TIMSS 2011

The TIMSS 2011 Instruction Affected by Science Resource Shortages Scale, Eighth Grade

The Instruction Affected by Science Resource Shortages (SRS) scale was created based on principals' responses concerning thirteen school and classroom resources 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 Instruction Affected by Science Resource Shortages Scale, Eighth Grade

How much is your school's capacity to provide instruction affected by a shortage or inadequacy of the following?

		Not at all	A little	Some	A lot
	A. General School Resources				
BCBG09AA	1) Instructional materials (e.g., textbooks)	○	○	○	○
BCBG09AB	2) Supplies (e.g., papers, pencils)	○	○	○	○
BCBG09AC	3) School buildings and grounds	○	○	○	○
BCBG09AD	4) Heating/cooling and lighting systems	○	○	○	○
BCBG09AE	5) Instructional space (e.g., classrooms)	○	○	○	○
BCBG09AF	6) Technologically competent staff	○	○	○	○
	B. Resources for Science Instruction				
BCBG09CA	1) Teachers with a specialization in science	○	○	○	○
BCBG09CB	2) Computers for science instruction	○	○	○	○
BCBG09CC	3) Computer software for science instruction	○	○	○	○
BCBG09CD	4) Library materials relevant to science instruction	○	○	○	○
BCBG09CE	5) Audio-visual resources for science instruction	○	○	○	○
BCBG09CF	6) Calculators for science instruction	○	○	○	○
BCBG09CG	7) Science equipment and materials	○	○	○	○

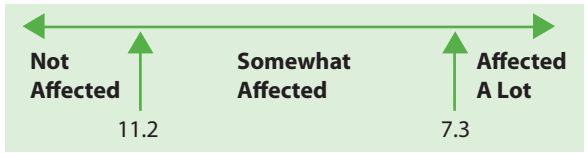

Exhibit 2: Item Parameters for the TIMSS 2011 Instruction Affected by Science Resource Shortages Scale, Eighth Grade

Item	delta	tau_1	tau_2	tau_3
BCBG09AA	–0.39578	–0.22588	–0.00596	0.23184
BCBG09AB	–0.67816	–0.23191	0.17618	0.05573
BCBG09AC	–0.30255	–0.73589	0.16302	0.57287
BCBG09AD	–0.58532	–0.64065	0.11567	0.52498
BCBG09AE	–0.17635	–0.35547	–0.06769	0.42316
BCBG09AF	–0.44207	–1.05277	–0.00384	1.05661
BCBG09CA	–0.36956	0.23683	–0.08554	–0.15129
BCBG09CB	–0.52738	–1.00283	0.13664	0.86619
BCBG09CC	–0.41925	–1.30735	0.10988	1.19747
BCBG09CD	–0.48780	–1.26605	0.03830	1.22775
BCBG09CE	–0.38853	–1.18214	–0.04749	1.22963
BCBG09CF	–0.96490	–0.50925	0.00532	0.50393
BCBG09CG	–0.10161	–1.02777	–0.09540	1.12317

Exhibit 3: Scale Transformation Constants

Scale Transformation Constants	
A = 9.91982 B = 1.43804	Transformed Scale Score = 9.91982 + 1.43804 • Logit Scale Score

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

Raw Score	Rasch Score	Cutpoint	Raw Score	Rasch Score	Cutpoint
0	3.39816		20	9.33397	
1	5.00981		21	9.45304	
2	5.77348		22	9.57088	
3	6.28450		23	9.69079	
4	6.67145		24	9.81367	
5	6.98426		25	9.94122	
6	7.24842	7.3	26	10.07251	
7	7.47784		27	10.21101	
8	7.68160		28	10.35751	
9	7.86550		29	10.51375	
10	8.03412		30	10.68125	
11	8.19058		31	10.86493	
12	8.33727		32	11.06840	
13	8.47615		33	11.29770	11.2
14	8.60873		34	11.56158	
15	8.73632		35	11.87449	
16	8.86000		36	12.26144	
17	8.98075		37	12.77228	
18	9.09946		38	13.53563	
19	9.21694		39	15.14656	

Exhibit 5: Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Instruction Affected by Science Resource Shortages Scale, Eighth Grade

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item												
			BCBG09AA	BCBG09AB	BCBG09AC	BCBG09AD	BCBG09AE	BCBG09AF	BCBG09CA	BCBG09CB	BCBG09CC	BCBG09CD	BCBG09CE	BCBG09CF	BCBG09CG
Armenia	0.85	36	0.51	0.62	0.53	0.59	0.72	0.65	0.50	0.64	0.60	0.66	0.65	0.49	0.63
Australia	0.91	50	0.70	0.71	0.61	0.63	0.63	0.70	0.64	0.69	0.76	0.81	0.81	0.70	0.79
Bahrain	0.92	51	0.88	0.86	0.78	0.88	0.86	0.75	0.83	0.56	0.40	0.48	0.43	0.57	0.74
Chile	0.91	49	0.60	0.69	0.62	0.61	0.59	0.73	0.73	0.77	0.73	0.82	0.84	0.60	0.75
Chinese Taipei	0.92	52	0.65	0.72	0.69	0.72	0.69	0.74	0.67	0.78	0.73	0.75	0.78	0.61	0.79
England	0.92	54	0.76	0.57	0.70	0.70	0.65	0.64	0.63	0.75	0.84	0.80	0.86	0.75	0.83
Finland	0.88	42	0.72	0.65	0.68	0.59	0.73	0.59	0.59	0.64	0.61	0.65	0.69	0.51	0.72
Georgia	0.86	38	0.62	0.59	0.58	0.60	0.58	0.62	0.61	0.65	0.63	0.69	0.68	0.40	0.70
Ghana	0.83	42	0.06	0.12	−0.10	0.42	−0.23	0.17	0.42	0.94	0.95	0.88	0.94	0.87	0.86
Hong Kong SAR	0.95	62	0.72	0.75	0.74	0.79	0.74	0.75	0.83	0.88	0.73	0.81	0.82	0.81	0.85
Hungary	0.91	50	0.78	0.81	0.78	0.79	0.75	0.46	0.73	0.60	0.59	0.74	0.78	0.55	0.75
Indonesia	0.86	38	0.53	0.38	0.40	0.56	0.39	0.71	0.72	0.74	0.76	0.64	0.69	0.62	0.72
Iran, Islamic Rep. of	0.86	39	0.79	0.77	0.66	0.79	0.80	0.66	0.71	0.27	0.25	0.53	0.37	0.24	0.77
Israel	0.95	62	0.81	0.81	0.75	0.78	0.81	0.78	0.81	0.78	0.72	0.75	0.79	0.78	0.87
Italy	0.87	40	0.57	0.68	0.57	0.49	0.52	0.54	0.59	0.76	0.72	0.70	0.74	0.56	0.68
Japan	0.91	50	0.76	0.78	0.76	0.65	0.84	0.68	0.79	0.61	0.54	0.73	0.68	0.45	0.80
Jordan	0.90	47	0.73	0.76	0.73	0.68	0.78	0.76	0.74	0.74	0.59	0.60	0.49	0.41	0.76
Kazakhstan	0.94	60	0.83	0.71	0.70	0.79	0.82	0.82	0.81	0.79	0.77	0.84	0.72	0.67	0.77
Korea, Rep. of	0.94	58	0.76	0.71	0.76	0.81	0.77	0.54	0.84	0.76	0.83	0.82	0.86	0.56	0.82
Lebanon	0.92	51	0.84	0.77	0.72	0.57	0.75	0.72	0.79	0.59	0.56	0.74	0.66	0.74	0.80
Lithuania	0.83	34	0.63	0.61	0.41	0.43	0.46	0.55	0.50	0.67	0.70	0.75	0.73	0.34	0.65
Macedonia, Rep. of	0.87	39	0.65	0.57	0.67	0.61	0.57	0.72	0.58	0.79	0.66	0.51	0.65	0.45	0.60
Malaysia	0.96	66	0.85	0.83	0.82	0.76	0.84	0.80	0.86	0.77	0.86	0.85	0.74	0.75	0.86
Morocco	0.80	35	0.12	0.16	0.05	0.53	−0.21	0.69	−0.18	0.79	0.87	0.85	0.83	0.81	0.47
New Zealand	0.92	52	0.70	0.71	0.71	0.65	0.68	0.70	0.68	0.72	0.71	0.81	0.83	0.68	0.79
Norway	0.83	33	0.49	0.38	0.70	0.66	0.61	0.53	0.56	0.65	0.59	0.59	0.58	0.49	0.60
Oman	0.91	50	0.72	0.75	0.69	0.80	0.80	0.74	0.74	0.59	0.52	0.73	0.64	0.53	0.83
Palestinian Nat'l Auth.	0.84	36	0.79	0.81	0.75	0.07	0.80	0.47	0.79	0.39	0.16	0.55	0.43	0.46	0.72
Qatar	0.97	77	0.87	0.91	0.84	0.92	0.92	0.89	0.90	0.90	0.86	0.87	0.79	0.82	0.89
Romania	0.89	43	0.65	0.46	0.58	0.66	0.64	0.52	0.64	0.75	0.72	0.79	0.73	0.66	0.65
Russian Federation	0.91	48	0.71	0.71	0.55	0.67	0.64	0.64	0.69	0.72	0.73	0.79	0.77	0.61	0.73
Saudi Arabia	0.83	36	0.86	0.83	0.65	0.88	0.90	0.33	0.84	−0.14	−0.10	−0.05	0.05	0.25	0.57
Singapore	0.98	81	0.93	0.92	0.91	0.91	0.91	0.83	0.92	0.92	0.88	0.85	0.88	0.92	0.92
Slovenia	0.82	33	0.56	0.61	0.49	0.55	0.46	0.43	0.28	0.63	0.69	0.64	0.74	0.56	0.71
Sweden	0.89	44	0.72	0.66	0.71	0.67	0.74	0.68	0.63	0.63	0.62	0.44	0.65	0.59	0.81
Syrian Arab Republic	0.80	30	0.26	0.41	0.48	0.53	0.43	0.61	0.51	0.66	0.63	0.62	0.60	0.53	0.68
Thailand	0.92	52	0.71	0.68	0.61	0.56	0.63	0.72	0.78	0.79	0.73	0.84	0.84	0.57	0.84
Tunisia	0.77	30	0.63	0.76	0.77	0.39	0.83	0.44	0.71	−0.13	−0.24	−0.18	0.42	−0.04	0.67

Exhibit 5: Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Instruction Affected by Science Resource Shortages Scale, Eighth Grade (Continued)

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item												
			BCBG09AA	BCBG09AB	BCBG09AC	BCBG09AD	BCBG09AE	BCBG09AF	BCBG09CA	BCBG09CB	BCBG09CC	BCBG09CD	BCBG09CE	BCBG09CF	BCBG09CG
Turkey	0.87	41	0.71	0.65	0.63	0.68	0.71	0.51	0.65	0.70	0.51	0.60	0.78	0.28	0.79
Ukraine	0.86	38	0.62	0.62	0.49	0.61	0.55	0.57	0.45	0.63	0.69	0.67	0.73	0.62	0.70
United Arab Emirates	0.94	60	0.85	0.84	0.79	0.88	0.86	0.77	0.86	0.69	0.59	0.69	0.67	0.67	0.87
United States	0.92	51	0.73	0.74	0.72	0.66	0.68	0.70	0.65	0.72	0.73	0.72	0.78	0.70	0.78
Ninth Grade Participants															
Botswana	0.79	34	0.33	–0.10	0.46	0.60	0.34	0.29	–0.24	0.84	0.86	0.72	0.82	0.76	0.48
Honduras	0.88	45	0.70	0.45	0.45	0.73	0.49	0.34	0.05	0.80	0.76	0.86	0.87	0.83	0.80
South Africa	0.88	43	0.46	0.27	0.38	0.69	0.31	0.71	0.51	0.78	0.78	0.81	0.83	0.77	0.81
Benchmarking Participants															
Alberta, Canada	0.90	46	0.66	0.67	0.56	0.56	0.63	0.68	0.71	0.74	0.61	0.69	0.79	0.70	0.74
Ontario, Canada	0.88	41	0.62	0.59	0.55	0.56	0.62	0.64	0.61	0.70	0.66	0.71	0.73	0.61	0.73
Quebec, Canada	0.90	45	0.64	0.67	0.61	0.58	0.72	0.64	0.63	0.71	0.71	0.64	0.77	0.66	0.72
Abu Dhabi, UAE	0.94	58	0.86	0.85	0.75	0.87	0.86	0.75	0.84	0.61	0.54	0.70	0.61	0.71	0.87
Dubai, UAE	0.97	72	0.87	0.85	0.87	0.92	0.89	0.84	0.91	0.83	0.76	0.80	0.85	0.75	0.89
Alabama, US	0.92	53	0.76	0.70	0.61	0.73	0.62	0.77	0.74	0.73	0.68	0.73	0.79	0.81	0.79
California, US	0.92	53	0.66	0.77	0.79	0.75	0.75	0.70	0.55	0.83	0.60	0.72	0.78	0.69	0.84
Colorado, US	0.92	53	0.70	0.63	0.56	0.65	0.61	0.59	0.63	0.82	0.83	0.84	0.78	0.77	0.93
Connecticut, US	0.93	54	0.73	0.70	0.65	0.51	0.69	0.74	0.69	0.83	0.73	0.83	0.84	0.72	0.80
Florida, US	0.94	59	0.75	0.82	0.66	0.70	0.70	0.82	0.73	0.79	0.79	0.72	0.82	0.79	0.83
Indiana, US	0.88	43	0.71	0.69	0.55	0.58	0.44	0.72	0.70	0.70	0.63	0.71	0.80	0.43	0.71
Massachusetts, US	0.93	54	0.73	0.71	0.62	0.65	0.68	0.83	0.63	0.74	0.76	0.79	0.87	0.68	0.85
Minnesota, US	0.89	42	0.63	0.51	0.50	0.32	0.68	0.56	0.54	0.74	0.78	0.74	0.82	0.68	0.78
North Carolina, US	0.91	49	0.58	0.65	0.79	0.50	0.76	0.66	0.64	0.70	0.79	0.78	0.80	0.70	0.70

Exhibit 6: Relationship Between the TIMSS 2011 Instruction Affected by Science Resource Shortages 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)	
Armenia	0.07	0.00	0.01
Australia	0.19	0.04	0.01
Bahrain	0.13	0.02	0.05
Chile	0.22	0.05	0.05
Chinese Taipei	0.02	0.00	0.00
England	–0.06	0.00	0.01
Finland	0.07	0.00	0.00
Georgia	0.02	0.00	0.00
Ghana	–0.08	0.01	0.00

Exhibit 6: Relationship Between the TIMSS 2011 Instruction Affected by Science Resource Shortages 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)	
Hong Kong SAR	0.09	0.01	0.01
Hungary	0.08	0.01	0.01
Indonesia	–0.30	0.09	0.05
Iran, Islamic Rep. of	0.14	0.02	0.03
Israel	0.22	0.05	0.07
Italy	0.12	0.02	0.02
Japan	0.10	0.01	0.01
Jordan	0.01	0.00	0.01
Kazakhstan	0.06	0.00	0.01
Korea, Rep. of	0.05	0.00	0.01
Lebanon	0.08	0.01	0.08
Lithuania	0.04	0.00	0.01
Macedonia, Rep. of	0.07	0.00	0.01
Malaysia	0.14	0.02	0.01
Morocco	–0.03	0.00	0.09
New Zealand	0.14	0.02	0.01
Norway	0.01	0.00	0.00
Oman	0.03	0.00	0.02
Palestinian Nat'l Auth.	–0.02	0.00	0.00
Qatar	0.21	0.04	0.04
Romania	0.09	0.01	0.00
Russian Federation	0.07	0.00	0.01
Saudi Arabia	–0.11	0.01	0.02
Singapore	0.07	0.01	0.00
Slovenia	0.03	0.00	0.00
Sweden	0.07	0.00	0.00
Syrian Arab Republic	–0.02	0.00	0.01
Thailand	0.12	0.02	0.01
Tunisia	–0.04	0.00	0.00
Turkey	0.07	0.00	0.02
Ukraine	–0.02	0.00	0.00
United Arab Emirates	0.17	0.03	0.03
United States	0.12	0.01	0.05
International Median	**0.07**	**0.01**	**0.01**

Exhibit 6: Relationship Between the TIMSS 2011 Instruction Affected by Science Resource Shortages 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)	
Ninth Grade Participants			
Botswana	0.06	0.00	0.01
Honduras	0.22	0.05	0.07
South Africa	0.11	0.01	0.11
Benchmarking Participants			
Alberta, Canada	0.06	0.00	0.01
Ontario, Canada	0.05	0.00	0.01
Quebec, Canada	0.07	0.01	0.01
Abu Dhabi, UAE	0.18	0.03	0.04
Dubai, UAE	0.27	0.08	0.08
Alabama, US	0.23	0.05	0.06
California, US	–0.05	0.00	0.01
Colorado, US	0.19	0.04	0.02
Connecticut, US	0.29	0.08	0.05
Florida, US	0.03	0.00	0.02
Indiana, US	–0.01	0.00	0.00
Massachusetts, US	0.15	0.02	0.04
Minnesota, US	0.11	0.01	0.00
North Carolina, US	–0.10	0.01	0.02