background variables for each sampled student. These background variables are called conditioning variables.[4] The random draws from the distribution can be considered to be representative values from the distribution of potential proficiencies for all students in the population with similar characteristics and identical patterns of item responses. The several draws from the distribution are different from each other in a way that quantifies the degree of precision in the underlying distribution of possible proficiencies that could have generated the observed performances on the items.

Both NAEP and TIMSS provide five sets of plausible values. Following Rubin (1987) the plausible values are regarded as five completed data sets, where the m^{th} data set consists of all information about each student along with the m^{th} plausible value for that student. Calculating a statistic, t, based on the m^{th} plausible value across all students provides an estimate, $t_{(m)}$, of t. A better estimate of t is t_M, the mean of the $t_{(m)}$.

The variance of t_M consists of two components. The first component is the variance due to sampling subjects. There are five potential estimates of this variance, one for each plausible value, the m^{th} estimated as the jackknife variance of $t_{(m)}$ according to Equation (6). While the best estimate of the sampling variance of t_M is the average of the five jackknife estimates, due to the heavy computational requirement of computing five jackknife variances, the typical practice used by NAEP and TIMSS is to simply use the jackknife variance for the first plausible value. That practice will be followed in this report.

The second component of the variance of t_M is that which is due to not observing θ. This component is added to the sampling component in Equation (6) and is estimated by

$$Var_{PV}(t_M) = \left(1+\frac{1}{5}\right)\sum_{m=1}^{5}\frac{\left(t_{(m)}-t_M\right)^2}{4}. \qquad (7)$$

[4] In its analysis, TIMSS essentially used a single conditioning variable, grade, within each country. NAEP used several hundred.

Table 5 gives the components of $Var(\hat{y})$ in Equation (5) attributable to measurement error. It can be seen that these components are an order of magnitude smaller than the equivalent components for sampling error shown in Table 3.

Table 5.--Components of $Var(\hat{y})$ due to measurement error for grade 8

Subject	Component: Multiplies:	K_0 1	K_1 x	K_2 x^2
Mathematics		4.511	-0.3286	6.0419E-4
Science		2.304	-0.2977	9.9238E-4

Table 6 provides a comparison between the estimate of the variance of $\hat{y}$ based on the naive estimate plus the term accounting for sampling error and the current estimate, which also accounts for the effect of measurement error. Included in the table is the percentage showing increase in the size of the naive variance that would have been obtained if the measurement error (but not the sampling error) was added to the variance. As in Table 4, the table uses the values of *Var(x)* and *x* from Table 2.

Table 6.--Comparison of the estimate of $Var(\hat{y})$ before and after including measurement error for grade 8

Subject	x = U.S. Mean			x = U.S. 90th Percentile		
	Naive plus sampling	Plus measurement error	Percentage increase over naive due to measurement error	Naive plus sampling	Plus measurement error	Percentage increase over naive due to measurement error
Mathematics	35.41	35.83	6%	40.85	42.52	24%
Science	37.01	37.77	9%	44.03	46.46	32%

It can be seen that, while the measurement error provides a noticeable increase in the size of the naive variance estimate, the bulk of the overall variance is determined by the sampling error component.

5.3 Component of $Var(\hat{y})$ Due to Model Misspecification

As discussed earlier, statistical moderation can produce markedly different links if carried out with different samples of students. To be useful, the link between NAEP and TIMSS should be the same for various subpopulations. That is, the function linking TIMSS to NAEP should be the same for boys as it is for girls, for members of various ethnic categories, and for students in public and private schools. To the extent that the link is consistent across the subpopulations, there is increased confidence in the goodness of the link.

Tables 7A and 7B provide estimates of $\hat{A}$ and $\hat{B}$ from Equation (1) for subpopulations defined by gender, selected race/ethnicity (black, Hispanic), and school type (public, private). In each case, the link was formed using data only from that subpopulation. The table also includes values of $\hat{y}$ for the values of *x* equal to the U.S. mean and the 90th percentile, along with standard errors, computed from the subpopulation data, which include the naive, sampling, and measurement components of variance. Note that the values in the tables are somewhat biased due to the absence of conditioning variables related to these subgroups in the generation of plausible values from the TIMSS at grade 8. It is known (Mislevy, Beaton, Sheehan, and Kaplan 1992) that exclusion of conditioning variables leads to underestimation of differences between subgroup and overall means. Following Mislevy (1993), the bias in the subgroup estimate of $\hat{A}$ is of the order of $(1-\rho)$ times the difference between the subgroup and overall NAEP means, where ρ is the reliability of a form of the TIMSS instrument for the U.S. population, reported to be around .8 to .9. Nevertheless, these functions accurately reflect the *reported* TIMSS distributions for these subgroups.

Table 7A.--Parameters and linked estimates derived within subpopulation--grade 8 mathematics

			x = U.S. mean		*x* = U.S. 90th percentile	
Subpopulation	$\hat{A}$	$\hat{B}$	$\hat{y}$	SE $\hat{y}$	$\hat{y}$	SE $\hat{y}$
Total	-180.13	2.498	499.4	6.0	613.1	6.5
Female	-195.90	2.545	496.5	5.9	612.3	6.7
Male	-168.15	2.466	502.6	6.7	614.8	7.4
Black	-120.16	2.295	504.1	7.5	608.5	10.3
Hispanic	-129.79	2.313	499.3	7.6	604.6	11.7
Private	-256.63	2.702	478.3	12.8	601.3	14.2
Public	-176.55	2.493	501.7	6.1	615.1	6.7

Table 7B.--Parameters and linked estimates derived within subpopulation--grade 8 science

Subpopulation	$\hat{A}$	$\hat{B}$	x = U.S. mean $\hat{y}$	x = U.S. mean SE $\hat{y}$	x = U.S. 90th percentile $\hat{y}$	x = U.S. 90th percentile SE $\hat{y}$
Total	70.62	3.087	533.7	6.1	662.4	6.8
Female	77.07	3.024	530.6	7.0	656.7	7.8
Male	69.15	3.119	537.0	6.6	667.1	7.6
Black	78.06	3.138	548.8	8.1	679.7	12.0
Hispanic	101.55	2.893	535.5	7.6	656.2	10.4
Private	26.91	3.214	508.9	13.5	642.9	14.9
Public	72.44	3.096	536.8	6.3	665.9	7.0

On examining Tables 7A and 7B, some variability exists in the parameter estimates across subgroups, particularly for the intercepts, $\hat{A}$. Additionally, the estimates of $\hat{y}$ vary somewhat. However, the differences in $\hat{y}$ between subgroups and between a subgroup and the total population is invariably nonsignificant. This nonsignificance would appear to sanction the use of the overall linking function for the subgroups examined here. Nevertheless, the issue of the consequence of variability of the linking function across subgroups will be explored.

In essence, variability of the linking function across subpopulations is an indication of model misspecification. That is, the linking function needs to include terms related to specific subpopulations. This was the approach adopted by Williams, et al., (1995) in their linking of NAEP to the North Carolina End of Grade (NC-EOG) mathematics test. In their study, they noted different relationships between the NC-EOG and NAEP by gender and race. These differences were accounted for through the use of a prediction equation that included intercepts and slopes for those groups. A similar approach was adopted by Bloxom, et al., (1995) in a linkage of scaled scores on the Armed Services Vocational Aptitude Battery (ASVAB) with NAEP.

However, both the NC-EOG and the ASVAB situations involved the construction of a linking function that would then be applied to individuals who are plausible members of the same population. That is, the NC-EOG to NAEP link was derived on a sample of North Carolina students for application in North Carolina--the ASVAB to NAEP link was based on a sample of the population to which the ASVAB is normally administered.

This is less clearly the case for the linking of NAEP to TIMSS, where the linking is performed on the combined U.S. population, but the results are to be applied to separate states. Instead, it is reasonable to view the instability of the linking function across subgroups as a potential component of variance of the linking function.

Suppose one has N subpopulations, which collectively constitute a partitioning of the population. For specificity, the 12 subpopulations formed by crossing gender by race/ethnicity (black, Hispanic, white+Asian+other) by school type (public, private) will be used. The selection of these specific subpopulations was made because they are key subgroups, and because the linking function could potentially differ across the subgroups.

For subpopulation s, suppose the linking function is

$$\hat{y}_S = \hat{A}_S + \hat{B}_S x,$$

where $\hat{A}_S$ and $\hat{B}_S$ are estimated solely from the data for subpopulation s. From Equation (3), one has

$$Var(\hat{y}_s) \approx \hat{B}_s^2 Var(x) + Var(\hat{A}_s) + 2xCov(\hat{A}_s, \hat{B}_s) + x^2 Var(\hat{B}_s). \tag{8}$$

Notice that $\hat{y}_S$ can be viewed as the conditional expectation of the linked estimate, conditional on membership in subpopulation s. Further, $Var(\hat{y}_s)$ in Equation (8) is the conditional variance. To emphasize this conditional relation, write

$$\hat{y}_S = E\left[\hat{y} \;\;|\;\; S = s\right] \text{ and } Var(\hat{y}) \;=\; Var\left[\hat{y} \;\;|\;\; S = s\right],$$

where E denotes expectation and S stands for subpopulation. By standard probability theory, the following representation for the unconditional variance of $\hat{y}$ occurs.

$$Var(\hat{y}) = E_S\left[Var\left[\hat{y} \;\;|\;\; S\right]\right] + Var_S\left[E\left[\hat{y} \;\;|\;\; S\right]\right], \tag{9}$$

where E_S and Var_S denote the expectation and variance taken across subpopulations. The first term of Equation (9) is

$$E_S\left[\hat{B}_S^2 Var(x) + Var\left(\hat{A}_S\right) + 2xCov\left(\hat{A}_S, \hat{B}_S\right) + x^2 Var\left(\hat{B}_S\right)\right], \tag{10}$$

where, for example,

$$E_S[\hat{B}_s^2] = \sum_{s=1}^{N} rf_s \hat{B}_s^2 \tag{11}$$

is the weighted average of the subpopulation values of $\hat{B}_S^2$, weighting by rf_s, the relative frequency of subpopulation *s* in the whole population.

Approximating Equation (11) by $\hat{B}^2$, the value for the complete population, and performing similar substitutions for the remaining terms in Equation (10) means that Equation (10) can be approximated by Equation (3). Consequently, Equation (9) becomes

$$\begin{aligned} Var(\hat{y}) \approx\ & \hat{B}^2 Var(x) + Var(\hat{A}) + 2xCov(\hat{A},\hat{B}) + x^2 Var(\hat{B}) \\ & + Var_S[E[\hat{y}|S]]. \end{aligned} \tag{12}$$

Thus, the variance of $\hat{y}$ has acquired a second component, $Var_S\left[E\left[y \mid S\right]\right]$, which measures instability (or mean-squared error) due to the variability of the linking function across subpopulations. The value of this component is

$$Var_S\left[E\left[\hat{y}|S\right]\right] = \sum_s rf_S\left(A_S + B_S x - \overline{A} - \overline{B}x\right)^2, \tag{13}$$

where A_s and B_s are the population values of the intercept and slope for subpopulation *s* and $\overline{A}$ and $\overline{B}$ are their averages across the subpopulations. An estimate of this component is

$$Var_S\left[E\left[\hat{y}|S\right]\right] = \sum_s rf_S\left(\hat{A}_S + \hat{B}_S x - \hat{A} - \hat{B}x\right)^2. \tag{14}$$

Note that even if $A_S = \overline{A}$ and $B_S = \overline{B}$ for all *s*, so that the variance component in Equation (13) is equal to zero, the estimate from Equation (14) will be nonzero simply because it is based on sample values. Consequently, a correction to the estimate must be applied. Normal theory with linear statistics gives the expectation of $V\hat{a}r_S$ as $(\mathrm{N}\,[\mathrm{d/D}] - 1)\sigma^2_{\mathrm{JKPV}}$ where *N* is the number of subpopulations, equal to 12 in this case, d/D is the ratio of the average design effect (defined below) within a subpopulation, D is the design effect for the whole population, and

$$\sigma^2_{\mathrm{JKPV}} = Var\left(\hat{A}\right) + 2xCov\left(\hat{A},\hat{B}\right) + x^2 Var\left(\hat{B}\right) \tag{15}$$

with estimate $\hat{\sigma}^2_{\mathrm{JKPV}}$ that includes both the sampling and measurement error components.

The design effect measures the impact of complex sample data collection designs, such as used by NAEP and TIMSS, on the variance of a statistic. Specifically, the design effect is the ratio of the actual variance of the statistic, taking the data collection design into account, to the equivalent variance estimate obtained by ignoring the complex nature of the data caused by the sample design and by measurement error. Typically, the design effect is larger than 1. Additionally, it is possible that the design effects for subpopulations are smaller than those for the total population, implying that the ratio, d/D, could be smaller than 1. Experience based on NAEP, TIMSS, and other complex data sets suggests that the ratio could be as small as 0.5, implying that the multiplier for the expected value of the estimate of variance due to model misspecification could be as small as 5.

Table 8 gives the values of $\hat{\sigma}^2_{\text{JKPV}}$ and $V\hat{a}r_S$ for the values of *Var(x)* and *x* in Table 2. We see that in every case, $V\hat{a}r_s / \hat{\sigma}^2_{\text{JKPV}}$ is smaller than the factor 5, so that the estimate of the variance due to model misspecification is smaller than a reasonable estimate of its expected value $(\text{N}[\text{d/D}]-1)\sigma^2_{\text{JKPV}}$. Furthermore, this implies that the variance estimate is much smaller than a critical value for, say, the 95% level of significance, which, for 5 degrees of freedom is about $11\sigma^2_{\text{JKPV}}$. This indicates that the variance estimate does not exceed the value to be expected due to sample and imputation variability under the hypothesis that the true component Var_S of Equation (13) is zero. Consequently, component due to model misspecification in the variance of the link is taken as zero.

Table 8.--Comparison of the component of variance due to model misspecification estimated by $V\hat{a}r_s$ with its expected value estimated by $\hat{\sigma}^2_{\text{JKPV}}$ for grade 8

Subject	*x* = U.S. mean			*x* = U.S. 90th percentile		
	$V\hat{a}r_S$	$\hat{\sigma}^2_{\text{JKPV}}$	Ratio	$V\hat{a}r_S$	$\hat{\sigma}^2_{\text{JKPV}}$	Ratio
Mathematics	101.3	28.8	3.5	82.1	35.5	2.3
Science	113.7	30.3	3.8	119.5	39.0	3.1

5.4 Component of $Var(\hat{y})$ Due to Temporal Shift

One disadvantage with using the actual TIMSS and NAEP data to construct a link is due to the fact that TIMSS and NAEP were administered in different years. Any procedure that attempts to link 1996 NAEP scores to 1995 TIMSS scores, based only on the 1995 TIMSS and the 1996 NAEP samples, will suffer from an unavoidable confounding of secular change--the within-instrument change in achievement over time--with effects due to differences between the instruments.

Estimation of the temporal effect of linking 1996 data to 1995 data is problematic, since any direct measure is lacking of the change in either NAEP or TIMSS measures of achievement between the 2 years. It is possible, by using related data (the NAEP long-term trend data from 1994 and 1996), to estimate the potential change in achievement as measured by NAEP between 1995 and 1996. As in every other case, it is impossible to estimate what the change in achievement would be in the TIMSS countries in 1996.

Adjustment for temporal trend would potentially adjust $\hat{\mu}_N$ of the linking function by a prediction of the difference between the NAEP mean in 1996 and what the mean would have been in 1995. This difference is estimated by

$$\Delta = \frac{\left(\hat{\mu}_{96} - \hat{\mu}_{94}\right)}{2} \frac{\hat{\sigma}_N}{\sqrt{\frac{1}{2}\left(\hat{\sigma}_{96}^2 + \hat{\sigma}_{94}^2\right)}}, \quad (16)$$

where $\hat{\mu}_{96}$ and $\hat{\sigma}_{96}$ are the mean and standard deviation from the 1996 NAEP long-term trend assessment and $\hat{\mu}_{94}$ and $\hat{\sigma}_{94}$ are the equivalent values from the 1994 long-term trend assessment. The second term in Equation (16) adjusts for the fact that the standard deviations for the main NAEP assessments differ from those for the long-term trend assessments. The square of Equation (16) is added to the variance of $\hat{\mu}_N$ in the estimate of the variance of the linking function. Since the variance of $\hat{\mu}_N$ is multiplied by $\hat{B}^2$ in Equation (5), the value of this component of $Var(\hat{y})$ is $\hat{B}^2\Delta^2$ and is constant for all *x*. The value of this component for the two subjects are shown in Table 9.

Table 9.--Value of the component of $Var(\hat{y})$ due to temporal shift for grade 8

Subject	$\hat{B}^2\Delta^2$
Mathematics	0.000
Science	0.942

6. TOTAL VARIANCE OF THE LINKING FUNCTION

Table 10 collects together all of the components of the variance of $\hat{y}$. Shown in the table for the values of *Var(x)* and *x* from Table 2, are the overall variance of $\hat{y}$, the standard error of $\hat{y}$, and the percentage of the total variance attributable to the naive variance estimate, to the sampling variance component, to the measurement error component, and to the component due to temporal shift. The number of times that the total variance is larger than the naive variance is 100 divided by the percentage of total variance attributable to the naive variance. Consequently, the total variance is at least 5 times larger than the naive variance, and so, the standard error with all components included will more than double that of the naive standard error. The sampling component is by far the most important component of the variance, accounting for 76 to 80 percent of the total.

Table 10.--Total variance of $\hat{y}$ with percentages due to components for grade 8

Subject		Total $Var(\hat{y})$	Standard Error ($\hat{y}$)	Percentage of total variance due to:			
				Naive *Var*	Sampling	Measure-ment error	Tem-poral shift
Mathematics	x = U.S. mean	35.83	5.99	20 %	79 %	1 %	0.0 %
	x = U.S. 90th percentile	42.52	6.52	17 %	80 %	4 %	0.0 %
Science	x = U.S. mean	38.71	6.22	19 %	76 %	2 %	2.4 %
	x = U.S. 90th percentile	47.40	6.88	16 %	77 %	5 %	2.0 %

7. LINKING FUNCTION FOR THE PUBLIC SCHOOL STATE DATA

Although the component for model misspecification was tested to be equal to zero, there is still some minor, albeit nonsignificant, difference in results between a link based on students in all schools and that based on public schools only. Since the major reporting aim of the link was to relate state results from the State NAEP to country results from TIMSS, since the published NAEP State results pertain to public school students only, and since the TIMSS private school samples were small and unstable, it was appropriate to use the public school data for this purpose.

The parameters used for linking public school State NAEP results to TIMSS are shown in Table 11. Table 12 provides the components of the variance of the linked estimate $\hat{y}$ from Equation (5). These components include the variances due to sampling, measurement error, and temporal shift. Each of these variances was computed in the manner described in previous sections, with the exception that all computations were based on the data from public school students only.

Table 11.--Parameter estimates for the linking of public school NAEP to TIMSS for grade 8

Subject	$\hat{B} = \hat{\sigma}_T / \hat{\sigma}_N$	$\hat{A} = \hat{\mu}_T - \hat{B}\mu_N$
Mathematics	2.493	-176.55
Science	3.096	72.44

Table 12.--Components of $Var(\hat{y})$ for the public school link for grade 8

Subject	Component:	$\hat{B}^2$	K_0	K_1	K_2
	Multiplies:	$Var(x)$	1	x	x^2
Mathematics		6.217	285.45	-1.8850	3.4841E-3
Science		9.582	141.78	-1.4587	4.9120E-3

8. LINKING FUNCTION FOR INTERNATIONAL MARKER LEVELS

In addition to reporting results in terms of means, the TIMSS reports also portray the performance of students in each country in terms of the percentages of students exceeding each of three marker levels. Since the TIMSS assessments do not have any prespecified performance standards, three marker levels were chosen on the basis of the combined performance of all students participating in the TIMSS. These marker levels corresponded to the 90th, 75th, and 50th percentiles of the combined distribution of proficiency across all participating countries for a given subject and grade. These marker levels are named, respectively, the Top 10 Percent, the Top Quarter, and the Top Half, and are given in Table 13.

Table 13.--International marker levels of achievement for grade 8

Subject	Top 10 Percent	Top Quarter	Top Half
Mathematics	656	587	509
Science	655	592	522

The predicted proportion of individuals in a given state that would exceed any given international marker level comes from determining a predicted value on the NAEP scale corresponding to the cutpoint on the TIMSS scale and then computing the proportion of students in that state whose NAEP plausible values exceed that NAEP cutpoint.

That is, one begins by linking TIMSS to NAEP. The equation for this linking is easily obtained by inverting Equation (1). Let y be a specified marker-level cutpoint, and let $\hat{x}$ be the predicted cutpoint on the NAEP scale. The connection between y and $\hat{x}$ is

$$\hat{x} = \hat{C} + \hat{D}y , \qquad (17)$$

where

$$\hat{D} = \frac{\hat{\sigma}_N}{\hat{\sigma}_T} \quad \text{and} \quad \hat{C} = \hat{\mu}_N - \hat{D}\,\hat{\mu}_T .$$

The variance of $\hat{x}$ is computed in a manner exactly analogous to that of the variance of $\hat{y}$. In fact, the equations for the variance can be determined from the previous derivations by making the following substitutions:

- $\hat{x}$ and $\hat{y}$ and *y* for *x*
- $\hat{\mu}_N$ and $\hat{\sigma}_N$ for $\hat{\mu}_T$ and $\hat{\sigma}_T$ and vice versa
- $\hat{C}$ for $\hat{A}$ and $\hat{D}$ for $\hat{B}$

The sole exception to this rule is that the marker level cutpoint, *y*, is taken in the TIMSS reports as a fixed value so that *Var(y)* has been taken to be 0. Following this convention, the variance of $\hat{x}$ is

$$Var(\hat{x}) \approx Var(\hat{C}) + 2yCov(\hat{C},\hat{D}) + y^2 Var(\hat{D}), \qquad (18)$$

where the terms in Equation (18) include the components of variance due to sampling, measurement error, and temporal shift.

Table 14 gives the values of the predicted NAEP cutpoint, $\hat{x}$, and its standard error, for the three marker levels. Since these results are to be used for the reporting of public school state results, the linking was accomplished using the public school data.

Table 14.--Predicted NAEP cutpoints and their standard errors corresponding to the TIMSS marker levels--public school linking for grade 8

Subject	Top 10 Percent		Top Quarter		Top Half	
	$\hat{x}$	SE	$\hat{x}$	SE	$\hat{x}$	SE
Mathematics	333.9	2.7	306.2	2.4	274.9	2.2
Science	188.2	2.1	167.8	1.9	145.2	1.8

Observe that, although the international marker levels are similar for grade 8 mathematics and science, the predicted NAEP cutpoints differ significantly. This is because of the differences in the metrics used in the NAEP and TIMSS scales. The TIMSS scales for each of the subjects were set to have a mean of 500 and a standard deviation of 100 across the participating countries. Conversely, the metric for the NAEP mathematics scale is a 500-point scale across the grades 4, 8, and 12 while the grade 8 science scale is expressed on a 300-point, within-grade metric.

Confidence intervals for the predicted proportion of students above a particular marker level are obtained by first identifying the lower and upper bound of a confidence interval on $\hat{x}$ as $\hat{x}_{LO} = \hat{x} - 2\,\mathrm{SE}(\hat{x})$ and $\hat{x}_{HI} = \hat{x} + 2\,\mathrm{SE}(\hat{x})$, where SE($\hat{x}$) is the standard error of $\hat{x}$. For each of these cutpoints, one computes $\hat{P}_{LO}$ and $\hat{P}_{HI}$, the estimates of the proportion of students in a given state exceeding the two cutpoints. Each of these estimated proportions is accompanied by a standard error, which accounts for the effects of sampling and imprecision of measurement in estimating that proportion for the given state.

Since $\hat{x}_{LO}$ is less than $\hat{x}_{HI}$ and since the proportion, $\hat{P}_{LO}$, exceeding the lower cutpoint cannot be smaller than the proportion, $\hat{P}_{HI}$, exceeding the higher cutpoint, a conservative confidence interval about the predicted proportion in the state exceeding the marker level is

$$\left(\hat{P}_{HI} - 2\,SE\left(\hat{P}_{HI}\right),\ \hat{P}_{LO} + 2\,SE\left(\hat{P}_{LO}\right)\right). \qquad (19)$$

9. VALIDATION

One state, Minnesota, participated in a state-level NAEP in 1996 and a state-level TIMSS in 1995 at grade 8. Consequently, these data provide a validation of the linking functions since they are independent of the data used to construct the links. Specifically, the linking functions developed from the U.S. National TIMSS and NAEP results can be used to convert the State NAEP results to projected results for that state on TIMSS. These projected results can then be compared with the actual TIMSS results.

Table 15 shows the results of applying the public school linking functions of Table 10 to the grade 8 public school data from Minnesota. The first two columns of Table 15 give the actual mean proficiency for the state from the TIMSS assessment. Accompanying this mean is its standard error and a 95 percent confidence interval. The last two columns of the table give the predicted TIMSS mean, its standard error, and 95 percent confidence interval, using the linking functions in Table 10 and the variance components in Table 11.

Table 16 provides comparisons between the actual TIMSS results and the results predicted from NAEP in terms of the percentages above the TIMSS marker levels. Since the 95 percent confidence interval for the predicted percentages from Equation 19 are nonsymmetric, all results are expressed in terms of confidence intervals.

Table 15.-- Comparison of actual TIMSS mean proficiency with predicted TIMSS proficiency from NAEP results (data are from public schools only) for grade 8

State	Subject	Actual TIMSS results		Predicted TIMSS results	
		mean (SE)	95 percent confidence interval	mean (SE)	95 percent confidence interval
Minnesota	Mathematics	528.9 (8.4)	512.1 - 545.7	532 (6.4)	519.2 - 544.8
Minnesota	Science	568.3 (7.3)	553.7 - 582.9	563 (7.1)	548.8 - 577.2

Table 16.--Ninety-five percent confidence intervals for the percentages above the TIMSS marker levels based on actual TIMSS data and on predictions from NAEP (data are from public schools only) for grade 8

State	Subject	TIMSS results	Top 10 Percent level	Top Quarter level	Top Half level
Minnesota	Mathematics	Actual	3.2 - 11.2	17.5 - 32.7	49.2 - 65.6
		Predicted	2.7 - 10.0	18.6 - 35.4	53.5 - 70.5
Minnesota	Science	Actual	14.8 - 24.8	33.8 - 47.4	61.2 - 73.6
		Predicted	8.9 - 22.7	31.3 - 48.5	62.0 - 76.6

The agreement between the actual TIMSS results and the results predicted from NAEP adds credibility to the linkage. Not only do the confidence intervals for the predicted TIMSS mean proficiencies contain the actual TIMSS means, and vice versa, but the intervals themselves substantially overlap. That the actual and predicted TIMSS results are based on different students in largely different schools and in different years and still show this degree of overlap provides support to the usefulness of the predicted grade 8 TIMSS results.[5]

An interesting feature of Table 15 deserves some comment. Since $Var(\hat{y})$ contains many components, the reader might be surprised that the standard errors for the actual TIMSS means are slightly larger than those of the means predicted from NAEP. This is contrary to the fact that the standard error of the predicted mean includes many additional components beyond the naive value $\hat{B}\,SE(x)$. In fact, using the components from Table 11, the error due to linking roughly doubles the naive standard error in this particular analysis.

The standard error of the predicted TIMSS mean is about the same size as that of the actual mean largely because of the difference in the sample sizes for the NAEP and TIMSS assessments in Minnesota. While the number of grade 8 public school students in Minnesota assessed with either NAEP mathematics or science is around 2,400, only around 900 public school students were assessed in that state with TIMSS mathematics and science. All other things being equal, the standard error of a mean based on 900 students will be roughly 1.7 times larger than the standard error of a mean based on 2,400

[5] Additional support for the grade 8 linkages comes from the preliminary results from the data from the two states, Missouri and Oregon, which participated in State NAEP at grade 8 in 1996 and gathered state representative TIMSS data in 1997. An application of the linkage functions to these data lead to predicted TIMSS means within acceptable statistical bounds of the actual TIMSS results.

students. Thus the increased variance of the predicted TIMSS mean is offset by the larger sample size for the NAEP data.[6]

The validation data provide an indication of how much information one can obtain from a linking study like this one. Loosely speaking, predicted TIMSS results from this study based on NAEP samples of 2,400 students are about as reliable as actual TIMSS results based on 900 students. Put another way, this particular statistical moderation study, where there was no direct information about how the same student might perform on both assessments, provides, from the NAEP assessment, information about the performance of students on the TIMSS assessment that is nearly three times less reliable than the information that would be obtained from a direct administration of TIMSS.

[6] The TIMSS sample design, which selected intact classrooms, also leads to somewhat larger standard errors than an equivalently sized NAEP sample, which randomly selects students within a school.

10. RESULTS

The linking functions developed in previous sections of this report can be applied to the data from the states that participated in the 1996 NAEP state assessment to enable approximate comparisons between those states and the countries that participated in TIMSS. State-level results are presented both for predicted TIMSS means and for predicted percentages above the TIMSS marker levels.

Table 17 provides the state-level predicted TIMSS mathematics and science means, based on the state-level NAEP data, for grade 8 public school data. The rows of the table correspond to the states and jurisdictions (henceforth called jurisdictions), arranged in alphabetic order. Adjacent to the jurisdiction names are the predicted TIMSS means, along with their standard errors, which take into account all components of variance discussed in this report. Table 18 provides the mathematics and science TIMSS means for the countries that participated in TIMSS. These countries are also arranged in alphabetic order. Adjacent to the country names are the values of the TIMSS means, accompanied by their standard errors, which take into account variability due to sampling and measurement error. Note that the means for the TIMSS countries reported in this table differ somewhat from those in the published TIMSS reports. This is because the means presented in the TIMSS reports are based on the first plausible value only. In contrast, the means presented in Table 18 and their standard errors use all five plausible values.

Note that the SOLE purpose of the data in these tables is to allow the comparison of predicted TIMSS means for individual jurisdictions with the actual TIMSS means of individual countries. It is NOT recommended that data in these tables be used to compare performance between jurisdictions or between countries (this is why the data for the jurisdictions and nations are arranged in alphabetical order). The proper between jurisdiction comparisons are provided in the NAEP reports (O'Sullivan, Reese, and Mazzeo, 1997; Reese, Miller, Mazzeo, and Dossey, 1997); while the proper between country comparisons are provided in the TIMSS reports (Beaton, Mullis, Martin, Gonzalez, Kelly, and Smith, 1996; Beaton, Martin, Mullis, Gonzalez, Smith, and Kelly, 1996).

Appendices C and D (abstracted from Johnson and Siegendorf, 1998) provide the comparisons of the estimated TIMSS scores for each jurisdiction with the actual TIMSS scores for the countries that participated in TIMSS. Appendix C presents one-page profiles for each jurisdiction participating in NAEP grade 8 mathematics while Appendix D provides profiles for grade 8 science. Each

Table 17. --Estimated TIMSS scores from public school, 1996 NAEP data for states and jurisdictions: Grade 8 mathematics and science

Mathematics			Science		
State/Jurisdiction	Mean	Standard Error	State/Jurisdiction	Mean	Standard Error
Alabama	463	7.7	Alabama	502	7.7
(Alaska)	516	7.1	(Alaska)	545	7.1
Arizona	491	6.8	Arizona	521	7.6
(Arkansas)	476	6.7	(Arkansas)	519	7.1
California	479	7.3	California	500	7.9
Colorado	511	6.2	Colorado	551	6.4
Connecticut	521	6.2	Connecticut	553	7.1
DDESS	494	8.0	DDESS	545	6.7
Delaware	488	6.0	Delaware	511	6.3
District of Columbia	404	6.8	District of Columbia	422	6.7
DoDDS	509	6.0	DoDDS	553	6.2
Florida	481	7.1	Florida	512	7.6
Georgia	478	6.8	Georgia	511	7.3
Guam	418	7.2	Guam	444	7.0
Hawaii	477	6.1	Hawaii	490	6.3
Indiana	510	6.5	Indiana	546	7.2
(Iowa)	532	6.4	(Iowa)	562	6.9
Kentucky	488	6.2	Kentucky	528	6.9
Louisiana	453	6.9	Louisiana	482	7.7
Maine	532	6.4	Maine	577	6.6
(Maryland)	496	7.6	(Maryland)	522	7.4
Massachusetts	516	7.0	Massachusetts	558	7.3
(Michigan)	514	7.1	(Michigan)	547	7.2
Minnesota	532	6.4	Minnesota	563	7.1
Mississippi	447	6.4	Mississippi	484	7.3
Missouri	505	6.5	Missouri	540	6.9
(Montana)	529	6.4	(Montana)	574	6.9
Nebraska	529	6.1	Nebraska	559	6.6
New Mexico	477	6.3	New Mexico	509	6.6
(New York)	497	7.0	(New York)	523	7.6
North Carolina	491	6.5	North Carolina	526	6.9
North Dakota	532	6.0	North Dakota	575	6.4
Oregon	512	6.7	Oregon	552	7.6
Rhode Island	494	6.0	Rhode Island	533	6.3
(South Carolina)	474	6.7	(South Carolina)	501	7.4
Tennessee	479	6.6	Tennessee	515	8.0
Texas	497	6.5	Texas	522	8.0
Utah	514	6.1	Utah	555	6.3
(Vermont)	520	6.1	(Vermont)	559	6.6
Virginia	496	6.8	Virginia	535	7.6
Washington	512	6.4	Washington	536	7.1
West Virginia	484	6.1	West Virginia	528	6.4
(Wisconsin)	529	6.7	(Wisconsin)	567	7.9
Wyoming	509	6.0	Wyoming	560	6.1

(Jurisdiction) indicates that the state or jurisdiction did not satisfy one or more of the sample participation guidelines. See Appendix B.
DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools
DoDDS: Department of Defense Dependents Schools (Overseas)
SOURCE: Tabulations based on data from the IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Table 18. --Actual 1995 TIMSS scores for countries: Grade 8 mathematics and science

	Mathematics			Science	
Country	Mean	Standard Error	Country	Mean	Standard Error
(Australia)	529	4.1	(Australia)	545	3.9
(Austria)	540	3.1	(Austria)	558	3.9
Belgium - Flemish	565	5.7	Belgium-Flemish	549	4.3
(Belgium - French)	526	3.6	(Belgium - French)	472	3.2
(Bulgaria)	539	6.3	(Bulgaria)	565	5.3
Canada	527	2.5	Canada	531	2.6
(Colombia)	385	3.5	(Colombia)	411	4.3
Cyprus	474	2.0	Cyprus	463	2.1
Czech Republic	564	5.0	Czech Republic	575	4.6
(Denmark)	503	2.9	(Denmark)	479	3.4
(England)	505	2.7	(England)	553	3.5
France	538	2.9	France	497	2.8
(Germany)	508	4.6	(Germany)	532	5.0
(Greece)	484	3.1	(Greece)	497	2.4
Hong Kong	588	6.5	Hong Kong	522	4.7
Hungary	538	3.3	Hungary	553	2.9
Iceland	488	4.8	Iceland	494	4.3
Iran, Islamic Republic	430	2.4	Iran, Islamic Republic	469	2.5
Ireland	527	5.2	Ireland	537	4.7
(Israel)	521	6.4	(Israel)	525	5.8
Japan	605	2.0	Japan	571	1.7
Korea	608	2.6	Korea	565	2.3
(Kuwait)	391	2.6	(Kuwait)	428	3.9
(Latvia-LSS)	494	3.3	(Latvia-LSS)	485	2.8
(Lithuania)	478	3.6	(Lithuania)	476	3.5
(Netherlands)	541	6.7	(Netherlands)	561	5.1
New Zealand	508	4.5	New Zealand	526	4.4
Norway	503	2.3	Norway	527	2.0
Portugal	455	2.5	Portugal	481	2.5
(Romania)	481	4.1	(Romania)	485	4.8
Russian Federation	536	5.3	Russian Federation	538	4.0
Singapore	642	5.0	Singapore	607	5.6
(Scotland)	498	5.5	(Scotland)	515	5.2
Slovak Republic	547	3.3	Slovak Republic	545	3.4
(Slovenia)	540	3.2	(Slovenia)	560	2.9
(South Africa)	354	4.5	(South Africa)	326	6.8
Spain	488	2.1	Spain	517	2.0
Sweden	519	3.1	Sweden	535	3.0
(Switzerland)	546	2.9	(Switzerland)	522	2.7
(Thailand)	522	5.8	(Thailand)	526	3.8
United States	499	4.7	United States	534	4.8

(Jurisdiction) indicates that the country did not satisfy one or more of the sample participation guidelines. See Appendix B.
Latvia-LSS: Latvian-speaking schools only
Average scores for the nations may differ from IEA reports because of the way averages were computed.
SOURCE: Tabulations based on data from the IEA Third International Mathematics and Science Study (TIMSS), 1994-1995.

page displays a table showing how a particular jurisdiction would perform in comparison to the 41 countries that participated in TIMSS at grade 8. Each table indicates whether the ACTUAL mean scores of each participating TIMSS country are significantly higher than, not significantly different than, or significantly lower than the ESTIMATED mean performance of grade 8 public school students in that particular jurisdiction. The significance of the difference of the estimated mean of the given jurisdiction and the actual means of the TIMSS countries are based on a Bonferroni multiple comparisons procedure that holds to 5 percent the probability of erroneously declaring any of the country means significantly different from the chosen jurisdiction's predicted mean.

Generally speaking, the state-level predicted TIMSS means have a somewhat smaller range than do the country-level TIMSS means and are distributed about the U.S. TIMSS mean. There is considerable variability in the results: The highest performing states have predicted means significantly higher than the TIMSS means of at least one-half of the countries, while the lowest performing states have predicted means significantly lower than the TIMSS means of at least half of the countries.

Tables 19 and 20 provide, in alphabetical order, the state-level predicted results in terms of the TIMSS international marker levels for mathematics and science, respectively. The predicted 95 percent confidence intervals for the percentages above the marker levels were computed for each jurisdiction using Equation (19). Also included in the tables is a point estimate of the percentages above each marker level for each jurisdiction, where the point estimate is computed as the midpoint of the 95 percent confidence interval. Tables 21 and 22 provide the actual percentages above the international marker levels, along with 95 percent confidence intervals, for the countries that participated in TIMSS. As was the case for the country means in Table 18, the percentages reported in Tables 21 and 22 differ somewhat from those published in the TIMSS reports. This is because Tables 21 and 22 are based on all five plausible values, while the TIMSS reports are based only on the first plausible value.

As was the case with the predicted means, there is a considerable spread across the jurisdictions in terms of the percentages above each of the marker levels. It is interesting to note that the position of a given state relative to the countries changes somewhat from that based on the means to that based on the percentage above a given marker level. This change in position is due to different distributions from state to state and from country to country. Some states and countries have more diffuse distributions while others have less. Thus, a state with roughly the same predicted TIMSS mean as a given country might have noticeably different predicted percentages above the various marker levels if the state has a markedly more or less diffuse predicted TIMSS distribution than the actual TIMSS distribution of the country. For example, if the state has a larger predicted TIMSS standard deviation than the country, the state will have a higher predicted percentage above the Top 10 Percent level.

Table 19. -- Ninety-five percent confidence intervals and estimates for percent of students reaching TIMSS International Marker Levels in mathematics at grade 8 based on estimates from 1996 NAEP public school data for states and jurisdictions

Estimates indicated in gray shading

	TIMSS International Marker Levels								
State/Jurisdiction	International Top Ten Percent			International Top Quarter			International Top Half		
Alabama	0.1	1.4	2.7	3.9	8.9	13.8	22.5	32.0	41.5
(Alaska)	3.0	6.9	10.7	16.3	23.5	30.6	46.0	54.9	63.8
Arizona	0.5	2.1	3.6	7.8	13.1	18.4	33.6	42.7	51.7
(Arkansas)	0.4	1.8	3.1	5.0	9.2	13.3	27.7	36.7	45.6
California	1.1	3.2	5.2	7.3	13.0	18.6	29.6	38.0	46.3
Colorado	0.9	3.5	6.1	12.0	18.7	25.3	43.9	52.1	60.3
Connecticut	2.0	5.4	8.7	16.7	23.7	30.7	48.8	56.4	64.0
DDESS	1.6	5.0	8.3	11.0	17.0	23.0	33.1	43.4	53.6
Delaware	1.1	3.0	4.9	9.2	14.0	18.8	33.0	40.8	48.5
District of Columbia	0.3	1.3	2.2	2.1	4.2	6.2	8.7	12.8	16.9
DoDDS	0.7	3.2	5.6	11.9	17.3	22.7	41.6	49.6	57.5
Florida	0.1	1.8	3.4	7.2	12.5	17.7	30.9	39.8	48.6
Georgia	0.5	2.4	4.3	6.3	11.8	17.3	29.6	38.0	46.4
Guam	0.0	0.9	1.8	1.5	4.1	6.7	13.3	19.1	24.8
Hawaii	0.8	2.5	4.2	7.5	12.0	16.4	30.4	37.4	44.4
Indiana	0.9	3.2	5.5	10.9	17.8	24.6	42.4	52.0	61.5
(Iowa)	1.4	4.2	7.0	15.2	23.3	31.4	54.0	63.1	72.1
Kentucky	0.1	1.5	2.9	6.4	11.4	16.3	31.4	39.8	48.2
Louisiana	0.1	0.7	1.3	1.9	5.2	8.5	17.1	25.2	33.3
Maine	2.3	5.6	8.8	16.1	23.8	31.5	53.7	62.4	71.0
(Maryland)	2.1	5.6	9.1	12.4	19.8	27.2	36.6	45.2	53.8
Massachusetts	1.7	5.1	8.4	13.3	21.0	28.6	45.1	54.6	64.1
(Michigan)	1.4	4.8	8.1	14.0	21.7	29.3	44.1	53.7	63.2
Minnesota	2.7	6.4	10.0	18.6	27.0	35.4	53.5	62.0	70.5
Mississippi	0.0	0.6	1.1	2.3	5.1	7.8	16.6	23.1	29.6
Missouri	0.5	2.5	4.5	9.3	15.6	21.9	38.9	48.5	58.1
(Montana)	2.3	5.5	8.6	17.5	25.0	32.5	53.3	61.8	70.3
Nebraska	1.8	5.2	8.6	16.4	23.4	30.4	52.1	60.7	69.2
New Mexico	0.4	1.6	2.8	5.9	10.3	14.6	28.1	36.4	44.7
(New York)	1.2	3.4	5.5	10.5	16.5	22.4	38.1	47.0	55.9
North Carolina	0.9	3.3	5.6	9.9	15.3	20.6	33.9	42.4	50.8
North Dakota	1.8	5.0	8.2	17.2	25.0	32.8	55.5	63.5	71.4
Oregon	1.4	4.4	7.3	13.1	19.9	26.7	44.3	52.7	61.0
Rhode Island	1.0	2.8	4.6	10.0	15.4	20.7	38.0	45.7	53.4
(South Carolina)	0.5	2.0	3.5	5.8	10.2	14.6	25.9	33.9	41.9
Tennessee	0.4	1.9	3.3	5.5	10.5	15.5	30.4	38.4	46.4
Texas	0.7	2.7	4.7	9.7	15.7	21.6	37.1	45.8	54.5
Utah	0.8	2.8	4.7	11.3	17.6	23.9	45.4	54.1	62.8
(Vermont)	1.5	4.0	6.5	13.5	20.6	27.6	48.5	57.3	66.1
Virginia	1.2	3.2	5.1	9.7	15.6	21.4	35.6	44.7	53.7
Washington	1.7	4.4	7.1	13.4	19.8	26.1	44.9	53.2	61.4
West Virginia	0.3	1.6	2.8	5.5	9.9	14.3	29.5	37.6	45.7
(Wisconsin)	2.1	5.5	8.9	16.3	24.3	32.3	52.0	61.2	70.4
Wyoming	0.6	2.6	4.6	10.1	15.6	21.0	42.3	51.5	60.7

(Jurisdiction) indicates that the state or jurisdiction did not satisfy one or more of the sample participation guidelines. See Appendix B.

DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools

DoDDS: Department of Defense Dependents Schools (Overseas)

SOURCE: Tabulations based on data from the IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Table 20. -- Ninety-five percent confidence intervals and estimates for percent of students reaching TIMSS International Marker Levels in science at grade 8 based on estimates from 1996 NAEP public school data for states and jurisdictions

Estimates indicated in gray shading

State/Jurisdiction	TIMSS International Marker Levels								
	International Top Ten Percent			International Top Quarter			International Top Half		
Alabama	2.4	6.2	10.0	13.2	20.2	27.2	36.6	44.7	52.8
(Alaska)	7.9	13.0	18.0	25.8	33.9	41.9	54.9	62.4	69.9
Arizona	3.8	8.2	12.6	17.3	24.7	32.0	43.3	51.8	60.3
(Arkansas)	3.5	7.9	12.2	17.2	24.9	32.6	44.3	52.2	60.0
California	3.9	7.6	11.3	15.0	21.7	28.4	36.0	44.4	52.7
Colorado	8.2	13.2	18.2	27.9	35.6	43.2	57.5	64.7	71.9
Connecticut	10.4	16.2	22.0	30.6	38.7	46.8	57.8	65.1	72.3
DDESS	5.0	10.3	15.6	20.8	29.8	38.7	52.6	62.4	72.2
Delaware	3.8	7.3	10.7	17.1	22.7	28.2	41.6	48.4	55.2
District of Columbia	0.7	1.8	2.8	2.7	5.5	8.3	12.5	17.3	22.0
DoDDS	6.7	12.1	17.4	26.5	34.3	42.0	58.4	65.1	71.8
Florida	3.8	8.1	12.3	16.3	23.4	30.5	39.5	48.3	57.0
Georgia	4.2	8.4	12.6	16.1	23.1	30.1	38.6	46.9	55.1
Guam	0.7	2.3	3.9	4.9	8.7	12.4	19.1	25.7	32.2
Hawaii	2.0	4.5	7.0	11.3	16.5	21.6	33.0	39.8	46.5
Indiana	5.9	11.9	17.9	23.9	32.6	41.2	53.2	61.4	69.6
(Iowa)	8.8	14.6	20.3	30.6	39.3	48.0	61.4	68.7	76.0
Kentucky	4.4	8.5	12.6	18.8	26.1	33.3	46.2	54.4	62.6
Louisiana	1.9	4.7	7.5	10.2	15.7	21.2	29.6	37.6	45.6
Maine	11.5	18.0	24.4	35.8	44.9	54.0	67.6	74.8	81.9
(Maryland)	5.6	10.6	15.6	20.1	27.5	34.9	44.7	52.6	60.4
Massachusetts	10.2	16.2	22.1	31.2	39.6	47.9	58.9	66.7	74.4
(Michigan)	7.6	13.4	19.2	26.6	35.2	43.7	54.3	62.3	70.2
Minnesota	8.9	15.8	22.7	31.3	39.9	48.5	62.0	69.3	76.6
Mississippi	1.7	4.2	6.6	9.4	14.4	19.3	28.5	36.6	44.6
Missouri	6.1	10.9	15.7	23.3	31.2	39.1	52.9	60.8	68.7
(Montana)	9.5	16.0	22.5	33.7	43.8	53.8	67.8	75.0	82.1
Nebraska	9.1	15.2	21.2	29.9	38.4	46.8	61.4	68.3	75.2
New Mexico	3.6	6.7	9.8	16.5	21.9	27.2	39.7	46.9	54.1
(New York)	6.9	12.0	17.1	21.9	29.5	37.0	46.3	54.1	61.9
North Carolina	5.7	9.7	13.7	19.6	26.6	33.5	45.8	53.6	61.3
North Dakota	10.3	16.9	23.5	35.5	44.0	52.5	68.4	75.3	82.2
Oregon	7.7	13.3	18.9	26.2	34.8	43.3	56.8	65.1	73.4
Rhode Island	6.3	10.4	14.4	21.5	28.4	35.3	49.1	56.5	63.9
(South Carolina)	3.2	6.5	9.7	13.4	19.5	25.5	34.1	42.5	50.9
Tennessee	4.7	9.0	13.2	17.0	24.7	32.3	41.5	50.5	59.5
Texas	4.5	8.5	12.5	18.4	25.9	33.4	44.0	52.7	61.3
Utah	7.2	12.1	16.9	27.1	35.2	43.2	60.3	67.3	74.3
(Vermont)	7.9	14.1	20.2	28.8	36.5	44.1	59.6	67.4	75.1
Virginia	6.3	11.4	16.4	21.6	30.0	38.3	48.1	56.4	64.7
Washington	6.6	11.2	15.7	21.9	29.3	36.7	50.0	58.2	66.4
West Virginia	3.5	6.7	9.9	17.2	23.8	30.3	45.5	53.4	61.3
(Wisconsin)	10.3	17.1	23.9	32.9	42.4	51.8	63.0	70.9	78.8
Wyoming	8.0	13.4	18.8	29.1	36.8	44.4	61.5	68.5	75.4

(Jurisdiction) indicates that the state or jurisdiction did not satisfy one or more of the sample participation guidelines. See Appendix B.

DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools

DoDDS: Department of Defense Dependents Schools (Overseas)

SOURCE: Tabulations based on data from the IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Table 21. -- Ninety-five percent confidence intervals and estimates for percent of students reaching TIMSS International Marker Levels in mathematics at grade 8 based on actual 1995 TIMSS data for countries

Estimates indicated in gray shading

Country	TIMSS International Marker Levels								
	International Top Ten Percent			International Top Quarter			International Top Half		
(Australia)	8.8	10.8	12.8	25.7	28.9	32.0	53.3	56.9	60.5
(Austria)	9.4	11.0	12.5	28.6	31.3	34.0	57.7	60.5	63.3
Belgium – Flemish	14.8	17.5	20.1	36.3	41.0	45.7	67.0	72.9	78.8
(Belgium - French)	4.2	5.7	7.1	22.0	25.2	28.3	54.6	58.3	61.9
(Bulgaria)	12.2	16.4	20.5	27.3	32.7	38.0	51.1	56.6	62.0
Canada	5.8	7.3	8.8	22.4	24.7	27.0	55.2	57.6	60.0
(Colombia)	0.0	0.0	0.0	0.1	1.1	2.0	2.4	4.1	5.7
Cyprus	1.0	2.1	3.1	9.2	10.8	12.3	31.0	33.5	36.0
Czech Republic	14.1	18.0	21.8	34.1	38.9	43.6	66.1	70.0	73.9
(Denmark)	2.8	3.8	4.7	14.8	17.2	19.6	43.0	46.8	50.6
England	5.3	6.6	7.8	17.1	19.9	22.6	44.5	47.8	51.0
France	5.1	6.8	8.4	23.4	26.5	29.5	59.7	62.9	66.1
(Germany)	4.1	5.7	7.2	16.9	20.3	23.7	44.1	48.8	53.4
(Greece)	2.4	3.5	4.6	10.9	12.7	14.4	33.6	36.9	40.2
Hong Kong	22.1	26.6	31.1	47.4	52.6	57.8	74.9	79.8	84.7
Hungary	9.0	10.9	12.7	26.3	29.3	32.3	56.3	59.6	62.8
Iceland	0.4	1.3	2.2	7.6	10.3	13.0	31.0	37.4	43.8
Iran, Islamic Republic	0.0	0.0	0.0	0.0	0.4	0.8	6.2	8.7	11.2
Ireland	6.8	8.9	10.9	22.4	26.9	31.3	51.9	56.7	61.5
(Israel)	4.3	6.4	8.5	18.9	24.3	29.6	50.1	55.7	61.2
Japan	30.3	32.0	33.6	55.9	57.8	59.6	82.0	83.3	84.6
Korea	31.8	34.2	36.6	55.5	57.8	60.0	80.4	82.2	83.9
(Kuwait)	0.0	0.0	0.0	0.0	0.4	0.7	1.3	2.6	3.9
Latvia-LSS	1.8	2.9	3.9	11.2	13.7	16.1	35.9	39.8	43.6
Lithuania	0.4	1.1	1.8	7.4	9.6	11.8	29.3	33.6	37.8
(Netherlands)	7.1	10.4	13.6	24.9	30.4	35.8	56.2	62.7	69.2
New Zealand	4.4	6.1	7.8	16.3	19.6	22.8	43.8	48.4	52.9
Norway	3.3	4.3	5.3	14.9	16.8	18.7	43.4	46.0	48.5
Portugal	0.0	0.4	0.7	1.4	2.5	3.5	16.5	19.3	22.0
(Romania)	2.3	3.1	3.9	10.8	13.2	15.6	32.5	36.5	40.5
Russian Federation	8.1	9.8	11.4	24.5	29.3	34.1	55.0	60.3	65.5
(Scotland)	2.8	4.8	6.8	12.6	16.9	21.1	38.3	43.7	49.1
Singapore	39.7	45.0	50.3	69.4	73.8	78.2	91.7	93.5	95.3
Slovak Republic	10.2	12.3	14.4	30.3	33.4	36.5	60.5	63.8	67.0
(Slovenia)	9.1	10.8	12.5	27.6	30.8	34.0	58.3	61.3	64.3
(South Africa)	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.5	4.3
Spain	1.1	1.7	2.2	8.3	9.8	11.3	33.5	36.1	38.7
Sweden	4.4	5.5	6.5	19.0	21.8	24.5	49.5	52.9	56.2
Switzerland	8.7	10.6	12.4	30.2	33.5	36.7	61.8	65.0	68.1
(Thailand)	4.5	7.1	9.7	17.5	22.7	27.9	48.9	54.5	60.0
United States	3.6	4.7	5.8	15.4	18.4	21.4	40.3	45.0	49.6

(Jurisdiction) indicates that the country or jurisdiction did not satisfy one or more of the sample participation guidelines. See Appendix B.

Latvia-LSS: Latvian-speaking schools only

Results for the nations may differ from IEA reports because of the way averages were computed.

SOURCE: Tabulations based on data from the IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Table 22. -- Ninety-five percent confidence intervals and estimates for percent of students reaching TIMSS International Marker Levels in science at grade 8 based on actual 1995 TIMSS data for countries

Estimates indicated in gray shading

Country	TIMSS International Marker Levels								
	International Top Ten Percent			International Top Quarter			International Top Half		
(Australia)	13.6	15.6	17.5	30.4	33.2	35.9	55.4	58.7	61.9
(Austria)	13.8	16.1	18.3	32.3	35.4	38.4	60.4	63.9	67.4
Belgium-Flemish	8.1	10.0	11.9	27.0	30.8	34.5	59.2	63.7	68.1
(Belgium-French)	0.6	1.2	1.8	6.0	7.5	9.0	25.6	28.7	31.7
(Bulgaria)	18.4	21.4	24.3	35.1	40.0	44.8	58.9	63.6	68.3
Canada	7.9	9.3	10.6	23.2	25.3	27.3	50.9	53.5	56.1
(Colombia)	0.0	0.2	0.3	0.3	0.9	1.4	5.4	7.5	9.6
Cyprus	0.6	1.2	1.8	5.3	7.0	8.6	24.3	26.5	28.6
Czech Republic	15.8	19.2	22.5	36.4	40.7	44.9	68.1	72.5	76.9
(Denmark)	1.5	2.4	3.2	7.4	9.2	10.9	29.4	32.1	34.8
England	14.6	17.0	19.4	30.8	34.2	37.5	57.0	60.5	63.9
France	0.6	1.3	1.9	9.5	11.2	12.9	34.3	37.4	40.4
(Germany)	9.2	11.4	13.5	25.2	28.6	32.0	50.1	54.4	58.6
(Greece)	2.9	3.9	4.8	12.6	14.2	15.8	34.7	37.8	40.8
Hong Kong	5.2	7.0	8.8	18.5	21.9	25.2	46.1	50.8	55.5
Hungary	11.7	13.6	15.5	30.7	33.6	36.5	60.2	63.4	66.6
Iceland	0.8	2.2	3.5	6.2	9.7	13.1	31.5	36.4	41.2
Iran, Islamic Republic	0.2	0.6	0.9	3.7	5.0	6.3	21.1	24.2	27.3
Ireland	9.4	11.7	14.0	25.7	29.2	32.6	52.4	56.5	60.6
(Israel)	7.9	10.8	13.7	19.8	24.7	29.6	45.8	51.2	56.5
Japan	16.5	18.2	19.8	39.3	41.1	42.8	69.8	71.3	72.7
Korea	16.3	18.1	19.9	36.5	38.6	40.7	65.5	67.6	69.7
(Kuwait)	0.0	0.1	0.2	0.6	1.6	2.5	8.0	10.6	13.1
Latvia-LSS	0.9	1.7	2.4	8.0	9.7	11.4	29.8	33.0	36.2
Lithuania	0.7	1.3	1.9	6.7	8.4	10.0	25.7	29.2	32.7
(Netherlands)	9.4	12.5	15.6	30.1	34.8	39.5	62.1	67.1	72.0
New Zealand	8.6	10.6	12.5	22.5	25.7	28.9	46.8	50.9	54.9
Norway	6.3	7.4	8.5	21.3	24.0	26.6	49.7	51.9	54.1
Portugal	0.1	0.7	1.2	5.4	6.8	8.1	25.2	28.1	31.0
(Romania)	3.5	4.7	5.9	13.3	16.1	18.9	31.6	35.6	39.5
Russian Federation	9.4	11.2	12.9	25.9	28.7	31.5	52.0	55.9	59.7
(Scotland)	6.3	8.6	10.9	18.9	22.7	26.5	43.6	48.1	52.6
Singapore	26.8	31.5	36.1	50.5	55.9	61.2	78.4	81.7	84.9
Slovak Republic	10.1	12.1	14.1	26.5	29.5	32.5	56.1	59.3	62.5
(Slovenia)	11.7	13.7	15.6	31.3	34.4	37.5	62.2	65.1	68.0
(South Africa)	0.1	0.6	1.0	0.3	1.0	1.7	2.6	5.4	8.1
Spain	3.2	4.2	5.2	16.3	18.1	19.8	44.7	46.9	49.0
Sweden	8.1	9.5	10.8	24.0	26.7	29.3	52.8	56.0	59.1
Switzerland	5.9	7.2	8.4	20.8	23.0	25.2	48.2	50.7	53.2
(Thailand)	2.5	3.7	4.8	14.7	18.5	22.3	46.7	51.4	56.0
United States	11.0	12.8	14.5	26.5	29.7	32.9	51.4	55.2	59.0

(Jurisdiction) indicates that the country or jurisdiction did not satisfy one or more of the sample participation guidelines. See Appendix B.

Latvia-LSS: Latvian-speaking schools only

Results for the nations may differ from IEA reports because of the way averages were computed.

SOURCE: Tabulations based on data from the IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

11. CONCLUSIONS

This report has described an attempt to link together the results from 1996 NAEP mathematics and science with the results of TIMSS. The purpose of the link was to predict TIMSS results for states and jurisdictions based on their State NAEP results.

Because they were the only data available, the link between NAEP and TIMSS was established using the data from the U.S. national administrations of both assessments. Since the two assessments differed in varying degrees in terms of the assessment specifications, numbers and kinds of tasks presented, and administration conditions, and since the linking data are based on assessments conducted 1 year apart, the type of link that was established was statistical moderation. That is, the link presented in this report uses formal linear equating procedures. However, there is no claim that the linked results are equated in any sense of the word. Rather, these results are, at best, applicable only to the purpose to which they have been put in this report: the comparison of state-level predicted TIMSS results with actual country-level results from TIMSS.

Statistical moderation is the weakest form of linking. Unlike equatings of assessments built to support equating, the procedures of statistical moderation can produce markedly different numerical links if carried out with different samples of students. As observed by Mislevy (1992), "We would have little confidence in a comparison of, say, subgroup means across 'moderated' test scores unless it held up under a broad range of choices for linking samples."

For this reason, the linking was evaluated for a variety of demographic subgroups. While the predicted values from the various subgroup-based linkings were not significantly different from each other, there was still enough difference to suggest that caution be used in applying the linking functions to subpopulations. Indeed, the ultimate linking used for predicting state-level TIMSS results was that derived for public school students, since that was the population for which NAEP state-level results have been published.

Since the linking functions are based on fallible data, a major portion of this report was devoted to developing estimates of the variability of the link attributable to various sources. In addition to the naive variance, which assumes the linking function was exactly known, variance estimates attributable to the following sources were estimated: sampling, measurement error, model misspecification, and temporal shift. Of these, by far the most important variance component was that due to sampling, accounting for around 80 percent of the total variance. Including these other variance components produced a variance estimate roughly four to six times larger than the naive variance estimate.

Evaluating the goodness of the link was hampered by the fact that no student was administered both assessments. Consequently, it is impossible to assess the degree of correlation between scores on the two assessments. Since the linkage results would be highly suspect if the two assessments were not strongly related, evidence was sought about the potential degree of relationship between NAEP and TIMSS proficiency estimates. One type of evidence was a set of content comparison analyses conducted by McLaughlin and others. The aim of this analysis was to determine the similarity in content coverage, item types, and difficulty of the NAEP and TIMSS instruments. The greater the similarity between the two instruments, the more likely that the two assessments are measuring roughly the same construct. A summary of the findings of the content analysis is included in Appendix A, which notes the important differences between the instruments but which also judges that the assessments are similar enough to warrant linkage for global comparisons.

The only direct validation of the link of the 1996 NAEP to the 1995 TIMSS came from data from Minnesota, which participated in the 1996 State NAEP and the 1995 state-level TIMSS. The agreement between the actual TIMSS results and the predicted TIMSS results provides support for the use of the linkage to predict public school, state-level TIMSS results at grade 8. Further validation of the link comes from the data from Missouri and Oregon. These states, who participated in the 1996 State NAEP, also participated in a special assessment of the TIMSS in their states in 1997. While the results of these assessments have not yet been publicly released, and while the data come from a 1997 rather than a 1995 administration of TIMSS, the predicted TIMSS results for these states using the 1995 TIMSS/1996 NAEP linking function were consistent (within acceptable statistical bounds) with their actual TIMSS results.

This adds support to the utility of the link for purposes such as approximate comparisons of the relative rankings of individual states versus other countries, but is likely not adequate for extensive analyses based on the point estimates of scores. And, of course, there is no guarantee that a validation conducted in other states would always have produced similar results. The reader is reminded that the moderation type of linking required for the available NAEP and TIMSS data is the weakest in terms of the strength and stability of the linkage produced, and in terms of the generalizability of the linkage. As discussed in the report, there have been a number of examples where such a linking has been judged as only adequate for rough comparisons. In fact, a similar validation analysis conducted on an equivalent linking based on fourth grade data has proven more problematic than the eighth grade link and is still undergoing review by NCES.

The fact that the link was formed in the direction of predicting TIMSS from NAEP removes from the link issues such as the applicability of a linkage function across diverse languages and educational systems--issues which would be of paramount importance if the linkage was in the direction of predicting NAEP from TIMSS. The links presented in this report express U.S. State NAEP results in terms of the U.S. TIMSS distribution. Consequently, the comparability of the predicted TIMSS results for U.S. states to the actual TIMSS results for the TIMSS countries is largely on the same footing as the comparability of the actual U.S. TIMSS results to the actual TIMSS results for other countries.

The link assumes comparability of NAEP across states and assumes that the relationship between NAEP and TIMSS is the same within the states as it is in the country as a whole. The validation of the link based on Minnesota data lends credence to this assumption.

Of course, one will never know if the link would hold equivalently in all states. Also, there is no guarantee that the link established in this report would hold in subsequent years. Nevertheless, this linkage should be quite serviceable for its stated purpose of comparing state-level, public school performance from the 1996 NAEP at the eighth grade.

For a more detailed set of comparisons between states and countries, see Johnson and Siegendorf (1998).

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VALIDATION STUDIES OF THE LINKAGE BETWEEN NAEP AND TIMSS EIGHTH GRADE MATHEMATICS ASSESSMENTS

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May 1997

NAEP-TIMSS MATHEMATICS LINKAGE VALIDATION SUMMARY

The NAEP and TIMSS 8th grade assessment instruments both covered number sense, measurement, geometry, statistics, and algebra and are generally sufficiently similar to warrant linkage for global comparisons at both grades but not necessarily for detailed comparisons of areas of student achievement or processes in classrooms. A few important differences were noted between the instruments; and these should be reported whenever the linkage is used as the basis for presenting comparisons.

Content Analysis Results

- The TIMSS mathematics assessment was embedded in a combined math and science assessment, and this may have had unknown effects on performance on the mathematics items.
- The NAEP mathematics assessment included blocks of items on which calculators were available and others on which rulers and cardboard shapes were to be used.
- There were somewhat more items on geometry in NAEP (19% vs. 13%).
- More TIMSS items involved computation (59% vs.40%), and more involved decimals or fractions (34% vs. 13%).
- More of the TIMSS items were multiple choice (79% vs. 57%).
- More NAEP items than TIMSS items were difficult, based on percentages of correct responses given by U.S. students.

Correlational Results

In most cases in which an item-type was more prevalent on one assessment than on the other, the correlation between performance on the more prevalent item-type and other items on the same assessment was sufficiently high not to raise concerns about the linkage. The only exception to this involved the comparison of easy and difficult items. Although the differential prevalence of difficult items would reduce the correlation underlying the linkage by only about 1 percent in grade 8, any statements based on the linkage should mention that NAEP contained a larger percentage of difficult items.

VALIDATION STUDIES OF THE LINKAGE BETWEEN NAEP AND TIMSS EIGHTH GRADE SCIENCE ASSESSMENTS

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NAEP-TIMSS SCIENCE LINKAGE VALIDATION SUMMARY

The NAEP and TIMSS 8th grade assessment instruments both covered physical, earth, and life science and are generally sufficiently similar to warrant linkage for global comparisons of middle school science achievement but not necessarily for detailed comparisons of areas of student achievement or processes in classrooms. A few important differences were noted between the instruments, and these should be reported whenever the linkage is used as the basis for presenting comparisons.

Content Analysis Results

- The TIMSS science assessment was part of a combined math and science assessment, which may have had unknown effects on performance on the science items.
- The NAEP science assessment included a block of hands-on laboratory-like items as one of the three blocks of items administered to each student.
- There were somewhat more items on physical science in TIMSS (45% vs. 31%).
- Twelve percent of the NAEP items involved graph-reading, compared to fewer than 1 percent of the TIMSS items.
- Seventy-three percent of TIMSS items were multiple choice, compared to 40 percent of NAEP items.
- More NAEP items than TIMSS items were difficult, based on percentages of correct responses given by U.S. 8th grade students. On multiple-choice items, 28 percent of the NAEP items, versus 9 percent of TIMSS items, were sufficiently difficult that fewer than 40 percent of students got them right; and on free-response items, the difference was 72 percent versus 32 percent. Moreover, 36 of 189 NAEP items had percentages less than 20 percent, compared to only 4 of 140 TIMSS items.

Correlational Results

In most cases in which an item-type was more prevalent on one assessment than on the other, the correlation between performance on the more prevalent item-type and other items on the same assessment was sufficiently high not to raise concerns about the linkage. Exceptions to this were the NAEP hands-on items and the graph-reading items, and TIMSS greater prevalence of multiple-choice items and easy items. Although none of these special types of items would reduce the correlation underlying the linkage by more than 6 percent, any statements based on the linkage should mention these differences.

SUMMARY OF DEVIATIONS FROM STUDY GUIDELINES

I. TIMSS POPULATION 2: NATIONS WITH DEVIATIONS FROM INTERNATIONAL STUDY GUIDELINES

Twenty-two of the 41 TIMSS countries experienced a more or less serious deviation from international guidelines for execution of the study at the Population 2 level (the two grades with the largest proportion of 13-year-olds—grades 7 and 8 in most countries). In 16 countries, the TIMSS International Study Center considered the deviations to be sufficiently serious to raise questions about the confidence to be placed in their Population 2 scores. These 16 nations with major difficulties are noted with an asterisk in this appendix.

***Australia --** Participation rate did not meet the international criterion of 75 percent of schools and students combined. Participation rate was 70 percent after replacements for refusals were substituted.

***Austria --** Participation rate did not meet the international criterion of at least 50 percent participation by schools before replacement. The initial school participation rate was 41 percent before replacement.

Belgium (Flemish) -- Participation rate of 75 percent of schools and students combined was achieved only after replacements for refusals were substituted.

***Belgium (French) --** Participation rate did not meet the international criterion of 75 percent of schools and students combined. Participation rate was 72 percent after replacements for refusals were substituted.

***Bulgaria --** Participation rate did not meet the international criterion of 75 percent of schools and students combined. Participation rate was 63 percent after replacements for refusals were substituted.

***Colombia --** The pair of grades tested was one grade higher than the international target. Average age of students in the upper grade was 15.7.

***Denmark --** International guidelines requiring random selection of the classrooms to receive the assessment were not followed.

England -- More than the international criterion of 10 percent of schools and students were excused from the test for various reasons, with resulting coverage of 89 percent of the desired population. Participation rate of 75 percent of schools and students combined was achieved only after replacements for refusals were substituted.

***Germany --** The pair of grades tested was one grade higher than the international target. Average student age of students in the upper grade was 14.8. One of 16 regions (Baden-Wuerttemberg) did not participate in the study, with resulting coverage of 88 percent of the desired population. Participation rate of 75 percent of schools and students combined was achieved only after replacements for refusals were substituted.

***Greece --** International guidelines requiring random selection of the classrooms to receive the assessment were not followed.

***Israel --** Test administered only in the Hebrew-speaking public school system, with resulting coverage of 74 percent of the desired population. International guidelines requiring random selection of the classrooms to receive the assessment were not followed. Participation rate did not meet the international criteria of at least 50 percent participation by schools in the sample before replacement. The school participation rate before replacement was 45 percent.

***Kuwait --** In contrast to other nations, which tested two adjacent grades, Kuwait tested only one grade, the ninth grade. This grade was higher than either of the grades that should have been the international target. Average student age was 15.3.

Latvia - LSS -- Test administered only in Latvian-speaking schools, with resulting coverage of 51 percent of the desired population. Because coverage fell below the international 65 percent population-coverage criterion, Latvia is designated Latvia - LSS for Latvian-speaking schools.

Lithuania -- Test administered only in Lithuanian-speaking schools, with resulting coverage of 84 percent of the desired population.

***Netherlands --** Participation rate did not meet the international criteria of at least 50 percent participation by schools before replacement. The initial participation rate before replacement was 24 percent. The combined participation of schools and students was 60 percent.

***Romania --** The pair of grades tested was one grade higher than the international target. Average student age in the upper grade was 14.6.

***Scotland --** Participation rate did not meet the international criterion of 75 percent of schools and students combined. Participation rate was 73 percent after replacements for refusals were substituted.

***Slovenia --** The pair of grades tested was one grade higher than the international target. Average student age was 14.8.

***South Africa --** International guidelines requiring random selection of the classrooms to receive the assessment were not followed. Participation rate did not meet the international criterion of 75 percent of schools and students combined. Participation rate was 62 percent after replacements for refusals were substituted.

Switzerland -- Test administered in 22 of 26 cantons, with resulting coverage of 86 percent of the desired population.

***Thailand --** International guidelines requiring random selection of the classrooms to receive the assessment were not followed.

United States -- Participation rate of 75 percent of schools and students combined was achieved only after replacements for refusals were substituted.

II. NAEP GRADE 8: STATES AND JURISDICTIONS WITH DEVIATIONS FROM PARTICIPATION RATE STANDARDS FOR 1996

In carrying out the 1996 state assessment program, the National Center for Education Statistics (NCES) established participation rate standards that jurisdictions were required to meet in order for their results to be reported. NCES also established additional standards that required the annotation of published results for jurisdictions whose sample participation rates were low enough to raise concerns about their representativeness.

Three states (Nevada, New Hampshire, and New Jersey) failed to meet the initial public school participation rate of 70 percent. For these states, results for grade 8 public school students are not reported in this or any report of NAEP 1996 findings. Several other jurisdictions whose results were published received a notation to indicate possible nonresponse bias.

NCES standards require weighted school participation rates before substitution of at least 85 percent to guard against potential bias due to school nonresponse. The NCES standards do not explicitly address the use of substitute schools to replace initially selected schools that declined to participate in the assessment. However, considerable technical consideration has been given to this issue. Even though the characteristics of the substitute schools were matched as closely as possible to the characteristics of the initially selected schools, substitution does not entirely eliminate the possibility of bias because of the nonparticipation of initially selected schools. Thus, for the weighted school participation rates that included substitute schools, the guideline was set at 90 percent. This is expressed in the following guideline:

A jurisdiction will receive a notation if its weighted participation rate for the initial sample of schools was below 85 percent and the weighted school participation rate after substitution was below 90 percent.

Seven jurisdictions did not meet this guideline for public schools at grade 8: Arkansas, Iowa, Michigan, Montana, New York, Vermont, and Wisconsin.

To help ensure adequate sample representation for each jurisdiction participating in the 1996 state assessment program, NAEP provided substitutes for nonparticipating schools. (When possible, a substitute school was provided for each initially selected school that declined participation.) For jurisdictions that used substitute schools, the assessment results were based on the student data from all schools participating from both the original sample and the list of substitutes (unless an initial school and its substitute eventually participated, in which case only the data from the initial school were used). For jurisdictions that did not use substitute schools, the participation rates were based on participating schools from the original sample.

The NCES standards specify that attention should be given to the representativeness of the sample coverage. Thus, inadequate representation of an important segment of a jurisdiction's population is of concern, regardless of the overall participation rate. A jurisdiction that is not already receiving a notation for problematic overall school or student participation rates will receive a notation if the sampled students within participating schools included a class of students with similar characteristics that had a weighted student response rate below 80 percent, and from which the nonresponding students together accounted for more than 5 percent of the jurisdiction's weighted assessable student sample.

At grade 8, Maryland and South Carolina (for public schools) failed to meet this NCES guideline.

In one state (Alaska), the public school student participation rate for grade 8 fell below the NCES-prescribed criterion of 85 percent.

APPENDIX C

COMPARISONS OF EACH NAEP STATE AND JURISDICTION WITH THE TIMSS NATIONS FOR GRADE 8 MATHEMATICS

This appendix presents one-page profiles for each state and jurisdiction participating in grade 8 mathematics in alphabetical order. Each page presents a table displaying how the state or jurisdiction would perform in comparison to the 41 nations that took TIMSS mathematics at grade 8. Each table indicates whether the **actual** scores of the participating TIMSS nations are significantly higher than, not significantly different from, or significantly lower than the **estimated** average performance of the public school students in the state or jurisdiction. The significance of the difference of the estimated mean of the given jurisdiction and the actual means of the TIMSS countries are based on a Bonferroni multiple comparisons procedure that holds to 5 percent the probability of erroneously declaring any of the country means significantly different from the chosen jurisdiction's predicted mean.

A second profile is presented for the state of Minnesota in addition to the profile for the estimated average performance. Because **actual** TIMSS results for Minnesota's public school students are available, these are compared with the results of the 41 nations who participated in TIMSS for grade 8 mathematics.

Readers of these profiles are reminded that the state's or jurisdiction's TIMSS performance in grade 8 mathematics is **estimated** from its NAEP score, using the linking function, and must therefore be interpreted with caution. Furthermore, the calculations for the 1996 NAEP scores and 1995 TIMSS scores for the participating states, jurisdictions, and nations are based on samples of the student populations, not entire student populations. Hence, estimates are imprecise.

The SOLE purpose of these profiles is to allow the comparison of predicted TIMSS performances for individual states with the actual TIMSS performances of individual countries. It is NOT appropriate to use these profiles to compare performances between states or between countries. Accordingly, the profiles for the states and jurisdictions participating in NAEP grade 8 mathematics are arranged in alphabetical order. The proper between-state comparisons are provided in the NAEP mathematics report (Reese, et al., 1997), while the proper between country comparisons are provided in the TIMSS mathematics report (Beaton, Mullis, et al., 1997).

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Alabama

If the public school students in Alabama participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Alabama	Not significantly different from Alabama	Lower than Alabama
(Australia)	Cyprus	(Colombia)
(Austria)	(Greece)	Iran, Islamic Republic
Belgium – Flemish	Iceland	(Kuwait)
(Belgium – French)	(Lithuania)	(South Africa)
(Bulgaria)	Portugal	
Canada	(Romania)	
Czech Republic	Spain	
(Denmark)		
(England)		
France		
(Germany)		
Hong Kong		
Hungary		
Ireland		
(Israel)		
Japan		
Korea		
(Latvia-LSS)		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Alaska)

If the public school students in Alaska participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Alaska	**Not significantly different from Alaska**	**Lower than Alaska**
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Greece)
Japan	(Bulgaria)	Iran, Islamic Republic
Korea	Canada	(Kuwait)
Singapore	(Denmark)	(Lithuania)
Slovak Republic	(England)	Portugal
(Switzerland)	France	(Romania)
	(Germany)	(South Africa)
	Hungary	Spain
	Iceland	
	Ireland	
	(Israel)	
	(Latvia – LSS)	
	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	(Slovenia)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Arkansas)

If the public school students in Arkansas participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Arkansas	Not significantly different from Arkansas	Lower than Arkansas
(Australia)	Cyprus	(Colombia)
(Austria)	(Greece)	Iran, Islamic Republic
Belgium – Flemish	Iceland	(Kuwait)
(Belgium – French)	(Latvia-LSS)	(South Africa)
(Bulgaria)	(Lithuania)	
Canada	Portugal	
Czech Republic	(Romania)	
(Denmark)	(Scotland)	
(England)	Spain	
France	United States (average)	
(Germany)		
Hong Kong		
Hungary		
Ireland		
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Arizona

If the public school students in Arizona participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Arizona	**Not significantly different from Arizona**	**Lower than Arizona**
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Israel)	
France	(Latvia-LSS)	
Hong Kong	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Russian Federation	United States (average)	
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: California

If the public school students in California participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than California	Not significantly different from California	Lower than California
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(Greece)	(Kuwait)
(Belgium – French)	Iceland	(South Africa)
(Bulgaria)	(Latvia-LSS)	
Canada	(Lithuania)	
Czech Republic	Norway	
(England)	Portugal	
France	(Romania)	
(Germany)	(Scotland)	
Hong Kong	Spain	
Hungary	United States (average)	
Ireland		
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Colorado

If the public school students in Colorado participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Colorado	**Not significantly different from Colorado**	**Lower than Colorado**
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
(Bulgaria)	Canada	(Greece)
Czech Republic	(Denmark)	Iran, Islamic Republic
France	(England)	(Kuwait)
Hong Kong	(Germany)	(Lithuania)
Hungary	Iceland	Portugal
Japan	Ireland	(Romania)
Korea	(Israel)	(South Africa)
(Netherlands)	(Latvia – LSS)	Spain
Singapore	New Zealand	
Slovak Republic	Norway	
(Slovenia)	Russian Federation	
(Switzerland)	(Scotland)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Connecticut

If the public school students in Connecticut participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Connecticut	Not significantly different from Connecticut	Lower than Connecticut
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Greece)
Japan	(Bulgaria)	Iceland
Korea	Canada	Iran, Islamic Republic
Singapore	(Denmark)	(Kuwait)
Slovak Republic	(England)	(Latvia – LSS)
(Switzerland)	France	(Lithuania)
	(Germany)	Portugal
	Hungary	(Romania)
	Ireland	(South Africa)
	(Israel)	Spain
	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	(Slovenia)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Delaware

If the public school students in Delaware participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Delaware	Not significantly different from Delaware	Lower than Delaware
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Latvia-LSS)	
France	(Lithuania)	
Hong Kong	New Zealand	
Hungary	Norway	
Ireland	(Romania)	
(Israel)	(Scotland)	
Japan	Spain	
Korea	United States (average)	
(Netherlands)		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Department of Defense Domestic Dependent Elementary and Secondary Schools – DDESS

If the public school students in DDESS participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than DDESS	**Not significantly different from DDESS**	**Lower than DDESS**
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Israel)	
France	(Latvia-LSS)	
Hong Kong	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Russian Federation	Sweden	
Singapore	(Thailand)	
Slovak Republic	United States (average)	
(Slovenia)		
(Switzerland)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Department of Defense Dependent Schools – DoDDS

If the public school students in the DoDDS participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than DoDDS	**Not significantly different from DoDDS**	**Lower than DoDDS**
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
(Bulgaria)	Canada	(Greece)
Czech Republic	(Denmark)	Iran, Islamic Republic
France	(England)	(Kuwait)
Hong Kong	(Germany)	(Lithuania)
Hungary	Iceland	Portugal
Japan	Ireland	(Romania)
Korea	(Israel)	(South Africa)
(Netherlands)	(Latvia – LSS)	Spain
Russian Federation	New Zealand	
Singapore	Norway	
Slovak Republic	(Scotland)	
(Slovenia)	Sweden	
(Switzerland)	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: District of Columbia

If the public school students in the District of Columbia participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than DC	Not significantly different from DC	Lower than DC
(Australia) (Austria) Belgium – Flemish (Belgium – French) (Bulgaria) Canada Cyprus Czech Republic (Denmark) (England) France (Germany) (Greece) Hong Kong Hungary Iceland Iran, Islamic Republic Ireland (Israel) Japan Korea (Latvia-LSS) (Lithuania) (Netherlands) New Zealand Norway Portugal (Romania) Russian Federation (Scotland) Singapore Slovak Republic (Slovenia) Spain Sweden (Switzerland) (Thailand) United States (average)	(Colombia) (Kuwait)	(South Africa)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Florida

If the public school students in Florida participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Florida	**Not significantly different from Florida**	**Lower than Florida**
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Latvia-LSS)	
France	(Lithuania)	
Hong Kong	New Zealand	
Hungary	Norway	
Ireland	(Romania)	
(Israel)	(Scotland)	
Japan	Spain	
Korea	United States (average)	
(Netherlands)		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Georgia

If the public school students in Georgia participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Georgia	Not significantly different from Georgia	Lower than Georgia
(Australia)	Cyprus	(Colombia)
(Austria)	(Greece)	Iran, Islamic Republic
Belgium – Flemish	Iceland	(Kuwait)
(Belgium – French)	(Latvia-LSS)	(South Africa)
(Bulgaria)	(Lithuania)	
Canada	Portugal	
Czech Republic	(Romania)	
(Denmark)	(Scotland)	
(England)	Spain	
France	United States (average)	
(Germany)		
Hong Kong		
Hungary		
Ireland		
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Guam

If the public school students in Guam participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Guam	Not significantly different from Guam	Lower than Guam
(Australia)	Iran, Islamic Republic	(Colombia)
(Austria)		(Kuwait)
Belgium – Flemish		(South Africa)
(Belgium – French)		
(Bulgaria)		
Canada		
Cyprus		
Czech Republic		
(Denmark)		
(England)		
France		
(Germany)		
(Greece)		
Hong Kong		
Hungary		
Iceland		
Ireland		
(Israel)		
Japan		
Korea		
(Latvia-LSS)		
(Lithuania)		
(Netherlands)		
New Zealand		
Norway		
Portugal		
(Romania)		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Hawaii

If the public school students in Hawaii participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Hawaii	Not significantly different from Hawaii	Lower than Hawaii
(Australia)	Cyprus	(Colombia)
(Austria)	(Greece)	Iran, Islamic Republic
Belgium – Flemish	Iceland	(Kuwait)
(Belgium – French)	(Latvia-LSS)	Portugal
(Bulgaria)	(Lithuania)	(South Africa)
Canada	(Romania)	
Czech Republic	(Scotland)	
(Denmark)	Spain	
(England)	United States (average)	
France		
(Germany)		
Hong Kong		
Hungary		
Ireland		
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Indiana

If the public school students in Indiana participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Indiana	Not significantly different from Indiana	Lower than Indiana
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
Czech Republic	(Bulgaria)	(Greece)
France	Canada	Iran, Islamic Republic
Hong Kong	(Denmark)	(Kuwait)
Hungary	(England)	(Lithuania)
Japan	(Germany)	Portugal
Korea	Iceland	(Romania)
Singapore	Ireland	(South Africa)
Slovak Republic	(Israel)	Spain
(Slovenia)	(Latvia – LSS)	
(Switzerland)	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Iowa)

If the public school students in Iowa participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Iowa	**Not significantly different from Iowa**	**Lower than Iowa**
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Denmark)
Japan	(Bulgaria)	(England)
Korea	Canada	(Greece)
Singapore	France	Iceland
	(Germany)	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	(Netherlands)	Norway
	New Zealand	Portugal
	Russian Federation	(Romania)
	Slovak Republic	(Scotland)
	(Slovenia)	(South Africa)
	Sweden	Spain
	(Switzerland)	United States (average)
	(Thailand)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Kentucky

If the public school students in Kentucky participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Kentucky	Not significantly different from Kentucky	Lower than Kentucky
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Latvia-LSS)	
France	(Lithuania)	
Hong Kong	New Zealand	
Hungary	Norway	
Ireland	(Romania)	
(Israel)	(Scotland)	
Japan	Spain	
Korea	United States (average)	
(Netherlands)		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Louisiana

If the public school students in Louisiana participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Louisiana	Not significantly different from Louisiana	Lower than Louisiana
(Australia)	Cyprus	(Colombia)
(Austria)	Iran, Islamic Republic	(Kuwait)
Belgium – Flemish	(Lithuania)	(South Africa)
(Belgium – French)	Portugal	
(Bulgaria)		
Canada		
Czech Republic		
(Denmark)		
(England)		
France		
(Germany)		
(Greece)		
Hong Kong		
Hungary		
Iceland		
Ireland		
(Israel)		
Japan		
Korea		
(Latvia-LSS)		
(Netherlands)		
New Zealand		
Norway		
(Romania)		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Maine

If the public school students in Maine participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Maine	Not significantly different from Maine	Lower than Maine
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium - French)	(Denmark)
Japan	(Bulgaria)	(England)
Korea	Canada	(Greece)
Singapore	France	Iceland
	(Germany)	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia - LSS)
	(Israel)	(Lithuania)
	(Netherlands)	Norway
	New Zealand	Portugal
	Russian Federation	(Romania)
	Slovak Republic	(Scotland)
	(Slovenia)	(South Africa)
	Sweden	Spain
	(Switzerland)	United States (average)
	(Thailand)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Maryland)

If the public school students in Maryland participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Maryland	Not significantly different from Maryland	Lower than Maryland
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Israel)	
France	(Latvia-LSS)	
Hong Kong	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Russian Federation	Sweden	
Singapore	(Thailand)	
Slovak Republic	United States (average)	
(Slovenia)		
(Switzerland)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Massachusetts

If the public school students in Massachusetts participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Massachusetts	Not significantly different from Massachusetts	Lower than Massachusetts
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Greece)
Japan	(Bulgaria)	Iceland
Korea	Canada	Iran, Islamic Republic
Singapore	(Denmark)	(Kuwait)
Slovak Republic	(England)	(Lithuania)
(Switzerland)	France	Portugal
	(Germany)	(Romania)
	Hungary	(South Africa)
	Ireland	Spain
	(Israel)	
	(Latvia – LSS)	
	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	(Slovenia)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Michigan)

If the public school students in Michigan participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Michigan	Not significantly different from Michigan	Lower than Michigan
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
Czech Republic	(Bulgaria)	(Greece)
Hong Kong	Canada	Iran, Islamic Republic
Japan	(Denmark)	(Kuwait)
Korea	(England)	(Lithuania)
Singapore	France	Portugal
Slovak Republic	(Germany)	(Romania)
(Slovenia)	Hungary	(South Africa)
(Switzerland)	Iceland	Spain
	Ireland	
	(Israel)	
	(Latvia – LSS)	
	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Minnesota

If the public school students in Minnesota participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Minnesota	**Not significantly different from Minnesota**	**Lower than Minnesota**
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Denmark)
Japan	(Bulgaria)	(England)
Korea	Canada	(Greece)
Singapore	France	Iceland
	(Germany)	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	(Netherlands)	Norway
	New Zealand	Portugal
	Russian Federation	(Romania)
	Slovak Republic	(Scotland)
	(Slovenia)	(South Africa)
	Sweden	Spain
	(Switzerland)	United States (average)
	(Thailand)	

*The comparisons and values shown in this profile represent actual TIMSS results and not estimated TIMSS results based on the link between NAEP and TIMSS.
(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Actual TIMSS Scores from Public School Data for Minnesota with Actual TIMSS Scores for Nations: Grade 8 Mathematics (1995)

State/Jurisdiction: Minnesota*

How did the students in Minnesota perform in grade 8 mathematics in comparison to the students in the 41 nations that participated in TIMSS?

Nations whose performance was:

Higher than Minnesota	Not significantly different from Minnesota	Lower than Minnesota
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Denmark)
Japan	(Bulgaria)	(Greece)
Korea	Canada	Iceland
Singapore	(England)	Iran, Islamic Republic
	France	(Kuwait)
	(Germany)	(Latvia – LSS)
	Hungary	(Lithuania)
	Ireland	Norway
	(Israel)	Portugal
	(Netherlands)	(Romania)
	New Zealand	(Scotland)
	Russian Federation	(South Africa)
	Slovak Republic	Spain
	(Slovenia)	United States (average)
	Sweden	
	(Switzerland)	
	(Thailand)	

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*The comparisons and values shown in this profile represent actual TIMSS results and not estimated TIMSS results based on the link between NAEP and TIMSS.
(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Mississippi

If the public school students in Mississippi participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Mississippi	Not significantly different from Mississippi	Lower than Mississippi
(Australia)	Iran, Islamic Republic	(Colombia)
(Austria)	Portugal	(Kuwait)
Belgium – Flemish		(South Africa)
(Belgium – French)		
(Bulgaria)		
Canada		
Cyprus		
Czech Republic		
(Denmark)		
(England)		
France		
(Germany)		
(Greece)		
Hong Kong		
Hungary		
Iceland		
Ireland		
(Israel)		
Japan		
Korea		
(Latvia-LSS)		
(Lithuania)		
(Netherlands)		
New Zealand		
Norway		
(Romania)		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Missouri

If the public school students in Missouri participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Missouri	Not significantly different from Missouri	Lower than Missouri
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
(Bulgaria)	Canada	Iran, Islamic Republic
Czech Republic	(Denmark)	(Kuwait)
France	(England)	(Lithuania)
Hong Kong	(Germany)	Portugal
Hungary	(Greece)	(South Africa)
Japan	Iceland	
Korea	Ireland	
(Netherlands)	(Israel)	
Russian Federation	(Latvia – LSS)	
Singapore	New Zealand	
Slovak Republic	Norway	
(Slovenia)	(Romania)	
(Switzerland)	(Scotland)	
	Spain	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Montana)

If the public school students in Montana participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Montana	Not significantly different from Montana	Lower than Montana
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Denmark)
Japan	(Bulgaria)	(England)
Korea	Canada	(Greece)
Singapore	France	Iceland
	(Germany)	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	(Netherlands)	Norway
	New Zealand	Portugal
	Russian Federation	(Romania)
	Slovak Republic	(Scotland)
	(Slovenia)	(South Africa)
	Sweden	Spain
	(Switzerland)	United States (average)
	(Thailand)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Nebraska

If the public school students in Nebraska participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Nebraska	Not significantly different from Nebraska	Lower than Nebraska
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Denmark)
Japan	(Bulgaria)	(England)
Korea	Canada	(Greece)
Singapore	France	Iceland
	(Germany)	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	(Netherlands)	Norway
	New Zealand	Portugal
	Russian Federation	(Romania)
	Slovak Republic	(Scotland)
	(Slovenia)	(South Africa)
	Sweden	Spain
	(Switzerland)	United States (average)
	(Thailand)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: New Mexico

If the public school students in New Mexico participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than New Mexico	Not significantly different from New Mexico	Lower than New Mexico
(Australia) (Austria) Belgium – Flemish (Belgium – French) (Bulgaria) Canada Czech Republic (Denmark) (England) France (Germany) Hong Kong Hungary Ireland (Israel) Japan Korea (Netherlands) New Zealand Norway Russian Federation Singapore Slovak Republic (Slovenia) Sweden (Switzerland) (Thailand)	Cyprus (Greece) Iceland (Latvia-LSS) (Lithuania) (Romania) (Scotland) Spain United States (average)	(Colombia) Iran, Islamic Republic (Kuwait) Portugal (South Africa)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (New York)

If the public school students in New York participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than New York	**Not significantly different from New York**	**Lower than New York**
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Israel)	
France	(Latvia – LSS)	
Hong Kong	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Russian Federation	Sweden	
Singapore	(Thailand)	
Slovak Republic	United States (average)	
(Slovenia)		
(Switzerland)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: North Carolina

If the public school students in North Carolina participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than North Carolina	Not significantly different from North Carolina	Lower than North Carolina
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Israel)	
France	(Latvia-LSS)	
Hong Kong	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Russian Federation	United States (average)	
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: North Dakota

If the public school students in North Dakota participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than North Dakota	**Not significantly different from North Dakota**	**Lower than North Dakota**
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Denmark)
Japan	(Bulgaria)	(England)
Korea	Canada	(Greece)
Singapore	France	Iceland
	(Germany)	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	(Netherlands)	New Zealand
	Russian Federation	Norway
	Slovak Republic	Portugal
	(Slovenia)	(Romania)
	Sweden	(Scotland)
	(Switzerland)	(South Africa)
	(Thailand)	Spain
		United States (average)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Oregon

If the public school students in Oregon participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Oregon	Not significantly different from Oregon	Lower than Oregon
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
Czech Republic	(Bulgaria)	(Greece)
France	Canada	Iran, Islamic Republic
Hong Kong	(Denmark)	(Kuwait)
Hungary	(England)	(Lithuania)
Japan	(Germany)	Portugal
Korea	Iceland	(Romania)
Singapore	Ireland	(South Africa)
Slovak Republic	(Israel)	Spain
(Slovenia)	(Latvia – LSS)	
(Switzerland)	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Rhode Island

If the public school students in Rhode Island participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Rhode Island	Not significantly different from Rhode Island	Lower than Rhode Island
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Israel)	
France	(Latvia-LSS)	
Hong Kong	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Russian Federation	United States (average)	
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (South Carolina)

If the public school students in South Carolina participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than South Carolina	Not significantly different from South Carolina	Lower than South Carolina
(Australia)	Cyprus	(Colombia)
(Austria)	(Greece)	Iran, Islamic Republic
Belgium – Flemish	Iceland	(Kuwait)
(Belgium – French)	(Latvia-LSS)	(South Africa)
(Bulgaria)	(Lithuania)	
Canada	Portugal	
Czech Republic	(Romania)	
(Denmark)	(Scotland)	
(England)	Spain	
France	United States (average)	
(Germany)		
Hong Kong		
Hungary		
Ireland		
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Tennessee

If the public school students in Tennessee participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Tennessee	Not significantly different from Tennessee	Lower than Tennessee
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(Greece)	(Kuwait)
(Belgium – French)	Iceland	Portugal
(Bulgaria)	(Latvia-LSS)	(South Africa)
Canada	(Lithuania)	
Czech Republic	(Romania)	
(England)	(Scotland)	
France	Spain	
(Germany)	United States (average)	
Hong Kong		
Hungary		
Ireland		
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Texas

If the public school students in Texas participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Texas	Not significantly different from Texas	Lower than Texas
(Australia)	(Denmark)	(Colombia)
(Austria)	(England)	Cyprus
Belgium – Flemish	(Germany)	Iran, Islamic Republic
(Belgium – French)	(Greece)	(Kuwait)
(Bulgaria)	Iceland	Portugal
Canada	(Israel)	(South Africa)
Czech Republic	(Latvia – LSS)	
France	(Lithuania)	
Hong Kong	New Zealand	
Hungary	Norway	
Ireland	(Romania)	
Japan	(Scotland)	
Korea	Spain	
(Netherlands)	Sweden	
Russian Federation	(Thailand)	
Singapore	United States (average)	
Slovak Republic		
(Slovenia)		
(Switzerland)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Utah

If the public school students in Utah participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Utah	**Not significantly different from Utah**	**Lower than Utah**
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
Czech Republic	(Bulgaria)	(Greece)
France	Canada	Iceland
Hong Kong	(Denmark)	Iran, Islamic Republic
Hungary	(England)	(Kuwait)
Japan	(Germany)	(Lithuania)
Korea	Ireland	Portugal
Singapore	(Israel)	(Romania)
Slovak Republic	(Latvia – LSS)	(South Africa)
(Slovenia)	(Netherlands)	Spain
(Switzerland)	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Vermont)

If the public school students in Vermont participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Vermont	Not significantly different from Vermont	Lower than Vermont
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Greece)
Japan	(Bulgaria)	Iceland
Korea	Canada	Iran, Islamic Republic
Singapore	(Denmark)	(Kuwait)
Slovak Republic	(England)	(Latvia – LSS)
(Switzerland)	France	(Lithuania)
	(Germany)	Portugal
	Hungary	(Romania)
	Ireland	(South Africa)
	(Israel)	Spain
	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	(Slovenia)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Virginia

If the public school students in Virginia participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Virginia	**Not significantly different from Virginia**	**Lower than Virginia**
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Israel)	
France	(Latvia-LSS)	
Hong Kong	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Russian Federation	Sweden	
Singapore	(Thailand)	
Slovak Republic	United States (average)	
(Slovenia)		
(Switzerland)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Washington

If the public school students in Washington participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Washington	Not significantly different from Washington	Lower than Washington
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
Czech Republic	(Bulgaria)	(Greece)
France	Canada	Iran, Islamic Republic
Hong Kong	(Denmark)	(Kuwait)
Hungary	(England)	(Lithuania)
Japan	(Germany)	Portugal
Korea	Iceland	(Romania)
Singapore	Ireland	(South Africa)
Slovak Republic	(Israel)	Spain
(Slovenia)	(Latvia – LSS)	
(Switzerland)	(Netherlands)	
	New Zealand	
	Norway	
	Russian Federation	
	(Scotland)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: West Virginia

If the public school students in West Virginia participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Virginia	**Not significantly different from West Virginia**	**Lower than West Virginia**
(Australia)	Cyprus	(Colombia)
(Austria)	(Denmark)	Iran, Islamic Republic
Belgium – Flemish	(England)	(Kuwait)
(Belgium – French)	(Germany)	Portugal
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	(Latvia-LSS)	
France	(Lithuania)	
Hong Kong	New Zealand	
Hungary	Norway	
Ireland	(Romania)	
(Israel)	(Scotland)	
Japan	Spain	
Korea	United States (average)	
(Netherlands)		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
(Switzerland)		
(Thailand)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: (Wisconsin)

If the public school students in Wisconsin participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Wisconsin	Not significantly different from Wisconsin	Lower than Wisconsin
Belgium – Flemish	(Australia)	(Colombia)
Czech Republic	(Austria)	Cyprus
Hong Kong	(Belgium – French)	(Denmark)
Japan	(Bulgaria)	(Greece)
Korea	Canada	Iceland
Singapore	(England)	Iran, Islamic Republic
	France	(Kuwait)
	(Germany)	(Latvia – LSS)
	Hungary	(Lithuania)
	Ireland	Norway
	(Israel)	Portugal
	(Netherlands)	(Romania)
	New Zealand	(Scotland)
	Russian Federation	(South Africa)
	Slovak Republic	Spain
	(Slovenia)	United States (average)
	Sweden	
	(Switzerland)	
	(Thailand)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparison of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Mathematics States (1996), Nations (1995)

State/Jurisdiction: Wyoming

If the public school students in Wyoming participated in TIMSS, how would their average performance in mathematics compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Wyoming	**Not significantly different from Wyoming**	**Lower than Wyoming**
(Austria)	(Australia)	(Colombia)
Belgium – Flemish	(Belgium – French)	Cyprus
(Bulgaria)	Canada	(Greece)
Czech Republic	(Denmark)	Iran, Islamic Republic
France	(England)	(Kuwait)
Hong Kong	(Germany)	(Lithuania)
Hungary	Iceland	Portugal
Japan	Ireland	(Romania)
Korea	(Israel)	(South Africa)
(Netherlands)	(Latvia – LSS)	Spain
Russian Federation	New Zealand	
Singapore	Norway	
Slovak Republic	(Scotland)	
(Slovenia)	Sweden	
(Switzerland)	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

APPENDIX D

COMPARISONS OF EACH NAEP STATE AND JURISDICTION WITH THE TIMSS NATIONS FOR GRADE 8 SCIENCE

This appendix presents one-page profiles for each state and jurisdiction participating in grade 8 science in alphabetical order. Each page presents a table displaying how the state or jurisdiction would perform in comparison to the 41 nations that took TIMSS science at grade 8. Each table indicates whether the **actual** scores of the participating TIMSS nations are significantly higher than, not significantly different from, or significantly lower than the **estimated** average performance of the public school students in the state or jurisdiction. The significance of the difference of the estimated mean of the given jurisdiction and the actual means of the TIMSS countries are based on a Bonferroni multiple comparisons procedure that holds to 5 percent the probability of erroneously declaring any of the country means significantly different from the chosen jurisdiction's predicted mean.

A second profile is presented for the state of Minnesota in addition to the profile for the estimated average performance. Because **actual** TIMSS results for Minnesota's public school students are available, these are compared with the results of the 41 nations who participated in TIMSS for grade 8 science.

Readers of these profiles are reminded that the state's or jurisdiction's TIMSS performance in grade 8 science is **estimated** from its NAEP score, using the linking function, and must therefore be interpreted with caution. Furthermore, the calculations for the 1996 NAEP scores and 1995 TIMSS scores for the participating states, jurisdictions, and nations are based on samples of the student populations, not entire student populations. Hence, estimates are imprecise.

The SOLE purpose of these profiles is to allow the comparison of predicted TIMSS performances for individual states with the actual TIMSS performances of individual countries. It is NOT appropriate to use these profiles to compare performances between states or between countries. Accordingly, the profiles for the states and jurisdictions participating in NAEP grade 8 science are arranged in alphabetical order. The proper between-state comparisons are provided in the NAEP reports (O'Sullivan, Reese, and Mazzeo 1997), while the proper between country comparisons are provided in the TIMSS reports (Beaton, Martin, et al., 1997).

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Alabama

If the public school students in Alabama participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Alabama	Not significantly different from Alabama	Lower than Alabama
(Australia)	(Denmark)	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Greece)	Cyprus
(Bulgaria)	Hong Kong	Iran, Islamic Republic
Canada	Iceland	(Kuwait)
Czech Republic	(Israel)	(South Africa)
(England)	(Latvia – LSS)	
(Germany)	(Lithuania)	
Hungary	New Zealand	
Ireland	Norway	
Japan	Portugal	
Korea	(Romania)	
(Netherlands)	(Scotland)	
Russian Federation	Spain	
Singapore	(Switzerland)	
Slovak Republic	(Thailand)	
(Slovenia)		
Sweden		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Alaska)

If the public school students in Alaska participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Alaska	Not significantly different from Alaska	Lower than Alaska
Czech Republic	(Australia)	(Belgium – French)
Japan	(Austria)	(Colombia)
Singapore	Belgium – Flemish	Cyprus
	(Bulgaria)	(Denmark)
	Canada	France
	(England)	(Greece)
	(Germany)	Iceland
	Hong Kong	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	Korea	Portugal
	(Netherlands)	(Romania)
	New Zealand	(Scotland)
	Norway	(South Africa)
	Russian Federation	Spain
	Slovak Republic	
	(Slovenia)	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Arizona

If the public school students in Arizona participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Arizona	Not significantly different from Arizona	Lower than Arizona
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
(England)	France	(Denmark)
Hungary	(Germany)	Iran, Islamic Republic
Japan	(Greece)	(Kuwait)
Korea	Hong Kong	(Latvia – LSS)
(Netherlands)	Iceland	(Lithuania)
Singapore	Ireland	Portugal
(Slovenia)	(Israel)	(Romania)
	New Zealand	(South Africa)
	Norway	
	Russian Federation	
	(Scotland)	
	Slovak Republic	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Arkansas)

If the public school students in Arkansas participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Arkansas	Not significantly different from Arkansas	Lower than Arkansas
(Australia)	Canada	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Germany)	Cyprus
(Bulgaria)	(Greece)	(Denmark)
Czech Republic	Hong Kong	Iran, Islamic Republic
(England)	Iceland	(Kuwait)
Hungary	Ireland	(Latvia – LSS)
Japan	(Israel)	(Lithuania)
Korea	New Zealand	Portugal
(Netherlands)	Norway	(Romania)
Singapore	Russian Federation	(South Africa)
Slovak Republic	(Scotland)	
(Slovenia)	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: California

If the public school students in California participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than California	**Not significantly different from California**	**Lower than California**
(Australia)	(Denmark)	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Greece)	Cyprus
(Bulgaria)	Hong Kong	Iran, Islamic Republic
Canada	Iceland	(Kuwait)
Czech Republic	(Israel)	(South Africa)
(England)	(Latvia – LSS)	
(Germany)	(Lithuania)	
Hungary	New Zealand	
Ireland	Portugal	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Norway	(Switzerland)	
Russian Federation	(Thailand)	
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Colorado

If the public school students in Colorado participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Colorado	**Not significantly different from Colorado**	**Lower than Colorado**
Singapore	(Australia)	(Belgium – French)
	(Austria)	(Colombia)
	Belgium – Flemish	Cyprus
	(Bulgaria)	(Denmark)
	Canada	France
	Czech Republic	(Greece)
	(England)	Hong Kong
	(Germany)	Iceland
	Hungary	Iran, Islamic Republic
	Ireland	(Kuwait)
	(Israel)	(Latvia – LSS)
	Japan	(Lithuania)
	Korea	Norway
	(Netherlands)	Portugal
	New Zealand	(Romania)
	Russian Federation	(Scotland)
	Slovak Republic	(South Africa)
	(Slovenia)	Spain
	Sweden	(Switzerland)
	United States (average)	(Thailand)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Connecticut

If the public school students in Connecticut participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Connecticut	**Not significantly different from Connecticut**	**Lower than Connecticut**
Singapore	(Australia)	(Belgium – French)
	(Austria)	(Colombia)
	Belgium – Flemish	Cyprus
	(Bulgaria)	(Denmark)
	Canada	France
	Czech Republic	(Greece)
	(England)	Hong Kong
	(Germany)	Iceland
	Hungary	Iran, Islamic Republic
	Ireland	(Kuwait)
	(Israel)	(Latvia – LSS)
	Japan	(Lithuania)
	Korea	Norway
	(Netherlands)	Portugal
	New Zealand	(Romania)
	Russian Federation	(Scotland)
	Slovak Republic	(South Africa)
	(Slovenia)	Spain
	Sweden	(Switzerland)
	United States (average)	(Thailand)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Delaware

If the public school students in Delaware participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Delaware	**Not significantly different from Delaware**	**Lower than Delaware**
(Australia)	Canada	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Germany)	Cyprus
(Bulgaria)	(Greece)	(Denmark)
Czech Republic	Hong Kong	Iran, Islamic Republic
(England)	Iceland	(Kuwait)
Hungary	(Israel)	(Latvia – LSS)
Ireland	New Zealand	(Lithuania)
Japan	Norway	Portugal
Korea	(Romania)	(South Africa)
(Netherlands)	(Scotland)	
Russian Federation	Spain	
Singapore	(Switzerland)	
Slovak Republic	(Thailand)	
(Slovenia)	United States (average)	
Sweden		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Department of Defense Domestic Dependent Elementary and Secondary Schools – DDESS

If the public school students in the DDESS participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than DDESS	Not significantly different from DDESS	Lower than DDESS
Czech Republic	(Australia)	(Belgium – French)
Japan	(Austria)	(Colombia)
Singapore	Belgium – Flemish	Cyprus
	(Bulgaria)	(Denmark)
	Canada	France
	(England)	(Greece)
	(Germany)	Iceland
	Hong Kong	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	Korea	Portugal
	(Netherlands)	(Romania)
	New Zealand	(Scotland)
	Norway	(South Africa)
	Russian Federation	Spain
	Slovak Republic	(Switzerland)
	(Slovenia)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Department of Defense Dependents Schools Overseas – DoDDS

If the public school students in the DoDDS participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than DoDDS	Not significantly different from DoDDS	Lower than DoDDS
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	(Germany)	(Greece)
	Hungary	Hong Kong
	Ireland	Iceland
	Japan	Iran, Islamic Republic
	Korea	(Israel)
	(Netherlands)	(Kuwait)
	Russian Federation	(Latvia – LSS)
	Slovak Republic	(Lithuania)
	(Slovenia)	New Zealand
	Sweden	Norway
	United States (average)	Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		(Switzerland)
		(Thailand)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: District of Columbia

If the public school students in the District of Columbia participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than DC	Not significantly different from DC	Lower than DC
(Australia)	(Colombia)	(South Africa)
(Austria)	(Kuwait)	
Belgium – Flemish		
(Belgium – French)		
(Bulgaria)		
Canada		
Cyprus		
Czech Republic		
(Denmark)		
(England)		
France		
(Germany)		
(Greece)		
Hong Kong		
Hungary		
Iceland		
Iran, Islamic Republic		
Ireland		
(Israel)		
Japan		
Korea		
(Latvia – LSS)		
(Lithuania)		
(Netherlands)		
New Zealand		
Norway		
Portugal		
(Romania)		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Florida

If the public school students in Florida participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Florida	**Not significantly different from Florida**	**Lower than Florida**
(Australia)	Canada	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Germany)	Cyprus
(Bulgaria)	(Greece)	(Denmark)
Czech Republic	Hong Kong	Iran, Islamic Republic
(England)	Iceland	(Kuwait)
Hungary	Ireland	(Latvia – LSS)
Japan	(Israel)	(Lithuania)
Korea	New Zealand	Portugal
(Netherlands)	Norway	(South Africa)
Singapore	(Romania)	
Slovak Republic	Russian Federation	
(Slovenia)	(Scotland)	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Georgia

If the public school students in Georgia participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Georgia	Not significantly different from Georgia	Lower than Georgia
(Australia)	Canada	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Germany)	Cyprus
(Bulgaria)	(Greece)	(Denmark)
Czech Republic	Hong Kong	Iran, Islamic Republic
(England)	Iceland	(Kuwait)
Hungary	Ireland	(Latvia – LSS)
Japan	(Israel)	(Lithuania)
Korea	New Zealand	Portugal
(Netherlands)	Norway	(South Africa)
Russian Federation	(Romania)	
Singapore	(Scotland)	
Slovak Republic	Spain	
(Slovenia)	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Guam

If the public school students in Guam participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Guam	Not significantly different from Guam	Lower than Guam
(Australia)	Cyprus	(Colombia)
(Austria)	(Kuwait)	(South Africa)
Belgium – Flemish		
(Belgium – French)		
(Bulgaria)		
Canada		
Czech Republic		
(Denmark)		
(England)		
France		
(Germany)		
(Greece)		
Hong Kong		
Hungary		
Iceland		
Iran, Islamic Republic		
Ireland		
(Israel)		
Japan		
Korea		
(Latvia – LSS)		
(Lithuania)		
(Netherlands)		
New Zealand		
Norway		
Portugal		
(Romania)		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Hawaii

If the public school students in Hawaii participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Hawaii	**Not significantly different from Hawaii**	**Lower than Hawaii**
(Australia)	(Belgium – French)	(Colombia)
(Austria)	(Denmark)	Cyprus
Belgium – Flemish	France	(Kuwait)
(Bulgaria)	(Greece)	(South Africa)
Canada	Iceland	
Czech Republic	Iran, Islamic Republic	
(England)	(Latvia – LSS)	
(Germany)	(Lithuania)	
Hong Kong	Portugal	
Hungary	(Romania)	
Ireland	(Scotland)	
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Indiana

If the public school students in Indiana participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Indiana	**Not significantly different from Indiana**	**Lower than Indiana**
Czech Republic	(Australia)	(Belgium – French)
Japan	(Austria)	(Colombia)
Singapore	Belgium – Flemish	Cyprus
	(Bulgaria)	(Denmark)
	Canada	France
	(England)	(Greece)
	(Germany)	Iceland
	Hong Kong	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	Korea	Portugal
	(Netherlands)	(Romania)
	New Zealand	(Scotland)
	Norway	(South Africa)
	Russian Federation	Spain
	Slovak Republic	
	(Slovenia)	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Iowa)

If the public school students in Iowa participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Iowa	**Not significantly different from Iowa**	**Lower than Iowa**
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	(Bulgaria)	(Colombia)
	(Netherlands)	Cyprus
	(Slovenia)	(Denmark)
	Belgium – Flemish	France
	Czech Republic	(Germany)
	(England)	(Greece)
	Hungary	Hong Kong
	Ireland	Iceland
	Japan	Iran, Islamic Republic
	Korea	(Israel)
	Russian Federation	(Kuwait)
	Slovak Republic	(Latvia – LSS)
		(Lithuania)
		New Zealand
		Norway
		Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		Sweden
		(Switzerland)
		(Thailand)
		United States (average)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Kentucky

If the public school students in Kentucky participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Kentucky	Not significantly different from Kentucky	Lower than Kentucky
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
Japan	(England)	(Denmark)
Korea	(Germany)	France
(Netherlands)	Hong Kong	(Greece)
Singapore	Hungary	Iceland
(Slovenia)	Ireland	Iran, Islamic Republic
	(Israel)	(Kuwait)
	New Zealand	(Latvia – LSS)
	Norway	(Lithuania)
	Russian Federation	Portugal
	(Scotland)	(Romania)
	Slovak Republic	(South Africa)
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Louisiana

If the public school students in Louisiana participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Louisiana	Not significantly different from Louisiana	Lower than Louisiana
(Australia)	(Belgium – French)	(Colombia)
(Austria)	Cyprus	(Kuwait)
Belgium – Flemish	(Denmark)	(South Africa)
(Bulgaria)	France	
Canada	(Greece)	
Czech Republic	Iceland	
(England)	Iran, Islamic Republic	
(Germany)	(Latvia – LSS)	
Hong Kong	(Lithuania)	
Hungary	Portugal	
Ireland	(Romania)	
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Maine

If the public school students in Maine participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Maine	**Not significantly different from Maine**	**Lower than Maine**
Singapore	(Austria) (Bulgaria) Czech Republic (England) Japan Korea (Netherlands) (Slovenia)	(Australia) Belgium - Flemish (Belgium – French) Canada (Colombia) Cyprus (Denmark) France (Germany) (Greece) Hong Kong Hungary Iceland Iran, Islamic Republic Ireland (Israel) (Kuwait) (Latvia - LSS) (Lithuania) New Zealand Norway Portugal (Romania) Russian Federation (Scotland) Slovak Republic (South Africa) Spain Sweden (Switzerland) (Thailand) United States (average)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Maryland)

If the public school students in Maryland participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Maryland	**Not significantly different from Maryland**	**Lower than Maryland**
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
(England)	France	(Denmark)
Hungary	(Germany)	Iceland
Japan	(Greece)	Iran, Islamic Republic
Korea	Hong Kong	(Kuwait)
(Netherlands)	Ireland	(Latvia – LSS)
Singapore	(Israel)	(Lithuania)
(Slovenia)	New Zealand	Portugal
	Norway	(Romania)
	Russian Federation	(South Africa)
	(Scotland)	
	Slovak Republic	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Massachusetts

If the public school students in Massachusetts participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Massachusetts	Not significantly different from Massachusetts	Lower than Massachusetts
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	(Germany)	(Greece)
	Hungary	Hong Kong
	Ireland	Iceland
	Japan	Iran, Islamic Republic
	Korea	(Israel)
	(Netherlands)	(Kuwait)
	Russian Federation	(Latvia – LSS)
	Slovak Republic	(Lithuania)
	(Slovenia)	New Zealand
	Sweden	Norway
	United States (average)	Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		(Switzerland)
		(Thailand)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Michigan)

If the public school students in Michigan participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Michigan	**Not significantly different from Michigan**	**Lower than Michigan**
Czech Republic	(Australia)	(Belgium – French)
Singapore	(Austria)	(Colombia)
	Belgium – Flemish	Cyprus
	(Bulgaria)	(Denmark)
	Canada	France
	(England)	(Greece)
	(Germany)	Iceland
	Hong Kong	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	Japan	Portugal
	Korea	(Romania)
	(Netherlands)	(Scotland)
	New Zealand	(South Africa)
	Norway	Spain
	Russian Federation	
	Slovak Republic	
	(Slovenia)	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Minnesota

If the public school students in Minnesota participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Minnesota	**Not significantly different from Minnesota**	**Lower than Minnesota**
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	Hungary	(Germany)
	Ireland	(Greece)
	Japan	Hong Kong
	Korea	Iceland
	(Netherlands)	Iran, Islamic Republic
	Russian Federation	(Israel)
	Slovak Republic	(Kuwait)
	(Slovenia)	(Latvia – LSS)
		(Lithuania)
		New Zealand
		Norway
		Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		Sweden
		(Switzerland)
		(Thailand)
		United States (average)

*The comparisons and values shown in this profile represent actual TIMSS results and not estimated TIMSS results based on the link between NAEP and TIMSS.
(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Actual TIMSS Scores from Public School Data for Minnesota with Actual TIMSS Scores for Nations: Grade 8 Science (1995)

State/Jurisdiction: Minnesota*

How did the public school students in Minnesota perform in grade 8 science in comparison to the students in the 41 nations that participated in TIMSS?

Nations whose performance was:

Higher than Minnesota	Not significantly different from Minnesota	Lower than Minnesota
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	Hungary	(Germany)
	Japan	(Greece)
	Korea	Hong Kong
	(Netherlands)	Iceland
	Slovak Republic	Iran, Islamic Republic
	(Slovenia)	Ireland
		(Israel)
		(Kuwait)
		(Latvia – LSS)
		(Lithuania)
		New Zealand
		Norway
		Portugal
		(Romania)
		Russian Federation
		(Scotland)
		(South Africa)
		Spain
		Sweden
		(Switzerland)
		(Thailand)
		United States (average)

*The comparisons and values shown in this profile represent actual TIMSS results and not estimated TIMSS results based on the link between NAEP and TIMSS.
(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Mississippi

If the public school students in Mississippi participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Mississippi	Not significantly different from Mississippi	Lower than Mississippi
(Australia)	(Belgium – French)	(Colombia)
(Austria)	Cyprus	(Kuwait)
Belgium – Flemish	(Denmark)	(South Africa)
(Bulgaria)	France	
Canada	(Greece)	
Czech Republic	Iceland	
(England)	Iran, Islamic Republic	
(Germany)	(Latvia – LSS)	
Hong Kong	(Lithuania)	
Hungary	Portugal	
Ireland	(Romania)	
(Israel)		
Japan		
Korea		
(Netherlands)		
New Zealand		
Norway		
Russian Federation		
(Scotland)		
Singapore		
Slovak Republic		
(Slovenia)		
Spain		
Sweden		
(Switzerland)		
(Thailand)		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Missouri

If the public school students in Missouri participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Missouri	**Not significantly different from Missouri**	**Lower than Missouri**
Czech Republic	(Australia)	(Belgium – French)
Japan	(Austria)	(Colombia)
Korea	Belgium – Flemish	Cyprus
Singapore	(Bulgaria)	(Denmark)
	Canada	France
	(England)	(Greece)
	(Germany)	Iceland
	Hong Kong	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	(Netherlands)	Portugal
	New Zealand	(Romania)
	Norway	(South Africa)
	Russian Federation	
	(Scotland)	
	Slovak Republic	
	(Slovenia)	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Montana)

If the public school students in Montana participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Montana	Not significantly different from Montana	Lower than Montana
Singapore	(Austria)	(Australia)
	Belgium - Flemish	(Belgium - French)
	(Bulgaria)	Canada
	Czech Republic	(Colombia)
	(England)	Cyprus
	Hungary	(Denmark)
	Japan	France
	Korea	(Germany)
	(Netherlands)	(Greece)
	(Slovenia)	Hong Kong
		Iceland
		Iran, Islamic Republic
		Ireland
		(Israel)
		(Kuwait)
		(Latvia – LSS)
		(Lithuania)
		New Zealand
		Norway
		Portugal
		(Romania)
		Russian Federation
		(Scotland)
		Slovak Republic
		(South Africa)
		Spain
		Sweden
		(Switzerland)
		(Thailand)
		United States (average)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Nebraska

If the public school students in Nebraska participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Nebraska	Not significantly different from Nebraska	Lower than Nebraska
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	Hungary	(Germany)
	Ireland	(Greece)
	Japan	Hong Kong
	Korea	Iceland
	(Netherlands)	Iran, Islamic Republic
	Russian Federation	(Israel)
	Slovak Republic	(Kuwait)
	(Slovenia)	(Latvia – LSS)
	United States (average)	(Lithuania)
		New Zealand
		Norway
		Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		Sweden
		(Switzerland)
		(Thailand)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: New Mexico

If the public school students in New Mexico participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than New Mexico	Not significantly different from New Mexico	Lower than New Mexico
(Australia)	Canada	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Germany)	Cyprus
(Bulgaria)	(Greece)	(Denmark)
Czech Republic	Hong Kong	Iran, Islamic Republic
(England)	Iceland	(Kuwait)
Hungary	(Israel)	(Latvia – LSS)
Ireland	New Zealand	(Lithuania)
Japan	Norway	Portugal
Korea	(Romania)	(South Africa)
(Netherlands)	(Scotland)	
Russian Federation	Spain	
Singapore	(Switzerland)	
Slovak Republic	(Thailand)	
(Slovenia)	United States (average)	
Sweden		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (New York)

If the public school students in New York participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than New York	**Not significantly different from New York**	**Lower than New York**
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
(England)	(Germany)	(Denmark)
Hungary	Hong Kong	France
Japan	Ireland	(Greece)
Korea	(Israel)	Iceland
(Netherlands)	New Zealand	Iran, Islamic Republic
Singapore	Norway	(Kuwait)
(Slovenia)	Russian Federation	(Latvia – LSS)
	(Scotland)	(Lithuania)
	Slovak Republic	Portugal
	Spain	(Romania)
	Sweden	(South Africa)
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: North Carolina

If the public school students in North Carolina participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than North Carolina	Not significantly different from North Carolina	Lower than North Carolina
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
(England)	(Germany)	(Denmark)
Hungary	Hong Kong	France
Japan	Ireland	(Greece)
Korea	(Israel)	Iceland
(Netherlands)	New Zealand	Iran, Islamic Republic
Singapore	Norway	(Kuwait)
(Slovenia)	Russian Federation	(Latvia – LSS)
	(Scotland)	(Lithuania)
	Slovak Republic	Portugal
	Spain	(Romania)
	Sweden	(South Africa)
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: North Dakota

If the public school students in North Dakota participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than North Dakota	Not significantly different from North Dakota	Lower than North Dakota
Singapore	(Austria) (Bulgaria) Czech Republic (England) Hungary Japan Korea (Netherlands) (Slovenia)	(Australia) Belgium - Flemish (Belgium - French) Canada (Colombia) Cyprus (Denmark) France (Germany) (Greece) Hong Kong Iceland Iran, Islamic Republic Ireland (Israel) (Kuwait) (Latvia - LSS) (Lithuania) New Zealand Norway Portugal (Romania) Russian Federation (Scotland) Slovak Republic (South Africa) Spain Sweden (Switzerland) (Thailand) United States (average)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Oregon

If the public school students in Oregon participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Oregon	Not significantly different from Oregon	Lower than Oregon
Singapore	(Australia)	(Belgium – French)
	(Austria)	(Colombia)
	Belgium – Flemish	Cyprus
	(Bulgaria)	(Denmark)
	Canada	France
	Czech Republic	(Greece)
	(England)	Hong Kong
	(Germany)	Iceland
	Hungary	Iran, Islamic Republic
	Ireland	(Kuwait)
	(Israel)	(Latvia – LSS)
	Japan	(Lithuania)
	Korea	Portugal
	(Netherlands)	(Romania)
	New Zealand	(Scotland)
	Norway	(South Africa)
	Russian Federation	Spain
	Slovak Republic	(Switzerland)
	(Slovenia)	
	Sweden	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Rhode Island

If the public school students in Rhode Island participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Rhode Island	Not significantly different from Rhode Island	Lower than Rhode Island
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
Japan	(England)	(Denmark)
Korea	(Germany)	France
(Netherlands)	Hong Kong	(Greece)
Singapore	Hungary	Iceland
(Slovenia)	Ireland	Iran, Islamic Republic
	(Israel)	(Kuwait)
	New Zealand	(Latvia – LSS)
	Norway	(Lithuania)
	Russian Federation	Portugal
	(Scotland)	(Romania)
	Slovak Republic	(South Africa)
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (South Carolina)

If the public school students in South Carolina participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than South Carolina	**Not significantly different from South Carolina**	**Lower than South Carolina**
(Australia)	(Denmark)	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Greece)	Cyprus
(Bulgaria)	Hong Kong	Iran, Islamic Republic
Canada	Iceland	(Kuwait)
Czech Republic	(Israel)	(South Africa)
(England)	(Latvia – LSS)	
(Germany)	(Lithuania)	
Hungary	New Zealand	
Ireland	Portugal	
Japan	(Romania)	
Korea	(Scotland)	
(Netherlands)	Spain	
Norway	(Switzerland)	
Russian Federation	(Thailand)	
Singapore		
Slovak Republic		
(Slovenia)		
Sweden		
United States (average)		

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Tennessee

If the public school students in Tennessee participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Tennessee	Not significantly different from Tennessee	Lower than Tennessee
(Australia)	Canada	(Belgium – French)
(Austria)	France	(Colombia)
Belgium – Flemish	(Germany)	Cyprus
(Bulgaria)	(Greece)	(Denmark)
Czech Republic	Hong Kong	Iran, Islamic Republic
(England)	Iceland	(Kuwait)
Hungary	Ireland	(Latvia – LSS)
Japan	(Israel)	(Lithuania)
Korea	New Zealand	Portugal
(Netherlands)	Norway	(South Africa)
Singapore	(Romania)	
Slovak Republic	Russian Federation	
(Slovenia)	(Scotland)	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Texas

If the public school students in Texas participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Texas	Not significantly different from Texas	Lower than Texas
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
(England)	France	(Denmark)
Hungary	(Germany)	Iran, Islamic Republic
Japan	(Greece)	(Kuwait)
Korea	Hong Kong	(Latvia – LSS)
(Netherlands)	Iceland	(Lithuania)
Singapore	Ireland	Portugal
(Slovenia)	(Israel)	(Romania)
	New Zealand	(South Africa)
	Norway	
	Russian Federation	
	(Scotland)	
	Slovak Republic	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Utah

If the public school students in Utah participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Utah	Not significantly different from Utah	Lower than Utah
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	(Germany)	(Greece)
	Hungary	Hong Kong
	Ireland	Iceland
	Japan	Iran, Islamic Republic
	Korea	(Israel)
	(Netherlands)	(Kuwait)
	Russian Federation	(Latvia – LSS)
	Slovak Republic	(Lithuania)
	(Slovenia)	New Zealand
	Sweden	Norway
	United States (average)	Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		(Switzerland)
		(Thailand)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Vermont)

If the public school students in Vermont participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Vermont	Not significantly different from Vermont	Lower than Vermont
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	(Germany)	(Greece)
	Hungary	Hong Kong
	Ireland	Iceland
	Japan	Iran, Islamic Republic
	Korea	(Israel)
	(Netherlands)	(Kuwait)
	Russian Federation	(Latvia – LSS)
	Slovak Republic	(Lithuania)
	(Slovenia)	New Zealand
	Sweden	Norway
	United States (average)	Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		(Switzerland)
		(Thailand)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Virginia

If the public school students in Virginia participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Virginia	Not significantly different from Virginia	Lower than Virginia
Czech Republic	(Australia)	(Belgium – French)
Japan	(Austria)	(Colombia)
Korea	Belgium – Flemish	Cyprus
Singapore	(Bulgaria)	(Denmark)
	Canada	France
	(England)	(Greece)
	(Germany)	Iceland
	Hong Kong	Iran, Islamic Republic
	Hungary	(Kuwait)
	Ireland	(Latvia – LSS)
	(Israel)	(Lithuania)
	(Netherlands)	Portugal
	New Zealand	(Romania)
	Norway	(South Africa)
	Russian Federation	
	(Scotland)	
	Slovak Republic	
	(Slovenia)	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Washington

If the public school students in Washington participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Washington	**Not significantly different from Washington**	**Lower than Washington**
(Bulgaria)	(Australia)	(Belgium – French)
Czech Republic	(Austria)	(Colombia)
Japan	Belgium – Flemish	Cyprus
Korea	Canada	(Denmark)
Singapore	(England)	France
	(Germany)	(Greece)
	Hong Kong	Iceland
	Hungary	Iran, Islamic Republic
	Ireland	(Kuwait)
	(Israel)	(Latvia – LSS)
	(Netherlands)	(Lithuania)
	New Zealand	Portugal
	Norway	(Romania)
	Russian Federation	(South Africa)
	(Scotland)	
	Slovak Republic	
	(Slovenia)	
	Spain	
	Sweden	
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: West Virginia

If the public school students in West Virginia participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than West Virginia	Not significantly different from West Virginia	Lower than West Virginia
(Austria)	(Australia)	(Belgium – French)
(Bulgaria)	Belgium – Flemish	(Colombia)
Czech Republic	Canada	Cyprus
(England)	(Germany)	(Denmark)
Hungary	Hong Kong	France
Japan	Ireland	(Greece)
Korea	(Israel)	Iceland
(Netherlands)	New Zealand	Iran, Islamic Republic
Singapore	Norway	(Kuwait)
(Slovenia)	Russian Federation	(Latvia – LSS)
	(Scotland)	(Lithuania)
	Slovak Republic	Portugal
	Spain	(Romania)
	Sweden	(South Africa)
	(Switzerland)	
	(Thailand)	
	United States (average)	

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: (Wisconsin)

If the public school students in Wisconsin participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Wisconsin	Not significantly different from Wisconsin	Lower than Wisconsin
Singapore	(Australia) (Austria) Belgium – Flemish (Bulgaria) Czech Republic (England) Hungary Japan Korea (Netherlands) Slovak Republic (Slovenia)	(Belgium - French) Canada (Colombia) Cyprus (Denmark) France (Germany) (Greece) Hong Kong Iceland Iran, Islamic Republic Ireland (Israel) (Kuwait) (Latvia – LSS) (Lithuania) New Zealand Norway Portugal (Romania) Russian Federation (Scotland) (South Africa) Spain Sweden (Switzerland) (Thailand) United States (average)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.

Comparisons of Estimated TIMSS Scores from Public School NAEP Data for States and Jurisdictions with Actual TIMSS Scores for Nations: Grade 8 Science States (1996), Nations (1995)

State/Jurisdiction: Wyoming

If the public school students in Wyoming participated in TIMSS, how would their average performance in science compare to that of students in the 41 nations that took TIMSS at grade 8?

Nations whose performance is expected to be:

Higher than Wyoming	**Not significantly different from Wyoming**	**Lower than Wyoming**
Singapore	(Australia)	(Belgium – French)
	(Austria)	Canada
	Belgium – Flemish	(Colombia)
	(Bulgaria)	Cyprus
	Czech Republic	(Denmark)
	(England)	France
	Hungary	(Germany)
	Ireland	(Greece)
	Japan	Hong Kong
	Korea	Iceland
	(Netherlands)	Iran, Islamic Republic
	Russian Federation	(Israel)
	Slovak Republic	(Kuwait)
	(Slovenia)	(Latvia – LSS)
		(Lithuania)
		New Zealand
		Norway
		Portugal
		(Romania)
		(Scotland)
		(South Africa)
		Spain
		Sweden
		(Switzerland)
		(Thailand)
		United States (average)

(Jurisdiction) indicates that the nation, state, or jurisdiction did not satisfy one or more of the sample participation guidelines.
Latvia-LSS: Latvian-speaking schools only
SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-1995, and the National Assessment of Educational Progress (NAEP), 1996.