TIMSS 2011

The TIMSS 2011 Teachers Emphasize Science Investigation Scale, Eighth Grade

The Teachers Emphasize Science Investigation (ESI) scale was created based on teachers' responses to the seven 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 TIMSS 2011 Teachers Emphasize Science Investigation Scale

In teaching science to the students in this class, how often do you usually ask them to do the following?

		Every or almost every lesson	About half the lessons	Some lessons	Never
BTBS19A	1) Observe natural phenomena and describe what they see	○	○	○	○
BTBS19B	2) Watch me demonstrate an experiment or investigation	○	○	○	○
BTBS19C	3) Design or plan experiments or investigations	○	○	○	○
BTBS19D	4) Conduct experiments or investigations	○	○	○	○
BTBS19G	5) Use scientific formulas and laws to solve routine problems	○	○	○	○
BTBS19H	6) Give explanations about something they are studying	○	○	○	○
BTBS19I	7) Relate what they are learning in science to their daily lives	○	○	○	○

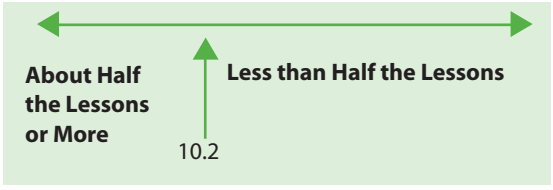

Exhibit 2: Item Parameters for the TIMSS 2011 Teachers Emphasize Science Investigation Scale, Eighth Grade*

Item	delta	tau_1	tau_2
BTBS19A	0.37523	–0.17512	0.17512
BTBS19B	0.48753	–0.19719	0.19719
BTBS19C	1.21194	–0.28248	0.28248
BTBS19D	0.96891	–0.40132	0.40132
BTBS19G	0.03507	–0.06347	0.06347
BTBS19H	–1.09286	–0.07979	0.07979
BTBS19I	–1.12883	–0.23628	0.23628

*For the purpose of scaling, the categories "Some lessons" and "Never" were combined because there were very few respondents in each of these categories.

Exhibit 3: Scale Transformation Constants

Scale Transformation Constants	
A = 9.97329 B = 1.61831	Transformed Scale Score = 9.97329 + 1.61831 • Logit Scale Score

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

Raw Score	Transformed Scale Score	Cutpoint
0	4.97335	
1	6.64135	
2	7.51414	
3	8.17528	
4	8.74640	
5	9.26866	
6	9.75184	
7	10.20882	10.2
8	10.65799	
9	11.11215	
10	11.59177	
11	12.12151	
12	12.76340	
13	13.64468	
14	15.39795	

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

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item						
			BTBS19A	BTBS19B	BTBS19C	BTBS19D	BTBS19G	BTBS19H	BTBS19I
Armenia	0.57	31	0.52	0.76	0.76	0.71	0.41	0.23	0.22
Australia	0.75	41	0.64	0.70	0.71	0.65	0.61	0.55	0.64
Bahrain	0.72	38	0.63	0.55	0.74	0.68	0.62	0.50	0.57
Chile	0.78	44	0.69	0.75	0.83	0.77	0.62	0.49	0.39
Chinese Taipei	0.71	38	0.58	0.54	0.62	0.64	0.55	0.63	0.70
England	0.70	36	0.63	0.63	0.63	0.62	0.52	0.54	0.61
Finland	0.72	38	0.49	0.66	0.58	0.69	0.56	0.66	0.65
Georgia	0.70	37	0.65	0.66	0.79	0.72	0.56	0.36	0.42
Ghana	0.79	44	0.68	0.75	0.80	0.79	0.64	0.37	0.49

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

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item						
			BTBS19A	BTBS19B	BTBS19C	BTBS19D	BTBS19G	BTBS19H	BTBS19I
Hong Kong SAR	0.70	36	0.56	0.72	0.52	0.58	0.45	0.67	0.67
Hungary	0.66	34	0.61	0.64	0.55	0.60	0.61	0.58	0.47
Indonesia	0.66	34	0.53	0.77	0.78	0.69	0.50	0.26	0.36
Iran, Islamic Rep. of	0.72	37	0.56	0.52	0.71	0.69	0.62	0.54	0.62
Israel	0.78	44	0.76	0.61	0.75	0.68	0.62	0.57	0.63
Italy	0.72	41	0.61	0.76	0.80	0.72	0.56	0.47	0.43
Japan	0.76	42	0.76	0.72	0.62	0.79	0.51	0.59	0.45
Jordan	0.75	41	0.59	0.70	0.64	0.70	0.60	0.64	0.58
Kazakhstan	0.61	32	0.58	0.72	0.76	0.75	0.36	0.25	0.24
Korea, Rep. of	0.68	36	0.63	0.72	0.74	0.73	0.29	0.44	0.47
Lebanon	0.71	37	0.57	0.74	0.78	0.69	0.51	0.43	0.40
Lithuania	0.64	38	0.58	0.77	0.82	0.78	0.39	0.34	0.41
Macedonia, Rep. of	0.77	43	0.66	0.78	0.78	0.76	0.63	0.44	0.40
Malaysia	0.75	41	0.61	0.59	0.78	0.70	0.62	0.54	0.61
Morocco	0.62	31	0.48	0.54	0.71	0.69	0.51	0.41	0.47
New Zealand	0.67	34	0.62	0.54	0.60	0.67	0.38	0.58	0.65
Norway	0.70	39	0.61	0.56	0.80	0.81	0.22	0.73	0.43
Oman	0.63	36	0.59	0.58	0.69	0.74	–	0.50	0.42
Palestinian Nat'l Auth.	0.77	42	0.62	0.68	0.65	0.64	0.73	0.64	0.58
Qatar	0.80	45	0.65	0.67	0.81	0.79	0.68	0.48	0.58
Romania	0.76	42	0.60	0.76	0.81	0.80	0.49	0.53	0.47
Russian Federation	0.67	36	0.55	0.71	0.76	0.74	0.57	0.33	0.38
Saudi Arabia	0.77	43	0.64	0.73	0.73	0.72	0.66	0.51	0.56
Singapore	0.72	39	0.68	0.70	0.66	0.63	0.44	0.55	0.65
Slovenia	0.66	35	0.59	0.62	0.71	0.62	0.57	0.46	0.53
Sweden	0.71	37	0.55	0.70	0.67	0.61	0.53	0.63	0.57
Syrian Arab Republic	0.64	32	0.53	0.62	0.69	0.60	0.44	0.48	0.57
Thailand	0.80	46	0.78	0.57	0.77	0.74	0.66	0.58	0.61
Tunisia	0.65	33	0.62	0.53	0.72	0.70	0.45	0.47	0.44
Turkey	0.71	37	0.61	0.48	0.70	0.73	0.66	0.55	0.52
Ukraine	0.67	36	0.56	0.78	0.78	0.80	0.51	0.17	0.31
United Arab Emirates	0.73	39	0.57	0.67	0.80	0.73	0.55	0.48	0.50
United States	0.77	43	0.62	0.58	0.72	0.75	0.59	0.63	0.65
Ninth Grade Participants									
Botswana	0.74	39	0.47	0.59	0.77	0.78	0.64	0.56	0.54
Honduras	0.76	41	0.65	0.79	0.69	0.76	0.54	0.54	0.48
South Africa	0.77	43	0.62	0.77	0.76	0.76	0.62	0.47	0.55

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

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item						
			BTBS19A	BTBS19B	BTBS19C	BTBS19D	BTBS19G	BTBS19H	BTBS19I
Benchmarking Participants									
Alberta, Canada	0.72	38	0.67	0.55	0.67	0.68	0.63	0.54	0.57
Ontario, Canada	0.67	35	0.58	0.56	0.63	0.64	0.58	0.48	0.62
Quebec, Canada	0.70	36	0.61	0.59	0.75	0.68	0.47	0.55	0.52
Abu Dhabi, UAE	0.75	41	0.57	0.69	0.79	0.71	0.45	0.56	0.61
Dubai, UAE	0.76	41	0.66	0.72	0.80	0.73	0.63	0.43	0.43
Alabama, US	0.78	43	0.69	0.61	0.75	0.71	0.56	0.57	0.67
California, US	0.75	41	0.51	0.61	0.75	0.75	0.54	0.66	0.66
Colorado, US	0.75	41	0.51	0.57	0.68	0.68	0.71	0.67	0.61
Connecticut, US	0.80	46	0.67	0.61	0.78	0.79	0.66	0.58	0.63
Florida, US	0.79	45	0.58	0.64	0.86	0.83	0.62	0.49	0.57
Indiana, US	0.76	42	0.56	0.60	0.67	0.69	0.60	0.71	0.68
Massachusetts, US	0.78	43	0.73	0.52	0.68	0.68	0.69	0.61	0.67
Minnesota, US	0.75	41	0.70	0.55	0.75	0.72	0.53	0.58	0.59
North Carolina, US	0.69	36	0.75	0.50	0.67	0.80	0.45	0.50	0.45

A dash (–) indicates that the item was not administered or comparable data was not available.

Exhibit 6: Relationship Between the TIMSS 2011 Teachers Emphasize Science Investigation 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)	(r2)	
Armenia	0.03	0.00	0.00
Australia	0.01	0.00	0.00
Bahrain	0.16	0.02	0.01
Chile	0.05	0.00	0.00
Chinese Taipei	–0.06	0.00	0.01
England	0.08	0.01	0.01
Finland	0.07	0.01	0.00
Georgia	0.01	0.00	0.00
Ghana	0.04	0.00	0.00
Hong Kong SAR	0.18	0.03	0.03
Hungary	0.02	0.00	0.00
Indonesia	–0.01	0.00	0.00
Iran, Islamic Rep. of	0.04	0.00	0.01
Israel	–0.08	0.01	0.01
Italy	–0.02	0.00	0.00
Japan	0.02	0.00	0.00
Jordan	0.04	0.00	0.00

Exhibit 6: Relationship Between the TIMSS 2011 Teachers Emphasize Science Investigation 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)	(r2)	
Kazakhstan	–0.01	0.00	0.00
Korea, Rep. of	0.02	0.00	0.00
Lebanon	0.01	0.00	0.00
Lithuania	–0.01	0.00	0.00
Macedonia, Rep. of	0.02	0.00	0.00
Malaysia	0.08	0.01	0.01
Morocco	0.04	0.00	0.00
New Zealand	0.00	0.00	0.00
Norway	0.01	0.00	0.01
Oman	0.08	0.01	0.01
Palestinian Nat'l Auth.	0.12	0.01	0.01
Qatar	0.09	0.01	0.00
Romania	0.03	0.00	0.00
Russian Federation	0.10	0.01	0.00
Saudi Arabia	0.07	0.00	0.00
Singapore	0.04	0.00	0.00
Slovenia	0.01	0.00	0.00
Sweden	0.00	0.00	0.00
Syrian Arab Republic	0.00	0.00	0.00
Thailand	0.09	0.01	0.00
Tunisia	0.05	0.00	0.00
Turkey	–0.01	0.00	0.00
Ukraine	0.04	0.00	0.00
United Arab Emirates	–0.01	0.00	0.00
United States	0.08	0.01	0.01
International Median	**0.03**	**0.00**	**0.00**
Ninth Grade Participants			
Botswana	0.03	0.00	0.00
Honduras	0.05	0.00	0.01
South Africa	–0.13	0.02	0.01
Benchmarking Participants			
Alberta, Canada	0.01	0.00	0.00
Ontario, Canada	0.03	0.00	0.00
Quebec, Canada	–0.07	0.00	0.00
Abu Dhabi, UAE	–0.03	0.00	0.00
Dubai, UAE	–0.09	0.01	0.01
Alabama, US	–0.09	0.01	0.00
California, US	–0.02	0.00	0.00

Exhibit 6: Relationship Between the TIMSS 2011 Teachers Emphasize Science Investigation 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)	(r2)	
Colorado, US	0.10	0.01	0.00
Connecticut, US	0.06	0.00	0.00
Florida, US	–0.03	0.00	0.00
Indiana, US	–0.01	0.00	0.00
Massachusetts, US	0.04	0.00	0.04
Minnesota, US	0.03	0.00	0.00
North Carolina, US	–0.14	0.02	0.01