TIMSS 2011

The TIMSS 2011 Instruction Affected by Mathematics Resource Shortages Scale, Fourth Grade

The Instruction Affected by Mathematics Resource Shortages (MRS) scale was created based on principals' responses concerning twelve 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 Mathematics Resource Shortages Scale, Fourth 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				
ACBG10AA	1) Instructional materials (e.g., textbooks)	○	○	○	○
ACBG10AB	2) Supplies (e.g., papers, pencils)	○	○	○	○
ACBG10AC	3) School buildings and grounds	○	○	○	○
ACBG10AD	4) Heating/cooling and lighting systems	○	○	○	○
ACBG10AE	5) Instructional space (e.g., classrooms)	○	○	○	○
ACBG10AF	6) Technologically competent staff	○	○	○	○
ACBG10AG	7) Computers for instruction	○	○	○	○
	B. Resources for Mathematics Instruction				
ACBG10CA	1) Teachers with a specialization in mathematics	○	○	○	○
ACBG10CB	2) Computer software for mathematics instruction	○	○	○	○
ACBG10CC	3) Library materials relevant to mathematics instruction	○	○	○	○
ACBG10CD	4) Audio-visual resources for mathematics instruction	○	○	○	○
ACBG10CE	5) Calculators for mathematics instruction	○	○	○	○

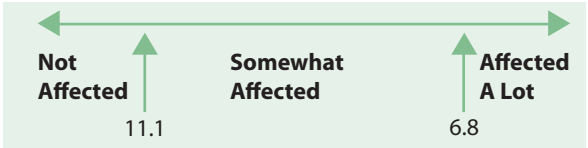

Exhibit 2: Item Parameters for the TIMSS 2011 Instruction Affected by Mathematics Resource Shortages Scale, Fourth Grade

Item	delta	tau_1	tau_2	tau_3
ACBG10AA	–0.59687	–0.22960	0.00491	0.22469
ACBG10AB	–1.00676	–0.43346	0.25010	0.18336
ACBG10AC	–0.46433	–0.67978	0.14217	0.53761
ACBG10AD	–0.75980	–0.38004	0.13910	0.24094
ACBG10AE	–0.39850	–0.47267	0.06898	0.40369
ACBG10AF	–0.53717	–1.06819	0.01190	1.05629
ACBG10AG	–0.31895	–0.99851	0.08278	0.91573
ACBG10CA	–0.58337	–0.46094	–0.03405	0.49499
ACBG10CB	–0.46196	–1.34697	–0.00665	1.35362
ACBG10CC	–0.52176	–1.42911	0.07210	1.35701
ACBG10CD	–0.38701	–1.35748	–0.01036	1.36784
ACBG10CE	–1.07822	–0.67144	0.12010	0.55134

Exhibit 3: Scale Transformation Constants

Scale Transformation Constants	
A = 9.93074 B = 1.62099	Transformed Scale Score = 9.93074 + 1.62099 • Logit Scale Score

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

Raw Score	Transformed Scale Score	Cutpoint
0	2.40475	
1	4.22927	
2	5.09673	
3	5.67810	
4	6.11882	
5	6.47561	
6	6.77697	6.8
7	7.03904	
8	7.27233	
9	7.48394	
10	7.67886	
11	7.86082	
12	8.03267	
13	8.19665	
14	8.35459	
15	8.50803	
16	8.65830	
17	8.80659	
18	8.95405	
19	9.10175	
20	9.25082	
21	9.40237	
22	9.55876	
23	9.71846	
24	9.88318	
25	10.06047	
26	10.24702	
27	10.44740	
28	10.66416	
29	10.90389	
30	11.17301	11.1
31	11.48181	
32	11.84614	
33	12.29495	
34	12.88471	
35	13.76020	
36	15.59280	

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

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item											
			ACBG10AA	ACBG10AB	ACBG10AC	ACBG10AD	ACBG10AE	ACBG10AF	ACBG10AG	ACBG10CA	ACBG10CB	ACBG10CC	ACBG10CD	ACBG10CE
Armenia	0.82	35	0.61	0.56	0.61	0.62	0.68	0.56	0.57	0.52	0.55	0.60	0.65	0.53
Australia	0.91	50	0.77	0.67	0.69	0.69	0.71	0.66	0.68	0.70	0.75	0.71	0.69	0.75
Austria	0.82	36	0.53	0.63	0.69	0.60	0.65	0.63	0.67	0.61	0.62	0.48	0.63	0.31
Azerbaijan	0.84	38	0.73	0.65	0.68	0.67	0.76	0.77	0.54	0.73	0.43	0.58	0.32	0.25
Bahrain	0.90	51	0.87	0.85	0.80	0.89	0.89	0.77	0.78	0.79	0.38	0.45	0.31	0.34
Belgium (Flemish)	0.82	36	0.66	0.61	0.46	0.52	0.49	0.64	0.69	0.57	0.77	0.54	0.68	0.50
Chile	0.90	47	0.61	0.71	0.68	0.64	0.62	0.77	0.72	0.73	0.65	0.73	0.68	0.64
Chinese Taipei	0.92	53	0.72	0.76	0.76	0.80	0.82	0.72	0.78	0.82	0.67	0.63	0.66	0.51
Croatia	0.89	47	0.85	0.82	0.69	0.82	0.83	0.79	0.64	0.64	0.19	0.53	0.52	0.61
Czech Republic	0.84	38	0.60	0.70	0.66	0.70	0.64	0.67	0.56	0.70	0.65	0.24	0.50	0.61
Denmark	0.83	36	0.63	0.60	0.65	0.62	0.39	0.55	0.49	0.59	0.67	0.68	0.65	0.64
England	0.84	38	0.61	0.46	0.61	0.46	0.56	0.54	0.57	0.65	0.82	0.71	0.77	0.51
Finland	0.89	46	0.66	0.70	0.76	0.68	0.81	0.74	0.71	0.70	0.68	0.36	0.64	0.54
Georgia	0.82	35	0.53	0.58	0.58	0.61	0.64	0.61	0.63	0.63	0.65	0.69	0.60	0.25
Germany	0.82	35	0.56	0.57	0.56	0.55	0.60	0.64	0.64	0.35	0.66	0.63	0.70	0.53
Hong Kong SAR	0.82	35	0.58	0.50	0.67	0.64	0.76	0.69	0.60	0.39	0.60	0.52	0.63	0.40
Hungary	0.89	45	0.81	0.80	0.77	0.71	0.80	0.55	0.71	0.73	0.39	0.56	0.59	0.51
Iran, Islamic Rep. of	0.84	38	0.79	0.82	0.78	0.84	0.82	0.58	0.09	0.70	0.27	0.40	0.47	0.25
Ireland	0.84	37	0.48	0.41	0.55	0.51	0.46	0.73	0.64	0.63	0.76	0.69	0.71	0.58
Italy	0.85	39	0.48	0.62	0.57	0.53	0.56	0.56	0.61	0.55	0.75	0.80	0.74	0.62
Japan	0.90	48	0.76	0.70	0.71	0.66	0.72	0.76	0.72	0.66	0.57	0.70	0.68	0.66
Kazakhstan	0.94	62	0.84	0.70	0.74	0.81	0.89	0.85	0.81	0.79	0.78	0.83	0.70	0.68
Korea, Rep. of	0.91	53	0.77	0.80	0.68	0.76	0.76	0.67	0.72	0.74	0.77	0.71	0.75	0.55
Kuwait	0.93	57	0.84	0.88	0.80	0.89	0.90	0.80	0.86	0.84	0.44	0.41	0.59	0.52
Lithuania	0.78	31	0.61	0.65	0.46	0.49	0.49	0.56	0.61	0.23	0.63	0.64	0.67	0.43
Malta	0.87	43	0.76	0.76	0.65	0.76	0.64	0.73	0.67	0.55	0.66	0.57	0.65	0.40
Morocco	0.83	42	–0.10	0.26	0.37	0.57	–0.10	0.83	0.70	0.69	0.82	0.90	0.84	0.83
Netherlands	0.81	34	0.54	0.45	0.59	0.59	0.40	0.56	0.63	0.63	0.58	0.64	0.74	0.53
New Zealand	0.84	37	0.53	0.59	0.57	0.61	0.56	0.66	0.48	0.61	0.71	0.59	0.72	0.65
Northern Ireland	0.85	38	0.62	0.59	0.56	0.59	0.52	0.67	0.70	0.48	0.68	0.59	0.72	0.66
Norway	0.82	34	0.68	0.35	0.63	0.64	0.66	0.58	0.67	0.38	0.67	0.58	0.68	0.37
Oman	0.88	44	0.71	0.69	0.67	0.72	0.76	0.78	0.62	0.72	0.58	0.57	0.61	0.49
Poland	0.86	41	0.70	0.68	0.64	0.66	0.54	0.63	0.58	0.59	0.64	0.67	0.71	0.58
Portugal	0.84	37	0.71	0.65	0.66	0.58	0.54	0.65	0.65	0.43	0.65	0.60	0.66	0.48
Qatar	0.96	72	0.88	0.90	0.80	0.91	0.91	0.88	0.87	0.88	0.72	0.80	0.76	0.83
Romania	0.87	41	0.77	0.67	0.69	0.76	0.71	0.63	0.66	0.69	0.46	0.57	0.35	0.60
Russian Federation	0.91	50	0.79	0.70	0.69	0.73	0.72	0.73	0.68	0.74	0.69	0.82	0.65	0.50

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

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item											
			ACBG10AA	ACBG10AB	ACBG10AC	ACBG10AD	ACBG10AE	ACBG10AF	ACBG10AG	ACBG10CA	ACBG10CB	ACBG10CC	ACBG10CD	ACBG10CE
Saudi Arabia	0.77	34	−0.58	−0.46	0.08	−0.47	−0.59	0.46	0.57	−0.22	0.75	0.79	0.80	0.72
Serbia	0.89	46	0.72	0.77	0.71	0.77	0.77	0.77	0.74	0.61	0.45	0.56	0.65	0.56
Singapore	0.95	66	0.88	0.84	0.81	0.83	0.79	0.81	0.87	0.77	0.81	0.73	0.80	0.81
Slovak Republic	0.80	32	0.64	0.55	0.59	0.62	0.63	0.58	0.61	0.56	0.60	0.30	0.58	0.43
Slovenia	0.81	34	0.49	0.61	0.49	0.57	0.52	0.55	0.68	0.43	0.67	0.70	0.69	0.55
Spain	0.89	46	0.72	0.73	0.60	0.65	0.65	0.58	0.72	0.76	0.67	0.74	0.68	0.62
Sweden	0.86	41	0.64	0.65	0.69	0.61	0.64	0.70	0.59	0.63	0.74	0.56	0.64	0.54
Thailand	0.91	50	0.78	0.77	0.67	0.66	0.65	0.77	0.79	0.75	0.71	0.71	0.73	0.49
Tunisia	0.85	39	0.51	0.53	0.33	0.61	0.18	0.74	0.58	0.66	0.78	0.77	0.75	0.76
Turkey	0.84	37	0.70	0.67	0.66	0.72	0.71	0.50	0.64	0.65	0.53	0.44	0.59	0.41
United Arab Emirates	0.93	56	0.84	0.87	0.79	0.90	0.87	0.79	0.82	0.80	0.46	0.47	0.49	0.66
United States	0.91	51	0.77	0.68	0.69	0.65	0.66	0.73	0.76	0.65	0.76	0.75	0.80	0.66
Yemen	0.81	42	−0.28	0.31	0.23	0.60	−0.12	0.66	0.85	0.39	0.91	0.88	0.89	0.86
Sixth Grade Participants														
Botswana	0.81	39	0.09	0.30	0.00	0.36	−0.29	0.56	0.69	0.69	0.93	0.82	0.92	0.85
Honduras	0.92	55	0.71	0.70	0.45	0.70	0.59	0.78	0.77	0.77	0.84	0.84	0.84	0.81
Yemen	0.83	43	−0.18	0.18	0.40	0.70	−0.01	0.70	0.86	0.47	0.87	0.89	0.86	0.87
Benchmarking Participants														
Alberta, Canada	0.86	40	0.58	0.55	0.59	0.45	0.45	0.73	0.61	0.61	0.75	0.79	0.75	0.65
Ontario, Canada	0.87	41	0.68	0.57	0.70	0.61	0.64	0.70	0.71	0.56	0.62	0.61	0.65	0.61
Quebec, Canada	0.87	42	0.65	0.60	0.66	0.64	0.59	0.71	0.70	0.65	0.70	0.60	0.68	0.61
Abu Dhabi, UAE	0.92	54	0.81	0.86	0.74	0.88	0.86	0.82	0.81	0.83	0.46	0.44	0.47	0.56
Dubai, UAE	0.95	64	0.85	0.88	0.86	0.90	0.85	0.82	0.83	0.79	0.62	0.64	0.72	0.78
Florida, US	0.91	52	0.78	0.77	0.72	0.67	0.67	0.76	0.68	0.64	0.74	0.70	0.87	0.59
North Carolina, US	0.94	62	0.84	0.84	0.75	0.80	0.79	0.80	0.79	0.69	0.85	0.70	0.76	0.83

Exhibit 6: Relationship Between the TIMSS 2011 Instruction Affected by Mathematics Resource Shortages Scale, Fourth Grade, and TIMSS 2011 Mathematics Achievement

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r^2)	
Armenia	0.09	0.01	0.01
Australia	0.15	0.02	0.02
Austria	0.05	0.00	0.00
Azerbaijan	0.02	0.00	0.01
Bahrain	0.13	0.02	0.03
Belgium (Flemish)	0.03	0.00	0.00
Chile	0.25	0.06	0.05
Chinese Taipei	0.08	0.01	0.01
Croatia	–0.01	0.00	0.00
Czech Republic	–0.03	0.00	0.01
Denmark	–0.02	0.00	0.00
England	0.04	0.00	0.00
Finland	0.05	0.00	0.00
Georgia	0.01	0.00	0.00
Germany	0.02	0.00	0.01
Hong Kong SAR	0.06	0.00	0.07
Hungary	0.08	0.01	0.01
Iran, Islamic Rep. of	0.02	0.00	0.00
Ireland	0.08	0.01	0.00
Italy	0.13	0.02	0.01
Japan	–0.01	0.00	0.00
Kazakhstan	–0.03	0.00	0.01
Korea, Rep. of	0.06	0.00	0.01
Kuwait	–0.02	0.00	0.01
Lithuania	0.01	0.00	0.00
Malta	0.07	0.01	0.00
Morocco	–0.06	0.00	0.01
Netherlands	0.06	0.00	0.00
New Zealand	0.10	0.01	0.00
Northern Ireland	0.03	0.00	0.00
Norway	–0.03	0.00	0.01
Oman	0.02	0.00	0.00
Poland	0.05	0.00	0.00
Portugal	0.02	0.00	0.00
Qatar	0.23	0.05	0.04
Romania	0.06	0.00	0.00
Russian Federation	0.09	0.01	0.01
Saudi Arabia	0.01	0.00	0.00

Exhibit 6: Relationship Between the TIMSS 2011 Instruction Affected by Mathematics Resource Shortages Scale, Fourth Grade, and TIMSS 2011 Mathematics Achievement

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r^2)	
Serbia	0.10	0.01	0.02
Singapore	–0.03	0.00	0.00
Slovak Republic	0.02	0.00	0.00
Slovenia	0.02	0.00	0.00
Spain	0.01	0.00	0.00
Sweden	0.14	0.02	0.01
Thailand	0.14	0.02	0.02
Tunisia	0.05	0.00	0.00
Turkey	0.14	0.02	0.01
United Arab Emirates	0.16	0.03	0.03
United States	0.08	0.01	0.00
Yemen	–0.05	0.00	0.02
International Median	**0.05**	**0.00**	**0.00**
Sixth Grade Participants			
Botswana	0.06	0.00	0.02
Honduras	0.18	0.03	0.02
Yemen	–0.10	0.01	0.01
Benchmarking Participants			
Alberta, Canada	–0.03	0.00	0.00
Ontario, Canada	–0.01	0.00	0.00
Quebec, Canada	0.08	0.01	0.01
Abu Dhabi, UAE	0.13	0.02	0.02
Dubai, UAE	0.23	0.05	0.06
Florida, US	0.01	0.00	0.00
North Carolina, US	–0.03	0.00	0.00