

TIMSS 2011

The TIMSS 2011 Students Engaged in Science Lessons Scale, Eighth Grade

The Students Engaged in Science Lessons (ESL) scale was created based on students' degree of agreement to the five statements described below. See [Creating and Interpreting TIMSS and PIRLS 2011 Context Questionnaire Scales](#) for more information on how the scales were formed.

Exhibit 1: Items in the TIMSS 2011 Students Engaged in Science Lessons Scale, Eighth Grade

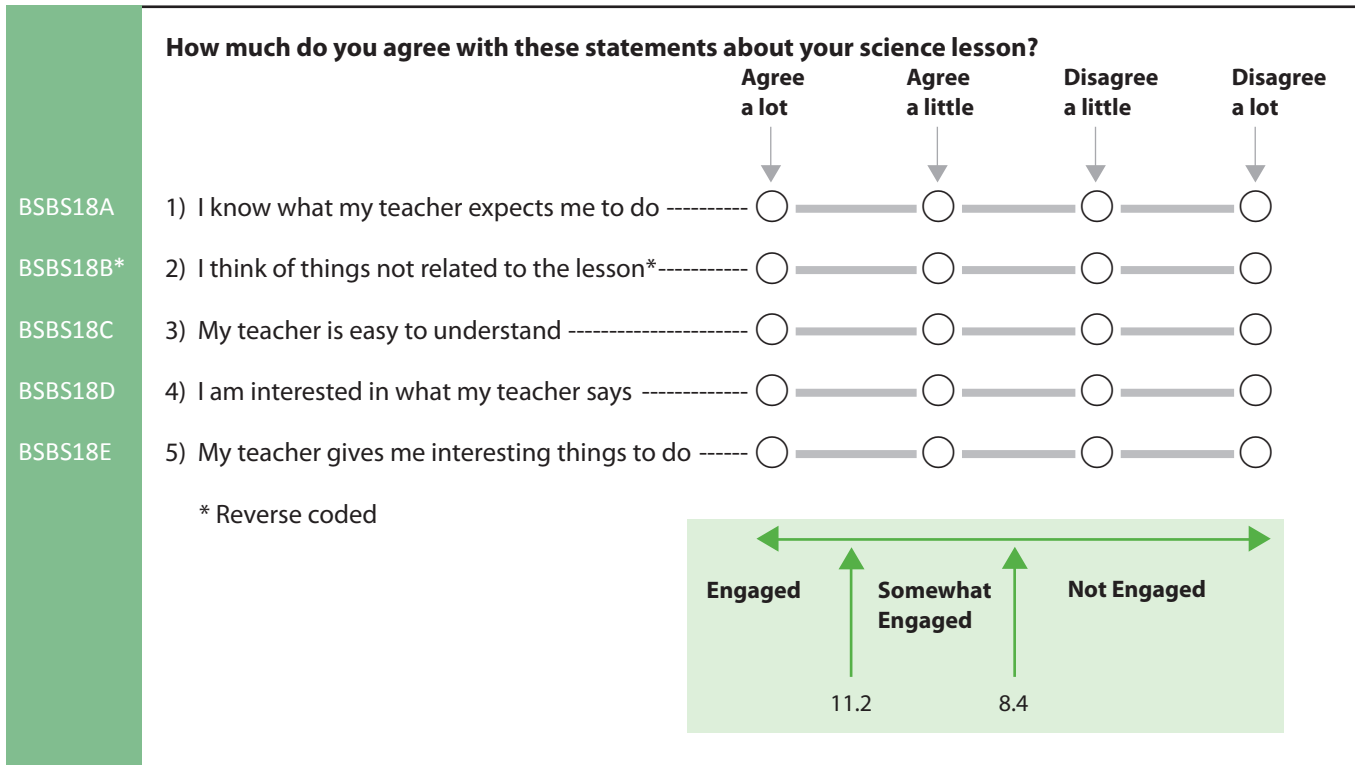


Exhibit 2: Item Parameters for the TIMSS 2011 Students Engaged in Science Lessons Scale, Eighth Grade

| Item | delta | tau_1 | tau_2 | tau_3 |
|----------|----------|----------|----------|---------|
| BSBS18A | -1.23287 | -0.79345 | -0.43287 | 1.22632 |
| BSBS18B* | -0.28987 | -1.35822 | 0.44889 | 0.90933 |
| BSBS18C | -1.14718 | -0.86460 | -0.20866 | 1.07326 |
| BSBS18D | -1.24372 | -0.80106 | -0.15803 | 0.95909 |
| BSBS18E | -0.81892 | -0.82790 | -0.11896 | 0.94686 |

*Reverse coded

Exhibit 3: Scale Transformation Constants

Scale Transformation Constants

$$A = 10.04284$$

$$B = 1.54164$$

$$\text{Transformed Scale Score} = 10.04284 + 1.54164 \cdot \text{Logit Scale Score}$$

Exhibit 4: Equivalence Table of the Raw Score and the Transformed Scale Score

| Raw Score | Transformed Scale Score | Cutpoint | Raw Score | Transformed Scale Score | Cutpoint |
|-----------|-------------------------|----------|-----------|-------------------------|----------|
| 0 | 3.55607 | | 8 | 8.69954 | |
| 1 | 5.23495 | | 9 | 9.11017 | |
| 2 | 6.05062 | | 10 | 9.54897 | |
| 3 | 6.62923 | | 11 | 10.02885 | |
| 4 | 7.10299 | | 12 | 10.57281 | |
| 5 | 7.52384 | | 13 | 11.22017 | 11.2 |
| 6 | 7.91938 | | 14 | 12.10159 | |
| 7 | 8.30491 | 8.4 | 15 | 13.83345 | |

Exhibit 5: Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Students Engaged in Science Lessons Scale, Eighth Grade

| Country | Cronbach's Alpha Reliability Coefficient | Percent of Variance Explained | Factor Loadings for Each Item | | | | |
|-----------------------|--|-------------------------------|-------------------------------|----------|---------|---------|---------|
| | | | BSBS18A | BSBS18B* | BSBS18C | BSBS18D | BSBS18E |
| Australia | 0.82 | 59 | 0.75 | 0.44 | 0.83 | 0.88 | 0.86 |
| Bahrain | 0.72 | 53 | 0.77 | 0.21 | 0.83 | 0.81 | 0.82 |
| Chile | 0.73 | 51 | 0.70 | 0.42 | 0.74 | 0.81 | 0.81 |
| Chinese Taipei | 0.81 | 57 | 0.75 | 0.52 | 0.84 | 0.86 | 0.76 |
| England | 0.80 | 58 | 0.76 | 0.41 | 0.82 | 0.87 | 0.85 |
| Ghana | 0.45 | 36 | 0.54 | 0.12 | 0.67 | 0.73 | 0.73 |
| Hong Kong SAR | 0.78 | 58 | 0.79 | 0.24 | 0.87 | 0.88 | 0.84 |
| Iran, Islamic Rep. of | 0.67 | 47 | 0.63 | 0.41 | 0.79 | 0.82 | 0.70 |
| Israel | 0.81 | 58 | 0.75 | 0.56 | 0.81 | 0.86 | 0.80 |
| Italy | 0.78 | 53 | 0.63 | 0.66 | 0.71 | 0.82 | 0.81 |

Exhibit 5: Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Students Engaged in Science Lessons Scale, Eighth Grade (Continued)

| Country | Cronbach's Alpha Reliability Coefficient | Percent of Variance Explained | Factor Loadings for Each Item | | | | |
|----------------------------------|--|-------------------------------|-------------------------------|----------|---------|---------|---------|
| | | | BSBS18A | BSBS18B* | BSBS18C | BSBS18D | BSBS18E |
| Japan | 0.80 | 56 | 0.69 | 0.49 | 0.80 | 0.88 | 0.83 |
| Jordan | 0.61 | 44 | 0.68 | 0.24 | 0.78 | 0.74 | 0.75 |
| Korea, Rep. of | 0.83 | 60 | 0.68 | 0.66 | 0.81 | 0.87 | 0.82 |
| Malaysia | 0.76 | 54 | 0.75 | 0.29 | 0.82 | 0.86 | 0.81 |
| New Zealand | 0.80 | 58 | 0.74 | 0.38 | 0.83 | 0.89 | 0.86 |
| Norway | 0.80 | 57 | 0.72 | 0.50 | 0.80 | 0.86 | 0.84 |
| Oman | 0.60 | 43 | 0.58 | 0.30 | 0.78 | 0.76 | 0.74 |
| Palestinian Nat'l Auth. | 0.65 | 45 | 0.60 | 0.35 | 0.76 | 0.77 | 0.78 |
| Qatar | 0.75 | 55 | 0.78 | 0.21 | 0.85 | 0.84 | 0.82 |
| Saudi Arabia | 0.67 | 46 | 0.67 | 0.37 | 0.76 | 0.79 | 0.72 |
| Singapore | 0.80 | 59 | 0.78 | 0.37 | 0.86 | 0.88 | 0.84 |
| Thailand | 0.68 | 49 | 0.63 | 0.20 | 0.81 | 0.82 | 0.82 |
| Tunisia | 0.63 | 43 | 0.60 | 0.45 | 0.70 | 0.78 | 0.71 |
| Turkey | 0.66 | 46 | 0.74 | 0.42 | 0.76 | 0.79 | 0.60 |
| United Arab Emirates | 0.72 | 52 | 0.73 | 0.28 | 0.81 | 0.83 | 0.81 |
| United States | 0.79 | 58 | 0.75 | 0.34 | 0.85 | 0.87 | 0.85 |
| Ninth Grade Participants | | | | | | | |
| Botswana | 0.63 | 42 | 0.60 | 0.37 | 0.72 | 0.76 | 0.72 |
| Honduras | 0.59 | 44 | 0.61 | 0.20 | 0.70 | 0.81 | 0.80 |
| South Africa | 0.63 | 46 | 0.67 | 0.15 | 0.75 | 0.79 | 0.80 |
| Benchmarking Participants | | | | | | | |
| Alberta, Canada | 0.81 | 59 | 0.76 | 0.38 | 0.85 | 0.87 | 0.86 |
| Ontario, Canada | 0.79 | 57 | 0.74 | 0.38 | 0.84 | 0.87 | 0.84 |
| Quebec, Canada | 0.81 | 58 | 0.69 | 0.53 | 0.82 | 0.87 | 0.84 |
| Abu Dhabi, UAE | 0.71 | 52 | 0.74 | 0.26 | 0.81 | 0.82 | 0.80 |
| Dubai, UAE | 0.75 | 54 | 0.74 | 0.31 | 0.82 | 0.84 | 0.82 |
| Alabama, US | 0.77 | 56 | 0.74 | 0.25 | 0.85 | 0.86 | 0.84 |
| California, US | 0.80 | 59 | 0.76 | 0.31 | 0.86 | 0.89 | 0.86 |
| Colorado, US | 0.78 | 57 | 0.76 | 0.29 | 0.85 | 0.87 | 0.85 |
| Connecticut, US | 0.81 | 60 | 0.77 | 0.37 | 0.86 | 0.87 | 0.87 |
| Florida, US | 0.78 | 57 | 0.75 | 0.31 | 0.84 | 0.88 | 0.83 |
| Indiana, US | 0.80 | 59 | 0.75 | 0.35 | 0.86 | 0.88 | 0.85 |
| Massachusetts, US | 0.80 | 58 | 0.77 | 0.40 | 0.84 | 0.87 | 0.83 |
| Minnesota, US | 0.80 | 58 | 0.74 | 0.41 | 0.85 | 0.87 | 0.85 |
| North Carolina, US | 0.80 | 59 | 0.74 | 0.39 | 0.85 | 0.88 | 0.86 |

*Reverse coded

Exhibit 6: Relationship Between the TIMSS 2011 Students Engaged in Science Lessons Scale, Eighth Grade, and TIMSS 2011 Science Achievement

| Country | Pearson's Correlation with Science Achievement | | Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2) |
|----------------------------------|--|-------------------|---|
| | (r) | (r ²) | |
| Australia | 0.23 | 0.05 | 0.04 |
| Bahrain | 0.17 | 0.03 | 0.03 |
| Chile | 0.07 | 0.00 | 0.01 |
| Chinese Taipei | 0.30 | 0.09 | 0.07 |
| England | 0.12 | 0.02 | 0.02 |
| Ghana | 0.28 | 0.08 | 0.07 |
| Hong Kong SAR | 0.16 | 0.03 | 0.03 |
| Iran, Islamic Rep. of | 0.04 | 0.00 | 0.01 |
| Israel | 0.15 | 0.02 | 0.03 |
| Italy | 0.13 | 0.02 | 0.01 |
| Japan | 0.30 | 0.09 | 0.06 |
| Jordan | 0.27 | 0.07 | 0.08 |
| Korea, Rep. of | 0.35 | 0.12 | 0.10 |
| Malaysia | 0.15 | 0.02 | 0.03 |
| New Zealand | 0.16 | 0.02 | 0.03 |
| Norway | 0.19 | 0.04 | 0.03 |
| Oman | 0.31 | 0.10 | 0.10 |
| Palestinian Nat'l Auth. | 0.22 | 0.05 | 0.05 |
| Qatar | 0.26 | 0.07 | 0.07 |
| Saudi Arabia | 0.23 | 0.05 | 0.05 |
| Singapore | 0.10 | 0.01 | 0.01 |
| Thailand | 0.07 | 0.01 | 0.01 |
| Tunisia | 0.11 | 0.01 | 0.01 |
| Turkey | 0.26 | 0.07 | 0.07 |
| United Arab Emirates | 0.16 | 0.02 | 0.03 |
| United States | 0.16 | 0.03 | 0.03 |
| International Median | 0.16 | 0.03 | 0.03 |
| Ninth Grade Participants | | | |
| Botswana | 0.27 | 0.07 | 0.07 |
| Honduras | 0.08 | 0.01 | 0.01 |
| South Africa | 0.19 | 0.04 | 0.05 |
| Benchmarking Participants | | | |
| Alberta, Canada | 0.13 | 0.02 | 0.02 |
| Ontario, Canada | 0.13 | 0.02 | 0.01 |
| Quebec, Canada | 0.15 | 0.02 | 0.02 |
| Abu Dhabi, UAE | 0.16 | 0.03 | 0.04 |

Exhibit 6: Relationship Between the TIMSS 2011 Students Engaged in Science Lessons Scale, Eighth Grade, and TIMSS 2011 Science Achievement (Continued)

| Country | Pearson's Correlation with Science Achievement | | Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2) |
|--------------------|--|-------------------|---|
| | (r) | (r ²) | |
| Dubai, UAE | 0.12 | 0.01 | 0.02 |
| Alabama, US | 0.03 | 0.00 | 0.01 |
| California, US | 0.20 | 0.04 | 0.05 |
| Colorado, US | 0.15 | 0.02 | 0.02 |
| Connecticut, US | 0.11 | 0.01 | 0.02 |
| Florida, US | 0.20 | 0.04 | 0.04 |
| Indiana, US | 0.14 | 0.02 | 0.02 |
| Massachusetts, US | 0.12 | 0.01 | 0.01 |
| Minnesota, US | 0.21 | 0.04 | 0.04 |
| North Carolina, US | 0.17 | 0.03 | 0.02 |