

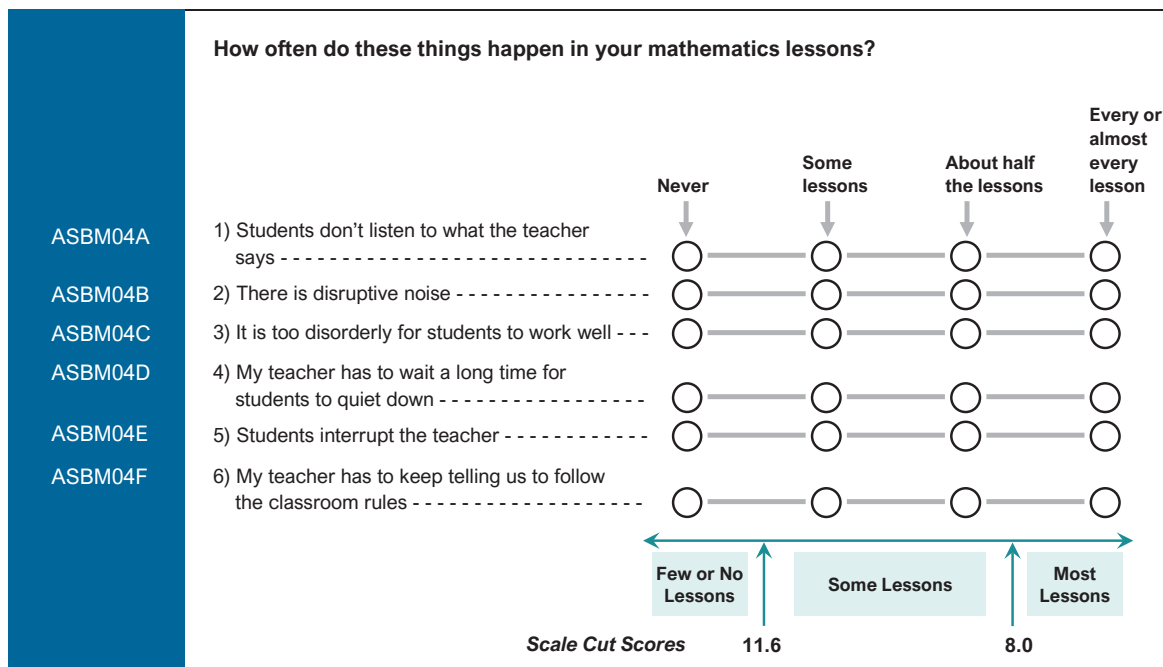
Appendix 16A: TIMSS 2019 Context Questionnaire Scales—Grade 4

Scales Based on Students' and Parents' Reports

Disorderly Behavior During Mathematics Lessons – Grade 4

About the Scale

The *Disorderly Behavior During Mathematics Lessons* scale was created based on students' responses to six items listed below.



Item Parameters for the TIMSS 2019 *Disorderly Behavior During Mathematics Lessons* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBM04A	0.06260	-0.67190	-0.64661	1.31851	1.06
ASBM04B	0.15853	-0.46978	-0.54643	1.01621	0.94
ASBM04C	-0.43410	-0.26438	-0.23380	0.49818	1.01
ASBM04D	0.06350	-0.10998	-0.60607	0.71605	0.91
ASBM04E	-0.09436	-0.22110	-0.59219	0.81329	0.90
ASBM04F	0.24383	0.10650	-0.79706	0.69056	1.29

Scale Transformation Constants for the TIMSS 2019 *Disorderly Behavior During Mathematics Lessons* Scale – Grade 4

Scale Transformation Constants

$$A = 9.816113$$

$$B = 1.569359$$

$$\text{Transformed Scale Score} = 9.816113 + 1.569359 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Disorderly Behavior During Mathematics Lessons* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	5.44760	
1	6.85775	
2	7.51217	
3	7.96009	8.0
4	8.31475	
5	8.61844	
6	8.89281	
7	9.15042	
8	9.40001	
9	9.65042	
10	9.90339	
11	10.17203	
12	10.46699	
13	10.79976	
14	11.19445	
15	11.68787	11.6
16	12.34583	
17	13.31363	
18	15.22889	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Disorderly Behavior During Mathematics Lessons* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item					
			ASBM04A	ASBM04B	ASBM04C	ASBM04D	ASBM04E	ASBM04F
Albania	0.79	51	0.72	0.80	0.80	0.70	0.76	0.42
Armenia	0.84	55	0.75	0.78	0.66	0.77	0.76	0.73
Australia	0.86	58	0.71	0.77	0.71	0.81	0.81	0.75
Austria	0.85	57	0.67	0.78	0.76	0.82	0.79	0.70
Azerbaijan	0.80	50	0.70	0.79	0.75	0.71	0.72	0.54
Bahrain	0.79	49	0.69	0.74	0.67	0.75	0.76	0.59
Belgium (Flemish)	0.78	48	0.66	0.66	0.56	0.76	0.77	0.71
Bosnia and Herzegovina	0.84	55	0.67	0.75	0.62	0.81	0.80	0.76
Bulgaria	0.85	57	0.57	0.80	0.81	0.83	0.74	0.72
Canada	0.84	56	0.71	0.74	0.71	0.80	0.79	0.73
Chile	0.84	55	0.64	0.72	0.77	0.79	0.81	0.72
Chinese Taipei	0.84	56	0.72	0.78	0.81	0.76	0.78	0.60
Croatia	0.87	61	0.69	0.81	0.77	0.84	0.82	0.75
Cyprus	0.79	50	0.67	0.74	0.53	0.80	0.79	0.66
Czech Republic	0.89	64	0.74	0.82	0.78	0.83	0.84	0.80
Denmark	0.85	58	0.67	0.82	0.81	0.79	0.77	0.68
England	0.85	58	0.73	0.77	0.71	0.81	0.82	0.72
Finland	0.88	62	0.73	0.80	0.82	0.83	0.80	0.75
France	0.82	52	0.61	0.75	0.76	0.78	0.72	0.72
Georgia	0.84	55	0.67	0.77	0.62	0.81	0.81	0.74
Germany	0.85	58	0.68	0.79	0.79	0.80	0.78	0.70
Hong Kong SAR	0.88	63	0.78	0.81	0.82	0.82	0.82	0.71
Hungary	0.86	58	0.66	0.79	0.71	0.82	0.81	0.80
Iran, Islamic Rep. of	0.84	55	0.65	0.77	0.77	0.80	0.78	0.68
Ireland	0.83	54	0.71	0.74	0.69	0.78	0.77	0.70
Italy	0.81	52	0.61	0.77	0.76	0.74	0.76	0.67
Japan	0.86	58	0.73	0.76	0.78	0.75	0.78	0.77
Kazakhstan	0.77	50	0.69	0.79	0.76	0.73	0.80	0.35
Korea, Rep. of	0.83	55	0.77	0.80	0.75	0.73	0.81	0.54
Kosovo	0.80	52	0.71	0.79	0.76	0.76	0.79	0.45
Kuwait	0.76	45	0.69	0.76	0.67	0.73	0.75	0.37
Latvia	0.86	58	0.73	0.79	0.72	0.81	0.80	0.72
Lithuania	0.85	58	0.76	0.82	0.78	0.82	0.74	0.63
Malta	0.79	49	0.66	0.73	0.65	0.76	0.78	0.62
Montenegro	0.82	52	0.70	0.76	0.57	0.78	0.79	0.71
Morocco	0.75	45	0.64	0.72	0.72	0.71	0.72	0.47
Netherlands	0.84	55	0.60	0.79	0.79	0.81	0.78	0.67
New Zealand	0.84	56	0.67	0.75	0.76	0.79	0.80	0.70
North Macedonia	0.84	56	0.73	0.78	0.75	0.80	0.79	0.60

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Disorderly Behavior During Mathematics Lessons* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item					
			ASBM04A	ASBM04B	ASBM04C	ASBM04D	ASBM04E	ASBM04F
Northern Ireland	0.81	52	0.64	0.68	0.76	0.78	0.76	0.68
Norway (5)	0.87	60	0.70	0.81	0.78	0.83	0.80	0.74
Oman	0.80	49	0.64	0.74	0.74	0.74	0.73	0.61
Pakistan	0.77	47	0.68	0.66	0.69	0.74	0.69	0.65
Philippines	0.64	36	0.58	0.60	0.63	0.60	0.67	0.49
Poland	0.89	63	0.67	0.82	0.83	0.84	0.80	0.81
Portugal	0.86	58	0.64	0.78	0.77	0.79	0.81	0.79
Qatar	0.83	54	0.71	0.77	0.72	0.77	0.79	0.62
Russian Federation	0.88	63	0.73	0.82	0.82	0.82	0.79	0.77
Saudi Arabia	0.80	51	0.69	0.78	0.77	0.75	0.76	0.50
Serbia	0.83	53	0.68	0.75	0.66	0.76	0.80	0.72
Singapore	-	-	-	-	-	-	-	-
Slovak Republic	0.87	61	0.67	0.80	0.77	0.82	0.82	0.78
South Africa (5)	0.74	43	0.59	0.67	0.68	0.72	0.72	0.55
Spain	0.77	48	0.67	0.76	0.65	0.79	0.79	0.45
Sweden	0.87	61	0.71	0.80	0.81	0.84	0.81	0.71
Turkey (5)	0.83	54	0.72	0.78	0.66	0.76	0.77	0.70
United Arab Emirates	0.86	59	0.76	0.80	0.76	0.80	0.81	0.67
United States	0.87	60	0.74	0.79	0.71	0.81	0.82	0.76
Benchmarking Participants								
Ontario, Canada	0.84	56	0.71	0.74	0.68	0.80	0.82	0.73
Quebec, Canada	0.84	55	0.71	0.72	0.75	0.79	0.75	0.72
Moscow City, Russian Fed.	0.87	61	0.72	0.81	0.83	0.83	0.78	0.73
Madrid, Spain	0.77	48	0.67	0.74	0.65	0.79	0.79	0.46
Abu Dhabi, UAE	0.84	56	0.72	0.78	0.75	0.76	0.79	0.65
Dubai, UAE	0.87	62	0.78	0.79	0.73	0.82	0.83	0.74

A dash (-) indicates comparable data not available.

Relationship Between the TIMSS 2019 *Disorderly Behavior During Mathematics Lessons* Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.11	0.01	0.02
Armenia	0.06	0.00	0.01
Australia	0.24	0.06	0.04
Austria	0.21	0.04	0.03
Azerbaijan	0.04	0.00	0.00
Bahrain	0.10	0.01	0.01
Belgium (Flemish)	0.15	0.02	0.01
Bosnia and Herzegovina	0.09	0.01	0.02
Bulgaria	0.21	0.04	0.06
Canada	0.16	0.03	0.02
Chile	0.12	0.01	0.01
Chinese Taipei	0.01	0.00	0.00
Croatia	0.10	0.01	0.01
Cyprus	0.19	0.04	0.02
Czech Republic	0.18	0.03	0.03
Denmark	0.08	0.01	0.01
England	0.22	0.05	0.03
Finland	0.07	0.00	0.00
France	0.22	0.05	0.03
Georgia	0.14	0.02	0.02
Germany	0.11	0.01	0.01
Hong Kong SAR	0.07	0.01	0.00
Hungary	0.15	0.02	0.02
Iran, Islamic Rep. of	-0.06	0.00	0.01
Ireland	0.19	0.04	0.02
Italy	0.09	0.01	0.00
Japan	0.06	0.00	0.01
Kazakhstan	0.15	0.02	0.02
Korea, Rep. of	0.01	0.00	0.00
Kosovo	0.10	0.01	0.04
Kuwait	0.06	0.00	0.00
Latvia	0.16	0.02	0.02
Lithuania	0.12	0.01	0.01
Malta	0.12	0.01	0.01
Montenegro	0.10	0.01	0.02
Morocco	0.02	0.00	0.01
Netherlands	0.08	0.01	0.00
New Zealand	0.25	0.06	0.04

Relationship Between the TIMSS 2019 *Disorderly Behavior During Mathematics Lessons* Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.16	0.03	0.04
Northern Ireland	0.22	0.05	0.03
Norway (5)	0.10	0.01	0.00
Oman	0.13	0.02	0.01
Pakistan	0.19	0.04	0.03
Philippines	0.11	0.01	0.01
Poland	0.11	0.01	0.01
Portugal	0.16	0.02	0.02
Qatar	0.11	0.01	0.01
Russian Federation	0.14	0.02	0.02
Saudi Arabia	0.16	0.03	0.02
Serbia	0.06	0.00	0.01
Singapore	-	-	-
Slovak Republic	0.17	0.03	0.02
South Africa (5)	0.03	0.00	0.00
Spain	0.19	0.03	0.02
Sweden	0.12	0.01	0.01
Turkey (5)	0.14	0.02	0.01
United Arab Emirates	0.12	0.01	0.01
United States	0.19	0.03	0.03
International Median	0.12	0.01	0.01
Benchmarking Participants			
Ontario, Canada	0.17	0.03	0.02
Quebec, Canada	0.15	0.02	0.01
Moscow City, Russian Fed.	0.18	0.03	0.04
Madrid, Spain	0.18	0.03	0.02
Abu Dhabi, UAE	0.13	0.02	0.01
Dubai, UAE	0.07	0.01	0.00

A dash (–) indicates comparable data not available.

Early Literacy and Numeracy Activities – Grade 4

About the Scale

The *Early Literacy and Numeracy Activities* scale was created based on parents' responses to eighteen items listed below.

Before your child began primary/elementary school, how often did you or someone else in your home do the following activities with him/her?

		Often	Sometimes	Never or almost never
ASBH01A ^T	1) Read books -----	○	○	○
ASBH01B ^T	2) Tell stories -----	○	○	○
ASBH01C ^T	3) Sing songs -----	○	○	○
ASBH01D ^T	4) Play with alphabet toys (e.g., blocks with letters of the alphabet) -----	○	○	○
ASBH01E ^T	5) Talk about things you had done -----	○	○	○
ASBH01F ^T	6) Talk about what you had read -----	○	○	○
ASBH01G ^T	7) Play word games -----	○	○	○
ASBH01H ^T	8) Write letters or words -----	○	○	○
ASBH01I ^T	9) Read aloud signs and labels -----	○	○	○
ASBH01J ^T	10) Say counting rhymes or sing counting songs -----	○	○	○
ASBH01K ^T	11) Play with number toys (e.g., blocks with numbers) -----	○	○	○
ASBH01L ^T	12) Count different things -----	○	○	○
ASBH01M ^T	13) Play games involving shapes (e.g., shape sorting toys, puzzles) -----	○	○	○
ASBH01N ^T	14) Play with building blocks or construction toys -----	○	○	○
ASBH01O ^T	15) Play board or card games -----	○	○	○
ASBH01P ^T	16) Write numbers -----	○	○	○
ASBH01Q	17) Draw shapes -----	○	○	○
ASBH01R	18) Measure or weigh things (e.g., when cooking) -----	○	○	○

Scale Cut Scores 10.6 6.5

^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Early Literacy and Numeracy Activities* Scale – Grade 4

Item	delta	tau_1	tau_2	Infit
ASBH01A	-0.34476	-1.40303	1.40303	1.05
ASBH01B	-0.32936	-1.33519	1.33519	1.01
ASBH01C	-0.07756	-0.92757	0.92757	1.18
ASBH01D	0.18438	-0.96013	0.96013	0.95
ASBH01E	-0.72634	-1.12221	1.12221	1.08
ASBH01F	0.22725	-1.30680	1.30680	1.02
ASBH01G	0.31745	-1.17398	1.17398	0.94
ASBH01H	-0.10842	-1.07733	1.07733	0.97
ASBH01I	0.14535	-0.96132	0.96132	1.00
ASBH01J	0.41173	-0.98655	0.98655	1.01
ASBH01K	0.26656	-0.99356	0.99356	0.90
ASBH01L	-0.68847	-1.15621	1.15621	0.90
ASBH01M	-0.38096	-0.97230	0.97230	0.94
ASBH01N	-0.36931	-0.70955	0.70955	1.02
ASBH01O	0.20194	-1.08281	1.08281	1.08
ASBH01P	-0.25815	-1.11519	1.11519	0.96
ASBH01Q	-0.17558	-1.16158	1.16158	0.97
ASBH01R	1.70425	-1.11057	1.11057	1.15

Scale Transformation Constants for the TIMSS 2019 *Early Literacy and Numeracy Activities* Scale – Grade 4

Scale Transformation Constants

A = 8.584625

B = 1.556418

Transformed Scale Score = 8.584625 + 1.556418 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Early Literacy and Numeracy Activities Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	1.07265	
1	2.86711	
2	3.74829	
3	4.36060	
4	4.84206	
5	5.24617	
6	5.60111	
7	5.92077	
8	6.21476	
9	6.48948	6.5
10	6.74944	
11	6.99730	
12	7.23716	
13	7.46992	
14	7.69717	
15	7.92028	
16	8.14041	
17	8.35859	
18	8.57563	
19	8.79290	
20	9.01090	
21	9.23074	
22	9.45351	
23	9.68045	
24	9.91301	
25	10.15289	
26	10.40107	
27	10.66194	10.6
28	10.93840	
29	11.23530	
30	11.55952	
31	11.92129	
32	12.33545	
33	12.83153	
34	13.46485	
35	14.37589	
36	16.21238	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Early Literacy and Numeracy Activities Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item																	
			ASBH01A	ASBH01B	ASBH01C	ASBH01D	ASBH01E	ASBH01F	ASBH01G	ASBH01H	ASBH01I	ASBH01J	ASBH01K	ASBH01L	ASBH01M	ASBH01N	ASBH01O	ASBH01P	ASBH01Q	ASBH01R
Albania	0.88	34	0.55	0.53	0.40	0.64	0.50	0.57	0.60	0.63	0.58	0.59	0.66	0.64	0.65	0.59	0.51	0.62	0.59	0.50
Armenia	0.85	28	0.47	0.51	0.39	0.60	0.39	0.48	0.58	0.56	0.57	0.58	0.64	0.58	0.60	0.44	0.46	0.57	0.60	0.50
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Austria	0.84	28	0.44	0.50	0.43	0.53	0.45	0.55	0.57	0.52	0.55	0.61	0.62	0.61	0.51	0.48	0.41	0.54	0.60	0.48
Azerbaijan	0.85	28	0.48	0.49	0.36	0.59	0.36	0.53	0.56	0.59	0.59	0.54	0.63	0.53	0.60	0.55	0.42	0.59	0.60	0.48
Bahrain	0.84	28	0.42	0.46	0.35	0.58	0.40	0.43	0.59	0.58	0.53	0.56	0.65	0.60	0.60	0.57	0.55	0.60	0.58	0.36
Belgium (Flemish)	0.85	29	0.48	0.48	0.42	0.58	0.40	0.49	0.63	0.56	0.59	0.62	0.65	0.64	0.50	0.41	0.50	0.56	0.57	0.47
Bosnia and Herzegovina	0.84	28	0.45	0.47	0.45	0.60	0.38	0.50	0.54	0.54	0.53	0.61	0.65	0.58	0.57	0.48	0.48	0.53	0.57	0.46
Bulgaria	0.92	43	0.62	0.59	0.46	0.73	0.63	0.69	0.70	0.74	0.66	0.65	0.74	0.71	0.72	0.68	0.59	0.74	0.64	0.49
Canada	0.89	36	0.55	0.55	0.47	0.65	0.47	0.62	0.68	0.67	0.64	0.60	0.69	0.65	0.63	0.51	0.50	0.67	0.63	0.53
Chile	0.87	31	0.47	0.52	0.44	0.62	0.37	0.49	0.63	0.64	0.52	0.63	0.69	0.59	0.62	0.61	0.47	0.62	0.60	0.43
Chinese Taipei	0.90	39	0.59	0.58	0.51	0.63	0.51	0.58	0.62	0.55	0.65	0.70	0.73	0.73	0.69	0.65	0.52	0.67	0.69	0.50
Croatia	0.87	31	0.51	0.55	0.40	0.62	0.41	0.55	0.61	0.62	0.58	0.55	0.68	0.62	0.61	0.51	0.45	0.63	0.61	0.39
Cyprus	0.88	34	0.53	0.54	0.45	0.67	0.45	0.58	0.63	0.62	0.57	0.61	0.71	0.65	0.64	0.56	0.51	0.63	0.64	0.48
Czech Republic	0.84	27	0.35	0.41	0.38	0.59	0.42	0.54	0.55	0.63	0.53	0.52	0.67	0.58	0.53	0.42	0.45	0.65	0.59	0.48
Denmark	0.86	30	0.47	0.52	0.43	0.59	0.43	0.58	0.66	0.65	0.57	0.59	0.61	0.60	0.51	0.40	0.45	0.62	0.51	0.54
England	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Finland	0.86	30	0.42	0.49	0.40	0.63	0.41	0.58	0.60	0.66	0.58	0.54	0.64	0.62	0.53	0.41	0.45	0.66	0.59	0.53
France	0.84	28	0.49	0.49	0.40	0.59	0.37	0.47	0.59	0.61	0.53	0.55	0.64	0.61	0.56	0.49	0.47	0.57	0.55	0.47
Georgia	0.85	29	0.53	0.43	0.37	0.66	0.42	0.50	0.58	0.58	0.59	0.55	0.68	0.52	0.56	0.57	0.36	0.59	0.59	0.44
Germany	0.84	27	0.36	0.44	0.37	0.59	0.40	0.50	0.62	0.61	0.60	0.58	0.63	0.56	0.49	0.38	0.43	0.61	0.61	0.49
Hong Kong SAR	0.89	35	0.52	0.55	0.52	0.65	0.43	0.49	0.65	0.57	0.57	0.67	0.73	0.71	0.72	0.65	0.48	0.62	0.60	0.42
Hungary	0.85	28	0.43	0.45	0.37	0.63	0.36	0.46	0.60	0.59	0.58	0.58	0.65	0.57	0.52	0.42	0.47	0.61	0.58	0.56
Iran, Islamic Rep. of	0.88	34	0.53	0.52	0.52	0.62	0.47	0.55	0.64	0.60	0.59	0.61	0.66	0.60	0.63	0.61	0.60	0.58	0.59	0.43
Ireland	0.89	35	0.53	0.55	0.48	0.64	0.44	0.55	0.65	0.62	0.63	0.64	0.70	0.66	0.65	0.55	0.49	0.65	0.65	0.52
Italy	0.83	26	0.40	0.44	0.37	0.62	0.35	0.49	0.56	0.61	0.54	0.59	0.65	0.59	0.49	0.43	0.34	0.58	0.54	0.41
Japan	0.88	33	0.47	0.51	0.49	0.59	0.49	0.56	0.63	0.66	0.61	0.61	0.63	0.68	0.58	0.50	0.47	0.68	0.65	0.49
Kazakhstan	0.84	28	0.48	0.35	0.37	0.55	0.43	0.52	0.56	0.56	0.53	0.56	0.64	0.51	0.58	0.54	0.58	0.56	0.60	0.45
Korea, Rep. of	0.90	39	0.49	0.43	0.45	0.64	0.47	0.55	0.72	0.68	0.69	0.72	0.74	0.74	0.68	0.56	0.51	0.72	0.68	0.56
Kosovo	0.82	26	0.42	0.41	0.38	0.59	0.34	0.41	0.52	0.56	0.54	0.55	0.62	0.53	0.59	0.53	0.48	0.52	0.54	0.47
Kuwait	0.85	29	0.43	0.46	0.31	0.60	0.39	0.40	0.58	0.60	0.55	0.58	0.69	0.60	0.64	0.58	0.53	0.63	0.59	0.34
Latvia	0.86	30	0.51	0.52	0.40	0.63	0.43	0.57	0.59	0.62	0.51	0.59	0.65	0.61	0.56	0.48	0.48	0.63	0.59	0.47
Lithuania	0.86	30	0.51	0.48	0.42	0.63	0.46	0.59	0.62	0.61	0.49	0.57	0.65	0.60	0.57	0.52	0.44	0.62	0.56	0.47
Malta	0.88	34	0.54	0.54	0.45	0.62	0.46	0.58	0.63	0.62	0.63	0.59	0.69	0.65	0.66	0.55	0.49	0.58	0.63	0.48
Montenegro	0.86	30	0.50	0.50	0.47	0.61	0.47	0.54	0.57	0.54	0.55	0.59	0.66	0.59	0.61	0.53	0.53	0.54	0.57	0.49
Morocco	0.93	43	0.61	0.62	0.54	0.70	0.59	0.65	0.69	0.74	0.70	0.64	0.73	0.61	0.70	0.67	0.69	0.73	0.71	0.46
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Zealand	0.90	38	0.53	0.60	0.53	0.61	0.51	0.64	0.67	0.67	0.67	0.62	0.68	0.67	0.68	0.52	0.55	0.66	0.66	0.60
North Macedonia	0.88	33	0.55	0.54	0.44	0.64	0.45	0.58	0.63	0.62	0.57	0.64	0.66	0.62	0.62	0.55	0.51	0.59	0.61	0.54
Northern Ireland	0.90	37	0.50	0.58	0.47	0.67	0.46	0.59	0.67	0.64	0.64	0.62	0.70	0.67	0.67	0.58	0.54	0.63	0.64	0.54

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Early Literacy and Numeracy Activities Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item																	
			ASBH01A	ASBH01B	ASBH01C	ASBH01D	ASBH01E	ASBH01F	ASBH01G	ASBH01H	ASBH01I	ASBH01J	ASBH01K	ASBH01L	ASBH01M	ASBH01N	ASBH01O	ASBH01P	ASBH01Q	ASBH01R
Norway (5)	0.87	31	0.46	0.47	0.40	0.64	0.43	0.61	0.71	0.64	0.61	0.63	0.69	0.59	0.50	0.33	0.43	0.65	0.54	0.54
Oman	0.83	27	0.47	0.45	0.23	0.57	0.38	0.49	0.58	0.59	0.59	0.48	0.62	0.52	0.57	0.49	0.58	0.57	0.55	0.41
Pakistan	0.86	31	0.53	0.53	0.27	0.56	0.53	0.61	0.53	0.68	0.60	0.62	0.47	0.59	0.57	0.61	0.42	0.65	0.56	0.49
Philippines	0.88	32	0.54	0.53	0.44	0.61	0.46	0.56	0.53	0.60	0.62	0.62	0.66	0.62	0.64	0.58	0.50	0.59	0.63	0.44
Poland	0.86	30	0.42	0.45	0.47	0.62	0.49	0.57	0.58	0.61	0.57	0.59	0.66	0.57	0.47	0.40	0.44	0.65	0.64	0.50
Portugal	0.86	30	0.52	0.53	0.40	0.61	0.41	0.49	0.61	0.57	0.51	0.58	0.69	0.64	0.62	0.55	0.48	0.59	0.58	0.45
Qatar	0.86	31	0.45	0.46	0.41	0.61	0.44	0.47	0.59	0.58	0.60	0.62	0.68	0.63	0.64	0.59	0.52	0.60	0.61	0.39
Russian Federation	0.88	33	0.56	0.49	0.47	0.61	0.54	0.57	0.60	0.63	0.52	0.57	0.66	0.58	0.63	0.58	0.59	0.64	0.63	0.49
Saudi Arabia	0.86	30	0.42	0.47	0.35	0.62	0.46	0.45	0.62	0.61	0.57	0.57	0.68	0.55	0.59	0.56	0.57	0.63	0.61	0.36
Serbia	0.86	30	0.53	0.54	0.51	0.61	0.43	0.53	0.57	0.58	0.58	0.59	0.64	0.60	0.59	0.49	0.49	0.55	0.58	0.47
Singapore	0.91	40	0.56	0.58	0.52	0.70	0.50	0.59	0.63	0.65	0.68	0.71	0.75	0.74	0.73	0.63	0.50	0.70	0.69	0.50
Slovak Republic	0.88	34	0.48	0.47	0.32	0.64	0.52	0.59	0.63	0.63	0.62	0.59	0.70	0.65	0.60	0.54	0.49	0.67	0.62	0.54
South Africa (5)	0.88	32	0.57	0.50	0.41	0.61	0.47	0.54	0.56	0.60	0.60	0.57	0.65	0.61	0.64	0.59	0.53	0.58	0.61	0.46
Spain	0.85	29	0.48	0.49	0.41	0.64	0.34	0.46	0.63	0.60	0.53	0.57	0.68	0.55	0.60	0.52	0.43	0.62	0.56	0.41
Sweden	0.87	32	0.41	0.46	0.44	0.67	0.37	0.58	0.69	0.64	0.57	0.63	0.67	0.61	0.57	0.44	0.44	0.65	0.60	0.53
Turkey (5)	0.94	50	0.69	0.68	0.54	0.71	0.72	0.74	0.75	0.72	0.75	0.69	0.75	0.73	0.77	0.68	0.61	0.74	0.75	0.65
United Arab Emirates	0.88	34	0.48	0.48	0.39	0.61	0.49	0.54	0.60	0.60	0.60	0.62	0.69	0.67	0.69	0.62	0.56	0.64	0.64	0.47
United States	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benchmarking Participants																				
Ontario, Canada	0.90	38	0.54	0.57	0.50	0.65	0.50	0.65	0.69	0.69	0.68	0.61	0.70	0.68	0.67	0.54	0.53	0.68	0.65	0.52
Quebec, Canada	0.87	32	0.53	0.51	0.40	0.63	0.45	0.57	0.66	0.65	0.58	0.57	0.68	0.61	0.59	0.43	0.47	0.64	0.58	0.52
Moscow City, Russian Fed.	0.88	34	0.52	0.49	0.49	0.60	0.59	0.62	0.64	0.65	0.52	0.58	0.67	0.60	0.58	0.53	0.56	0.64	0.64	0.54
Madrid, Spain	0.85	29	0.43	0.46	0.38	0.65	0.39	0.45	0.61	0.61	0.52	0.60	0.69	0.55	0.59	0.52	0.42	0.61	0.59	0.44
Abu Dhabi, UAE	0.89	35	0.48	0.50	0.42	0.61	0.48	0.53	0.62	0.62	0.59	0.62	0.70	0.69	0.70	0.63	0.59	0.67	0.66	0.45
Dubai, UAE	0.88	33	0.50	0.48	0.40	0.61	0.47	0.52	0.58	0.59	0.61	0.61	0.70	0.67	0.68	0.59	0.50	0.63	0.62	0.46

A dash (-) indicates comparable data not available.

Relationship Between the TIMSS 2019 *Early Literacy and Numeracy Activities* Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.23	0.05	0.05	0.22	0.05	0.05
Armenia	0.09	0.01	0.01	0.11	0.01	0.01
Australia	-	-	-	-	-	-
Austria	0.15	0.02	0.01	0.16	0.03	0.02
Azerbaijan	0.12	0.02	0.02	0.14	0.02	0.03
Bahrain	0.11	0.01	0.01	0.19	0.04	0.03
Belgium (Flemish)	0.15	0.02	0.01	0.14	0.02	0.01
Bosnia and Herzegovina	0.13	0.02	0.01	0.14	0.02	0.02
Bulgaria	0.40	0.16	0.14	0.44	0.19	0.18
Canada	0.09	0.01	0.01	0.15	0.02	0.02
Chile	0.22	0.05	0.03	0.23	0.05	0.03
Chinese Taipei	0.22	0.05	0.03	0.22	0.05	0.03
Croatia	0.20	0.04	0.03	0.22	0.05	0.03
Cyprus	0.19	0.04	0.03	0.22	0.05	0.04
Czech Republic	0.09	0.01	0.01	0.07	0.00	0.00
Denmark	0.12	0.01	0.01	0.17	0.03	0.03
England	-	-	-	-	-	-
Finland	0.14	0.02	0.01	0.12	0.01	0.01
France	0.21	0.05	0.03	0.22	0.05	0.04
Georgia	-0.02	0.00	0.00	-0.04	0.00	0.00
Germany	0.12	0.01	0.01	0.11	0.01	0.01
Hong Kong SAR	0.18	0.03	0.03	0.19	0.03	0.03
Hungary	0.12	0.02	0.02	0.11	0.01	0.02
Iran, Islamic Rep. of	0.16	0.03	0.02	0.22	0.05	0.04
Ireland	0.21	0.04	0.03	0.22	0.05	0.03
Italy	0.15	0.02	0.01	0.17	0.03	0.01
Japan	0.17	0.03	0.03	0.16	0.03	0.02
Kazakhstan	0.12	0.02	0.01	0.17	0.03	0.03
Korea, Rep. of	0.21	0.04	0.03	0.19	0.04	0.03
Kosovo	0.12	0.01	0.01	0.16	0.03	0.03
Kuwait	0.12	0.01	0.02	0.14	0.02	0.02
Latvia	0.11	0.01	0.01	0.13	0.02	0.01
Lithuania	0.09	0.01	0.01	0.09	0.01	0.01
Malta	0.19	0.04	0.03	0.16	0.03	0.02
Montenegro	0.18	0.03	0.03	0.20	0.04	0.04
Morocco	0.20	0.04	0.04	0.20	0.04	0.04
Netherlands	-	-	-	-	-	-

Relationship Between the TIMSS 2019 *Early Literacy and Numeracy Activities* Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.12	0.01	0.01	0.16	0.03	0.02
North Macedonia	0.20	0.04	0.03	0.23	0.05	0.05
Northern Ireland	0.15	0.02	0.01	0.16	0.02	0.02
Norway (5)	0.13	0.02	0.01	0.16	0.03	0.02
Oman	0.22	0.05	0.03	0.25	0.06	0.04
Pakistan	0.11	0.01	0.02	0.08	0.01	0.01
Philippines	0.18	0.03	0.03	0.20	0.04	0.04
Poland	0.10	0.01	0.00	0.11	0.01	0.00
Portugal	0.17	0.03	0.02	0.17	0.03	0.03
Qatar	0.19	0.04	0.03	0.21	0.04	0.03
Russian Federation	0.08	0.01	0.00	0.11	0.01	0.01
Saudi Arabia	0.12	0.02	0.01	0.15	0.02	0.02
Serbia	0.25	0.06	0.05	0.26	0.07	0.06
Singapore	0.15	0.02	0.02	0.18	0.03	0.03
Slovak Republic	0.12	0.01	0.02	0.17	0.03	0.04
South Africa (5)	0.20	0.04	0.03	0.20	0.04	0.04
Spain	0.18	0.03	0.02	0.18	0.03	0.02
Sweden	0.10	0.01	0.01	0.08	0.01	0.00
Turkey (5)	0.41	0.17	0.15	0.46	0.21	0.19
United Arab Emirates	0.14	0.02	0.02	0.16	0.02	0.02
United States	-	-	-	-	-	-
International Median	0.15	0.02	0.02	0.17	0.03	0.03
Benchmarking Participants						
Ontario, Canada	0.09	0.01	0.01	0.12	0.01	0.01
Quebec, Canada	0.13	0.02	0.02	0.17	0.03	0.02
Moscow City, Russian Fed.	0.07	0.00	0.01	0.08	0.01	0.01
Madrid, Spain	0.14	0.02	0.01	0.14	0.02	0.01
Abu Dhabi, UAE	0.16	0.03	0.02	0.16	0.03	0.02
Dubai, UAE	0.12	0.02	0.01	0.15	0.02	0.02

A dash (-) indicates comparable data not available.

Early Literacy and Numeracy Tasks – Grade 4

About the Scale

The *Early Literacy and Numeracy Tasks* scale was created based on parents' responses to twelve items listed below.

		Very well	Moderately well	Not very well	Not at all
How well could your child do the following when he/she began the first grade of primary/elementary school?					
ASBH06A ^T	1) Recognize most of the letters of the alphabet -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH06B ^T	2) Read some words - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH06C ^T	3) Read sentences - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH06D ^T	4) Read a story - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH06E ^T	5) Write letters of the alphabet - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH06F	6) Write his/her name - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH06G	7) Write words other than his/her name - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Could your child do the following when he/she began the first grade of primary/elementary school?					
		Up to 100 or higher	Up to 20	Up to 10	Not at all
ASBH07A ^T	1) Count by himself/herself - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH07B ^T	2) Recognize written numbers - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASBH07C ^T	3) Write numbers - - - - -	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Could your child do the following when he/she began the first grade of primary/elementary school?					
		Yes	No		
ASBH07D ^T	1) Do simple addition - - - - -	<input type="radio"/>	<input type="radio"/>		
ASBH07E ^T	2) Do simple subtraction - - - - -	<input type="radio"/>	<input type="radio"/>		
		Scale Cut Scores 11.2 8.6			

^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Early Literacy and Numeracy Tasks* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBH06A	-0.89706	-1.55492	-0.05316	1.60808	0.91
ASBH06B	0.10783	-1.38397	-0.17270	1.55667	0.82
ASBH06C	0.99903	-1.17817	-0.18774	1.36591	0.87
ASBH06D	1.56339	-1.15006	-0.22907	1.37913	1.04
ASBH06E	-0.47596	-1.49821	-0.13281	1.63102	0.86
ASBH06F	-1.14427	-0.70993	-0.32096	1.03089	1.07
ASBH06G	0.18193	-1.37169	-0.14906	1.52075	0.87
ASBH07A	-0.21367	-1.91023	0.10567	1.80456	1.46
ASBH07B	0.20174	-2.00916	0.29670	1.71246	1.17
ASBH07C	0.41193	-1.91406	0.33064	1.58342	1.11
ASBH07D	-0.76002				1.00
ASBH07E	0.02513				1.03

Scale Transformation Constants for the TIMSS 2019 *Early Literacy and Numeracy Tasks* Scale – Grade 4

Scale Transformation Constants

A = 8.738315

B = 1.194342

Transformed Scale Score = 8.738315 + 1.194342 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Early Literacy and Numeracy Tasks Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	3.06734	
1	4.45634	
2	5.14320	
3	5.62117	
4	5.99829	
5	6.31846	
6	6.60154	
7	6.85988	
8	7.10112	
9	7.33022	
10	7.55012	
11	7.76411	
12	7.97308	
13	8.17826	
14	8.38068	
15	8.58119	8.6
16	8.78057	
17	8.97964	
18	9.17925	
19	9.38042	
20	9.58432	
21	9.79237	
22	10.00637	
23	10.22851	
24	10.46028	
25	10.70746	
26	10.97468	
27	11.26987	11.2
28	11.60550	
29	12.00147	
30	12.50191	
31	13.21514	
32	14.63421	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Early Literacy and Numeracy Tasks Scale – Grade 4*

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item												
			ASBH06A	ASBH06B	ASBH06C	ASBH06D	ASBH06E	ASBH06F	ASBH06G	ASBH07A	ASBH07B	ASBH07C	ASBH07D	ASBH07E	
Albania	0.91	52	0.78	0.81	0.79	0.67	0.79	0.73	0.80	0.62	0.67	0.65	0.61	0.65	
Armenia	0.89	47	0.76	0.85	0.83	0.74	0.83	0.81	0.83	0.37	0.49	0.55	0.43	0.44	
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Austria	0.89	44	0.76	0.81	0.78	0.70	0.75	0.45	0.76	0.48	0.67	0.71	0.49	0.51	
Azerbaijan	0.91	52	0.76	0.81	0.80	0.72	0.82	0.80	0.82	0.51	0.61	0.65	0.60	0.63	
Bahrain	0.88	45	0.71	0.79	0.80	0.71	0.73	0.65	0.76	0.57	0.62	0.62	0.52	0.54	
Belgium (Flemish)	0.89	46	0.75	0.79	0.77	0.73	0.78	0.53	0.79	0.49	0.65	0.70	0.50	0.55	
Bosnia and Herzegovina	0.90	49	0.73	0.82	0.81	0.76	0.77	0.65	0.81	0.52	0.62	0.66	0.59	0.60	
Bulgaria	0.93	59	0.83	0.85	0.81	0.74	0.83	0.81	0.84	0.67	0.69	0.72	0.68	0.68	
Canada	0.92	53	0.71	0.81	0.81	0.77	0.76	0.68	0.81	0.67	0.74	0.75	0.58	0.58	
Chile	0.91	50	0.77	0.83	0.83	0.78	0.79	0.70	0.80	0.57	0.61	0.62	0.55	0.53	
Chinese Taipei	0.86	43	0.78	0.83	0.82	0.78	0.80	0.73	0.79	0.24	0.30	0.31	0.49	0.51	
Croatia	0.90	49	0.73	0.81	0.81	0.74	0.76	0.58	0.78	0.59	0.69	0.70	0.58	0.59	
Cyprus	0.90	48	0.74	0.82	0.82	0.74	0.78	0.64	0.81	0.53	0.60	0.63	0.57	0.59	
Czech Republic	0.90	49	0.80	0.84	0.81	0.75	0.79	0.58	0.83	0.51	0.66	0.69	0.46	0.52	
Denmark	0.88	44	0.75	0.78	0.71	0.61	0.75	0.61	0.75	0.57	0.67	0.71	0.48	0.42	
England	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Finland	0.91	52	0.76	0.84	0.82	0.77	0.78	0.63	0.82	0.67	0.70	0.73	0.52	0.56	
France	0.88	44	0.67	0.76	0.74	0.68	0.73	0.60	0.73	0.60	0.66	0.68	0.55	0.51	
Georgia	0.89	46	0.77	0.83	0.82	0.72	0.79	0.76	0.80	0.36	0.49	0.57	0.51	0.53	
Germany	0.88	44	0.74	0.79	0.76	0.67	0.75	0.49	0.72	0.50	0.66	0.73	0.50	0.51	
Hong Kong SAR	0.82	38	0.76	0.83	0.83	0.71	0.80	0.75	0.76	0.15	0.17	0.16	0.37	0.36	
Hungary	0.90	48	0.78	0.84	0.79	0.70	0.81	0.64	0.81	0.48	0.65	0.70	0.46	0.47	
Iran, Islamic Rep. of	0.91	51	0.77	0.82	0.80	0.74	0.81	0.74	0.78	0.48	0.66	0.68	0.60	0.57	
Ireland	0.89	49	0.75	0.81	0.82	0.79	0.81	0.75	0.82	0.52	0.55	0.57	0.53	0.56	
Italy	0.90	49	0.73	0.80	0.78	0.71	0.77	0.62	0.79	0.57	0.69	0.72	0.57	0.57	
Japan	0.86	47	0.84	0.85	0.87	0.82	0.87	0.77	0.86	0.19	0.28	0.33	0.52	0.51	
Kazakhstan	0.89	47	0.70	0.80	0.82	0.77	0.74	0.73	0.79	0.53	0.59	0.61	0.49	0.51	
Korea, Rep. of	0.85	47	0.87	0.89	0.92	0.90	0.89	0.70	0.89	0.13	0.12	0.16	0.42	0.43	
Kosovo	0.87	43	0.72	0.76	0.75	0.64	0.74	0.64	0.75	0.52	0.60	0.60	0.52	0.54	
Kuwait	0.88	44	0.74	0.82	0.80	0.72	0.77	0.67	0.77	0.48	0.54	0.56	0.46	0.49	
Latvia	0.88	44	0.69	0.79	0.81	0.75	0.72	0.64	0.76	0.58	0.61	0.62	0.42	0.44	
Lithuania	0.90	48	0.74	0.81	0.81	0.78	0.75	0.62	0.79	0.58	0.65	0.64	0.51	0.52	
Malta	0.91	51	0.71	0.80	0.79	0.75	0.78	0.74	0.80	0.60	0.67	0.70	0.59	0.58	
Montenegro	0.90	49	0.77	0.82	0.81	0.74	0.80	0.68	0.81	0.49	0.59	0.64	0.57	0.58	
Morocco	0.93	56	0.77	0.86	0.84	0.73	0.81	0.82	0.83	0.62	0.70	0.71	0.68	0.56	
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
New Zealand	0.91	50	0.72	0.80	0.80	0.76	0.76	0.62	0.80	0.61	0.68	0.75	0.56	0.54	
North Macedonia	0.91	51	0.78	0.83	0.77	0.70	0.79	0.70	0.80	0.56	0.65	0.65	0.63	0.65	
Northern Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Early Literacy and Numeracy Tasks Scale – Grade 4*

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item												
			ASBH06A	ASBH06B	ASBH06C	ASBH06D	ASBH06E	ASBH06F	ASBH06G	ASBH07A	ASBH07B	ASBH07C	ASBH07D	ASBH07E	
Norway (5)	0.90	48	0.78	0.82	0.77	0.66	0.79	0.62	0.78	0.54	0.70	0.72	0.57	0.51	
Oman	0.90	48	0.73	0.81	0.80	0.73	0.75	0.66	0.78	0.59	0.63	0.63	0.57	0.59	
Pakistan	0.88	44	0.65	0.71	0.70	0.65	0.74	0.79	0.78	0.45	0.63	0.65	0.54	0.56	
Philippines	0.87	42	0.70	0.75	0.77	0.73	0.75	0.67	0.73	0.51	0.55	0.55	0.42	0.49	
Poland	0.91	52	0.76	0.82	0.82	0.76	0.79	0.69	0.80	0.59	0.69	0.71	0.55	0.57	
Portugal	0.89	46	0.73	0.79	0.76	0.70	0.77	0.63	0.77	0.53	0.63	0.66	0.52	0.53	
Qatar	0.89	46	0.70	0.80	0.79	0.73	0.76	0.68	0.77	0.54	0.58	0.61	0.53	0.56	
Russian Federation	0.91	52	0.76	0.82	0.83	0.76	0.77	0.76	0.80	0.66	0.70	0.71	0.50	0.51	
Saudi Arabia	0.90	49	0.71	0.83	0.80	0.71	0.77	0.72	0.78	0.56	0.64	0.65	0.57	0.60	
Serbia	0.91	52	0.77	0.82	0.80	0.73	0.80	0.71	0.82	0.56	0.65	0.68	0.62	0.61	
Singapore	0.89	47	0.75	0.81	0.82	0.77	0.77	0.72	0.79	0.56	0.59	0.59	0.45	0.47	
Slovak Republic	0.90	47	0.76	0.80	0.75	0.65	0.79	0.60	0.79	0.52	0.68	0.70	0.55	0.56	
South Africa (5)	0.85	39	0.66	0.74	0.76	0.73	0.71	0.60	0.71	0.43	0.50	0.52	0.48	0.49	
Spain	0.91	50	0.75	0.81	0.83	0.78	0.76	0.68	0.79	0.62	0.66	0.67	0.55	0.52	
Sweden	0.91	52	0.79	0.82	0.82	0.74	0.80	0.68	0.81	0.62	0.69	0.71	0.55	0.57	
Turkey (5)	0.95	64	0.84	0.87	0.85	0.81	0.87	0.83	0.88	0.67	0.75	0.78	0.71	0.71	
United Arab Emirates	0.90	48	0.68	0.78	0.80	0.74	0.74	0.69	0.77	0.66	0.69	0.71	0.50	0.53	
United States	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Benchmarking Participants															
Ontario, Canada	0.92	54	0.70	0.81	0.83	0.79	0.77	0.71	0.81	0.69	0.72	0.75	0.57	0.58	
Quebec, Canada	0.90	48	0.70	0.79	0.74	0.70	0.76	0.66	0.78	0.63	0.72	0.73	0.55	0.53	
Moscow City, Russian Fed.	0.90	50	0.74	0.81	0.81	0.75	0.77	0.75	0.81	0.61	0.66	0.69	0.46	0.48	
Madrid, Spain	0.90	49	0.71	0.79	0.81	0.77	0.77	0.68	0.79	0.61	0.64	0.65	0.58	0.51	
Abu Dhabi, UAE	0.91	51	0.72	0.81	0.81	0.74	0.77	0.72	0.79	0.67	0.70	0.71	0.51	0.55	
Dubai, UAE	0.90	49	0.65	0.77	0.79	0.74	0.76	0.71	0.78	0.67	0.70	0.73	0.52	0.55	

A dash (-) indicates comparable data not available.

Relationship Between the TIMSS 2019 *Early Literacy and Numeracy Tasks* Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.31	0.09	0.08	0.27	0.07	0.06
Armenia	0.12	0.01	0.01	0.13	0.02	0.01
Australia	-	-	-	-	-	-
Austria	0.13	0.02	0.01	0.03	0.00	0.00
Azerbaijan	0.24	0.06	0.04	0.19	0.04	0.03
Bahrain	0.17	0.03	0.02	0.28	0.08	0.06
Belgium (Flemish)	0.11	0.01	0.01	0.03	0.00	0.00
Bosnia and Herzegovina	0.27	0.07	0.06	0.22	0.05	0.04
Bulgaria	0.46	0.21	0.17	0.48	0.23	0.18
Canada	0.32	0.11	0.09	0.28	0.08	0.06
Chile	0.37	0.14	0.12	0.33	0.11	0.10
Chinese Taipei	0.29	0.09	0.07	0.27	0.07	0.06
Croatia	0.35	0.13	0.10	0.30	0.09	0.07
Cyprus	0.26	0.07	0.06	0.24	0.06	0.06
Czech Republic	0.24	0.06	0.05	0.19	0.04	0.03
Denmark	0.28	0.08	0.06	0.21	0.05	0.04
England	-	-	-	-	-	-
Finland	0.46	0.21	0.17	0.34	0.11	0.09
France	0.30	0.09	0.07	0.20	0.04	0.04
Georgia	0.14	0.02	0.02	0.15	0.02	0.02
Germany	0.15	0.02	0.02	0.06	0.00	0.00
Hong Kong SAR	0.34	0.11	0.09	0.31	0.10	0.08
Hungary	0.25	0.06	0.04	0.19	0.04	0.02
Iran, Islamic Rep. of	0.15	0.02	0.02	0.14	0.02	0.01
Ireland	0.37	0.14	0.11	0.34	0.12	0.09
Italy	0.16	0.03	0.03	0.12	0.01	0.02
Japan	0.36	0.13	0.11	0.30	0.09	0.08
Kazakhstan	0.19	0.04	0.03	0.18	0.03	0.03
Korea, Rep. of	0.33	0.11	0.09	0.30	0.09	0.07
Kosovo	0.21	0.05	0.04	0.20	0.04	0.04
Kuwait	0.30	0.09	0.09	0.28	0.08	0.08
Latvia	0.41	0.17	0.14	0.36	0.13	0.11
Lithuania	0.44	0.19	0.16	0.40	0.16	0.13
Malta	0.30	0.09	0.08	0.24	0.06	0.05
Montenegro	0.28	0.08	0.06	0.25	0.06	0.05
Morocco	0.30	0.09	0.10	0.29	0.08	0.09
Netherlands	-	-	-	-	-	-

Relationship Between the TIMSS 2019 *Early Literacy and Numeracy Tasks* Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	<i>r</i>	<i>r</i> ²		<i>r</i>	<i>r</i> ²	
New Zealand	0.24	0.06	0.05	0.16	0.03	0.02
North Macedonia	0.25	0.06	0.04	0.23	0.05	0.04
Northern Ireland	-	-	-	-	-	-
Norway (5)	0.31	0.10	0.08	0.24	0.06	0.05
Oman	0.31	0.09	0.08	0.38	0.14	0.12
Pakistan	0.11	0.01	0.02	0.08	0.01	0.01
Philippines	0.37	0.13	0.11	0.32	0.10	0.09
Poland	0.33	0.11	0.09	0.27	0.07	0.06
Portugal	0.22	0.05	0.04	0.19	0.04	0.03
Qatar	0.27	0.07	0.07	0.28	0.08	0.07
Russian Federation	0.32	0.10	0.09	0.30	0.09	0.08
Saudi Arabia	0.21	0.05	0.04	0.23	0.05	0.05
Serbia	0.43	0.18	0.15	0.40	0.16	0.13
Singapore	0.43	0.19	0.17	0.42	0.17	0.14
Slovak Republic	0.23	0.05	0.04	0.22	0.05	0.02
South Africa (5)	0.25	0.06	0.06	0.24	0.06	0.05
Spain	0.37	0.13	0.11	0.33	0.11	0.10
Sweden	0.36	0.13	0.12	0.26	0.07	0.06
Turkey (5)	0.32	0.10	0.07	0.35	0.12	0.09
United Arab Emirates	0.16	0.03	0.02	0.17	0.03	0.03
United States	-	-	-	-	-	-
International Median	0.29	0.09	0.07	0.25	0.06	0.06
Benchmarking Participants						
Ontario, Canada	0.42	0.18	0.14	0.32	0.10	0.08
Quebec, Canada	0.27	0.07	0.06	0.20	0.04	0.03
Moscow City, Russian Fed.	0.38	0.14	0.13	0.33	0.11	0.09
Madrid, Spain	0.33	0.11	0.08	0.30	0.09	0.07
Abu Dhabi, UAE	0.22	0.05	0.05	0.21	0.04	0.05
Dubai, UAE	0.16	0.03	0.02	0.15	0.02	0.02

A dash (–) indicates comparable data not available.

Home Resources for Learning – Grade 4

About the Scale

The *Home Resources for Learning* scale was created based on students' and parents' reports regarding the availability of five resources listed below.

ASBG04 ^T	Number of books in the home (students): 1) 0-10 2) 11-25 3) 26-100 4) 101-200 5) More than 200	Number of children's books in the home (parents): 1) 0-10 2) 11-25 3) 26-50 4) 51-100 5) More than 100	ASBH11 ^T
ASDG05S ^{T1}	Number of home study supports (students): 1) None 2) Internet connection or own room 3) Both internet connection and own room	Highest level of education of either parent (parents): 1) Finished some primary or lower secondary or did not go to school 2) Finished lower secondary 3) Finished upper secondary 4) Finished post-secondary education 5) Finished university or higher	ASDHEDUP ^{T1}
ASDHOCCP ^{T1}	Highest level of occupation of either parent (parents): 1) Has never worked outside home for pay, general laborer, or semi-professional (skilled agricultural or fishery worker, craft or trade worker, plant or machine operator) 2) Clerical (clerk or service or sales worker) 3) Small business owner 4) Professional (corporate manager or senior official, professional, or technician or associate professional)		
<p style="text-align: center;">Scale Cut Scores 11.8 7.4</p>			

^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

¹ Derived variable. For details, see Supplement 3 of the *TIMSS 2019 User Guide for the International Database*.

Item Parameters for the TIMSS 2019 *Home Resources for Learning* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	tau_4	Infit
ASBG04	0.66771	-1.10357	-0.44084	0.87876	0.66565	1.00
ASBH11	0.73132	-0.67187	-0.46465	0.41378	0.72274	0.95
ASDG05S	-0.95838	-0.70755	0.70755			1.09
ASDHEDUP	-0.48782	-0.47629	-0.91551	0.96162	0.43018	0.94
ASDHOCPP	0.04717	-0.19695	0.76018	-0.56323		1.04

Scale Transformation Constants for the TIMSS 2019 *Home Resources for Learning* Scale – Grade 4

Scale Transformation Constants

A = 9.451157

B = 1.787338

Transformed Scale Score = 9.451157 + 1.787338 • Logit Scale Score

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Home Resources for Learning* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	3.81993	
1	5.75677	
2	6.70211	
3	7.39134	7.4
4	7.95508	
5	8.43520	
6	8.85649	
7	9.23298	
8	9.58052	
9	9.91481	
10	10.25828	
11	10.61050	
12	10.98891	
13	11.40836	
14	11.89316	11.8
15	12.47492	
16	13.27846	
17	14.87955	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Home Resources for Learning* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item				
			ASBG04	ASBH11	ASDG05S	ASDHEDUP	ASDHOCPP
Albania	0.77	53	0.78	0.80	0.38	0.79	0.78
Armenia	0.59	39	0.53	0.70	0.24	0.77	0.74
Australia	-	-	-	-	-	-	-
Austria	0.73	49	0.73	0.80	0.28	0.79	0.75
Azerbaijan	0.57	36	0.55	0.57	0.41	0.71	0.72
Bahrain	0.56	36	0.60	0.69	0.23	0.72	0.63
Belgium (Flemish)	0.72	48	0.70	0.73	0.42	0.77	0.77
Bosnia and Herzegovina	0.69	46	0.64	0.75	0.18	0.81	0.79
Bulgaria	0.82	58	0.79	0.83	0.39	0.88	0.82
Canada	0.59	39	0.67	0.69	0.29	0.66	0.69
Chile	0.65	42	0.53	0.66	0.34	0.81	0.79
Chinese Taipei	0.71	48	0.77	0.79	0.25	0.78	0.71
Croatia	0.69	46	0.69	0.74	0.14	0.80	0.78
Cyprus	0.68	45	0.67	0.77	0.24	0.77	0.75
Czech Republic	0.64	43	0.69	0.72	0.03	0.78	0.74
Denmark	0.63	42	0.68	0.70	0.26	0.74	0.73
England	-	-	-	-	-	-	-
Finland	0.63	41	0.65	0.68	0.23	0.77	0.74
France	0.75	51	0.76	0.79	0.36	0.81	0.76
Georgia	0.68	45	0.70	0.75	0.37	0.75	0.71
Germany	0.69	45	0.71	0.75	0.28	0.76	0.72
Hong Kong SAR	0.76	51	0.73	0.80	0.36	0.81	0.78
Hungary	0.78	54	0.76	0.82	0.22	0.86	0.82
Iran, Islamic Rep. of	0.71	46	0.69	0.71	0.51	0.77	0.66
Ireland	0.69	46	0.74	0.78	0.06	0.76	0.74
Italy	0.68	45	0.69	0.76	0.11	0.79	0.74
Japan	0.61	40	0.71	0.76	0.20	0.69	0.63
Kazakhstan	0.54	36	0.63	0.63	0.47	0.65	0.61
Korea, Rep. of	0.62	41	0.66	0.73	0.32	0.75	0.64
Kosovo	0.62	39	0.69	0.69	0.30	0.71	0.66
Kuwait	0.41	31	0.46	0.56	0.05	0.74	0.68
Latvia	0.66	44	0.69	0.75	0.15	0.79	0.71
Lithuania	0.72	48	0.72	0.77	0.31	0.79	0.78
Malta	0.64	42	0.57	0.70	0.01	0.82	0.77
Montenegro	0.66	43	0.69	0.75	0.22	0.77	0.70
Morocco	0.68	44	0.72	0.71	0.55	0.73	0.59
Netherlands	-	-	-	-	-	-	-
New Zealand	0.66	43	0.69	0.69	0.38	0.74	0.71
North Macedonia	0.72	48	0.64	0.79	0.15	0.83	0.79

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Home Resources for Learning* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item				
			ASBG04	ASBH11	ASDG05S	ASDHEDUP	ASDHOCPP
Northern Ireland	0.70	46	0.73	0.75	0.08	0.81	0.75
Norway (5)	0.63	48	0.76	0.81	0.43	0.71	-
Oman	0.58	38	0.47	0.62	0.29	0.79	0.76
Pakistan	0.41	31	0.56	0.58	0.58	0.64	0.36
Philippines	0.47	33	0.27	0.51	0.47	0.74	0.74
Poland	0.71	47	0.70	0.74	0.22	0.80	0.78
Portugal	0.72	48	0.69	0.76	0.12	0.81	0.81
Qatar	0.50	34	0.48	0.65	0.32	0.71	0.67
Russian Federation	0.67	44	0.68	0.74	0.34	0.74	0.70
Saudi Arabia	0.47	32	0.35	0.50	0.22	0.79	0.77
Serbia	0.73	49	0.71	0.77	0.27	0.82	0.76
Singapore	0.65	43	0.70	0.73	0.23	0.76	0.71
Slovak Republic	0.78	54	0.79	0.81	0.32	0.82	0.79
South Africa (5)	0.59	36	0.52	0.54	0.54	0.70	0.69
Spain	0.69	46	0.68	0.76	-0.02	0.81	0.77
Sweden	0.70	48	0.72	0.76	0.41	0.78	0.72
Turkey (5)	0.75	50	0.68	0.77	0.55	0.80	0.70
United Arab Emirates	0.48	33	0.52	0.63	0.23	0.67	0.69
United States	-	-	-	-	-	-	-
Benchmarking Participants							
Ontario, Canada	0.58	38	0.67	0.68	0.32	0.64	0.69
Quebec, Canada	0.62	41	0.68	0.71	0.21	0.73	0.69
Moscow City, Russian Fed.	0.59	39	0.65	0.72	0.27	0.70	0.68
Madrid, Spain	0.71	47	0.69	0.76	0.05	0.82	0.80
Abu Dhabi, UAE	0.51	34	0.58	0.63	0.21	0.68	0.68
Dubai, UAE	0.46	33	0.50	0.65	0.24	0.68	0.67

A dash (-) indicates comparable data not available.

Relationship Between the TIMSS 2019 *Home Resources for Learning* Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.39	0.15	0.09	0.38	0.15	0.09
Armenia	0.26	0.07	0.03	0.27	0.08	0.03
Australia	-	-	-	-	-	-
Austria	0.46	0.21	0.14	0.53	0.29	0.17
Azerbaijan	0.28	0.08	0.03	0.27	0.08	0.03
Bahrain	0.19	0.04	0.02	0.31	0.09	0.04
Belgium (Flemish)	0.42	0.18	0.10	0.48	0.23	0.13
Bosnia and Herzegovina	0.35	0.12	0.06	0.31	0.10	0.04
Bulgaria	0.56	0.31	0.22	0.61	0.38	0.28
Canada	0.27	0.07	0.05	0.32	0.10	0.07
Chile	0.39	0.15	0.07	0.42	0.18	0.08
Chinese Taipei	0.40	0.16	0.11	0.44	0.19	0.13
Croatia	0.36	0.13	0.06	0.37	0.14	0.07
Cyprus	0.35	0.12	0.09	0.38	0.14	0.11
Czech Republic	0.41	0.17	0.11	0.42	0.18	0.11
Denmark	0.32	0.10	0.08	0.37	0.14	0.10
England	-	-	-	-	-	-
Finland	0.37	0.13	0.09	0.38	0.15	0.09
France	0.49	0.24	0.16	0.52	0.27	0.18
Georgia	0.23	0.05	0.03	0.20	0.04	0.03
Germany	0.47	0.22	0.13	0.49	0.24	0.15
Hong Kong SAR	0.37	0.14	0.09	0.38	0.14	0.11
Hungary	0.53	0.28	0.19	0.52	0.27	0.18
Iran, Islamic Rep. of	0.38	0.15	0.10	0.43	0.19	0.12
Ireland	0.43	0.19	0.12	0.45	0.20	0.13
Italy	0.31	0.09	0.04	0.35	0.12	0.06
Japan	0.35	0.12	0.06	0.36	0.13	0.06
Kazakhstan	0.22	0.05	0.02	0.27	0.07	0.05
Korea, Rep. of	0.40	0.16	0.13	0.40	0.16	0.12
Kosovo	0.29	0.08	0.04	0.29	0.09	0.04
Kuwait	0.20	0.04	0.02	0.19	0.03	0.01
Latvia	0.36	0.13	0.07	0.34	0.12	0.07
Lithuania	0.48	0.23	0.10	0.48	0.23	0.10
Malta	0.40	0.16	0.09	0.44	0.19	0.11
Montenegro	0.36	0.13	0.06	0.37	0.14	0.07
Morocco	0.26	0.07	0.05	0.21	0.05	0.04
Netherlands	-	-	-	-	-	-

Relationship Between the TIMSS 2019 *Home Resources for Learning* Scale and TIMSS 2019 Achievement – Grade 4

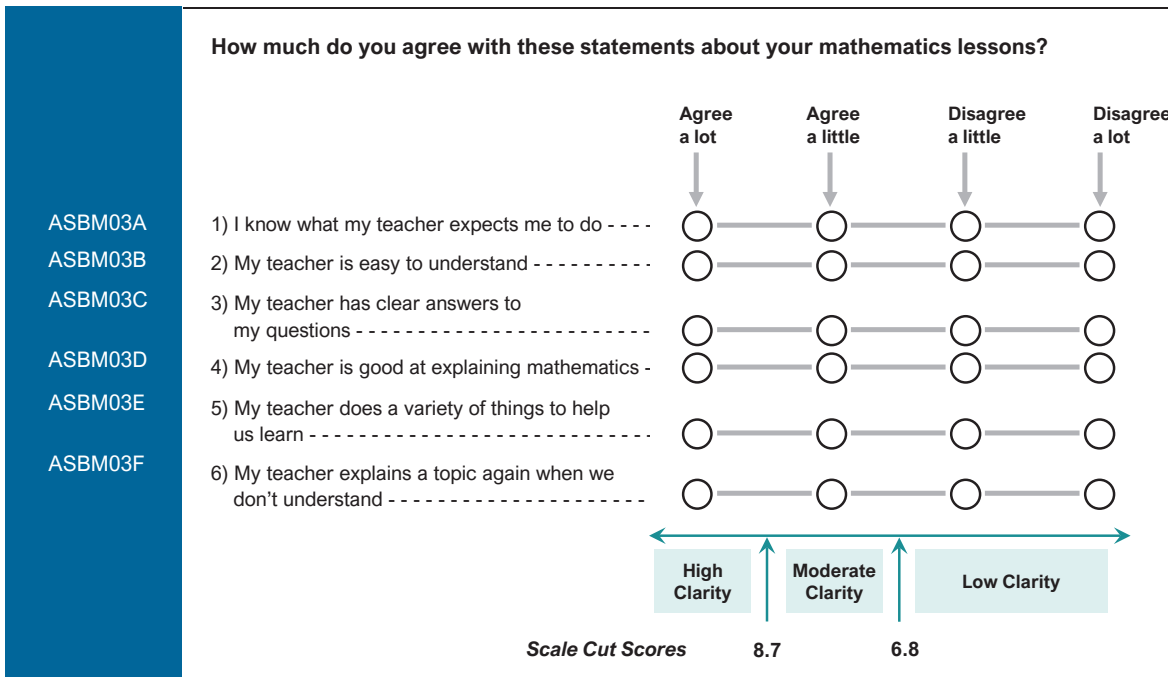
Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.45	0.20	0.14	0.49	0.24	0.16
North Macedonia	0.47	0.22	0.13	0.49	0.24	0.14
Northern Ireland	0.44	0.19	0.14	0.44	0.19	0.14
Norway (5)	0.36	0.13	0.09	0.43	0.19	0.11
Oman	0.29	0.08	0.04	0.34	0.11	0.05
Pakistan	0.09	0.01	0.00	0.07	0.01	0.00
Philippines	0.26	0.07	0.03	0.31	0.10	0.05
Poland	0.42	0.18	0.11	0.42	0.18	0.12
Portugal	0.42	0.18	0.11	0.41	0.17	0.11
Qatar	0.38	0.15	0.06	0.35	0.12	0.04
Russian Federation	0.28	0.08	0.03	0.33	0.11	0.05
Saudi Arabia	0.17	0.03	0.01	0.18	0.03	0.02
Serbia	0.51	0.26	0.17	0.51	0.26	0.18
Singapore	0.45	0.20	0.13	0.50	0.25	0.16
Slovak Republic	0.51	0.26	0.18	0.57	0.32	0.25
South Africa (5)	0.36	0.13	0.09	0.39	0.15	0.10
Spain	0.40	0.16	0.10	0.40	0.16	0.10
Sweden	0.43	0.19	0.13	0.48	0.23	0.16
Turkey (5)	0.56	0.32	0.22	0.55	0.30	0.22
United Arab Emirates	0.32	0.10	0.05	0.30	0.09	0.04
United States	-	-	-	-	-	-
International Median	0.37	0.14	0.09	0.39	0.15	0.10
Benchmarking Participants						
Ontario, Canada	0.26	0.07	0.05	0.30	0.09	0.06
Quebec, Canada	0.33	0.11	0.07	0.37	0.14	0.09
Moscow City, Russian Fed.	0.31	0.10	0.06	0.34	0.12	0.07
Madrid, Spain	0.39	0.15	0.11	0.38	0.15	0.10
Abu Dhabi, UAE	0.35	0.12	0.07	0.33	0.11	0.06
Dubai, UAE	0.30	0.09	0.05	0.30	0.09	0.04

A dash (–) indicates comparable data not available.

Instructional Clarity in Mathematics Lessons – Grade 4

About the Scale

The *Instructional Clarity in Mathematics Lessons* scale was created based on students’ responses to six items listed below.



Item Parameters for the TIMSS 2019 *Instructional Clarity in Mathematics Lessons* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBM03A	0.55669	-0.41814	-0.67074	1.08888	1.35
ASBM03B	0.16551	-0.64001	-0.56532	1.20533	0.99
ASBM03C	-0.01951	-0.59199	-0.40578	0.99777	0.90
ASBM03D	-0.32365	-0.23962	-0.42717	0.66679	0.84
ASBM03E	-0.25206	-0.14221	-0.49347	0.63568	0.95
ASBM03F	-0.12698	-0.03204	-0.45776	0.48980	1.02

Scale Transformation Constants for the TIMSS 2019 *Instructional Clarity in Mathematics Lessons* Scale – Grade 4

Scale Transformation Constants

A = 6.877313

B = 1.528419

Transformed Scale Score = 6.877313 + 1.528419 • Logit Scale Score

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Instructional Clarity in Mathematics Lessons* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	2.55279	
1	3.94739	
2	4.59152	
3	5.03338	
4	5.37899	
5	5.67743	
6	5.94784	
7	6.20271	
8	6.45082	
9	6.70099	6.8
10	6.95523	
11	7.22643	
12	7.52472	
13	7.86085	
14	8.25838	
15	8.75219	8.7
16	9.40649	
17	10.36648	
18	12.25706	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Instructional Clarity in Mathematics Lessons* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item					
			ASBM03A	ASBM03B	ASBM03C	ASBM03D	ASBM03E	ASBM03F
Albania	0.46	40	0.21	0.75	0.65	0.80	0.54	0.65
Armenia	0.77	53	0.36	0.73	0.75	0.84	0.85	0.73
Australia	0.82	53	0.61	0.78	0.79	0.80	0.75	0.62
Austria	0.75	48	0.45	0.64	0.77	0.79	0.76	0.69
Azerbaijan	0.67	43	0.38	0.59	0.69	0.78	0.70	0.73
Bahrain	0.75	47	0.47	0.72	0.77	0.78	0.74	0.58
Belgium (Flemish)	0.76	47	0.52	0.69	0.74	0.77	0.67	0.68
Bosnia and Herzegovina	0.80	52	0.56	0.72	0.78	0.81	0.70	0.74
Bulgaria	0.75	47	0.48	0.64	0.77	0.74	0.72	0.72
Canada	0.78	49	0.54	0.76	0.77	0.78	0.72	0.60
Chile	0.77	49	0.49	0.71	0.77	0.79	0.67	0.72
Chinese Taipei	0.86	60	0.72	0.77	0.78	0.80	0.80	0.76
Croatia	0.82	55	0.53	0.74	0.82	0.81	0.74	0.76
Cyprus	0.80	53	0.56	0.63	0.77	0.81	0.79	0.76
Czech Republic	0.85	59	0.59	0.82	0.80	0.82	0.80	0.75
Denmark	0.79	50	0.48	0.76	0.74	0.82	0.75	0.66
England	0.77	48	0.53	0.76	0.78	0.79	0.70	0.56
Finland	0.82	55	0.44	0.81	0.75	0.84	0.81	0.72
France	0.77	47	0.51	0.73	0.75	0.75	0.68	0.68
Georgia	0.66	47	0.34	0.75	0.75	0.80	0.70	0.66
Germany	0.80	52	0.49	0.80	0.76	0.80	0.71	0.72
Hong Kong SAR	0.89	65	0.72	0.81	0.85	0.84	0.84	0.77
Hungary	0.81	52	0.58	0.69	0.79	0.81	0.75	0.70
Iran, Islamic Rep. of	0.80	53	0.51	0.67	0.78	0.83	0.76	0.78
Ireland	0.77	48	0.47	0.75	0.78	0.80	0.72	0.59
Italy	0.64	39	0.34	0.60	0.72	0.76	0.62	0.62
Japan	0.84	58	0.48	0.80	0.82	0.84	0.82	0.76
Kazakhstan	0.69	47	0.39	0.62	0.75	0.80	0.75	0.72
Korea, Rep. of	0.83	57	0.46	0.76	0.80	0.86	0.82	0.76
Kosovo	0.51	42	0.22	0.73	0.69	0.73	0.73	0.64
Kuwait	0.80	51	0.52	0.72	0.79	0.78	0.76	0.69
Latvia	0.77	50	0.46	0.71	0.75	0.80	0.75	0.70
Lithuania	0.72	44	0.51	0.68	0.73	0.74	0.65	0.63
Malta	0.73	44	0.49	0.70	0.75	0.75	0.69	0.59
Montenegro	0.71	43	0.50	0.69	0.72	0.76	0.58	0.66
Morocco	0.62	40	0.32	0.52	0.70	0.74	0.73	0.67
Netherlands	0.79	50	0.57	0.76	0.78	0.75	0.69	0.66
New Zealand	0.81	52	0.57	0.76	0.79	0.80	0.73	0.64
North Macedonia	0.65	41	0.41	0.65	0.74	0.70	0.64	0.64

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Instructional Clarity in Mathematics Lessons* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item					
			ASBM03A	ASBM03B	ASBM03C	ASBM03D	ASBM03E	ASBM03F
Northern Ireland	0.77	48	0.53	0.78	0.78	0.79	0.68	0.57
Norway (5)	0.80	52	0.48	0.75	0.78	0.81	0.74	0.71
Oman	0.72	45	0.43	0.67	0.72	0.75	0.69	0.70
Pakistan	0.82	54	0.57	0.77	0.77	0.78	0.70	0.78
Philippines	0.70	41	0.42	0.67	0.65	0.71	0.68	0.66
Poland	0.83	55	0.59	0.68	0.79	0.82	0.77	0.78
Portugal	0.68	41	0.45	0.65	0.68	0.75	0.64	0.65
Qatar	0.81	51	0.51	0.74	0.79	0.79	0.76	0.68
Russian Federation	0.76	50	0.49	0.68	0.77	0.79	0.75	0.69
Saudi Arabia	0.75	47	0.46	0.69	0.77	0.77	0.74	0.63
Serbia	0.81	52	0.60	0.73	0.78	0.80	0.67	0.73
Singapore	0.83	54	0.59	0.79	0.80	0.81	0.74	0.66
Slovak Republic	0.77	48	0.52	0.75	0.72	0.78	0.76	0.61
South Africa (5)	0.78	48	0.58	0.70	0.70	0.76	0.68	0.72
Spain	0.73	47	0.34	0.66	0.77	0.79	0.73	0.71
Sweden	0.81	54	0.45	0.77	0.81	0.82	0.79	0.68
Turkey (5)	0.70	44	0.37	0.63	0.70	0.76	0.73	0.72
United Arab Emirates	0.81	53	0.55	0.75	0.79	0.80	0.77	0.69
United States	0.79	50	0.58	0.75	0.77	0.78	0.72	0.61
Benchmarking Participants								
Ontario, Canada	0.79	49	0.55	0.76	0.78	0.78	0.72	0.58
Quebec, Canada	0.78	50	0.52	0.76	0.76	0.77	0.72	0.66
Moscow City, Russian Fed.	0.78	52	0.46	0.70	0.81	0.80	0.77	0.72
Madrid, Spain	0.67	42	0.31	0.67	0.74	0.75	0.67	0.66
Abu Dhabi, UAE	0.84	55	0.58	0.76	0.80	0.80	0.79	0.72
Dubai, UAE	0.76	47	0.50	0.71	0.75	0.78	0.71	0.61

Relationship Between the TIMSS 2019 *Instructional Clarity in Mathematics Lessons* Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.10	0.01	0.01
Armenia	0.12	0.01	0.02
Australia	0.13	0.02	0.02
Austria	0.10	0.01	0.01
Azerbaijan	0.17	0.03	0.03
Bahrain	0.12	0.01	0.02
Belgium (Flemish)	0.07	0.01	0.01
Bosnia and Herzegovina	0.16	0.03	0.04
Bulgaria	0.08	0.01	0.01
Canada	0.09	0.01	0.01
Chile	0.15	0.02	0.04
Chinese Taipei	0.21	0.04	0.04
Croatia	0.10	0.01	0.00
Cyprus	0.10	0.01	0.01
Czech Republic	0.06	0.00	0.01
Denmark	0.16	0.03	0.02
England	0.11	0.01	0.01
Finland	0.10	0.01	0.01
France	0.02	0.00	0.00
Georgia	0.09	0.01	0.01
Germany	0.10	0.01	0.01
Hong Kong SAR	0.20	0.04	0.04
Hungary	0.17	0.03	0.02
Iran, Islamic Rep. of	0.13	0.02	0.03
Ireland	0.07	0.00	0.00
Italy	0.09	0.01	0.02
Japan	0.02	0.00	0.00
Kazakhstan	0.11	0.01	0.01
Korea, Rep. of	0.19	0.04	0.04
Kosovo	0.09	0.01	0.03
Kuwait	0.17	0.03	0.04
Latvia	0.12	0.01	0.01
Lithuania	0.03	0.00	0.00
Malta	0.14	0.02	0.02
Montenegro	0.12	0.02	0.02
Morocco	0.15	0.02	0.03
Netherlands	0.04	0.00	0.01
New Zealand	0.03	0.00	0.00

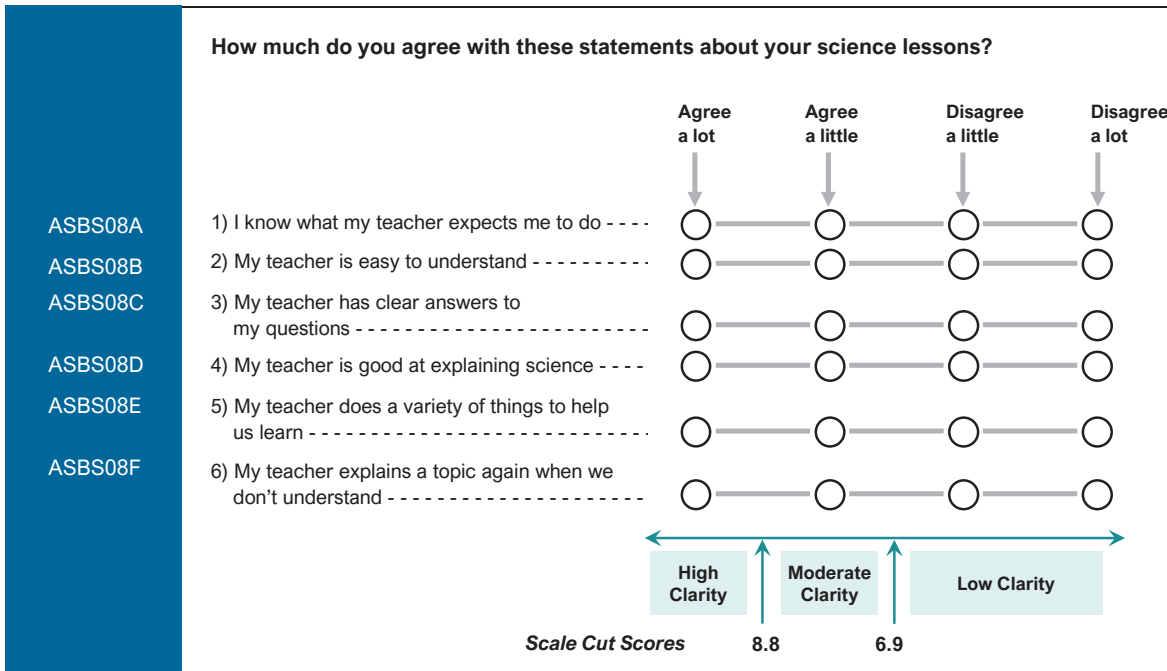
Relationship Between the TIMSS 2019 *Instructional Clarity in Mathematics Lessons* Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.20	0.04	0.03
Northern Ireland	0.10	0.01	0.01
Norway (5)	0.07	0.01	0.01
Oman	0.16	0.03	0.04
Pakistan	0.18	0.03	0.05
Philippines	0.30	0.09	0.09
Poland	0.10	0.01	0.01
Portugal	0.06	0.00	0.01
Qatar	0.18	0.03	0.05
Russian Federation	0.06	0.00	0.01
Saudi Arabia	0.17	0.03	0.04
Serbia	0.10	0.01	0.01
Singapore	0.24	0.06	0.05
Slovak Republic	-0.02	0.00	0.00
South Africa (5)	0.28	0.08	0.09
Spain	0.09	0.01	0.02
Sweden	0.03	0.00	0.01
Turkey (5)	0.29	0.08	0.07
United Arab Emirates	0.18	0.03	0.04
United States	0.14	0.02	0.02
International Median	0.11	0.01	0.02
Benchmarking Participants			
Ontario, Canada	0.11	0.01	0.01
Quebec, Canada	0.09	0.01	0.01
Moscow City, Russian Fed.	0.10	0.01	0.01
Madrid, Spain	0.05	0.00	0.01
Abu Dhabi, UAE	0.18	0.03	0.04
Dubai, UAE	0.09	0.01	0.01

Instructional Clarity in Science Lessons – Grade 4

About the Scale

The *Instructional Clarity in Science Lessons* scale was created based on students’ responses to six items listed below.



Item Parameters for the TIMSS 2019 *Instructional Clarity in Science Lessons* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBS08A	0.64445	-0.65910	-0.54914	1.20824	1.43
ASBS08B	0.05025	-0.67012	-0.52376	1.19388	0.96
ASBS08C	-0.14200	-0.73473	-0.33617	1.07090	0.86
ASBS08D	-0.32015	-0.44293	-0.45339	0.89632	0.86
ASBS08E	-0.21665	-0.52139	-0.40110	0.92249	0.93
ASBS08F	-0.01590	-0.31434	-0.42998	0.74432	1.05

Scale Transformation Constants for the TIMSS 2019 *Instructional Clarity in Science Lessons* Scale – Grade 4

Scale Transformation Constants

A = 6.991185

B = 1.413250

Transformed Scale Score = 6.991185 + 1.413250 • Logit Scale Score

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Instructional Clarity in Science Lessons* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	2.65952	
1	4.04481	
2	4.69156	
3	5.13557	
4	5.48896	
5	5.79290	
6	6.06900	
7	6.32969	
8	6.58700	
9	6.83933	6.9
10	7.10005	
11	7.37696	
12	7.67947	
13	8.01729	
14	8.41140	
15	8.89130	8.8
16	9.51083	
17	10.40151	
18	12.14438	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Instructional Clarity in Science Lessons* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item					
			ASBS08A	ASBS08B	ASBS08C	ASBS08D	ASBS08E	ASBS08F
Albania	0.62	48	0.29	0.81	0.71	0.86	0.69	0.67
Armenia	0.82	59	0.47	0.79	0.80	0.83	0.85	0.80
Australia	0.86	59	0.62	0.83	0.85	0.82	0.79	0.68
Austria	0.78	51	0.50	0.63	0.81	0.80	0.78	0.74
Azerbaijan	0.75	50	0.40	0.65	0.79	0.79	0.76	0.77
Bahrain	0.76	49	0.47	0.74	0.81	0.78	0.76	0.59
Belgium (Flemish)	0.80	51	0.59	0.74	0.78	0.75	0.68	0.72
Bosnia and Herzegovina	0.78	51	0.54	0.74	0.79	0.78	0.69	0.71
Bulgaria	0.77	49	0.50	0.70	0.81	0.74	0.70	0.71
Canada	0.83	55	0.58	0.80	0.82	0.81	0.76	0.64
Chile	0.80	52	0.51	0.69	0.79	0.81	0.73	0.74
Chinese Taipei	0.89	65	0.76	0.83	0.81	0.82	0.83	0.79
Croatia	0.86	60	0.62	0.79	0.85	0.84	0.76	0.76
Cyprus	0.87	61	0.63	0.71	0.84	0.85	0.84	0.81
Czech Republic	0.88	64	0.61	0.87	0.82	0.86	0.83	0.79
Denmark	0.84	58	0.52	0.81	0.81	0.85	0.81	0.72
England	0.83	56	0.57	0.82	0.82	0.82	0.77	0.65
Finland	0.85	61	0.49	0.85	0.80	0.87	0.83	0.77
France	0.82	53	0.57	0.78	0.79	0.78	0.72	0.72
Georgia	0.72	50	0.34	0.77	0.79	0.80	0.74	0.67
Germany	0.84	57	0.51	0.84	0.82	0.83	0.75	0.76
Hong Kong SAR	0.94	76	0.80	0.89	0.90	0.89	0.90	0.84
Hungary	0.84	57	0.58	0.75	0.84	0.84	0.76	0.73
Iran, Islamic Rep. of	0.80	53	0.46	0.74	0.78	0.82	0.76	0.77
Ireland	0.83	55	0.55	0.82	0.81	0.83	0.76	0.66
Italy	0.70	43	0.37	0.63	0.77	0.77	0.67	0.63
Japan	0.87	63	0.56	0.82	0.84	0.85	0.85	0.79
Kazakhstan	0.75	51	0.44	0.67	0.76	0.81	0.81	0.72
Korea, Rep. of	0.87	63	0.52	0.80	0.84	0.88	0.85	0.82
Kosovo	0.62	49	0.25	0.79	0.80	0.79	0.72	0.69
Kuwait	0.80	52	0.50	0.72	0.79	0.80	0.76	0.72
Latvia	0.81	54	0.53	0.77	0.79	0.76	0.78	0.73
Lithuania	0.76	47	0.57	0.70	0.74	0.73	0.71	0.68
Malta	0.82	54	0.58	0.78	0.80	0.78	0.74	0.68
Montenegro	0.80	52	0.55	0.75	0.79	0.78	0.68	0.75
Morocco	0.68	42	0.37	0.55	0.74	0.74	0.74	0.68
Netherlands	0.83	55	0.64	0.81	0.83	0.72	0.73	0.70
New Zealand	0.87	61	0.68	0.82	0.84	0.80	0.80	0.73
North Macedonia	0.71	47	0.39	0.69	0.78	0.81	0.69	0.67

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Instructional Clarity in Science Lessons* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item					
			ASBS08A	ASBS08B	ASBS08C	ASBS08D	ASBS08E	ASBS08F
Northern Ireland	0.82	54	0.59	0.80	0.82	0.77	0.76	0.64
Norway (5)	0.81	54	0.56	0.78	0.76	0.80	0.76	0.71
Oman	0.76	48	0.37	0.73	0.77	0.78	0.73	0.72
Pakistan	0.81	53	0.51	0.74	0.80	0.77	0.71	0.78
Philippines	0.72	42	0.44	0.68	0.67	0.71	0.70	0.66
Poland	0.89	64	0.70	0.78	0.84	0.86	0.81	0.81
Portugal	0.78	51	0.53	0.67	0.77	0.78	0.74	0.76
Qatar	0.82	54	0.51	0.77	0.82	0.81	0.78	0.67
Russian Federation	0.79	54	0.50	0.71	0.81	0.82	0.79	0.72
Saudi Arabia	0.76	49	0.43	0.74	0.77	0.77	0.77	0.65
Serbia	0.84	56	0.65	0.77	0.80	0.80	0.72	0.74
Singapore	0.87	61	0.65	0.82	0.83	0.84	0.80	0.73
Slovak Republic	0.81	53	0.55	0.79	0.74	0.81	0.77	0.69
South Africa (5)	0.80	50	0.59	0.74	0.74	0.76	0.70	0.72
Spain	0.76	50	0.34	0.70	0.80	0.80	0.76	0.76
Sweden	0.83	58	0.50	0.80	0.84	0.83	0.82	0.72
Turkey (5)	0.76	50	0.43	0.68	0.74	0.80	0.77	0.75
United Arab Emirates	0.84	57	0.58	0.78	0.82	0.82	0.79	0.71
United States	0.83	56	0.62	0.80	0.81	0.81	0.76	0.66
Benchmarking Participants								
Ontario, Canada	0.82	54	0.59	0.79	0.82	0.79	0.75	0.65
Quebec, Canada	0.84	58	0.56	0.82	0.83	0.83	0.78	0.71
Moscow City, Russian Fed.	0.81	56	0.51	0.74	0.83	0.83	0.81	0.71
Madrid, Spain	0.75	49	0.38	0.70	0.78	0.78	0.74	0.72
Abu Dhabi, UAE	0.86	60	0.62	0.80	0.83	0.82	0.80	0.73
Dubai, UAE	0.82	54	0.56	0.76	0.81	0.81	0.77	0.66

Relationship Between the TIMSS 2019 *Instructional Clarity in Science Lessons* Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.12	0.02	0.02
Armenia	0.12	0.02	0.02
Australia	-0.01	0.00	0.00
Austria	0.06	0.00	0.00
Azerbaijan	0.12	0.01	0.02
Bahrain	0.19	0.03	0.04
Belgium (Flemish)	0.04	0.00	0.00
Bosnia and Herzegovina	0.14	0.02	0.03
Bulgaria	0.08	0.01	0.01
Canada	0.04	0.00	0.00
Chile	0.13	0.02	0.03
Chinese Taipei	0.13	0.02	0.02
Croatia	0.07	0.00	0.01
Cyprus	0.07	0.01	0.01
Czech Republic	0.03	0.00	0.01
Denmark	0.04	0.00	0.00
England	-0.02	0.00	0.00
Finland	0.07	0.00	0.01
France	-0.01	0.00	0.00
Georgia	0.07	0.00	0.01
Germany	0.08	0.01	0.01
Hong Kong SAR	0.19	0.04	0.04
Hungary	0.07	0.01	0.01
Iran, Islamic Rep. of	0.17	0.03	0.03
Ireland	0.01	0.00	0.00
Italy	0.07	0.01	0.01
Japan	-0.03	0.00	0.00
Kazakhstan	0.16	0.03	0.02
Korea, Rep. of	0.10	0.01	0.01
Kosovo	0.11	0.01	0.04
Kuwait	0.18	0.03	0.05
Latvia	0.01	0.00	0.00
Lithuania	0.03	0.00	0.00
Malta	0.05	0.00	0.00
Montenegro	0.10	0.01	0.01
Morocco	0.16	0.03	0.04
Netherlands	-0.01	0.00	0.01
New Zealand	-0.06	0.00	0.00

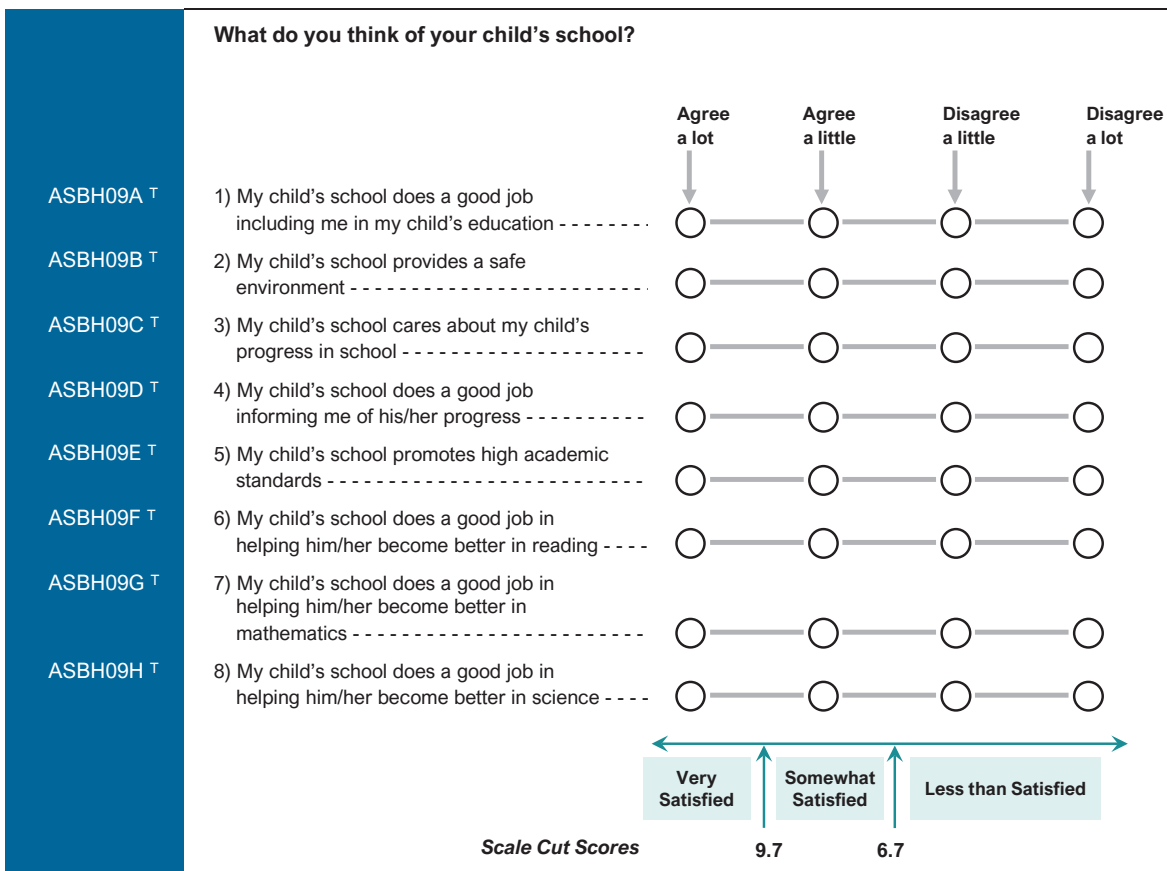
Relationship Between the TIMSS 2019 *Instructional Clarity in Science Lessons* Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.17	0.03	0.04
Northern Ireland	-0.02	0.00	0.00
Norway (5)	-0.04	0.00	0.00
Oman	0.20	0.04	0.05
Pakistan	0.13	0.02	0.02
Philippines	0.28	0.08	0.09
Poland	0.04	0.00	0.01
Portugal	0.08	0.01	0.01
Qatar	0.23	0.05	0.07
Russian Federation	-0.01	0.00	0.00
Saudi Arabia	0.22	0.05	0.06
Serbia	0.06	0.00	0.00
Singapore	0.12	0.01	0.01
Slovak Republic	-0.01	0.00	0.00
South Africa (5)	0.28	0.08	0.08
Spain	0.11	0.01	0.02
Sweden	-0.02	0.00	0.01
Turkey (5)	0.27	0.07	0.07
United Arab Emirates	0.22	0.05	0.05
United States	0.11	0.01	0.02
International Median	0.08	0.01	0.01
Benchmarking Participants			
Ontario, Canada	0.03	0.00	0.00
Quebec, Canada	0.03	0.00	0.00
Moscow City, Russian Fed.	0.05	0.00	0.01
Madrid, Spain	0.06	0.00	0.01
Abu Dhabi, UAE	0.22	0.05	0.05
Dubai, UAE	0.09	0.01	0.01

Parents' Perceptions of Their Child's School – Grade 4

About the Scale

The *Parents' Perceptions of Their Child's School* scale was created based on students' responses to eight items listed below.¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Disagree a little” and “Disagree a lot” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 Parents' Perceptions of Their Child's School Scale – Grade 4

Item	delta	tau_1	tau_2	Infit
ASBH09A	0.07406	-1.70344	1.70344	1.10
ASBH09B	-0.56525	-1.69657	1.69657	1.36
ASBH09C	-0.49961	-1.72317	1.72317	0.87
ASBH09D	-0.09816	-1.42520	1.42520	1.00
ASBH09E	1.03037	-1.68923	1.68923	1.19
ASBH09F	-0.18620	-1.52570	1.52570	0.88
ASBH09G	-0.01740	-1.58204	1.58204	0.85
ASBH09H	0.26219	-1.62188	1.62188	0.93

Scale Transformation Constants for the TIMSS 2019 Parents' Perceptions of Their Child's School Scale – Grade 4

Scale Transformation Constants

$$A = 8.205877$$

$$B = 0.941262$$

$$\text{Transformed Scale Score} = 8.205877 + 0.941262 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 Parents' Perceptions of Their Child's School Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	3.91475	
1	5.08120	
2	5.70687	
3	6.18579	
4	6.60143	6.7
5	6.99714	
6	7.39016	
7	7.79429	
8	8.20790	
9	8.61865	
10	9.01615	
11	9.40453	
12	9.79727	9.7
13	10.21729	
14	10.70311	
15	11.34573	
16	12.53666	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Parents' Perceptions of Their Child's School Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			ASBH09A	ASBH09B	ASBH09C	ASBH09D	ASBH09E	ASBH09F	ASBH09G	ASBH09H
Albania	0.86	54	0.75	0.64	0.78	0.74	0.63	0.75	0.81	0.78
Armenia	0.85	50	0.59	0.64	0.78	0.55	0.74	0.80	0.78	0.75
Australia	-	-	-	-	-	-	-	-	-	-
Austria	0.90	59	0.70	0.58	0.82	0.80	0.70	0.81	0.84	0.83
Azerbaijan	0.87	54	0.74	0.67	0.79	0.72	0.69	0.77	0.76	0.73
Bahrain	0.91	61	0.78	0.68	0.81	0.79	0.79	0.78	0.80	0.80
Belgium (Flemish)	0.89	57	0.78	0.64	0.80	0.81	0.61	0.77	0.81	0.78
Bosnia and Herzegovina	0.91	62	0.77	0.66	0.83	0.78	0.73	0.82	0.84	0.84
Bulgaria	0.92	64	0.73	0.70	0.84	0.79	0.80	0.83	0.85	0.85
Canada	0.91	62	0.77	0.57	0.82	0.79	0.79	0.83	0.85	0.82
Chile	0.92	63	0.77	0.69	0.83	0.81	0.77	0.84	0.82	0.81
Chinese Taipei	0.91	63	0.79	0.69	0.84	0.84	0.71	0.78	0.85	0.82
Croatia	0.92	64	0.75	0.68	0.84	0.76	0.79	0.86	0.85	0.86
Cyprus	0.89	57	0.70	0.63	0.80	0.74	0.77	0.80	0.83	0.77
Czech Republic	0.91	63	0.72	0.58	0.82	0.79	0.76	0.85	0.89	0.88
Denmark	0.92	64	0.77	0.69	0.82	0.81	0.82	0.81	0.85	0.81
England	-	-	-	-	-	-	-	-	-	-
Finland	0.90	58	0.74	0.60	0.80	0.75	0.70	0.83	0.84	0.83
France	0.91	60	0.77	0.65	0.82	0.79	0.75	0.79	0.84	0.78
Georgia	0.88	55	0.62	0.66	0.79	0.74	0.72	0.76	0.82	0.81
Germany	0.89	56	0.78	0.59	0.79	0.80	0.57	0.81	0.83	0.80
Hong Kong SAR	0.89	57	0.77	0.53	0.80	0.82	0.74	0.79	0.79	0.77
Hungary	0.91	62	0.77	0.64	0.81	0.79	0.76	0.83	0.84	0.84
Iran, Islamic Rep. of	0.87	53	0.67	0.62	0.77	0.72	0.65	0.79	0.79	0.78
Ireland	0.88	57	0.79	0.56	0.80	0.80	0.77	0.76	0.81	0.71
Italy	0.89	58	0.76	0.52	0.79	0.78	0.73	0.81	0.84	0.82
Japan	0.88	54	0.65	0.61	0.73	0.73	0.75	0.82	0.81	0.78
Kazakhstan	0.90	59	0.73	0.70	0.81	0.72	0.79	0.83	0.80	0.76
Korea, Rep. of	0.89	57	0.65	0.65	0.78	0.77	0.68	0.80	0.83	0.83
Kosovo	0.86	53	0.72	0.65	0.79	0.71	0.61	0.74	0.79	0.79
Kuwait	0.92	64	0.77	0.69	0.84	0.78	0.83	0.83	0.82	0.81
Latvia	0.90	58	0.66	0.61	0.82	0.70	0.79	0.82	0.84	0.82
Lithuania	0.89	59	0.64	0.66	0.80	0.76	0.70	0.84	0.85	0.86
Malta	0.85	50	0.69	0.50	0.77	0.74	0.69	0.74	0.78	0.72
Montenegro	0.91	63	0.78	0.68	0.84	0.78	0.75	0.83	0.84	0.85
Morocco	0.86	53	0.67	0.61	0.76	0.72	0.59	0.81	0.82	0.79
Netherlands	-	-	-	-	-	-	-	-	-	-
New Zealand	0.90	60	0.78	0.54	0.83	0.81	0.78	0.85	0.83	0.75
North Macedonia	0.87	55	0.62	0.68	0.79	0.74	0.65	0.78	0.83	0.83

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Parents' Perceptions of Their Child's School Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			ASBH09A	ASBH09B	ASBH09C	ASBH09D	ASBH09E	ASBH09F	ASBH09G	ASBH09H
Northern Ireland	0.88	56	0.80	0.49	0.82	0.80	0.75	0.76	0.84	0.68
Norway (5)	-	-	-	-	-	-	-	-	-	-
Oman	0.89	57	0.76	0.66	0.80	0.74	0.75	0.76	0.79	0.79
Pakistan	0.87	52	0.66	0.68	0.69	0.73	0.73	0.75	0.75	0.77
Philippines	0.89	56	0.69	0.65	0.74	0.74	0.75	0.79	0.81	0.80
Poland	0.89	56	0.67	0.66	0.84	0.70	0.73	0.81	0.78	0.79
Portugal	0.90	59	0.77	0.60	0.82	0.77	0.71	0.82	0.85	0.80
Qatar	0.90	60	0.75	0.65	0.82	0.77	0.80	0.79	0.80	0.81
Russian Federation	0.90	59	0.61	0.68	0.80	0.73	0.69	0.85	0.87	0.88
Saudi Arabia	0.91	62	0.75	0.66	0.83	0.80	0.77	0.82	0.83	0.82
Serbia	0.91	62	0.77	0.66	0.83	0.78	0.72	0.82	0.84	0.85
Singapore	0.89	58	0.75	0.60	0.82	0.79	0.71	0.77	0.81	0.80
Slovak Republic	0.91	60	0.68	0.61	0.82	0.75	0.78	0.82	0.86	0.85
South Africa (5)	0.86	51	0.69	0.63	0.74	0.72	0.68	0.75	0.77	0.75
Spain	0.90	59	0.75	0.60	0.81	0.78	0.72	0.79	0.83	0.84
Sweden	0.92	63	0.76	0.67	0.82	0.80	0.81	0.82	0.85	0.84
Turkey (5)	0.91	61	0.78	0.71	0.80	0.78	0.73	0.82	0.82	0.81
United Arab Emirates	0.92	63	0.79	0.63	0.84	0.80	0.81	0.81	0.82	0.82
United States	-	-	-	-	-	-	-	-	-	-
Benchmarking Participants										
Ontario, Canada	0.91	63	0.80	0.55	0.83	0.80	0.82	0.83	0.85	0.82
Quebec, Canada	0.90	58	0.72	0.57	0.81	0.77	0.73	0.82	0.85	0.79
Moscow City, Russian Fed.	0.90	60	0.50	0.68	0.81	0.70	0.79	0.87	0.88	0.88
Madrid, Spain	0.90	60	0.78	0.59	0.82	0.81	0.72	0.79	0.83	0.82
Abu Dhabi, UAE	0.92	65	0.78	0.69	0.85	0.81	0.82	0.83	0.82	0.81
Dubai, UAE	0.91	61	0.78	0.57	0.83	0.79	0.79	0.80	0.82	0.81

A dash (-) indicates comparable data not available.

Relationship Between the TIMSS 2019 Parents' Perceptions of Their Child's School Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.06	0.00	0.00	0.07	0.00	0.00
Armenia	0.06	0.00	0.00	0.04	0.00	0.00
Australia	-	-	-	-	-	-
Austria	0.08	0.01	0.01	0.01	0.00	0.00
Azerbaijan	0.05	0.00	0.00	0.03	0.00	0.00
Bahrain	0.06	0.00	0.01	0.14	0.02	0.02
Belgium (Flemish)	0.02	0.00	0.00	-0.03	0.00	0.00
Bosnia and Herzegovina	-0.01	0.00	0.00	-0.02	0.00	0.00
Bulgaria	-0.09	0.01	0.01	-0.11	0.01	0.01
Canada	0.03	0.00	0.00	-0.01	0.00	0.00
Chile	0.04	0.00	0.00	0.00	0.00	0.00
Chinese Taipei	-0.04	0.00	0.00	-0.09	0.01	0.00
Croatia	0.03	0.00	0.00	0.02	0.00	0.00
Cyprus	0.03	0.00	0.00	0.02	0.00	0.00
Czech Republic	-0.02	0.00	0.00	-0.03	0.00	0.00
Denmark	0.11	0.01	0.01	0.07	0.00	0.00
England	-	-	-	-	-	-
Finland	0.06	0.00	0.01	0.04	0.00	0.00
France	0.09	0.01	0.01	0.03	0.00	0.00
Georgia	-0.03	0.00	0.00	-0.05	0.00	0.00
Germany	0.10	0.01	0.01	0.04	0.00	0.00
Hong Kong SAR	0.11	0.01	0.01	0.12	0.01	0.02
Hungary	-0.02	0.00	0.00	-0.04	0.00	0.00
Iran, Islamic Rep. of	0.07	0.01	0.00	0.04	0.00	0.00
Ireland	0.02	0.00	0.00	-0.01	0.00	0.00
Italy	0.05	0.00	0.00	0.06	0.00	0.00
Japan	0.05	0.00	0.00	0.07	0.00	0.00
Kazakhstan	0.02	0.00	0.00	-0.03	0.00	0.00
Korea, Rep. of	0.02	0.00	0.00	-0.02	0.00	0.00
Kosovo	0.02	0.00	0.00	0.01	0.00	0.00
Kuwait	0.13	0.02	0.02	0.14	0.02	0.02
Latvia	0.01	0.00	0.00	0.01	0.00	0.00
Lithuania	0.04	0.00	0.00	0.04	0.00	0.00
Malta	0.01	0.00	0.00	-0.05	0.00	0.00
Montenegro	-0.01	0.00	0.00	-0.03	0.00	0.00
Morocco	0.14	0.02	0.01	0.13	0.02	0.02
Netherlands	-	-	-	-	-	-

Relationship Between the TIMSS 2019 Parents' Perceptions of Their Child's School Scale and TIMSS 2019 Achievement – Grade 4

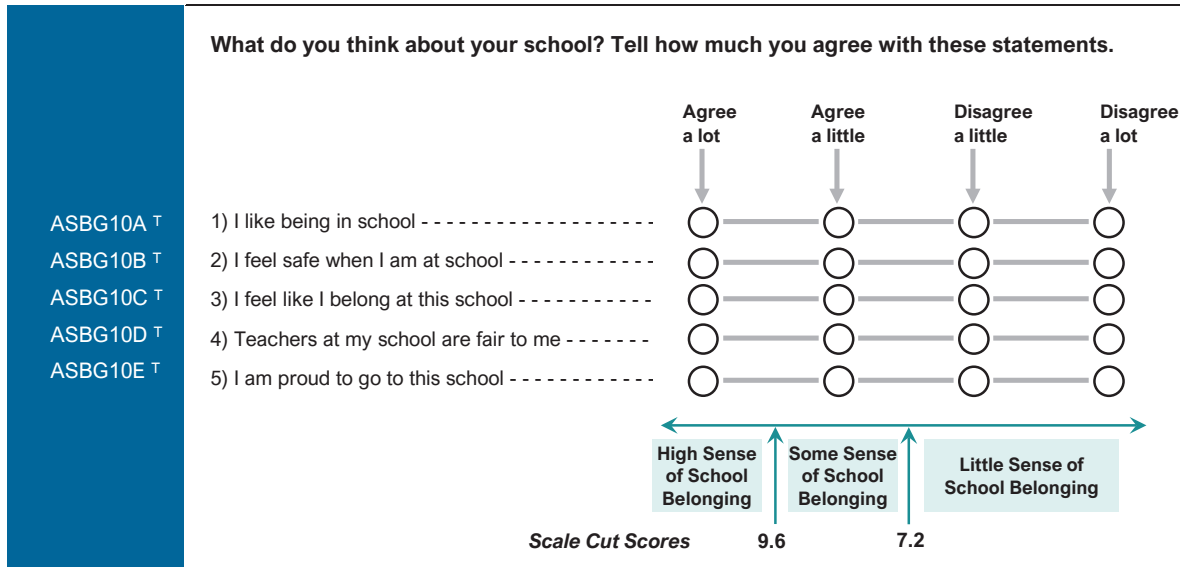
Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.03	0.00	0.00	0.01	0.00	0.00
North Macedonia	-0.03	0.00	0.00	-0.03	0.00	0.00
Northern Ireland	0.12	0.01	0.02	0.09	0.01	0.02
Norway (5)	-	-	-	-	-	-
Oman	0.19	0.04	0.03	0.18	0.03	0.03
Pakistan	0.21	0.04	0.03	0.22	0.05	0.03
Philippines	0.19	0.04	0.02	0.20	0.04	0.03
Poland	-0.03	0.00	0.00	-0.06	0.00	0.00
Portugal	0.05	0.00	0.01	0.03	0.00	0.00
Qatar	0.08	0.01	0.01	0.12	0.02	0.02
Russian Federation	-0.02	0.00	0.00	-0.03	0.00	0.00
Saudi Arabia	0.04	0.00	0.00	0.07	0.01	0.01
Serbia	-0.07	0.01	0.01	-0.08	0.01	0.01
Singapore	0.09	0.01	0.01	0.07	0.00	0.01
Slovak Republic	-0.06	0.00	0.00	-0.13	0.02	0.01
South Africa (5)	0.18	0.03	0.02	0.16	0.03	0.02
Spain	0.05	0.00	0.01	0.03	0.00	0.00
Sweden	0.05	0.00	0.00	0.02	0.00	0.00
Turkey (5)	-0.03	0.00	0.00	-0.04	0.00	0.00
United Arab Emirates	0.10	0.01	0.01	0.11	0.01	0.01
United States	-	-	-	-	-	-
International Median	0.04	0.00	0.00	0.02	0.00	0.00
Benchmarking Participants						
Ontario, Canada	0.07	0.01	0.01	-0.02	0.00	0.00
Quebec, Canada	0.03	0.00	0.00	-0.02	0.00	0.00
Moscow City, Russian Fed.	-0.04	0.00	0.00	-0.07	0.00	0.01
Madrid, Spain	0.04	0.00	0.00	0.04	0.00	0.00
Abu Dhabi, UAE	0.12	0.01	0.02	0.12	0.01	0.01
Dubai, UAE	0.13	0.02	0.01	0.13	0.02	0.02

A dash (–) indicates comparable data not available.

Sense of School Belonging – Grade 4

About the Scale

The *Sense of School Belonging* scale was created based on students' responses to five items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Sense of School Belonging* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBG10A	0.38967	-0.43337	-0.67867	1.11204	1.06
ASBG10B	-0.10231	-0.48418	-0.45813	0.94231	0.99
ASBG10C	0.06274	-0.30275	-0.38949	0.69224	1.00
ASBG10D	-0.21351	-0.22387	-0.45259	0.67646	1.11
ASBG10E	-0.13659	-0.09719	-0.47752	0.57471	0.92

Scale Transformation Constants for the TIMSS 2019 *Sense of School Belonging* Scale – Grade 4

Scale Transformation Constants

A = 7.434179

B = 1.647177

Transformed Scale Score = 7.434179 + 1.647177 • Logit Scale Score

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Sense of School Belonging* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	3.14477	
1	4.60013	
2	5.28784	
3	5.76505	
4	6.15081	
5	6.49005	
6	6.80548	
7	7.11672	7.2
8	7.42069	
9	7.74564	
10	8.10425	
11	8.51746	
12	9.02423	
13	9.69880	9.6
14	10.71074	
15	12.75064	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Sense of School Belonging* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item				
			ASBG10A	ASBG10B	ASBG10C	ASBG10D	ASBG10E
Albania	0.62	40	0.53	0.63	0.63	0.66	0.68
Armenia	0.77	54	0.77	0.73	0.64	0.73	0.78
Australia	0.81	57	0.74	0.73	0.78	0.70	0.83
Austria	0.76	52	0.73	0.78	0.72	0.58	0.77
Azerbaijan	0.72	48	0.70	0.67	0.70	0.63	0.75
Bahrain	0.78	53	0.73	0.73	0.77	0.60	0.79
Belgium (Flemish)	0.76	51	0.70	0.70	0.74	0.67	0.76
Bosnia and Herzegovina	0.76	52	0.71	0.70	0.73	0.65	0.80
Bulgaria	0.77	52	0.69	0.69	0.79	0.63	0.81
Canada	0.80	56	0.73	0.73	0.79	0.68	0.81
Chile	0.75	51	0.67	0.75	0.77	0.62	0.77
Chinese Taipei	0.76	52	0.73	0.74	0.75	0.67	0.70
Croatia	0.77	52	0.70	0.78	0.71	0.64	0.78
Cyprus	0.81	57	0.76	0.72	0.75	0.70	0.83
Czech Republic	0.76	51	0.70	0.76	0.64	0.71	0.77
Denmark	0.80	56	0.74	0.76	0.79	0.64	0.79
England	0.81	57	0.75	0.75	0.77	0.68	0.82
Finland	0.84	61	0.79	0.80	0.78	0.75	0.78
France	0.68	46	0.68	0.69	0.69	0.49	0.79
Georgia	0.63	42	0.66	0.64	0.58	0.61	0.74
Germany	0.78	53	0.70	0.77	0.74	0.65	0.78
Hong Kong SAR	0.84	61	0.80	0.81	0.84	0.69	0.76
Hungary	0.77	53	0.67	0.70	0.75	0.70	0.82
Iran, Islamic Rep. of	0.64	44	0.72	0.70	0.75	0.65	0.46
Ireland	0.79	56	0.70	0.77	0.76	0.69	0.80
Italy	0.75	51	0.69	0.71	0.71	0.66	0.78
Japan	0.80	56	0.78	0.75	0.72	0.68	0.82
Kazakhstan	0.76	52	0.73	0.65	0.74	0.71	0.76
Korea, Rep. of	0.79	55	0.76	0.76	0.72	0.68	0.79
Kosovo	0.59	40	0.58	0.60	0.64	0.61	0.73
Kuwait	0.79	54	0.74	0.73	0.79	0.64	0.77
Latvia	0.76	51	0.72	0.72	0.73	0.63	0.77
Lithuania	0.71	48	0.74	0.66	0.63	0.63	0.78
Malta	0.78	53	0.75	0.73	0.75	0.62	0.79
Montenegro	0.72	48	0.71	0.67	0.68	0.61	0.78
Morocco	0.67	44	0.66	0.65	0.70	0.57	0.73
Netherlands	0.78	54	0.74	0.72	0.76	0.68	0.76
New Zealand	0.80	57	0.73	0.73	0.79	0.67	0.83
North Macedonia	0.62	41	0.58	0.67	0.66	0.60	0.69

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Sense of School Belonging* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item				
			ASBG10A	ASBG10B	ASBG10C	ASBG10D	ASBG10E
Northern Ireland	0.78	55	0.71	0.75	0.77	0.67	0.80
Norway (5)	0.77	52	0.68	0.70	0.78	0.66	0.79
Oman	0.76	51	0.72	0.73	0.73	0.62	0.76
Pakistan	0.79	54	0.65	0.77	0.75	0.77	0.74
Philippines	0.66	43	0.69	0.66	0.65	0.53	0.73
Poland	0.78	54	0.75	0.71	0.73	0.65	0.81
Portugal	0.75	51	0.74	0.72	0.69	0.58	0.81
Qatar	0.79	54	0.72	0.76	0.78	0.62	0.78
Russian Federation	0.78	54	0.75	0.71	0.73	0.69	0.78
Saudi Arabia	0.75	50	0.68	0.70	0.76	0.63	0.75
Serbia	0.79	55	0.74	0.72	0.78	0.66	0.81
Singapore	0.80	55	0.76	0.74	0.78	0.66	0.79
Slovak Republic	0.76	52	0.70	0.73	0.72	0.66	0.78
South Africa (5)	0.70	46	0.70	0.69	0.71	0.54	0.74
Spain	0.75	51	0.69	0.72	0.71	0.65	0.78
Sweden	0.82	58	0.72	0.74	0.80	0.71	0.83
Turkey (5)	0.66	44	0.64	0.71	0.72	0.47	0.74
United Arab Emirates	0.80	56	0.75	0.75	0.77	0.65	0.80
United States	0.82	58	0.73	0.74	0.81	0.70	0.84
Benchmarking Participants							
Ontario, Canada	0.80	56	0.71	0.73	0.79	0.69	0.81
Quebec, Canada	0.81	56	0.77	0.72	0.78	0.67	0.81
Moscow City, Russian Fed.	0.80	56	0.79	0.73	0.75	0.67	0.79
Madrid, Spain	0.75	52	0.70	0.72	0.71	0.69	0.79
Abu Dhabi, UAE	0.80	55	0.75	0.75	0.77	0.64	0.81
Dubai, UAE	0.78	53	0.74	0.74	0.76	0.64	0.77

Relationship Between the TIMSS 2019 Sense of School Belonging Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.03	0.00	0.00	0.04	0.00	0.00
Armenia	0.05	0.00	0.00	0.06	0.00	0.01
Australia	0.15	0.02	0.02	0.13	0.02	0.01
Austria	0.11	0.01	0.01	0.09	0.01	0.01
Azerbaijan	0.08	0.01	0.01	0.03	0.00	0.00
Bahrain	0.04	0.00	0.00	0.11	0.01	0.01
Belgium (Flemish)	0.11	0.01	0.02	0.13	0.02	0.02
Bosnia and Herzegovina	0.03	0.00	0.00	0.03	0.00	0.00
Bulgaria	-0.14	0.02	0.01	-0.15	0.02	0.01
Canada	0.05	0.00	0.01	0.06	0.00	0.01
Chile	0.12	0.02	0.02	0.11	0.01	0.02
Chinese Taipei	0.07	0.01	0.01	0.07	0.00	0.01
Croatia	0.04	0.00	0.00	0.07	0.00	0.01
Cyprus	0.03	0.00	0.00	0.05	0.00	0.00
Czech Republic	0.02	0.00	0.01	-0.01	0.00	0.01
Denmark	0.14	0.02	0.02	0.14	0.02	0.02
England	0.12	0.01	0.02	0.10	0.01	0.01
Finland	0.08	0.01	0.01	0.04	0.00	0.01
France	0.09	0.01	0.01	0.09	0.01	0.01
Georgia	-0.01	0.00	0.00	-0.04	0.00	0.00
Germany	0.15	0.02	0.02	0.12	0.01	0.02
Hong Kong SAR	0.15	0.02	0.02	0.15	0.02	0.02
Hungary	0.03	0.00	0.00	0.01	0.00	0.00
Iran, Islamic Rep. of	-0.07	0.01	0.01	-0.09	0.01	0.01
Ireland	0.12	0.01	0.02	0.11	0.01	0.02
Italy	0.10	0.01	0.01	0.08	0.01	0.01
Japan	0.12	0.01	0.01	0.08	0.01	0.01
Kazakhstan	0.08	0.01	0.01	0.11	0.01	0.01
Korea, Rep. of	0.14	0.02	0.02	0.12	0.01	0.01
Kosovo	0.06	0.00	0.01	0.10	0.01	0.02
Kuwait	0.06	0.00	0.01	0.11	0.01	0.02
Latvia	0.09	0.01	0.01	0.08	0.01	0.01
Lithuania	0.02	0.00	0.00	0.02	0.00	0.00
Malta	0.06	0.00	0.01	0.02	0.00	0.00
Montenegro	0.02	0.00	0.00	-0.03	0.00	0.00
Morocco	0.12	0.01	0.02	0.15	0.02	0.02
Netherlands	0.10	0.01	0.01	0.10	0.01	0.02

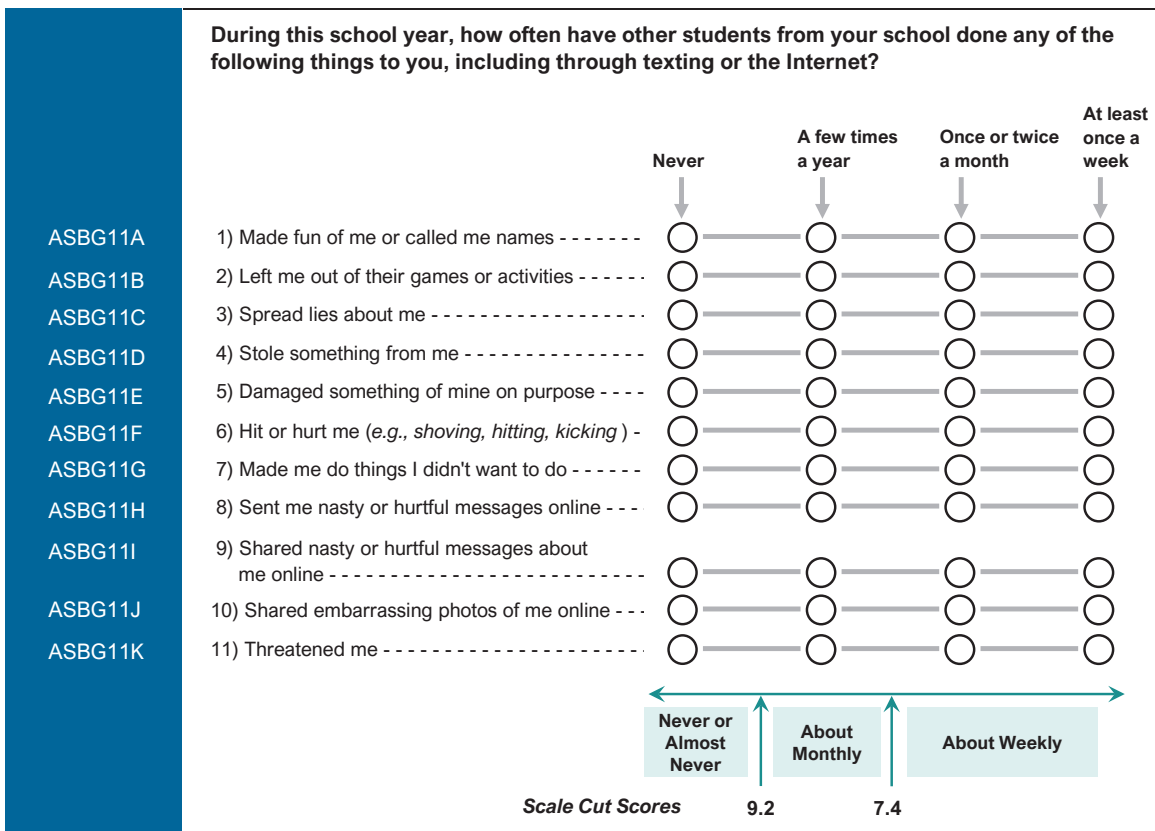
Relationship Between the TIMSS 2019 Sense of School Belonging Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.10	0.01	0.01	0.10	0.01	0.01
North Macedonia	0.03	0.00	0.01	0.05	0.00	0.01
Northern Ireland	0.16	0.03	0.03	0.15	0.02	0.02
Norway (5)	0.09	0.01	0.01	0.07	0.00	0.01
Oman	0.11	0.01	0.02	0.11	0.01	0.02
Pakistan	0.07	0.00	0.01	0.02	0.00	0.00
Philippines	0.16	0.03	0.04	0.14	0.02	0.03
Poland	-0.02	0.00	0.00	-0.02	0.00	0.00
Portugal	0.02	0.00	0.00	0.01	0.00	0.00
Qatar	0.10	0.01	0.01	0.15	0.02	0.03
Russian Federation	0.05	0.00	0.00	-0.01	0.00	0.00
Saudi Arabia	0.08	0.01	0.01	0.09	0.01	0.01
Serbia	-0.06	0.00	0.00	-0.07	0.01	0.00
Singapore	0.12	0.01	0.01	0.08	0.01	0.01
Slovak Republic	-0.07	0.00	0.00	-0.13	0.02	0.01
South Africa (5)	0.12	0.01	0.02	0.12	0.01	0.02
Spain	0.08	0.01	0.01	0.09	0.01	0.01
Sweden	0.12	0.02	0.01	0.09	0.01	0.01
Turkey (5)	0.13	0.02	0.02	0.11	0.01	0.02
United Arab Emirates	0.16	0.03	0.02	0.18	0.03	0.03
United States	0.18	0.03	0.04	0.16	0.02	0.03
International Median	0.08	0.01	0.01	0.09	0.01	0.01
Benchmarking Participants						
Ontario, Canada	0.08	0.01	0.01	0.06	0.00	0.00
Quebec, Canada	0.06	0.00	0.01	0.05	0.00	0.01
Moscow City, Russian Fed.	0.07	0.01	0.01	0.03	0.00	0.00
Madrid, Spain	-0.01	0.00	0.00	0.01	0.00	0.00
Abu Dhabi, UAE	0.09	0.01	0.01	0.12	0.01	0.02
Dubai, UAE	0.08	0.01	0.01	0.08	0.01	0.01

Student Bullying – Grade 4

About the Scale

The *Student Bullying* scale was created based on students’ responses to eleven items listed below.



Item Parameters for the TIMSS 2019 *Student Bullying* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBG11A	0.70887	0.25598	-0.31167	0.05569	1.10
ASBG11B	0.49313	0.00135	-0.01632	0.01497	1.19
ASBG11C	0.43075	0.05672	-0.08605	0.02933	1.03
ASBG11D	0.00016	0.34024	-0.14813	-0.19211	1.07
ASBG11E	-0.08448	0.35351	-0.03527	-0.31824	0.96
ASBG11F	0.38543	0.03273	-0.18101	0.14828	1.03
ASBG11G	-0.03872	0.28678	0.08095	-0.36773	0.98
ASBG11H	-0.44333	0.51278	0.34983	-0.86261	0.97
ASBG11I	-0.60515	0.67976	0.53743	-1.21719	0.87
ASBG11J	-0.73072	0.82778	0.68417	-1.51195	0.93
ASBG11K	-0.11594	0.45350	-0.08114	-0.37236	0.96

Scale Transformation Constants for the TIMSS 2019 *Student Bullying* Scale – Grade 4

Scale Transformation Constants

A = 7.495914

B = 1.758100

Transformed Scale Score = 7.495914 + 1.758100 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Student Bullying Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	2.86807	
1	4.32091	
2	4.88934	
3	5.25172	
4	5.52624	
5	5.75084	
6	5.94126	
7	6.11702	
8	6.27822	
9	6.42850	
10	6.57077	
11	6.70718	
12	6.83947	
13	6.96901	
14	7.09688	
15	7.22397	
16	7.35113	7.4
17	7.47839	
18	7.60884	
19	7.74099	
20	7.87654	
21	8.01658	
22	8.16227	
23	8.31512	
24	8.47681	
25	8.64712	
26	8.83393	
27	9.04042	
28	9.27434	9.2
29	9.54836	
30	9.88387	
31	10.33461	
32	11.04030	
33	12.71988	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Student Bullying Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item										
			ASBG11A	ASBG11B	ASBG11C	ASBG11D	ASBG11E	ASBG11F	ASBG11G	ASBG11H	ASBG11I	ASBG11J	ASBG11K
Albania	0.85	45	0.59	0.60	0.55	0.63	0.68	0.63	0.69	0.77	0.76	0.77	0.69
Armenia	0.90	55	0.63	0.56	0.66	0.75	0.76	0.74	0.80	0.81	0.82	0.77	0.77
Australia	0.85	41	0.68	0.63	0.70	0.62	0.70	0.69	0.66	0.57	0.57	0.47	0.71
Austria	0.85	41	0.67	0.65	0.71	0.58	0.66	0.67	0.68	0.64	0.62	0.54	0.64
Azerbaijan	0.82	40	0.55	0.52	0.62	0.65	0.65	0.61	0.63	0.68	0.68	0.68	0.66
Bahrain	0.88	45	0.61	0.65	0.68	0.63	0.70	0.67	0.70	0.69	0.70	0.66	0.68
Belgium (Flemish)	0.82	36	0.69	0.66	0.69	0.54	0.62	0.67	0.61	0.49	0.50	0.44	0.65
Bosnia and Herzegovina	0.86	44	0.62	0.60	0.69	0.64	0.73	0.69	0.68	0.71	0.71	0.67	0.58
Bulgaria	0.83	41	0.63	0.44	0.63	0.57	0.67	0.71	0.70	0.68	0.66	0.59	0.70
Canada	0.86	42	0.67	0.62	0.70	0.64	0.71	0.68	0.65	0.63	0.63	0.52	0.70
Chile	0.88	47	0.63	0.66	0.67	0.64	0.71	0.69	0.71	0.71	0.72	0.69	0.72
Chinese Taipei	0.83	39	0.66	0.61	0.66	0.61	0.67	0.66	0.70	0.55	0.54	0.52	0.70
Croatia	0.86	43	0.67	0.66	0.69	0.57	0.71	0.70	0.67	0.68	0.64	0.55	0.66
Cyprus	0.86	42	0.68	0.61	0.70	0.58	0.71	0.69	0.67	0.58	0.65	0.55	0.71
Czech Republic	0.86	44	0.67	0.53	0.70	0.63	0.72	0.66	0.69	0.67	0.69	0.63	0.70
Denmark	0.85	41	0.65	0.64	0.72	0.51	0.65	0.66	0.67	0.65	0.65	0.45	0.71
England	0.86	43	0.70	0.62	0.72	0.63	0.68	0.67	0.66	0.65	0.64	0.48	0.72
Finland	0.85	43	0.70	0.64	0.72	0.59	0.70	0.70	0.66	0.67	0.62	0.49	0.70
France	0.82	37	0.65	0.57	0.68	0.56	0.67	0.66	0.64	0.54	0.58	0.47	0.68
Georgia	0.84	46	0.55	0.45	0.65	0.63	0.69	0.59	0.72	0.77	0.79	0.76	0.73
Germany	0.85	41	0.63	0.60	0.68	0.63	0.68	0.66	0.66	0.64	0.67	0.56	0.66
Hong Kong SAR	0.86	43	0.55	0.62	0.65	0.62	0.73	0.66	0.72	0.68	0.70	0.64	0.69
Hungary	0.82	38	0.63	0.60	0.70	0.59	0.66	0.67	0.66	0.58	0.53	0.45	0.67
Iran, Islamic Rep. of	0.83	39	0.55	0.48	0.62	0.61	0.66	0.63	0.67	0.66	0.67	0.63	0.68
Ireland	0.86	43	0.69	0.65	0.72	0.60	0.69	0.69	0.67	0.63	0.63	0.53	0.67
Italy	0.82	37	0.66	0.60	0.66	0.58	0.65	0.64	0.63	0.54	0.55	0.50	0.69
Japan	0.80	35	0.69	0.65	0.67	0.58	0.60	0.67	0.71	0.43	0.41	0.42	0.60
Kazakhstan	0.83	41	0.57	0.48	0.65	0.59	0.69	0.65	0.68	0.69	0.68	0.65	0.66
Korea, Rep. of	0.81	38	0.64	0.59	0.66	0.51	0.66	0.70	0.68	0.63	0.62	0.39	0.61
Kosovo	0.91	56	0.64	0.67	0.65	0.73	0.79	0.73	0.79	0.79	0.83	0.80	0.79
Kuwait	0.89	49	0.62	0.63	0.67	0.66	0.69	0.69	0.75	0.74	0.75	0.74	0.74
Latvia	0.86	42	0.65	0.57	0.69	0.57	0.72	0.69	0.67	0.65	0.65	0.57	0.69
Lithuania	0.81	36	0.66	0.56	0.67	0.58	0.60	0.68	0.62	0.57	0.52	0.47	0.65
Malta	0.85	41	0.64	0.59	0.69	0.60	0.67	0.67	0.63	0.63	0.63	0.56	0.68
Montenegro	0.86	46	0.60	0.62	0.68	0.69	0.71	0.66	0.71	0.71	0.74	0.70	0.65
Morocco	0.83	38	0.59	0.55	0.60	0.54	0.63	0.64	0.65	0.62	0.65	0.66	0.67
Netherlands	0.85	43	0.68	0.56	0.69	0.63	0.71	0.69	0.68	0.63	0.66	0.56	0.69
New Zealand	0.87	44	0.67	0.61	0.72	0.68	0.73	0.70	0.70	0.63	0.62	0.53	0.71
North Macedonia	0.89	50	0.65	0.62	0.68	0.69	0.74	0.69	0.72	0.74	0.80	0.70	0.75
Northern Ireland	0.85	41	0.71	0.63	0.72	0.57	0.65	0.65	0.64	0.63	0.64	0.48	0.68

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Student Bullying Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item										
			ASBG11A	ASBG11B	ASBG11C	ASBG11D	ASBG11E	ASBG11F	ASBG11G	ASBG11H	ASBG11I	ASBG11J	ASBG11K
Norway (5)	0.85	41	0.67	0.67	0.72	0.58	0.63	0.67	0.65	0.64	0.63	0.49	0.70
Oman	0.85	41	0.59	0.55	0.64	0.57	0.64	0.62	0.67	0.69	0.70	0.69	0.68
Pakistan	0.88	46	0.60	0.57	0.68	0.66	0.68	0.72	0.72	0.69	0.71	0.68	0.72
Philippines	0.80	33	0.41	0.50	0.55	0.57	0.57	0.47	0.64	0.67	0.67	0.62	0.58
Poland	0.87	46	0.67	0.62	0.70	0.66	0.72	0.70	0.69	0.69	0.69	0.61	0.72
Portugal	0.86	45	0.62	0.60	0.65	0.66	0.70	0.68	0.70	0.67	0.66	0.67	0.72
Qatar	0.89	48	0.60	0.63	0.67	0.65	0.73	0.69	0.70	0.74	0.75	0.72	0.71
Russian Federation	0.83	39	0.67	0.45	0.67	0.59	0.65	0.70	0.64	0.61	0.65	0.53	0.66
Saudi Arabia	0.88	47	0.63	0.60	0.65	0.65	0.72	0.69	0.72	0.72	0.73	0.71	0.70
Serbia	0.85	43	0.60	0.62	0.68	0.58	0.69	0.64	0.67	0.68	0.71	0.62	0.69
Singapore	0.84	40	0.60	0.59	0.71	0.62	0.69	0.66	0.67	0.61	0.62	0.49	0.67
Slovak Republic	0.84	41	0.64	0.60	0.69	0.64	0.68	0.65	0.65	0.59	0.62	0.51	0.70
South Africa (5)	0.83	37	0.56	0.60	0.59	0.46	0.60	0.61	0.66	0.66	0.66	0.66	0.63
Spain	0.86	43	0.64	0.62	0.69	0.65	0.69	0.70	0.69	0.62	0.64	0.55	0.71
Sweden	0.85	42	0.68	0.61	0.73	0.59	0.68	0.67	0.64	0.67	0.66	0.49	0.66
Turkey (5)	0.83	40	0.56	0.59	0.65	0.50	0.66	0.64	0.63	0.68	0.70	0.63	0.68
United Arab Emirates	0.89	48	0.60	0.64	0.69	0.66	0.72	0.69	0.71	0.73	0.73	0.68	0.71
United States	0.86	44	0.67	0.64	0.69	0.64	0.71	0.69	0.66	0.64	0.65	0.55	0.70
Benchmarking Participants													
Ontario, Canada	0.86	43	0.68	0.62	0.70	0.65	0.72	0.67	0.63	0.64	0.63	0.52	0.68
Quebec, Canada	0.84	41	0.67	0.59	0.69	0.59	0.67	0.68	0.63	0.62	0.63	0.49	0.71
Moscow City, Russian Fed.	0.85	41	0.68	0.52	0.69	0.61	0.68	0.73	0.65	0.62	0.64	0.50	0.68
Madrid, Spain	0.84	40	0.62	0.65	0.68	0.59	0.69	0.69	0.65	0.58	0.59	0.52	0.72
Abu Dhabi, UAE	0.89	47	0.60	0.61	0.68	0.65	0.73	0.69	0.71	0.73	0.74	0.69	0.71
Dubai, UAE	0.87	45	0.61	0.63	0.68	0.66	0.70	0.69	0.69	0.71	0.70	0.66	0.67

Relationship Between the TIMSS 2019 Student Bullying Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.12	0.01	0.04	0.11	0.01	0.04
Armenia	0.10	0.01	0.02	0.14	0.02	0.03
Australia	0.13	0.02	0.03	0.12	0.01	0.03
Austria	0.17	0.03	0.04	0.21	0.04	0.05
Azerbaijan	0.15	0.02	0.03	0.14	0.02	0.03
Bahrain	0.12	0.01	0.02	0.25	0.06	0.09
Belgium (Flemish)	0.09	0.01	0.01	0.11	0.01	0.02
Bosnia and Herzegovina	0.12	0.01	0.03	0.10	0.01	0.03
Bulgaria	0.16	0.03	0.05	0.16	0.03	0.05
Canada	0.12	0.01	0.02	0.13	0.02	0.03
Chile	0.19	0.04	0.07	0.18	0.03	0.07
Chinese Taipei	0.08	0.01	0.01	0.11	0.01	0.02
Croatia	0.05	0.00	0.02	0.03	0.00	0.01
Cyprus	0.14	0.02	0.03	0.14	0.02	0.03
Czech Republic	0.16	0.02	0.05	0.15	0.02	0.05
Denmark	0.12	0.01	0.02	0.10	0.01	0.02
England	0.13	0.02	0.03	0.12	0.01	0.02
Finland	0.12	0.02	0.03	0.12	0.01	0.03
France	0.15	0.02	0.04	0.13	0.02	0.03
Georgia	0.15	0.02	0.03	0.15	0.02	0.04
Germany	0.19	0.04	0.06	0.18	0.03	0.06
Hong Kong SAR	0.09	0.01	0.02	0.06	0.00	0.01
Hungary	0.09	0.01	0.01	0.08	0.01	0.01
Iran, Islamic Rep. of	0.07	0.00	0.01	0.04	0.00	0.01
Ireland	0.12	0.02	0.03	0.13	0.02	0.03
Italy	0.11	0.01	0.02	0.10	0.01	0.03
Japan	0.06	0.00	0.00	0.06	0.00	0.00
Kazakhstan	0.11	0.01	0.01	0.08	0.01	0.01
Korea, Rep. of	0.03	0.00	0.00	0.02	0.00	0.00
Kosovo	0.18	0.03	0.06	0.22	0.05	0.07
Kuwait	0.18	0.03	0.05	0.21	0.04	0.05
Latvia	0.16	0.03	0.04	0.21	0.04	0.05
Lithuania	0.09	0.01	0.03	0.10	0.01	0.03
Malta	0.13	0.02	0.03	0.11	0.01	0.03
Montenegro	0.17	0.03	0.03	0.15	0.02	0.03
Morocco	0.13	0.02	0.03	0.12	0.01	0.03
Netherlands	0.06	0.00	0.01	0.08	0.01	0.02

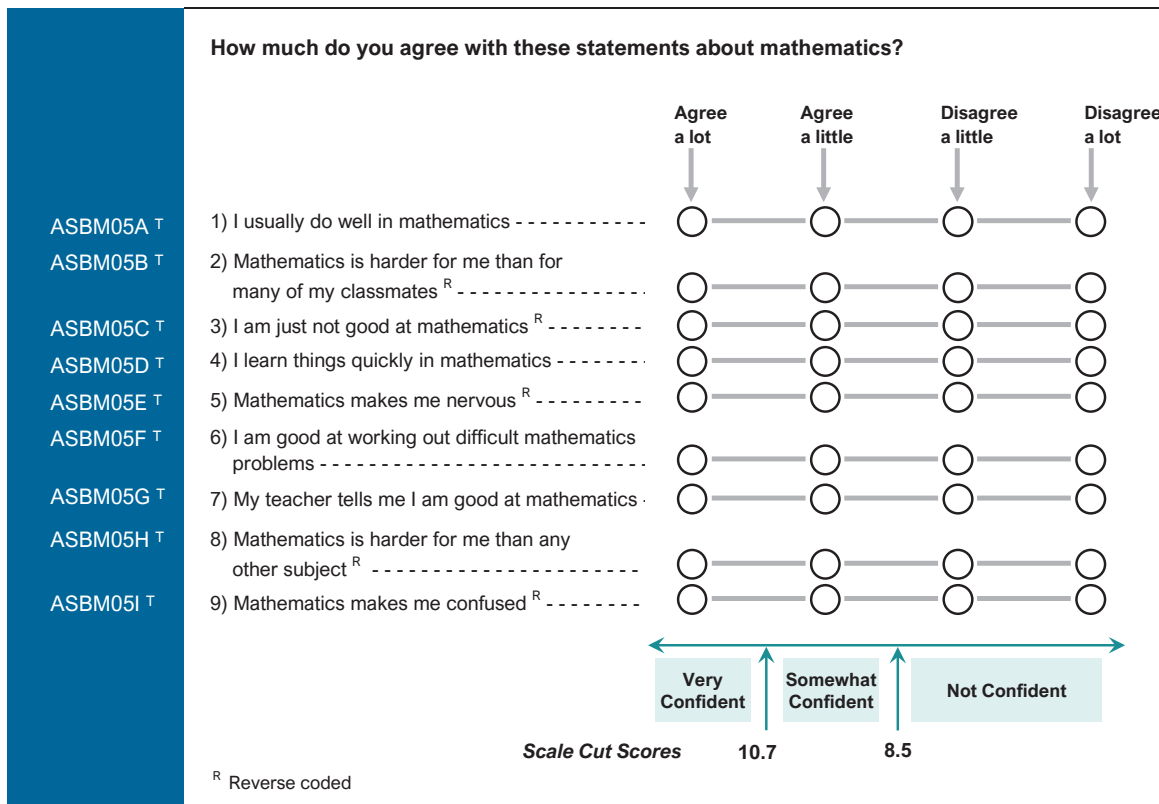
Relationship Between the TIMSS 2019 Student Bullying Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.17	0.03	0.05	0.20	0.04	0.06
North Macedonia	0.23	0.05	0.07	0.24	0.06	0.07
Northern Ireland	0.12	0.02	0.03	0.14	0.02	0.04
Norway (5)	0.08	0.01	0.01	0.09	0.01	0.01
Oman	0.20	0.04	0.05	0.19	0.04	0.05
Pakistan	0.12	0.02	0.02	0.15	0.02	0.03
Philippines	0.27	0.07	0.07	0.29	0.09	0.08
Poland	0.12	0.01	0.03	0.13	0.02	0.03
Portugal	0.11	0.01	0.03	0.13	0.02	0.04
Qatar	0.26	0.07	0.10	0.29	0.08	0.12
Russian Federation	0.15	0.02	0.02	0.14	0.02	0.02
Saudi Arabia	0.22	0.05	0.07	0.26	0.07	0.10
Serbia	0.08	0.01	0.02	0.11	0.01	0.02
Singapore	0.18	0.03	0.05	0.17	0.03	0.05
Slovak Republic	0.15	0.02	0.04	0.16	0.02	0.04
South Africa (5)	0.31	0.09	0.11	0.31	0.10	0.12
Spain	0.18	0.03	0.04	0.19	0.04	0.05
Sweden	0.16	0.03	0.03	0.15	0.02	0.03
Turkey (5)	0.20	0.04	0.07	0.19	0.03	0.06
United Arab Emirates	0.21	0.04	0.06	0.23	0.05	0.07
United States	0.15	0.02	0.05	0.15	0.02	0.05
International Median	0.13	0.02	0.03	0.14	0.02	0.03
Benchmarking Participants						
Ontario, Canada	0.13	0.02	0.03	0.13	0.02	0.03
Quebec, Canada	0.14	0.02	0.03	0.12	0.02	0.03
Moscow City, Russian Fed.	0.17	0.03	0.04	0.17	0.03	0.04
Madrid, Spain	0.07	0.00	0.02	0.10	0.01	0.03
Abu Dhabi, UAE	0.21	0.04	0.05	0.23	0.05	0.06
Dubai, UAE	0.11	0.01	0.02	0.12	0.02	0.03

Students Confident in Mathematics – Grade 4

About the Scale

The *Students Confident in Mathematics* scale was created based on students’ responses to nine items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Students Confident in Mathematics* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBM05A	-0.56785	-0.51008	-0.52132	1.03140	0.91
ASBM05B ^R	0.26875	-0.54868	0.23636	0.31232	1.00
ASBM05C ^R	0.04819	-0.38143	0.20974	0.17169	0.91
ASBM05D	-0.23147	-0.61721	-0.24060	0.85781	0.98
ASBM05E ^R	0.01818	-0.26390	0.17416	0.08974	1.12
ASBM05F	0.24431	-0.77636	-0.21888	0.99524	1.06
ASBM05G	-0.04911	-0.65149	-0.29073	0.94222	1.18
ASBM05H ^R	0.15465	-0.20402	0.18886	0.01516	0.91
ASBM05I ^R	0.11435	-0.32921	0.17352	0.15569	0.98

^R Reverse coded

Scale Transformation Constants for the TIMSS 2019 *Students Confident in Mathematics* Scale – Grade 4

Scale Transformation Constants

A = 8.556200

B = 1.689256

Transformed Scale Score = 8.556200 + 1.689256 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Students Confident in Mathematics Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	2.79993	
1	4.55349	
2	5.36447	
3	5.91005	
4	6.32925	
5	6.67668	
6	6.97600	
7	7.24155	
8	7.48123	
9	7.70454	
10	7.91361	
11	8.11184	
12	8.30222	
13	8.48743	8.5
14	8.66992	
15	8.85216	
16	9.03664	
17	9.22621	
18	9.42421	
19	9.63460	
20	9.86233	
21	10.11082	
22	10.39472	
23	10.72977	10.7
24	11.14456	
25	11.70061	
26	12.55225	
27	14.40638	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Students Confident in Mathematics Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ASBM05A	ASBM05B _R	ASBM05C _R	ASBM05D	ASBM05E _R	ASBM05F	ASBM05G	ASBM05H _R	ASBM05I _R	
Albania	0.82	42	0.65	0.68	0.74	0.61	0.58	0.65	0.65	0.69	0.55	
Armenia	0.81	40	0.65	0.60	0.73	0.60	0.57	0.60	0.63	0.69	0.63	
Australia	0.87	51	0.76	0.73	0.79	0.72	0.62	0.76	0.39	0.78	0.77	
Austria	0.89	54	0.77	0.75	0.77	0.76	0.61	0.70	0.69	0.80	0.76	
Azerbaijan	0.81	40	0.57	0.64	0.74	0.59	0.60	0.58	0.63	0.69	0.65	
Bahrain	0.81	39	0.39	0.68	0.71	0.55	0.67	0.54	0.50	0.76	0.70	
Belgium (Flemish)	0.88	52	0.79	0.77	0.82	0.68	0.55	0.73	0.61	0.79	0.70	
Bosnia and Herzegovina	0.86	47	0.72	0.69	0.72	0.67	0.63	0.65	0.68	0.73	0.71	
Bulgaria	0.88	51	0.75	0.72	0.75	0.75	0.61	0.71	0.67	0.76	0.72	
Canada	0.87	50	0.76	0.75	0.77	0.71	0.64	0.71	0.39	0.77	0.77	
Chile	0.82	41	0.63	0.60	0.72	0.63	0.61	0.60	0.47	0.73	0.74	
Chinese Taipei	0.85	46	0.73	0.67	0.64	0.74	0.56	0.69	0.64	0.73	0.72	
Croatia	0.89	52	0.75	0.73	0.72	0.77	0.66	0.69	0.61	0.79	0.77	
Cyprus	0.87	49	0.70	0.74	0.77	0.67	0.65	0.67	0.57	0.74	0.75	
Czech Republic	0.86	48	0.73	0.70	0.78	0.73	0.64	0.57	0.57	0.76	0.72	
Denmark	0.88	50	0.76	0.73	0.81	0.76	0.55	0.66	0.51	0.75	0.75	
England	0.88	52	0.77	0.74	0.81	0.74	0.64	0.76	0.35	0.80	0.76	
Finland	0.86	48	0.76	0.71	0.80	0.75	0.64	0.70	0.48	0.76	0.57	
France	0.88	52	0.77	0.73	0.79	0.74	0.58	0.70	0.55	0.75	0.82	
Georgia	0.81	40	0.63	0.69	0.75	0.58	0.60	0.46	0.49	0.73	0.68	
Germany	0.90	54	0.76	0.77	0.80	0.74	0.64	0.70	0.65	0.78	0.75	
Hong Kong SAR	0.84	45	0.70	0.65	0.78	0.67	0.59	0.70	0.56	0.73	0.63	
Hungary	0.88	51	0.78	0.73	0.78	0.73	0.55	0.70	0.72	0.74	0.69	
Iran, Islamic Rep. of	0.79	38	0.62	0.52	0.52	0.63	0.64	0.63	0.58	0.69	0.68	
Ireland	0.86	50	0.75	0.75	0.78	0.74	0.60	0.75	0.31	0.80	0.73	
Italy	0.85	46	0.71	0.70	0.64	0.72	0.65	0.59	0.55	0.75	0.73	
Japan	0.87	49	0.72	0.67	0.83	0.70	0.65	0.76	0.43	0.72	0.75	
Kazakhstan	0.86	47	0.68	0.71	0.79	0.73	0.58	0.69	0.58	0.73	0.67	
Korea, Rep. of	0.88	53	0.84	0.76	0.76	0.75	0.46	0.80	0.53	0.80	0.75	
Kosovo	0.74	33	0.53	0.69	0.71	0.41	0.64	0.34	0.49	0.73	0.51	
Kuwait	0.76	34	0.29	0.70	0.72	0.41	0.71	0.35	0.38	0.74	0.69	
Latvia	0.89	53	0.79	0.73	0.79	0.77	0.61	0.71	0.66	0.77	0.68	
Lithuania	0.87	50	0.78	0.70	0.70	0.73	0.62	0.73	0.66	0.76	0.64	
Malta	0.87	49	0.71	0.73	0.78	0.69	0.67	0.64	0.51	0.77	0.75	
Montenegro	0.84	44	0.66	0.69	0.70	0.61	0.66	0.57	0.60	0.74	0.72	
Morocco	0.74	32	0.39	0.67	0.69	0.39	0.67	0.33	0.37	0.72	0.68	
Netherlands	0.88	53	0.78	0.74	0.84	0.71	0.49	0.75	0.51	0.79	0.83	
New Zealand	0.83	43	0.71	0.64	0.75	0.66	0.55	0.70	0.38	0.74	0.69	
North Macedonia	0.82	41	0.59	0.72	0.72	0.55	0.65	0.50	0.58	0.74	0.70	
Northern Ireland	0.87	51	0.77	0.73	0.80	0.74	0.63	0.74	0.34	0.78	0.77	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Students Confident in Mathematics* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ASBM05A	ASBM05B ^R	ASBM05C ^R	ASBM05D	ASBM05E ^R	ASBM05F	ASBM05G	ASBM05H ^R	ASBM05I ^R	
Norway (5)	0.87	50	0.75	0.73	0.79	0.74	0.54	0.76	0.43	0.76	0.74	
Oman	0.71	31	0.16	0.73	0.65	0.34	0.73	0.19	0.25	0.76	0.72	
Pakistan	0.70	30	0.21	0.66	0.71	0.19	0.72	0.21	0.20	0.73	0.74	
Philippines	0.54	26	-0.31	0.67	0.60	-0.25	0.57	-0.32	-0.34	0.67	0.61	
Poland	0.87	49	0.75	0.71	0.71	0.75	0.58	0.72	0.57	0.77	0.71	
Portugal	0.85	46	0.70	0.62	0.77	0.65	0.62	0.68	0.60	0.71	0.73	
Qatar	0.79	37	0.37	0.72	0.75	0.43	0.71	0.43	0.39	0.77	0.74	
Russian Federation	0.88	52	0.75	0.71	0.79	0.79	0.61	0.71	0.62	0.75	0.73	
Saudi Arabia	0.76	36	0.12	0.75	0.74	0.37	0.76	0.24	0.33	0.79	0.76	
Serbia	0.90	55	0.77	0.76	0.81	0.72	0.66	0.71	0.68	0.77	0.76	
Singapore	0.87	51	0.77	0.75	0.79	0.70	0.63	0.70	0.47	0.78	0.75	
Slovak Republic	0.88	50	0.76	0.69	0.80	0.68	0.65	0.65	0.58	0.76	0.75	
South Africa (5)	0.68	28	0.20	0.69	0.70	0.21	0.66	0.16	0.12	0.74	0.69	
Spain	0.84	44	0.66	0.69	0.73	0.61	0.64	0.61	0.54	0.72	0.75	
Sweden	0.87	50	0.76	0.70	0.77	0.76	0.58	0.73	0.43	0.80	0.74	
Turkey (5)	0.84	45	0.71	0.69	0.76	0.64	0.50	0.67	0.61	0.75	0.70	
United Arab Emirates	0.80	39	0.50	0.70	0.73	0.51	0.66	0.48	0.46	0.75	0.71	
United States	0.86	48	0.69	0.75	0.77	0.68	0.63	0.65	0.37	0.80	0.76	
Benchmarking Participants												
Ontario, Canada	0.87	50	0.76	0.77	0.79	0.69	0.63	0.71	0.39	0.77	0.78	
Quebec, Canada	0.87	50	0.78	0.73	0.71	0.74	0.66	0.74	0.39	0.75	0.78	
Moscow City, Russian Fed.	0.90	56	0.76	0.77	0.82	0.81	0.65	0.74	0.60	0.78	0.77	
Madrid, Spain	0.84	44	0.68	0.66	0.71	0.62	0.65	0.61	0.54	0.70	0.78	
Abu Dhabi, UAE	0.78	36	0.42	0.71	0.74	0.45	0.66	0.42	0.39	0.75	0.70	
Dubai, UAE	0.82	42	0.62	0.68	0.75	0.59	0.62	0.58	0.51	0.73	0.70	

^R Reverse coded

Relationship Between the TIMSS 2019 Students Confident in Mathematics Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.39	0.15	0.16
Armenia	0.37	0.14	0.14
Australia	0.44	0.20	0.19
Austria	0.48	0.23	0.22
Azerbaijan	0.38	0.15	0.15
Bahrain	0.26	0.07	0.06
Belgium (Flemish)	0.46	0.21	0.21
Bosnia and Herzegovina	0.40	0.16	0.16
Bulgaria	0.42	0.18	0.19
Canada	0.44	0.20	0.20
Chile	0.41	0.17	0.17
Chinese Taipei	0.44	0.19	0.18
Croatia	0.44	0.20	0.19
Cyprus	0.48	0.24	0.22
Czech Republic	0.41	0.17	0.17
Denmark	0.47	0.22	0.20
England	0.45	0.20	0.19
Finland	0.42	0.18	0.18
France	0.43	0.18	0.18
Georgia	0.34	0.12	0.12
Germany	0.47	0.22	0.22
Hong Kong SAR	0.39	0.15	0.17
Hungary	0.50	0.25	0.25
Iran, Islamic Rep. of	0.30	0.09	0.09
Ireland	0.41	0.17	0.15
Italy	0.29	0.09	0.08
Japan	0.44	0.19	0.19
Kazakhstan	0.26	0.07	0.06
Korea, Rep. of	0.48	0.23	0.22
Kosovo	0.37	0.13	0.15
Kuwait	0.28	0.08	0.09
Latvia	0.51	0.26	0.25
Lithuania	0.48	0.23	0.21
Malta	0.39	0.16	0.16
Montenegro	0.42	0.17	0.17
Morocco	0.33	0.11	0.10
Netherlands	0.54	0.29	0.28
New Zealand	0.40	0.16	0.15

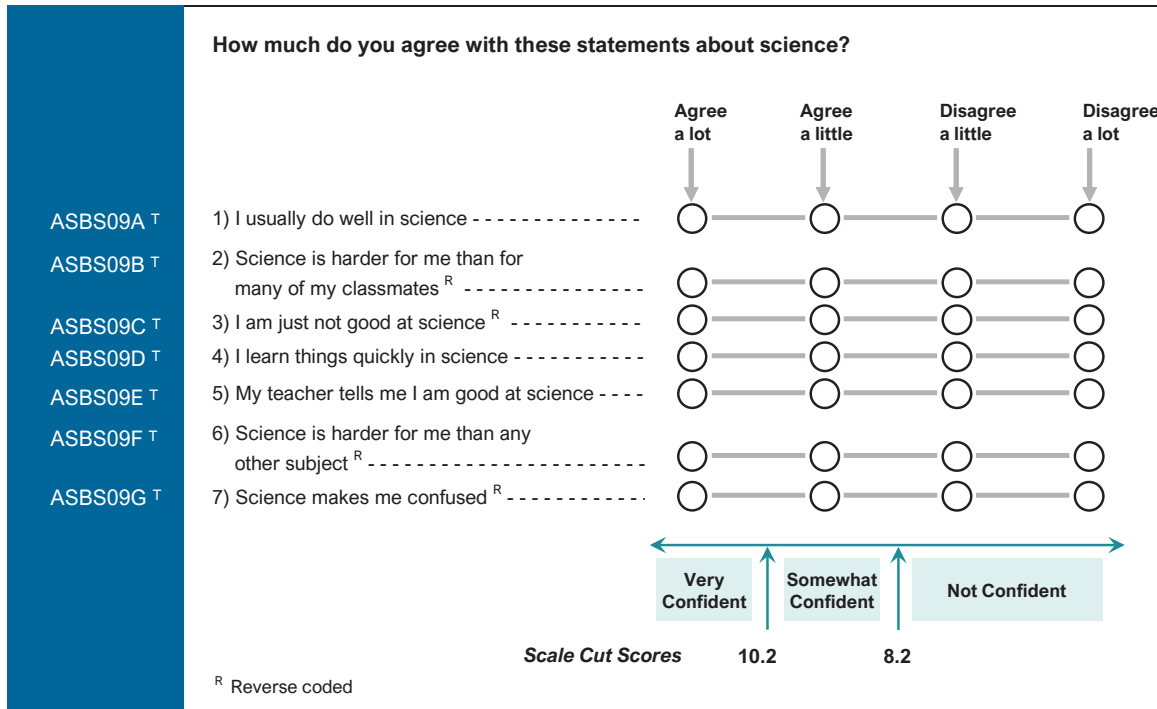
Relationship Between the TIMSS 2019 Students Confident in Mathematics Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.43	0.19	0.18
Northern Ireland	0.43	0.19	0.19
Norway (5)	0.41	0.17	0.18
Oman	0.37	0.13	0.14
Pakistan	0.24	0.06	0.05
Philippines	0.33	0.11	0.10
Poland	0.45	0.20	0.20
Portugal	0.48	0.23	0.22
Qatar	0.30	0.09	0.09
Russian Federation	0.38	0.15	0.14
Saudi Arabia	0.35	0.12	0.14
Serbia	0.47	0.22	0.21
Singapore	0.49	0.24	0.25
Slovak Republic	0.43	0.18	0.17
South Africa (5)	0.41	0.17	0.15
Spain	0.46	0.21	0.21
Sweden	0.37	0.13	0.12
Turkey (5)	0.41	0.17	0.17
United Arab Emirates	0.24	0.06	0.06
United States	0.46	0.21	0.23
International Median	0.42	0.17	0.17
Benchmarking Participants			
Ontario, Canada	0.43	0.19	0.18
Quebec, Canada	0.48	0.23	0.24
Moscow City, Russian Fed.	0.48	0.23	0.23
Madrid, Spain	0.48	0.23	0.23
Abu Dhabi, UAE	0.27	0.08	0.08
Dubai, UAE	0.19	0.04	0.04

Students Confident in Science – Grade 4

About the Scale

The *Students Confident in Science* scale was created based on students’ responses to seven items listed below.



Item Parameters for the TIMSS 2019 *Students Confident in Science* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBS09A	-0.44367	-0.49754	-0.58589	1.08343	1.00
ASBS09B ^R	0.20303	-0.59182	0.16393	0.42789	0.98
ASBS09C ^R	0.09612	-0.41547	0.10720	0.30827	0.92
ASBS09D	-0.22028	-0.69208	-0.23794	0.93002	1.01
ASBS09E	0.18927	-0.75182	-0.22051	0.97233	1.25
ASBS09F ^R	0.09940	-0.27149	0.06208	0.20941	0.93
ASBS09G ^R	0.07613	-0.18729	0.10026	0.08703	1.00

^R Reverse coded

Scale Transformation Constants for the TIMSS 2019 *Students Confident in Science* Scale – Grade 4

Scale Transformation Constants

A = 8.285794

B = 1.534620

Transformed Scale Score = 8.285794 + 1.534620 • Logit Scale Score

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Students Confident in Science* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	3.43187	
1	4.99918	
2	5.73357	
3	6.23436	
4	6.62722	
5	6.95609	
6	7.24267	
7	7.50349	
8	7.74367	
9	7.96952	
10	8.18638	8.2
11	8.39905	
12	8.61225	
13	8.83106	
14	9.06148	
15	9.31112	
16	9.58967	
17	9.90692	
18	10.29731	10.2
19	10.81276	
20	11.59621	
21	13.29214	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Students Confident in Science* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			ASBS09A	ASBS09B _R	ASBS09C _R	ASBS09D	ASBS09E	ASBS09F _R	ASBS09G _R	
Albania	0.78	44	0.61	0.73	0.76	0.63	0.60	0.72	0.54	
Armenia	0.79	44	0.63	0.67	0.72	0.61	0.62	0.72	0.68	
Australia	0.83	51	0.72	0.73	0.79	0.72	0.49	0.76	0.74	
Austria	0.86	54	0.73	0.75	0.76	0.72	0.65	0.79	0.74	
Azerbaijan	0.77	42	0.44	0.73	0.75	0.51	0.49	0.78	0.72	
Bahrain	0.77	43	0.27	0.78	0.78	0.52	0.45	0.80	0.75	
Belgium (Flemish)	0.85	54	0.78	0.76	0.82	0.69	0.58	0.78	0.70	
Bosnia and Herzegovina	0.82	47	0.65	0.72	0.73	0.63	0.60	0.75	0.72	
Bulgaria	0.83	50	0.65	0.73	0.73	0.70	0.57	0.78	0.74	
Canada	0.84	51	0.74	0.76	0.75	0.74	0.46	0.76	0.76	
Chile	0.75	41	0.47	0.72	0.76	0.53	0.32	0.77	0.76	
Chinese Taipei	0.82	48	0.62	0.73	0.70	0.66	0.49	0.80	0.78	
Croatia	0.85	53	0.71	0.76	0.76	0.70	0.60	0.80	0.75	
Cyprus	0.86	55	0.75	0.74	0.78	0.74	0.65	0.75	0.77	
Czech Republic	0.84	51	0.70	0.73	0.80	0.70	0.55	0.79	0.71	
Denmark	0.84	51	0.73	0.71	0.80	0.75	0.54	0.73	0.71	
England	0.84	53	0.73	0.74	0.81	0.74	0.44	0.80	0.76	
Finland	0.80	47	0.72	0.73	0.80	0.74	0.50	0.73	0.49	
France	0.86	55	0.76	0.75	0.78	0.75	0.53	0.76	0.82	
Georgia	0.80	46	0.62	0.73	0.78	0.62	0.49	0.75	0.69	
Germany	0.85	52	0.72	0.76	0.76	0.71	0.59	0.78	0.75	
Hong Kong SAR	0.76	42	0.49	0.76	0.81	0.47	0.29	0.81	0.71	
Hungary	0.86	55	0.75	0.75	0.80	0.73	0.67	0.79	0.68	
Iran, Islamic Rep. of	0.78	43	0.51	0.65	0.77	0.57	0.47	0.77	0.78	
Ireland	0.83	50	0.73	0.76	0.79	0.71	0.43	0.75	0.71	
Italy	0.80	46	0.68	0.68	0.61	0.72	0.60	0.76	0.70	
Japan	0.83	50	0.69	0.70	0.83	0.71	0.49	0.76	0.73	
Kazakhstan	0.84	52	0.71	0.75	0.79	0.74	0.60	0.75	0.68	
Korea, Rep. of	0.85	53	0.81	0.74	0.76	0.71	0.56	0.75	0.73	
Kosovo	0.73	39	0.53	0.75	0.74	0.50	0.52	0.73	0.52	
Kuwait	0.73	39	0.19	0.80	0.77	0.41	0.37	0.80	0.73	
Latvia	0.85	53	0.76	0.72	0.81	0.72	0.61	0.77	0.69	
Lithuania	0.83	50	0.77	0.75	0.70	0.72	0.65	0.78	0.56	
Malta	0.84	52	0.70	0.73	0.79	0.72	0.55	0.79	0.73	
Montenegro	0.78	43	0.45	0.76	0.77	0.49	0.43	0.79	0.77	
Morocco	0.73	38	0.39	0.72	0.75	0.46	0.37	0.76	0.70	
Netherlands	0.82	49	0.65	0.72	0.77	0.68	0.45	0.76	0.79	
New Zealand	0.75	40	0.55	0.70	0.76	0.56	0.31	0.75	0.70	
North Macedonia	0.78	44	0.56	0.74	0.70	0.58	0.55	0.76	0.69	
Northern Ireland	0.84	52	0.74	0.74	0.82	0.74	0.42	0.77	0.74	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Students Confident in Science* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item						
			ASBS09A	ASBS09B ^R	ASBS09C ^R	ASBS09D	ASBS09E	ASBS09F ^R	ASBS09G ^R
Norway (5)	0.80	47	0.70	0.74	0.79	0.70	0.40	0.73	0.70
Oman	0.72	38	0.19	0.78	0.69	0.41	0.35	0.82	0.75
Pakistan	0.70	36	0.33	0.73	0.75	0.33	0.30	0.73	0.75
Philippines	0.48	31	-0.33	0.70	0.66	-0.19	-0.37	0.73	0.64
Poland	0.84	51	0.74	0.76	0.69	0.74	0.54	0.79	0.73
Portugal	0.75	41	0.60	0.66	0.71	0.60	0.48	0.64	0.73
Qatar	0.77	42	0.28	0.81	0.79	0.41	0.35	0.83	0.78
Russian Federation	0.86	55	0.71	0.78	0.81	0.76	0.61	0.80	0.72
Saudi Arabia	0.73	40	0.14	0.78	0.79	0.40	0.36	0.81	0.77
Serbia	0.84	52	0.63	0.74	0.80	0.68	0.60	0.78	0.77
Singapore	0.85	53	0.74	0.77	0.80	0.67	0.51	0.80	0.75
Slovak Republic	0.84	51	0.73	0.70	0.80	0.69	0.56	0.75	0.74
South Africa (5)	0.66	34	0.21	0.77	0.74	0.29	0.14	0.79	0.69
Spain	0.80	46	0.62	0.75	0.72	0.61	0.48	0.74	0.77
Sweden	0.85	53	0.74	0.74	0.80	0.76	0.50	0.79	0.73
Turkey (5)	0.81	47	0.63	0.71	0.78	0.60	0.51	0.77	0.74
United Arab Emirates	0.78	43	0.46	0.77	0.76	0.54	0.46	0.79	0.73
United States	0.82	49	0.66	0.76	0.77	0.66	0.39	0.80	0.76
Benchmarking Participants									
Ontario, Canada	0.84	52	0.73	0.78	0.79	0.72	0.43	0.76	0.76
Quebec, Canada	0.83	51	0.75	0.73	0.65	0.78	0.51	0.77	0.78
Moscow City, Russian Fed.	0.87	58	0.73	0.79	0.83	0.78	0.60	0.81	0.74
Madrid, Spain	0.82	49	0.68	0.73	0.73	0.65	0.52	0.75	0.79
Abu Dhabi, UAE	0.77	42	0.39	0.78	0.77	0.48	0.40	0.80	0.73
Dubai, UAE	0.79	45	0.57	0.73	0.74	0.64	0.53	0.75	0.70

^R Reverse coded

Relationship Between the TIMSS 2019 Students Confident in Science Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.32	0.10	0.09
Armenia	0.27	0.07	0.07
Australia	0.19	0.04	0.04
Austria	0.31	0.10	0.11
Azerbaijan	0.28	0.08	0.07
Bahrain	0.36	0.13	0.13
Belgium (Flemish)	0.27	0.07	0.08
Bosnia and Herzegovina	0.27	0.08	0.08
Bulgaria	0.38	0.14	0.15
Canada	0.19	0.04	0.04
Chile	0.31	0.09	0.11
Chinese Taipei	0.31	0.10	0.10
Croatia	0.26	0.07	0.06
Cyprus	0.26	0.07	0.07
Czech Republic	0.25	0.06	0.07
Denmark	0.26	0.07	0.07
England	0.21	0.04	0.05
Finland	0.20	0.04	0.05
France	0.30	0.09	0.09
Georgia	0.20	0.04	0.05
Germany	0.35	0.12	0.13
Hong Kong SAR	0.27	0.07	0.08
Hungary	0.31	0.10	0.10
Iran, Islamic Rep. of	0.36	0.13	0.14
Ireland	0.17	0.03	0.03
Italy	0.17	0.03	0.04
Japan	0.20	0.04	0.04
Kazakhstan	0.20	0.04	0.03
Korea, Rep. of	0.28	0.08	0.07
Kosovo	0.33	0.11	0.12
Kuwait	0.30	0.09	0.09
Latvia	0.20	0.04	0.04
Lithuania	0.24	0.06	0.06
Malta	0.27	0.07	0.09
Montenegro	0.34	0.11	0.12
Morocco	0.33	0.11	0.12
Netherlands	0.27	0.08	0.09
New Zealand	0.22	0.05	0.05

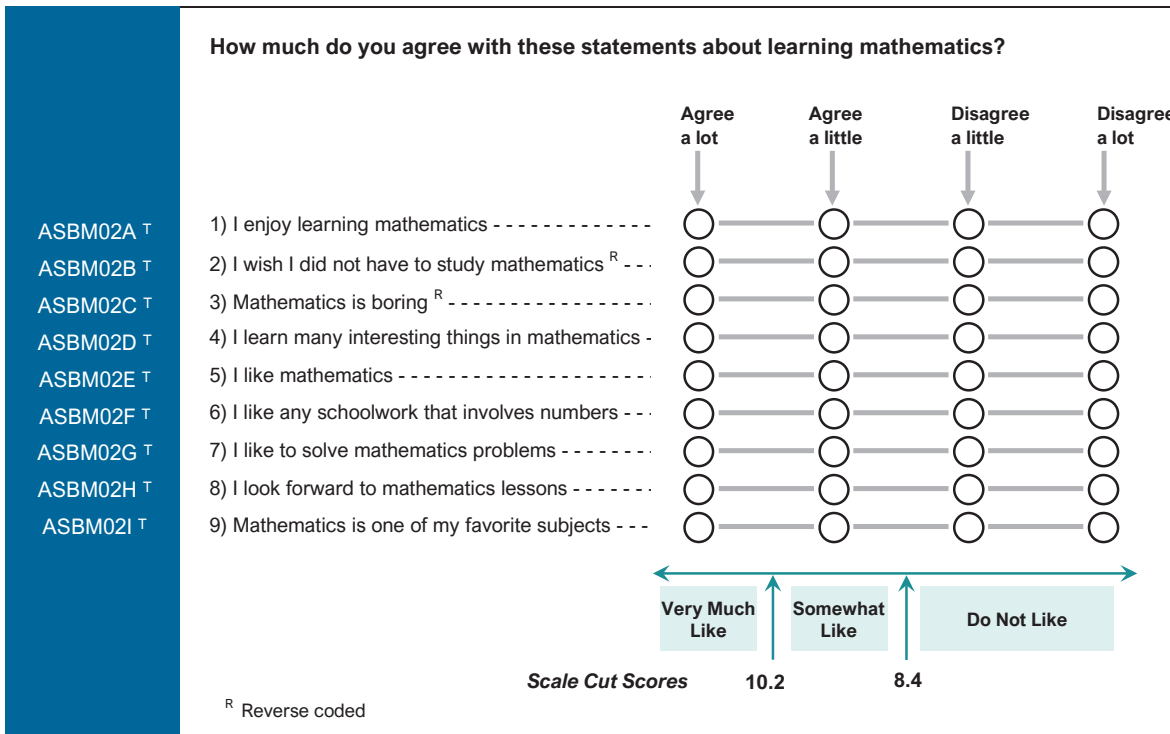
Relationship Between the TIMSS 2019 Students Confident in Science Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.42	0.18	0.18
Northern Ireland	0.23	0.05	0.06
Norway (5)	0.22	0.05	0.05
Oman	0.38	0.14	0.15
Pakistan	0.21	0.04	0.04
Philippines	0.39	0.16	0.14
Poland	0.23	0.05	0.06
Portugal	0.28	0.08	0.09
Qatar	0.33	0.11	0.12
Russian Federation	0.19	0.03	0.04
Saudi Arabia	0.35	0.12	0.13
Serbia	0.25	0.06	0.07
Singapore	0.26	0.07	0.08
Slovak Republic	0.26	0.07	0.07
South Africa (5)	0.41	0.17	0.17
Spain	0.27	0.07	0.08
Sweden	0.19	0.03	0.04
Turkey (5)	0.33	0.11	0.12
United Arab Emirates	0.27	0.07	0.08
United States	0.25	0.06	0.08
International Median	0.27	0.07	0.08
Benchmarking Participants			
Ontario, Canada	0.18	0.03	0.04
Quebec, Canada	0.21	0.04	0.05
Moscow City, Russian Fed.	0.19	0.03	0.04
Madrid, Spain	0.28	0.08	0.10
Abu Dhabi, UAE	0.30	0.09	0.10
Dubai, UAE	0.17	0.03	0.03

Students Like Learning Mathematics – Grade 4

About the Scale

The *Students Like Learning Mathematics* scale was created based on students’ responses to nine items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Students Like Learning Mathematics* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBM02A	-0.36071	-0.72190	-0.46691	1.18881	0.78
ASBM02B ^R	0.25692	-0.42734	0.08319	0.34415	1.77
ASBM02C ^R	0.13685	-0.71463	0.14695	0.56768	1.33
ASBM02D	-0.64160	-0.71305	-0.29401	1.00706	1.14
ASBM02E	-0.20358	-0.49481	-0.33283	0.82764	0.64
ASBM02F	0.01126	-1.11828	-0.10444	1.22272	1.01
ASBM02G	0.09150	-0.86159	-0.20061	1.06220	1.00
ASBM02H	0.34970	-0.96071	-0.17174	1.13245	0.83
ASBM02I	0.35966	-0.48032	-0.05428	0.53460	0.88

^R Reverse coded

Scale Transformation Constants for the TIMSS 2019 *Students Like Learning Mathematics* Scale – Grade 4

Scale Transformation Constants

A = 8.402636

B = 1.234546

Transformed Scale Score = 8.402636 + 1.234546 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Students Like Learning Mathematics Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	3.85307	
1	5.17652	
2	5.79688	
3	6.21498	
4	6.54051	
5	6.81155	
6	7.04782	
7	7.26046	
8	7.45571	
9	7.64004	
10	7.81505	
11	7.98325	
12	8.14669	
13	8.30721	8.4
14	8.46650	
15	8.62627	
16	8.78843	
17	8.95513	
18	9.12899	
19	9.31319	
20	9.51007	
21	9.72723	
22	9.97246	
23	10.25879	10.2
24	10.60755	
25	11.06393	
26	11.73885	
27	13.14434	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Students Like Learning Mathematics* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ASBM02A	ASBM02B R	ASBM02C R	ASBM02D	ASBM02E	ASBM02F	ASBM02G	ASBM02H	ASBM02I	
Albania	0.81	46	0.78	0.33	0.55	0.53	0.82	0.69	0.75	0.76	0.77	
Armenia	0.86	52	0.71	0.39	0.39	0.74	0.86	0.75	0.79	0.82	0.84	
Australia	0.94	68	0.89	0.73	0.80	0.70	0.91	0.78	0.84	0.90	0.86	
Austria	0.94	68	0.89	0.70	0.74	0.73	0.91	0.79	0.86	0.90	0.86	
Azerbaijan	0.78	50	0.79	0.03	0.38	0.72	0.85	0.70	0.79	0.80	0.84	
Bahrain	0.89	56	0.78	0.52	0.57	0.75	0.88	0.70	0.81	0.81	0.82	
Belgium (Flemish)	0.93	64	0.88	0.76	0.81	0.64	0.92	0.76	0.69	0.84	0.84	
Bosnia and Herzegovina	0.91	60	0.83	0.55	0.67	0.68	0.90	0.79	0.77	0.89	0.84	
Bulgaria	0.93	65	0.85	0.56	0.73	0.75	0.90	0.83	0.88	0.84	0.84	
Canada	0.93	64	0.87	0.65	0.77	0.69	0.90	0.76	0.81	0.87	0.84	
Chile	0.90	57	0.81	0.51	0.65	0.66	0.89	0.70	0.82	0.85	0.83	
Chinese Taipei	0.94	67	0.87	0.70	0.69	0.76	0.91	0.83	0.85	0.87	0.85	
Croatia	0.94	67	0.89	0.68	0.82	0.78	0.93	0.84	0.60	0.92	0.86	
Cyprus	0.92	62	0.85	0.65	0.70	0.73	0.89	0.76	0.79	0.86	0.84	
Czech Republic	0.93	65	0.89	0.63	0.72	0.73	0.92	0.79	0.73	0.91	0.88	
Denmark	0.93	65	0.86	0.69	0.79	0.79	0.89	0.76	0.75	0.88	0.84	
England	0.93	66	0.88	0.71	0.78	0.69	0.91	0.76	0.82	0.89	0.85	
Finland	0.93	65	0.86	0.67	0.82	0.74	0.91	0.80	0.70	0.87	0.85	
France	0.91	60	0.86	0.67	0.74	0.71	0.89	0.71	0.69	0.82	0.84	
Georgia	0.86	50	0.78	0.47	0.53	0.61	0.85	0.70	0.74	0.82	0.78	
Germany	0.94	67	0.87	0.71	0.74	0.74	0.91	0.81	0.78	0.90	0.87	
Hong Kong SAR	0.93	66	0.86	0.56	0.68	0.79	0.91	0.85	0.86	0.87	0.87	
Hungary	0.92	62	0.88	0.62	0.70	0.67	0.91	0.79	0.74	0.87	0.85	
Iran, Islamic Rep. of	0.87	52	0.80	0.53	0.53	0.68	0.87	0.59	0.82	0.76	0.81	
Ireland	0.93	65	0.87	0.68	0.77	0.71	0.91	0.74	0.81	0.88	0.83	
Italy	0.93	64	0.86	0.72	0.80	0.67	0.89	0.78	0.71	0.87	0.85	
Japan	0.93	66	0.88	0.60	0.71	0.75	0.91	0.81	0.86	0.88	0.84	
Kazakhstan	0.88	54	0.76	0.39	0.69	0.65	0.85	0.73	0.78	0.83	0.82	
Korea, Rep. of	0.95	71	0.88	0.69	0.81	0.75	0.92	0.87	0.91	0.84	0.87	
Kosovo	0.63	37	0.70	0.08	0.26	0.56	0.85	0.75	0.51	0.63	0.72	
Kuwait	0.87	53	0.78	0.26	0.37	0.75	0.88	0.76	0.83	0.83	0.82	
Latvia	0.93	64	0.87	0.65	0.78	0.70	0.89	0.77	0.83	0.86	0.84	
Lithuania	0.92	61	0.86	0.71	0.73	0.59	0.89	0.78	0.85	0.79	0.81	
Malta	0.91	59	0.85	0.61	0.75	0.66	0.88	0.70	0.71	0.85	0.84	
Montenegro	0.90	57	0.83	0.53	0.66	0.68	0.88	0.76	0.72	0.88	0.79	
Morocco	0.78	42	0.58	0.32	0.37	0.67	0.80	0.69	0.72	0.78	0.69	
Netherlands	0.92	63	0.83	0.68	0.77	0.64	0.90	0.76	0.85	0.84	0.82	
New Zealand	0.94	66	0.87	0.71	0.76	0.71	0.91	0.77	0.84	0.88	0.85	
North Macedonia	0.81	46	0.80	0.35	0.43	0.59	0.86	0.66	0.63	0.77	0.80	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Students Like Learning Mathematics* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ASBM02A	ASBM02B ^R	ASBM02C ^R	ASBM02D	ASBM02E	ASBM02F	ASBM02G	ASBM02H	ASBM02I	
Northern Ireland	0.93	64	0.86	0.66	0.77	0.66	0.90	0.79	0.80	0.88	0.83	
Norway (5)	0.94	67	0.87	0.66	0.79	0.75	0.90	0.79	0.86	0.87	0.84	
Oman	0.80	44	0.72	0.27	0.40	0.73	0.84	0.66	0.78	0.59	0.77	
Pakistan	0.75	42	0.65	-0.03	-0.05	0.73	0.80	0.68	0.76	0.74	0.76	
Philippines	0.76	36	0.69	0.31	0.40	0.65	0.74	0.63	0.66	0.46	0.72	
Poland	0.93	64	0.87	0.67	0.75	0.76	0.90	0.77	0.86	0.72	0.85	
Portugal	0.92	62	0.86	0.66	0.71	0.68	0.89	0.76	0.80	0.85	0.81	
Qatar	0.90	56	0.78	0.49	0.56	0.73	0.88	0.75	0.82	0.83	0.83	
Russian Federation	0.90	58	0.84	0.53	0.72	0.66	0.87	0.76	0.73	0.84	0.83	
Saudi Arabia	0.86	52	0.72	0.36	0.49	0.75	0.86	0.72	0.82	0.83	0.78	
Serbia	0.93	66	0.85	0.66	0.79	0.76	0.91	0.80	0.78	0.90	0.84	
Singapore	0.93	65	0.86	0.74	0.77	0.72	0.90	0.73	0.81	0.85	0.86	
Slovak Republic	0.93	63	0.88	0.65	0.78	0.56	0.90	0.74	0.82	0.90	0.85	
South Africa (5)	0.80	42	0.72	0.29	0.35	0.62	0.79	0.71	0.69	0.70	0.73	
Spain	0.90	58	0.81	0.51	0.72	0.66	0.88	0.73	0.78	0.84	0.84	
Sweden	0.94	70	0.87	0.71	0.85	0.77	0.93	0.84	0.82	0.88	0.84	
Turkey (5)	0.88	54	0.77	0.61	0.71	0.47	0.87	0.65	0.80	0.79	0.83	
United Arab Emirates	0.89	56	0.80	0.51	0.57	0.71	0.87	0.73	0.79	0.82	0.83	
United States	0.93	65	0.87	0.64	0.74	0.71	0.91	0.77	0.87	0.88	0.85	
Benchmarking Participants												
Ontario, Canada	0.93	64	0.88	0.65	0.77	0.68	0.91	0.74	0.83	0.86	0.85	
Quebec, Canada	0.92	62	0.85	0.62	0.76	0.71	0.89	0.76	0.76	0.87	0.82	
Moscow City, Russian Fed.	0.92	61	0.87	0.53	0.75	0.70	0.89	0.75	0.77	0.85	0.86	
Madrid, Spain	0.90	56	0.81	0.54	0.73	0.65	0.87	0.71	0.74	0.83	0.82	
Abu Dhabi, UAE	0.89	55	0.80	0.47	0.53	0.73	0.87	0.73	0.79	0.82	0.83	
Dubai, UAE	0.91	59	0.81	0.59	0.71	0.64	0.87	0.73	0.82	0.83	0.83	

^R Reverse coded

Relationship Between the TIMSS 2019 Students Like Learning Mathematics Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.30	0.09	0.06
Armenia	0.25	0.06	0.05
Australia	0.24	0.06	0.05
Austria	0.19	0.04	0.03
Azerbaijan	0.30	0.09	0.08
Bahrain	0.19	0.03	0.03
Belgium (Flemish)	0.18	0.03	0.03
Bosnia and Herzegovina	0.16	0.03	0.03
Bulgaria	0.15	0.02	0.02
Canada	0.23	0.05	0.05
Chile	0.21	0.04	0.04
Chinese Taipei	0.26	0.07	0.06
Croatia	0.21	0.04	0.05
Cyprus	0.24	0.06	0.06
Czech Republic	0.21	0.05	0.04
Denmark	0.20	0.04	0.03
England	0.22	0.05	0.05
Finland	0.16	0.03	0.02
France	0.21	0.05	0.04
Georgia	0.18	0.03	0.03
Germany	0.23	0.05	0.05
Hong Kong SAR	0.23	0.05	0.06
Hungary	0.21	0.04	0.04
Iran, Islamic Rep. of	0.17	0.03	0.03
Ireland	0.20	0.04	0.04
Italy	0.13	0.02	0.02
Japan	0.31	0.09	0.08
Kazakhstan	0.15	0.02	0.01
Korea, Rep. of	0.31	0.10	0.09
Kosovo	0.36	0.13	0.10
Kuwait	0.24	0.06	0.06
Latvia	0.26	0.07	0.06
Lithuania	0.15	0.02	0.02
Malta	0.19	0.04	0.03
Montenegro	0.21	0.04	0.04
Morocco	0.29	0.08	0.08
Netherlands	0.18	0.03	0.03
New Zealand	0.15	0.02	0.02

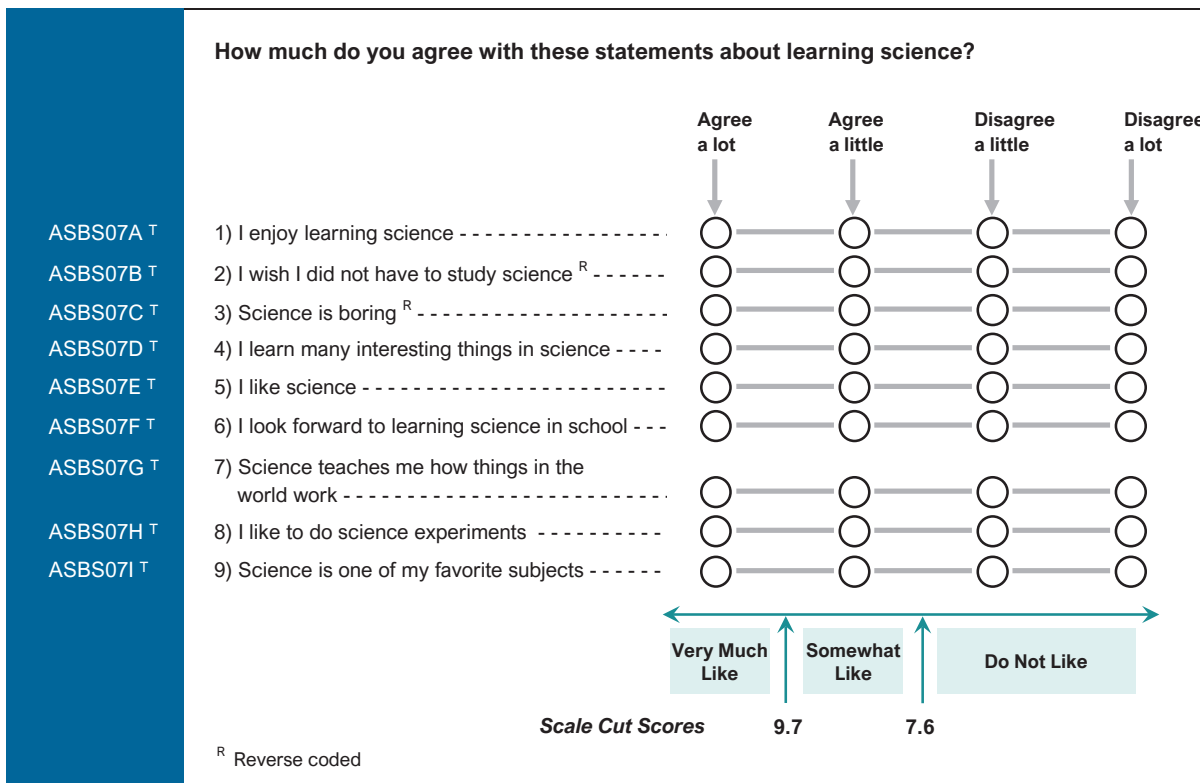
Relationship Between the TIMSS 2019 *Students Like Learning Mathematics* Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.29	0.08	0.08
Northern Ireland	0.25	0.06	0.06
Norway (5)	0.12	0.02	0.02
Oman	0.28	0.08	0.07
Pakistan	0.12	0.01	0.03
Philippines	0.41	0.16	0.17
Poland	0.20	0.04	0.04
Portugal	0.25	0.06	0.05
Qatar	0.18	0.03	0.05
Russian Federation	0.18	0.03	0.03
Saudi Arabia	0.26	0.07	0.07
Serbia	0.17	0.03	0.03
Singapore	0.30	0.09	0.09
Slovak Republic	0.09	0.01	0.01
South Africa (5)	0.34	0.12	0.13
Spain	0.19	0.04	0.04
Sweden	0.11	0.01	0.01
Turkey (5)	0.23	0.05	0.05
United Arab Emirates	0.21	0.04	0.05
United States	0.19	0.04	0.05
International Median	0.21	0.04	0.04
Benchmarking Participants			
Ontario, Canada	0.21	0.04	0.05
Quebec, Canada	0.26	0.07	0.06
Moscow City, Russian Fed.	0.25	0.06	0.06
Madrid, Spain	0.17	0.03	0.03
Abu Dhabi, UAE	0.16	0.03	0.03
Dubai, UAE	0.12	0.02	0.02

Students Like Learning Science – Grade 4

About the Scale

The *Students Like Learning Science* scale was created based on students’ responses to nine items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Students Like Learning Science* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ASBS07A	-0.12179	-0.53434	-0.49509	1.02943	0.81
ASBS07B ^R	0.51587	-0.34763	-0.09494	0.44257	1.55
ASBS07C ^R	0.30062	-0.44642	-0.04532	0.49174	1.25
ASBS07D	-0.46068	-0.25588	-0.41313	0.66901	0.94
ASBS07E	-0.06693	-0.45384	-0.32221	0.77605	0.66
ASBS07F	0.26162	-0.76615	-0.14592	0.91207	0.82
ASBS07G	-0.54440	-0.39669	-0.49739	0.89408	1.13
ASBS07H	-0.38772	-0.17842	-0.29340	0.47182	1.26
ASBS07I	0.50341	-0.65684	-0.14297	0.79981	0.90

^R Reverse coded

Scale Transformation Constants for the TIMSS 2019 *Students Like Learning Science* Scale – Grade 4

Scale Transformation Constants

A = 7.692952

B = 1.486733

Transformed Scale Score = 7.692952 + 1.486733 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Students Like Learning Science Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	2.69347	
1	4.16658	
2	4.83600	
3	5.28195	
4	5.62666	
5	5.91275	
6	6.16040	
7	6.38769	
8	6.59779	
9	6.79572	
10	6.98534	
11	7.16962	
12	7.35091	
13	7.53117	7.6
14	7.71287	
15	7.89534	
16	8.08274	
17	8.27639	
18	8.47890	
19	8.69346	
20	8.92203	
21	9.17441	
22	9.45888	
23	9.79069	9.7
24	10.19505	
25	10.72673	
26	11.51982	
27	13.19236	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Students Like Learning Science* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ASBS07A	ASBS07B _R	ASBS07C _R	ASBS07D	ASBS07E	ASBS07F	ASBS07G	ASBS07H	ASBS07I	
Albania	0.75	41	0.76	0.33	0.54	0.60	0.84	0.76	0.52	0.54	0.70	
Armenia	0.86	50	0.74	0.39	0.37	0.76	0.87	0.83	0.72	0.66	0.84	
Australia	0.93	64	0.88	0.72	0.78	0.78	0.91	0.90	0.67	0.68	0.84	
Austria	0.88	54	0.83	0.64	0.73	0.74	0.91	0.90	0.55	0.28	0.84	
Azerbaijan	0.76	45	0.76	0.04	0.36	0.75	0.85	0.80	0.66	0.59	0.80	
Bahrain	0.86	51	0.74	0.51	0.52	0.79	0.86	0.77	0.71	0.66	0.81	
Belgium (Flemish)	0.91	58	0.86	0.76	0.82	0.70	0.91	0.84	0.54	0.43	0.84	
Bosnia and Herzegovina	0.87	52	0.82	0.48	0.61	0.72	0.89	0.87	0.55	0.62	0.81	
Bulgaria	0.87	52	0.82	0.45	0.63	0.76	0.86	0.79	0.67	0.62	0.81	
Canada	0.91	59	0.86	0.64	0.76	0.75	0.91	0.89	0.60	0.60	0.85	
Chile	0.85	49	0.75	0.43	0.56	0.73	0.86	0.81	0.66	0.60	0.78	
Chinese Taipei	0.92	62	0.86	0.61	0.58	0.83	0.91	0.88	0.74	0.74	0.85	
Croatia	0.89	56	0.85	0.61	0.73	0.76	0.91	0.89	0.54	0.44	0.83	
Cyprus	0.92	61	0.87	0.68	0.74	0.78	0.91	0.87	0.68	0.60	0.86	
Czech Republic	0.91	59	0.86	0.62	0.71	0.74	0.91	0.90	0.65	0.57	0.88	
Denmark	0.92	61	0.84	0.71	0.79	0.83	0.90	0.89	0.63	0.52	0.82	
England	0.92	63	0.87	0.73	0.78	0.75	0.91	0.90	0.66	0.62	0.84	
Finland	0.92	63	0.85	0.70	0.78	0.79	0.91	0.87	0.67	0.68	0.84	
France	0.92	61	0.87	0.73	0.77	0.76	0.90	0.85	0.63	0.65	0.83	
Georgia	0.85	48	0.78	0.54	0.56	0.63	0.87	0.82	0.55	0.62	0.75	
Germany	0.92	61	0.83	0.75	0.74	0.78	0.89	0.88	0.65	0.62	0.84	
Hong Kong SAR	0.91	60	0.83	0.42	0.48	0.83	0.92	0.89	0.79	0.78	0.86	
Hungary	0.89	55	0.85	0.62	0.70	0.73	0.90	0.87	0.58	0.47	0.82	
Iran, Islamic Rep. of	0.85	48	0.76	0.50	0.52	0.69	0.84	0.74	0.66	0.68	0.81	
Ireland	0.91	60	0.84	0.66	0.74	0.74	0.90	0.89	0.63	0.67	0.82	
Italy	0.89	53	0.83	0.69	0.73	0.71	0.87	0.85	0.46	0.47	0.83	
Japan	0.92	61	0.86	0.60	0.68	0.77	0.90	0.90	0.69	0.74	0.83	
Kazakhstan	0.88	52	0.78	0.47	0.65	0.73	0.84	0.82	0.70	0.66	0.80	
Korea, Rep. of	0.93	64	0.87	0.71	0.79	0.78	0.90	0.85	0.70	0.72	0.86	
Kosovo	0.71	41	0.77	0.11	0.37	0.61	0.86	0.73	0.66	0.59	0.72	
Kuwait	0.82	47	0.67	0.27	0.37	0.75	0.83	0.81	0.74	0.73	0.78	
Latvia	0.88	52	0.84	0.64	0.75	0.76	0.87	0.65	0.57	0.52	0.82	
Lithuania	0.88	54	0.85	0.71	0.71	0.67	0.88	0.79	0.61	0.50	0.80	
Malta	0.91	59	0.85	0.60	0.74	0.75	0.90	0.87	0.63	0.65	0.84	
Montenegro	0.82	47	0.76	0.34	0.48	0.71	0.86	0.84	0.62	0.67	0.71	
Morocco	0.80	43	0.64	0.40	0.42	0.71	0.80	0.76	0.68	0.72	0.68	
Netherlands	0.90	56	0.84	0.57	0.72	0.73	0.91	0.84	0.62	0.65	0.81	
New Zealand	0.92	61	0.86	0.53	0.63	0.79	0.90	0.89	0.72	0.80	0.83	
North Macedonia	0.81	46	0.79	0.27	0.29	0.75	0.86	0.78	0.69	0.63	0.77	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Students Like Learning Science* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ASBS07A	ASBS07B ^R	ASBS07C ^R	ASBS07D	ASBS07E	ASBS07F	ASBS07G	ASBS07H	ASBS07I	
Northern Ireland	0.91	58	0.84	0.65	0.71	0.74	0.89	0.87	0.63	0.69	0.80	
Norway (5)	0.91	60	0.87	0.71	0.79	0.78	0.91	0.89	0.55	0.56	0.82	
Oman	0.79	43	0.66	0.36	0.45	0.68	0.80	0.68	0.71	0.69	0.77	
Pakistan	0.78	41	0.58	0.22	0.20	0.75	0.76	0.68	0.74	0.75	0.77	
Philippines	0.76	37	0.69	0.29	0.36	0.68	0.74	0.54	0.64	0.67	0.68	
Poland	0.90	56	0.85	0.61	0.64	0.82	0.88	0.71	0.70	0.67	0.83	
Portugal	0.88	53	0.82	0.55	0.57	0.73	0.87	0.82	0.67	0.69	0.76	
Qatar	0.86	51	0.73	0.42	0.47	0.75	0.86	0.81	0.73	0.70	0.81	
Russian Federation	0.88	54	0.82	0.57	0.70	0.73	0.87	0.83	0.64	0.56	0.82	
Saudi Arabia	0.85	50	0.70	0.40	0.48	0.79	0.85	0.81	0.71	0.73	0.79	
Serbia	0.90	56	0.84	0.55	0.69	0.75	0.89	0.86	0.63	0.63	0.82	
Singapore	0.91	58	0.85	0.70	0.73	0.76	0.89	0.86	0.64	0.55	0.83	
Slovak Republic	0.90	56	0.86	0.66	0.76	0.61	0.89	0.88	0.60	0.57	0.83	
South Africa (5)	0.79	41	0.69	0.29	0.35	0.66	0.78	0.71	0.68	0.69	0.70	
Spain	0.85	49	0.81	0.43	0.63	0.73	0.88	0.84	0.57	0.42	0.80	
Sweden	0.93	64	0.86	0.73	0.82	0.80	0.91	0.89	0.66	0.62	0.83	
Turkey (5)	0.86	48	0.75	0.55	0.65	0.60	0.84	0.76	0.60	0.63	0.80	
United Arab Emirates	0.88	54	0.77	0.51	0.56	0.76	0.88	0.82	0.72	0.69	0.82	
United States	0.91	59	0.86	0.62	0.69	0.76	0.91	0.88	0.64	0.64	0.84	
Benchmarking Participants												
Ontario, Canada	0.91	60	0.85	0.66	0.77	0.75	0.90	0.89	0.64	0.57	0.84	
Quebec, Canada	0.91	59	0.87	0.60	0.75	0.77	0.91	0.90	0.51	0.63	0.87	
Moscow City, Russian Fed.	0.89	56	0.85	0.61	0.74	0.74	0.89	0.84	0.60	0.48	0.85	
Madrid, Spain	0.86	49	0.83	0.47	0.64	0.72	0.89	0.84	0.55	0.36	0.81	
Abu Dhabi, UAE	0.88	54	0.77	0.46	0.50	0.79	0.88	0.84	0.71	0.71	0.83	
Dubai, UAE	0.88	53	0.79	0.57	0.69	0.68	0.88	0.81	0.68	0.61	0.81	

^R Reverse coded

Relationship Between the TIMSS 2019 Students Like Learning Science Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.20	0.04	0.03
Armenia	0.22	0.05	0.05
Australia	0.10	0.01	0.01
Austria	0.17	0.03	0.02
Azerbaijan	0.22	0.05	0.04
Bahrain	0.33	0.11	0.10
Belgium (Flemish)	0.12	0.02	0.01
Bosnia and Herzegovina	0.08	0.01	0.01
Bulgaria	0.14	0.02	0.02
Canada	0.08	0.01	0.01
Chile	0.20	0.04	0.03
Chinese Taipei	0.17	0.03	0.02
Croatia	0.11	0.01	0.01
Cyprus	0.18	0.03	0.03
Czech Republic	0.09	0.01	0.01
Denmark	0.13	0.02	0.02
England	0.07	0.01	0.00
Finland	0.01	0.00	0.00
France	0.14	0.02	0.02
Georgia	0.08	0.01	0.01
Germany	0.18	0.03	0.03
Hong Kong SAR	0.23	0.05	0.05
Hungary	0.09	0.01	0.01
Iran, Islamic Rep. of	0.26	0.07	0.07
Ireland	0.15	0.02	0.02
Italy	0.09	0.01	0.01
Japan	0.13	0.02	0.01
Kazakhstan	0.14	0.02	0.02
Korea, Rep. of	0.20	0.04	0.03
Kosovo	0.28	0.08	0.07
Kuwait	0.33	0.11	0.10
Latvia	0.05	0.00	0.00
Lithuania	0.07	0.01	0.00
Malta	0.21	0.04	0.04
Montenegro	0.13	0.02	0.03
Morocco	0.35	0.12	0.10
Netherlands	0.16	0.03	0.02
New Zealand	0.15	0.02	0.02

Relationship Between the TIMSS 2019 *Students Like Learning Science* Scale and TIMSS 2019 Achievement – Grade 4

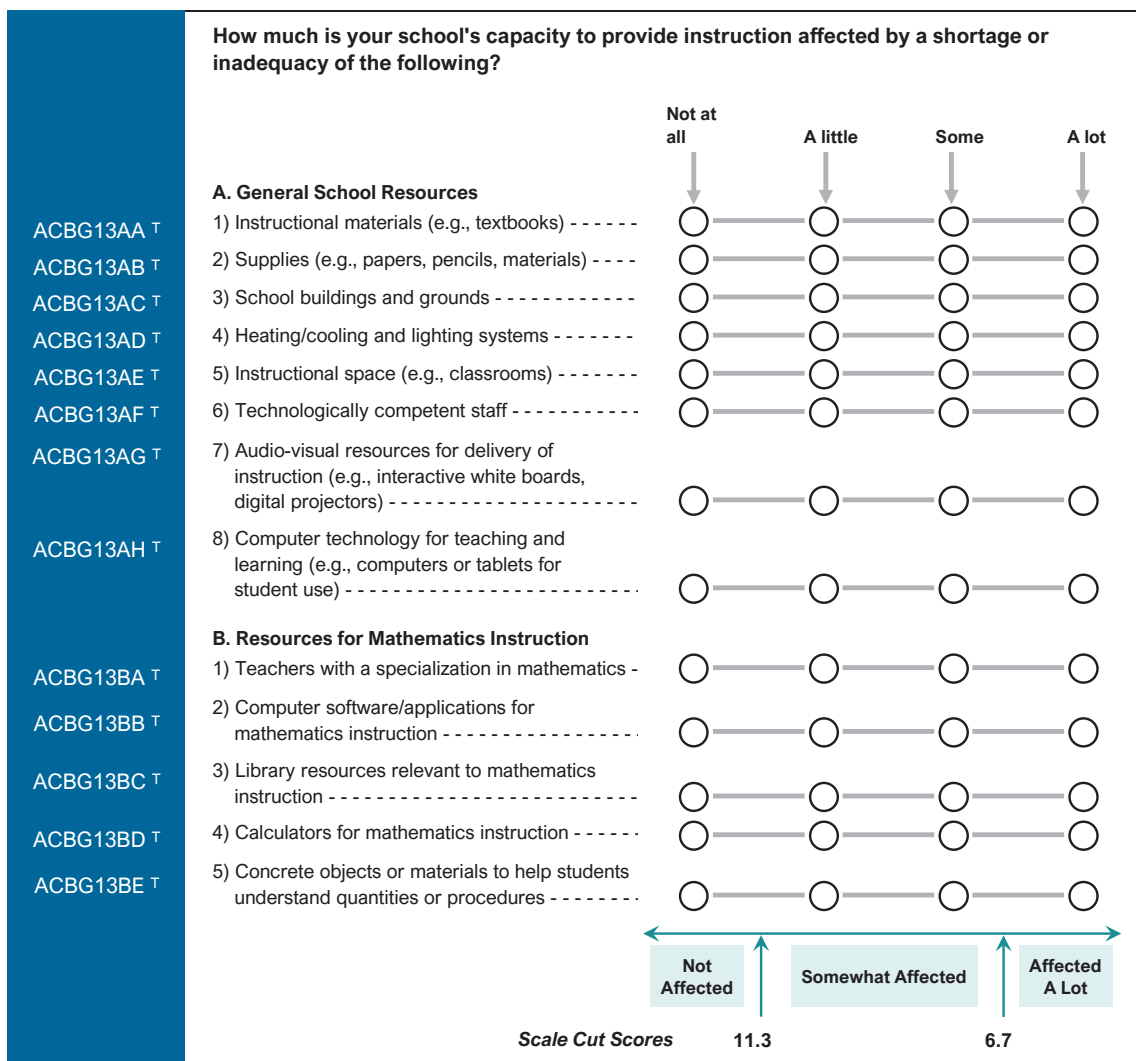
Country	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2	
North Macedonia	0.31	0.10	0.09
Northern Ireland	0.21	0.04	0.04
Norway (5)	0.09	0.01	0.01
Oman	0.34	0.11	0.11
Pakistan	0.19	0.04	0.05
Philippines	0.50	0.25	0.23
Poland	0.08	0.01	0.01
Portugal	0.20	0.04	0.05
Qatar	0.34	0.12	0.13
Russian Federation	0.04	0.00	0.00
Saudi Arabia	0.33	0.11	0.12
Serbia	0.03	0.00	0.01
Singapore	0.15	0.02	0.02
Slovak Republic	0.06	0.00	0.00
South Africa (5)	0.42	0.18	0.17
Spain	0.10	0.01	0.01
Sweden	0.05	0.00	0.01
Turkey (5)	0.29	0.09	0.08
United Arab Emirates	0.32	0.10	0.09
United States	0.13	0.02	0.02
International Median	0.15	0.02	0.02
Benchmarking Participants			
Ontario, Canada	0.07	0.00	0.01
Quebec, Canada	0.10	0.01	0.01
Moscow City, Russian Fed.	0.03	0.00	0.00
Madrid, Spain	0.09	0.01	0.01
Abu Dhabi, UAE	0.32	0.10	0.10
Dubai, UAE	0.15	0.02	0.02

Scales Based on Principals' Reports

Instruction Affected by Mathematics Resource Shortages – Grade 4

About the Scale

The *Instruction Affected by Mathematics Resource Shortages* scale was created based on principals' responses to thirteen items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

**Item Parameters for the TIMSS 2019 *Instruction Affected by Mathematics*
Resource Shortages Scale – Grade 4**

Item	delta	tau_1	tau_2	tau_3	Infit
ACBG13AA	-0.14948	-0.24821	0.06659	0.18162	0.94
ACBG13AB	-0.38241	-0.22495	0.19483	0.03012	0.86
ACBG13AC	0.12747	-0.72711	0.13093	0.59618	1.11
ACBG13AD	-0.13054	-0.44482	0.17299	0.27183	0.97
ACBG13AE	0.17053	-0.44105	-0.02256	0.46361	1.12
ACBG13AF	0.18053	-1.21486	-0.06356	1.27842	1.00
ACBG13AG	0.09526	-0.75238	0.02378	0.72860	0.95
ACBG13AH	0.32224	-0.95290	0.03310	0.91980	1.10
ACBG13BA	0.00799	-0.52502	0.00573	0.51929	1.10
ACBG13BB	0.16554	-1.32115	0.08121	1.23994	1.07
ACBG13BC	0.07814	-1.30714	0.04775	1.25939	1.15
ACBG13BD	-0.52163	-0.74124	0.19132	0.54992	1.35
ACBG13BE	0.03636	-1.10053	-0.05826	1.15879	0.86

**Scale Transformation Constants for the TIMSS 2019 *Instruction Affected by Mathematics*
Resource Shortages Scale – Grade 4**

Scale Transformation Constants

A = 8.983616

B = 1.642771

Transformed Scale Score = 8.983616 + 1.642771 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Instruction Affected by Mathematics Resource Shortages Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	2.26751	
1	4.10533	
2	4.97458	
3	5.55459	
4	5.99316	
5	6.34731	
6	6.64531	6.7
7	6.90436	
8	7.13441	
9	7.34236	
10	7.53320	
11	7.70956	
12	7.87690	
13	8.03580	
14	8.18794	
15	8.33477	
16	8.47754	
17	8.61741	
18	8.75540	
19	8.89246	
20	9.03124	
21	9.16743	
22	9.30709	
23	9.44946	
24	9.59555	
25	9.74642	
26	9.90334	
27	10.06763	
28	10.23978	
29	10.42410	
30	10.62249	
31	10.83857	
32	11.07716	
33	11.34502	11.3
34	11.65202	
35	12.01510	
36	12.46230	
37	13.05030	
38	13.92655	
39	15.77025	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Instruction Affected by Mathematics Resource Shortages Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item												
			ACBG13AA	ACBG13AB	ACBG13AC	ACBG13AD	ACBG13AE	ACBG13AF	ACBG13AG	ACBG13AH	ACBG13BA	ACBG13BB	ACBG13BC	ACBG13BD	ACBG13BE
Albania	0.90	46	0.73	0.81	0.81	0.77	0.75	0.73	0.62	0.63	0.63	0.46	0.48	0.47	0.78
Armenia	0.88	42	0.65	0.53	0.61	0.68	0.54	0.68	0.64	0.64	0.69	0.68	0.71	0.63	0.71
Australia	0.92	51	0.66	0.72	0.71	0.67	0.74	0.68	0.78	0.80	0.56	0.74	0.72	0.72	0.75
Austria	0.82	33	0.54	0.57	0.60	0.50	0.61	0.61	0.58	0.60	0.63	0.61	0.61	0.50	0.53
Azerbaijan	0.86	38	0.53	0.58	0.60	0.66	0.61	0.65	0.52	0.61	0.61	0.60	0.71	0.59	0.65
Bahrain	0.97	74	0.92	0.91	0.88	0.90	0.94	0.89	0.88	0.83	0.90	0.79	0.71	0.69	0.88
Belgium (Flemish)	0.89	46	0.76	0.76	0.62	0.71	0.62	0.61	0.78	0.71	0.52	0.66	0.48	0.71	0.78
Bosnia and Herzegovina	0.89	43	0.74	0.69	0.72	0.67	0.68	0.60	0.69	0.68	0.54	0.56	0.62	0.58	0.72
Bulgaria	0.86	41	0.76	0.78	0.75	0.80	0.65	0.31	0.75	0.66	0.64	0.47	0.53	0.37	0.63
Canada	0.90	47	0.75	0.77	0.73	0.69	0.64	0.66	0.76	0.74	0.51	0.64	0.67	0.65	0.67
Chile	0.92	52	0.68	0.70	0.67	0.59	0.69	0.79	0.83	0.80	0.54	0.69	0.78	0.72	0.82
Chinese Taipei	0.92	51	0.72	0.74	0.70	0.80	0.69	0.76	0.80	0.76	0.66	0.72	0.65	0.60	0.68
Croatia	0.85	38	0.65	0.71	0.67	0.71	0.69	0.65	0.54	0.38	0.56	0.62	0.54	0.41	0.72
Cyprus	0.92	51	0.83	0.81	0.62	0.73	0.78	0.77	0.73	0.54	0.67	0.77	0.69	0.64	0.69
Czech Republic	0.77	29	0.61	0.57	0.28	0.45	0.40	0.47	0.67	0.58	0.37	0.73	0.54	0.45	0.72
Denmark	0.91	49	0.77	0.78	0.62	0.58	0.59	0.68	0.80	0.78	0.59	0.75	0.62	0.68	0.81
England	0.84	37	0.56	0.44	0.60	0.58	0.52	0.58	0.65	0.66	0.49	0.78	0.55	0.67	0.75
Finland	0.88	43	0.69	0.60	0.59	0.57	0.71	0.73	0.72	0.68	0.59	0.74	0.55	0.54	0.73
France	0.82	32	0.57	0.52	0.59	0.43	0.54	0.56	0.69	0.52	0.57	0.63	0.60	0.49	0.62
Georgia	0.89	45	0.75	0.67	0.59	0.66	0.61	0.67	0.71	0.76	0.67	0.74	0.73	0.18	0.72
Germany	0.83	35	0.61	0.67	0.47	0.36	0.52	0.57	0.66	0.75	0.36	0.71	0.63	0.51	0.65
Hong Kong SAR	0.95	61	0.82	0.80	0.71	0.84	0.77	0.74	0.85	0.83	0.76	0.79	0.76	0.70	0.77
Hungary	0.91	48	0.72	0.58	0.66	0.75	0.73	0.62	0.76	0.71	0.53	0.66	0.67	0.69	0.84
Iran, Islamic Rep. of	0.91	47	0.71	0.76	0.68	0.77	0.79	0.74	0.69	0.43	0.79	0.65	0.57	0.54	0.72
Ireland	0.84	36	0.64	0.66	0.54	0.66	0.50	0.64	0.76	0.57	0.37	0.56	0.54	0.60	0.62
Italy	0.89	44	0.67	0.62	0.62	0.58	0.67	0.61	0.70	0.69	0.57	0.71	0.71	0.73	0.73
Japan	0.89	46	0.75	0.75	0.77	0.60	0.77	0.59	0.66	0.66	0.54	0.56	0.55	0.70	0.83
Kazakhstan	0.94	58	0.77	0.73	0.66	0.78	0.76	0.74	0.81	0.78	0.78	0.81	0.82	0.63	0.76
Korea, Rep. of	0.95	63	0.85	0.88	0.74	0.89	0.87	0.79	0.81	0.84	0.69	0.70	0.71	0.64	0.85
Kosovo	0.83	35	0.53	0.64	0.57	0.53	0.45	0.62	0.69	0.63	0.46	0.61	0.55	0.64	0.68
Kuwait	0.94	60	0.84	0.84	0.78	0.83	0.87	0.77	0.82	0.78	0.81	0.63	0.60	0.58	0.84
Latvia	0.89	44	0.74	0.71	0.63	0.71	0.65	0.70	0.62	0.57	0.73	0.56	0.77	0.53	0.67
Lithuania	0.87	40	0.64	0.69	0.36	0.53	0.41	0.67	0.66	0.66	0.62	0.73	0.72	0.61	0.76
Malta	0.89	44	0.79	0.76	0.63	0.54	0.53	0.75	0.83	0.84	0.49	0.62	0.41	0.37	0.79
Montenegro	0.89	44	0.69	0.71	0.70	0.69	0.68	0.71	0.68	0.70	0.51	0.66	0.65	0.55	0.65
Morocco	0.80	38	-0.17	0.10	0.35	0.55	-0.13	0.75	0.72	0.68	0.65	0.83	0.84	0.80	0.68
Netherlands	0.84	35	0.58	0.46	0.62	0.49	0.52	0.68	0.60	0.59	0.45	0.79	0.68	0.50	0.67
New Zealand	0.90	47	0.74	0.78	0.68	0.76	0.69	0.72	0.82	0.71	0.49	0.60	0.63	0.61	0.64
North Macedonia	0.91	47	0.71	0.76	0.70	0.77	0.71	0.79	0.72	0.67	0.59	0.62	0.55	0.60	0.68
Northern Ireland	0.86	40	0.76	0.67	0.65	0.54	0.58	0.59	0.69	0.73	0.51	0.66	0.52	0.56	0.66

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Instruction Affected by Mathematics Resource Shortages* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item												
			ACBG13AA	ACBG13AB	ACBG13AC	ACBG13AD	ACBG13AE	ACBG13AF	ACBG13AG	ACBG13AH	ACBG13BA	ACBG13BB	ACBG13BC	ACBG13BD	ACBG13BE
Norway (5)	0.85	37	0.67	0.61	0.63	0.64	0.60	0.60	0.67	0.53	0.58	0.67	0.45	0.54	0.64
Oman	0.94	57	0.86	0.82	0.70	0.85	0.84	0.85	0.70	0.72	0.80	0.75	0.62	0.42	0.79
Pakistan	0.77	31	0.60	0.69	0.80	0.79	0.83	0.75	0.27	-0.01	0.73	-0.13	0.01	0.05	0.27
Philippines	0.85	36	0.57	0.63	0.53	0.59	0.54	0.61	0.70	0.64	0.54	0.54	0.64	0.68	0.57
Poland	0.90	45	0.62	0.61	0.68	0.64	0.73	0.75	0.75	0.67	0.62	0.69	0.55	0.60	0.74
Portugal	0.91	48	0.64	0.64	0.76	0.71	0.76	0.66	0.70	0.68	0.58	0.71	0.72	0.72	0.73
Qatar	0.98	85	0.93	0.95	0.91	0.96	0.94	0.95	0.95	0.93	0.92	0.91	0.91	0.79	0.93
Russian Federation	0.92	52	0.77	0.68	0.66	0.69	0.70	0.76	0.79	0.75	0.66	0.74	0.79	0.56	0.79
Saudi Arabia	0.90	46	0.75	0.77	0.63	0.78	0.74	0.70	0.73	0.47	0.73	0.62	0.42	0.61	0.75
Serbia	0.87	40	0.77	0.73	0.73	0.71	0.75	0.67	0.64	0.59	0.46	0.49	0.47	0.45	0.65
Singapore	0.98	80	0.94	0.93	0.90	0.93	0.89	0.85	0.94	0.94	0.85	0.86	0.78	0.90	0.92
Slovak Republic	0.92	52	0.72	0.82	0.63	0.84	0.65	0.61	0.81	0.72	0.79	0.72	0.72	0.55	0.71
South Africa (5)	0.84	36	0.16	0.11	0.48	0.64	0.41	0.69	0.76	0.70	0.49	0.74	0.76	0.66	0.70
Spain	0.86	39	0.57	0.67	0.61	0.60	0.68	0.65	0.72	0.59	0.59	0.63	0.60	0.53	0.66
Sweden	0.86	40	0.66	0.73	0.58	0.63	0.61	0.62	0.71	0.64	0.58	0.67	0.35	0.63	0.71
Turkey (5)	0.92	52	0.82	0.80	0.67	0.78	0.78	0.59	0.79	0.67	0.76	0.69	0.62	0.52	0.78
United Arab Emirates	0.97	74	0.89	0.88	0.89	0.90	0.89	0.91	0.91	0.86	0.84	0.79	0.78	0.76	0.88
United States	0.93	55	0.77	0.81	0.77	0.78	0.70	0.78	0.79	0.77	0.57	0.67	0.69	0.74	0.75
Benchmarking Participants															
Ontario, Canada	0.89	44	0.68	0.72	0.77	0.63	0.53	0.68	0.76	0.76	0.50	0.64	0.65	0.58	0.62
Quebec, Canada	0.93	54	0.86	0.82	0.68	0.75	0.76	0.69	0.78	0.73	0.63	0.67	0.74	0.71	0.70
Moscow City, Russian Fed.	0.95	65	0.86	0.82	0.77	0.79	0.85	0.83	0.83	0.81	0.80	0.83	0.83	0.59	0.81
Madrid, Spain	0.88	41	0.66	0.68	0.72	0.69	0.70	0.46	0.62	0.61	0.65	0.57	0.66	0.59	0.71
Abu Dhabi, UAE	0.96	70	0.90	0.86	0.86	0.87	0.89	0.91	0.89	0.82	0.80	0.68	0.70	0.75	0.87
Dubai, UAE	0.98	80	0.91	0.94	0.89	0.92	0.85	0.93	0.94	0.88	0.88	0.88	0.86	0.81	0.89

Relationship Between the TIMSS 2019 *Instruction Affected by Mathematics Resource Shortages* Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.14	0.02	0.03
Armenia	0.05	0.00	0.01
Australia	0.09	0.01	0.01
Austria	0.08	0.01	0.01
Azerbaijan	0.01	0.00	0.00
Bahrain	0.13	0.02	0.01
Belgium (Flemish)	0.02	0.00	0.00
Bosnia and Herzegovina	0.04	0.00	0.00
Bulgaria	0.14	0.02	0.01
Canada	0.08	0.01	0.01
Chile	0.15	0.02	0.04
Chinese Taipei	-0.01	0.00	0.00
Croatia	0.06	0.00	0.00
Cyprus	0.04	0.00	0.01
Czech Republic	-0.03	0.00	0.00
Denmark	0.03	0.00	0.00
England	0.15	0.02	0.00
Finland	0.04	0.00	0.00
France	0.13	0.02	0.01
Georgia	0.03	0.00	0.00
Germany	0.08	0.01	0.00
Hong Kong SAR	-0.06	0.00	0.01
Hungary	-0.04	0.00	0.00
Iran, Islamic Rep. of	0.12	0.01	0.01
Ireland	0.11	0.01	0.01
Italy	0.08	0.01	0.01
Japan	0.01	0.00	0.00
Kazakhstan	-0.01	0.00	0.00
Korea, Rep. of	0.02	0.00	0.00
Kosovo	0.01	0.00	0.00
Kuwait	0.04	0.00	0.01
Latvia	-0.10	0.01	0.01
Lithuania	-0.02	0.00	0.00
Malta	0.08	0.01	0.01
Montenegro	0.02	0.00	0.01
Morocco	-0.25	0.06	0.07
Netherlands	0.04	0.00	0.00
New Zealand	0.09	0.01	0.01

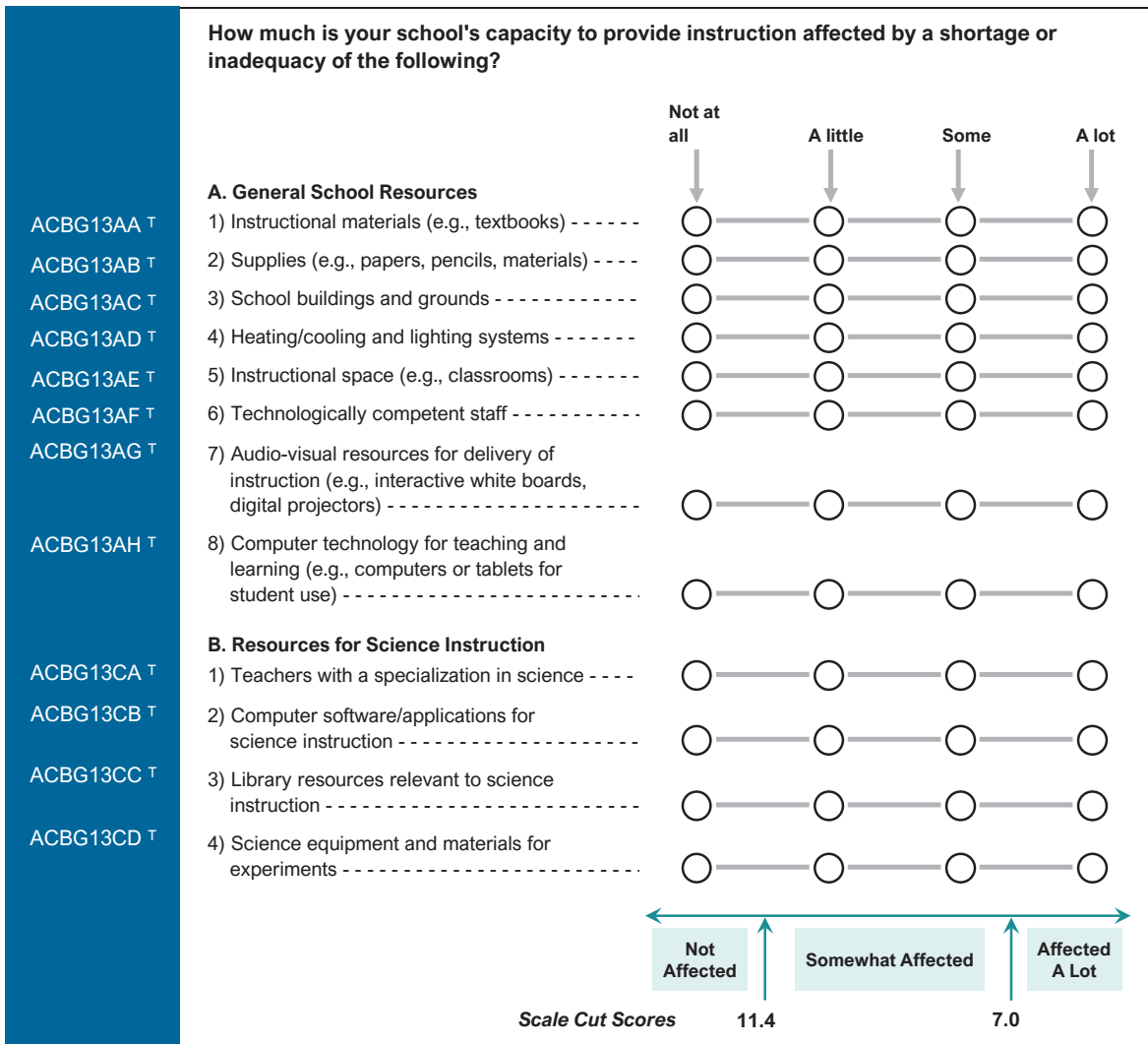
Relationship Between the TIMSS 2019 *Instruction Affected by Mathematics Resource Shortages* Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.07	0.01	0.00
Northern Ireland	0.04	0.00	0.00
Norway (5)	0.02	0.00	0.00
Oman	0.05	0.00	0.01
Pakistan	-0.16	0.03	0.02
Philippines	0.00	0.00	0.01
Poland	0.04	0.00	0.00
Portugal	0.06	0.00	0.00
Qatar	0.24	0.06	0.06
Russian Federation	0.11	0.01	0.01
Saudi Arabia	-0.04	0.00	0.01
Serbia	0.11	0.01	0.01
Singapore	0.02	0.00	0.01
Slovak Republic	0.08	0.01	0.01
South Africa (5)	0.10	0.01	0.05
Spain	0.13	0.02	0.02
Sweden	0.05	0.00	0.01
Turkey (5)	0.09	0.01	0.01
United Arab Emirates	0.18	0.03	0.06
United States	0.04	0.00	0.00
International Median	0.04	0.00	0.01
Benchmarking Participants			
Ontario, Canada	0.13	0.02	0.03
Quebec, Canada	0.05	0.00	0.00
Moscow City, Russian Fed.	-0.04	0.00	0.00
Madrid, Spain	0.05	0.00	0.00
Abu Dhabi, UAE	0.22	0.05	0.07
Dubai, UAE	0.05	0.00	0.04

Instruction Affected by Science Resource Shortages – Grade 4

About the Scale

The *Instruction Affected by Science Resource Shortages* scale was created based on principals' responses to twelve items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Instruction Affected by Science Resource Shortages* Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ACBG13AA	-0.26317	-0.24640	0.07411	0.17229	0.96
ACBG13AB	-0.49732	-0.22859	0.20397	0.02462	0.89
ACBG13AC	0.00857	-0.72314	0.13827	0.58487	1.07
ACBG13AD	-0.24911	-0.44652	0.18290	0.26362	0.95
ACBG13AE	0.04975	-0.43752	-0.01409	0.45161	1.08
ACBG13AF	0.05434	-1.21339	-0.05364	1.26703	0.97
ACBG13AG	-0.02743	-0.75072	0.03353	0.71719	0.97
ACBG13AH	0.19884	-0.94645	0.03998	0.90647	1.10
ACBG13CA	0.05539	-0.62018	0.03427	0.58591	1.20
ACBG13CB	0.19116	-1.27970	0.01680	1.26290	1.11
ACBG13CC	-0.02535	-1.27782	-0.03564	1.31346	1.02
ACBG13CD	0.50433	-1.02898	-0.04452	1.07350	1.08

Scale Transformation Constants for the TIMSS 2019 *Instruction Affected by Science Resource Shortages* Scale – Grade 4

Scale Transformation Constants

A = 9.169706

B = 1.659666

Transformed Scale Score = 9.169706 + 1.659666 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Instruction Affected by Science Resource Shortages Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	2.54711	
1	4.40071	
2	5.27500	
3	5.85711	
4	6.29613	
5	6.64979	
6	6.94814	7.0
7	7.20753	
8	7.43843	
9	7.64797	
10	7.84045	
11	8.02213	
12	8.19407	
13	8.35844	
14	8.51709	
15	8.67164	
16	8.82352	
17	8.97398	
18	9.12232	
19	9.27534	
20	9.42850	
21	9.58484	
22	9.74563	
23	9.91222	
24	10.08616	
25	10.26917	
26	10.46207	
27	10.67024	
28	10.89636	
29	11.14546	
30	11.42448	11.4
31	11.74332	
32	12.11928	
33	12.58077	
34	13.18547	
35	14.08130	
36	15.95552	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Instruction Affected by Science Resource Shortages* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item											
			ACBG13AA	ACBG13AB	ACBG13AC	ACBG13AD	ACBG13AE	ACBG13AF	ACBG13AG	ACBG13AH	ACBG13CA	ACBG13CB	ACBG13CC	ACBG13CD
Albania	0.91	50	0.67	0.76	0.79	0.76	0.71	0.71	0.67	0.68	0.68	0.61	0.66	0.71
Armenia	0.87	42	0.60	0.54	0.65	0.69	0.55	0.68	0.68	0.67	0.69	0.69	0.70	0.64
Australia	0.89	46	0.65	0.68	0.71	0.63	0.73	0.72	0.75	0.80	0.47	0.57	0.70	0.68
Austria	0.83	35	0.49	0.55	0.64	0.55	0.63	0.60	0.59	0.64	0.53	0.60	0.67	0.56
Azerbaijan	0.85	38	0.52	0.53	0.56	0.65	0.56	0.73	0.56	0.62	0.67	0.65	0.75	0.54
Bahrain	0.97	76	0.92	0.91	0.88	0.91	0.95	0.88	0.89	0.83	0.90	0.76	0.76	0.87
Belgium (Flemish)	0.89	46	0.66	0.66	0.66	0.72	0.66	0.65	0.77	0.72	0.51	0.76	0.68	0.66
Bosnia and Herzegovina	0.89	44	0.70	0.69	0.73	0.69	0.71	0.62	0.72	0.69	0.58	0.61	0.66	0.53
Bulgaria	0.83	41	0.79	0.81	0.75	0.82	0.65	0.29	0.74	0.64	0.65	0.43	0.50	0.29
Canada	0.89	45	0.74	0.75	0.74	0.68	0.65	0.69	0.75	0.77	0.47	0.60	0.68	0.48
Chile	0.91	51	0.66	0.68	0.70	0.62	0.74	0.77	0.80	0.77	0.64	0.69	0.77	0.69
Chinese Taipei	0.92	55	0.74	0.73	0.70	0.79	0.72	0.75	0.82	0.79	0.70	0.69	0.70	0.78
Croatia	0.87	42	0.67	0.73	0.69	0.74	0.66	0.68	0.57	0.35	0.60	0.63	0.57	0.75
Cyprus	0.91	52	0.84	0.80	0.64	0.75	0.80	0.77	0.71	0.59	0.59	0.78	0.65	0.67
Czech Republic	0.77	29	0.57	0.55	0.37	0.42	0.42	0.46	0.65	0.63	0.40	0.74	0.57	0.60
Denmark	0.90	48	0.79	0.75	0.63	0.57	0.58	0.68	0.81	0.77	0.59	0.70	0.68	0.70
England	0.84	38	0.48	0.26	0.67	0.56	0.49	0.63	0.61	0.65	0.60	0.71	0.76	0.77
Finland	0.88	43	0.69	0.55	0.63	0.57	0.73	0.71	0.71	0.69	0.58	0.61	0.61	0.73
France	0.81	34	0.45	0.37	0.44	0.28	0.39	0.65	0.72	0.61	0.66	0.74	0.74	0.65
Georgia	0.90	49	0.74	0.64	0.60	0.66	0.63	0.69	0.72	0.76	0.66	0.78	0.74	0.73
Germany	0.83	37	0.62	0.66	0.54	0.41	0.56	0.55	0.67	0.74	0.48	0.68	0.65	0.60
Hong Kong SAR	0.93	58	0.83	0.81	0.74	0.85	0.80	0.77	0.84	0.83	0.50	0.62	0.77	0.69
Hungary	0.90	48	0.71	0.61	0.70	0.76	0.75	0.62	0.76	0.71	0.59	0.74	0.67	0.65
Iran, Islamic Rep. of	0.91	51	0.72	0.76	0.71	0.78	0.81	0.74	0.67	0.41	0.79	0.74	0.61	0.71
Ireland	0.82	34	0.60	0.61	0.58	0.64	0.55	0.64	0.79	0.64	0.52	0.48	0.47	0.45
Italy	0.87	42	0.63	0.62	0.64	0.59	0.69	0.65	0.71	0.67	0.58	0.73	0.67	0.53
Japan	0.90	50	0.77	0.79	0.78	0.60	0.79	0.61	0.65	0.68	0.61	0.59	0.68	0.86
Kazakhstan	0.93	58	0.77	0.74	0.67	0.77	0.76	0.75	0.81	0.78	0.80	0.79	0.76	0.73
Korea, Rep. of	0.96	70	0.87	0.90	0.78	0.90	0.89	0.80	0.83	0.84	0.73	0.77	0.81	0.88
Kosovo	0.83	35	0.59	0.68	0.60	0.61	0.53	0.64	0.65	0.61	0.50	0.60	0.54	0.55
Kuwait	0.95	64	0.85	0.84	0.78	0.83	0.88	0.79	0.81	0.78	0.81	0.68	0.66	0.86
Latvia	0.89	46	0.76	0.70	0.66	0.71	0.68	0.68	0.61	0.57	0.71	0.63	0.72	0.69
Lithuania	0.86	40	0.66	0.67	0.40	0.54	0.44	0.70	0.67	0.70	0.55	0.77	0.68	0.72
Malta	0.88	45	0.77	0.72	0.67	0.56	0.58	0.77	0.80	0.83	0.53	0.56	0.44	0.67
Montenegro	0.89	45	0.72	0.72	0.72	0.71	0.67	0.71	0.70	0.71	0.51	0.62	0.70	0.57
Morocco	0.76	37	-0.21	0.07	0.33	0.55	-0.18	0.77	0.75	0.70	0.64	0.84	0.83	0.71
Netherlands	0.83	37	0.60	0.44	0.71	0.53	0.47	0.64	0.65	0.45	0.60	0.67	0.71	0.70
New Zealand	0.88	46	0.75	0.80	0.73	0.77	0.72	0.72	0.83	0.74	0.31	0.48	0.61	0.44
North Macedonia	0.90	48	0.72	0.78	0.70	0.78	0.72	0.78	0.75	0.68	0.60	0.64	0.61	0.51
Northern Ireland	0.86	40	0.69	0.61	0.64	0.48	0.55	0.62	0.69	0.74	0.62	0.58	0.64	0.69

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Instruction Affected by Science Resource Shortages* Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item											
			ACBG13AA	ACBG13AB	ACBG13AC	ACBG13AD	ACBG13AE	ACBG13AF	ACBG13AG	ACBG13AH	ACBG13CA	ACBG13CB	ACBG13CC	ACBG13CD
Norway (5)	0.83	35	0.65	0.50	0.65	0.63	0.63	0.67	0.67	0.54	0.51	0.63	0.53	0.48
Oman	0.94	62	0.86	0.82	0.71	0.85	0.86	0.85	0.69	0.72	0.83	0.74	0.73	0.73
Pakistan	0.77	33	0.26	0.57	0.41	0.64	0.45	0.73	0.65	0.50	0.67	0.59	0.69	0.59
Philippines	0.83	36	0.59	0.65	0.57	0.62	0.59	0.63	0.70	0.60	0.42	0.50	0.65	0.66
Poland	0.89	46	0.59	0.61	0.68	0.68	0.73	0.76	0.75	0.72	0.67	0.66	0.66	0.59
Portugal	0.90	47	0.62	0.64	0.75	0.70	0.76	0.68	0.71	0.70	0.55	0.69	0.67	0.71
Qatar	0.99	87	0.94	0.95	0.92	0.96	0.94	0.95	0.95	0.93	0.93	0.88	0.92	0.92
Russian Federation	0.92	54	0.76	0.67	0.68	0.67	0.71	0.77	0.78	0.77	0.68	0.78	0.77	0.76
Saudi Arabia	0.90	48	0.72	0.75	0.62	0.76	0.71	0.71	0.77	0.53	0.72	0.70	0.56	0.72
Serbia	0.88	44	0.76	0.72	0.75	0.70	0.76	0.68	0.69	0.59	0.43	0.53	0.62	0.64
Singapore	0.98	80	0.93	0.92	0.90	0.93	0.90	0.86	0.95	0.94	0.81	0.88	0.84	0.90
Slovak Republic	0.91	51	0.71	0.81	0.65	0.84	0.67	0.62	0.82	0.73	0.77	0.71	0.70	0.43
South Africa (5)	0.83	38	0.02	-0.01	0.43	0.63	0.34	0.63	0.80	0.75	0.60	0.79	0.82	0.80
Spain	0.86	40	0.56	0.65	0.65	0.62	0.69	0.68	0.73	0.60	0.59	0.59	0.65	0.56
Sweden	0.85	39	0.67	0.72	0.62	0.65	0.65	0.63	0.71	0.67	0.57	0.59	0.36	0.61
Turkey (5)	0.92	53	0.81	0.79	0.69	0.80	0.80	0.60	0.80	0.68	0.77	0.67	0.60	0.72
United Arab Emirates	0.97	77	0.89	0.88	0.89	0.90	0.90	0.91	0.91	0.86	0.85	0.78	0.83	0.90
United States	0.92	53	0.76	0.77	0.78	0.78	0.72	0.79	0.79	0.76	0.57	0.61	0.69	0.66
Benchmarking Participants														
Ontario, Canada	0.89	45	0.69	0.70	0.77	0.61	0.53	0.69	0.73	0.78	0.62	0.64	0.71	0.56
Quebec, Canada	0.88	47	0.86	0.83	0.71	0.76	0.79	0.71	0.80	0.75	0.25	0.53	0.62	0.28
Moscow City, Russian Fed.	0.95	67	0.86	0.81	0.76	0.78	0.85	0.83	0.83	0.82	0.81	0.79	0.81	0.85
Madrid, Spain	0.87	41	0.66	0.67	0.73	0.67	0.70	0.50	0.60	0.60	0.63	0.63	0.65	0.63
Abu Dhabi, UAE	0.96	72	0.89	0.86	0.87	0.88	0.89	0.91	0.90	0.83	0.82	0.65	0.77	0.89
Dubai, UAE	0.98	81	0.91	0.95	0.88	0.92	0.85	0.94	0.94	0.90	0.88	0.84	0.89	0.88

Relationship Between the TIMSS 2019 *Instruction Affected by Science Resource Shortages* Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.13	0.02	0.04
Armenia	0.06	0.00	0.01
Australia	0.10	0.01	0.01
Austria	0.13	0.02	0.02
Azerbaijan	0.01	0.00	0.00
Bahrain	0.18	0.03	0.03
Belgium (Flemish)	0.02	0.00	0.00
Bosnia and Herzegovina	0.05	0.00	0.00
Bulgaria	0.16	0.02	0.01
Canada	0.08	0.01	0.00
Chile	0.14	0.02	0.03
Chinese Taipei	-0.01	0.00	0.00
Croatia	0.02	0.00	0.00
Cyprus	0.01	0.00	0.01
Czech Republic	-0.05	0.00	0.00
Denmark	-0.01	0.00	0.00
England	0.17	0.03	0.02
Finland	0.02	0.00	0.00
France	0.14	0.02	0.02
Georgia	0.02	0.00	0.00
Germany	0.07	0.00	0.00
Hong Kong SAR	-0.05	0.00	0.01
Hungary	-0.04	0.00	0.00
Iran, Islamic Rep. of	0.13	0.02	0.02
Ireland	0.05	0.00	0.01
Italy	0.05	0.00	0.00
Japan	0.01	0.00	0.00
Kazakhstan	0.02	0.00	0.00
Korea, Rep. of	0.02	0.00	0.00
Kosovo	0.01	0.00	0.00
Kuwait	-0.01	0.00	0.01
Latvia	-0.06	0.00	0.01
Lithuania	-0.02	0.00	0.00
Malta	0.13	0.02	0.01
Montenegro	0.00	0.00	0.01
Morocco	-0.22	0.05	0.05
Netherlands	0.07	0.00	0.00
New Zealand	0.08	0.01	0.01

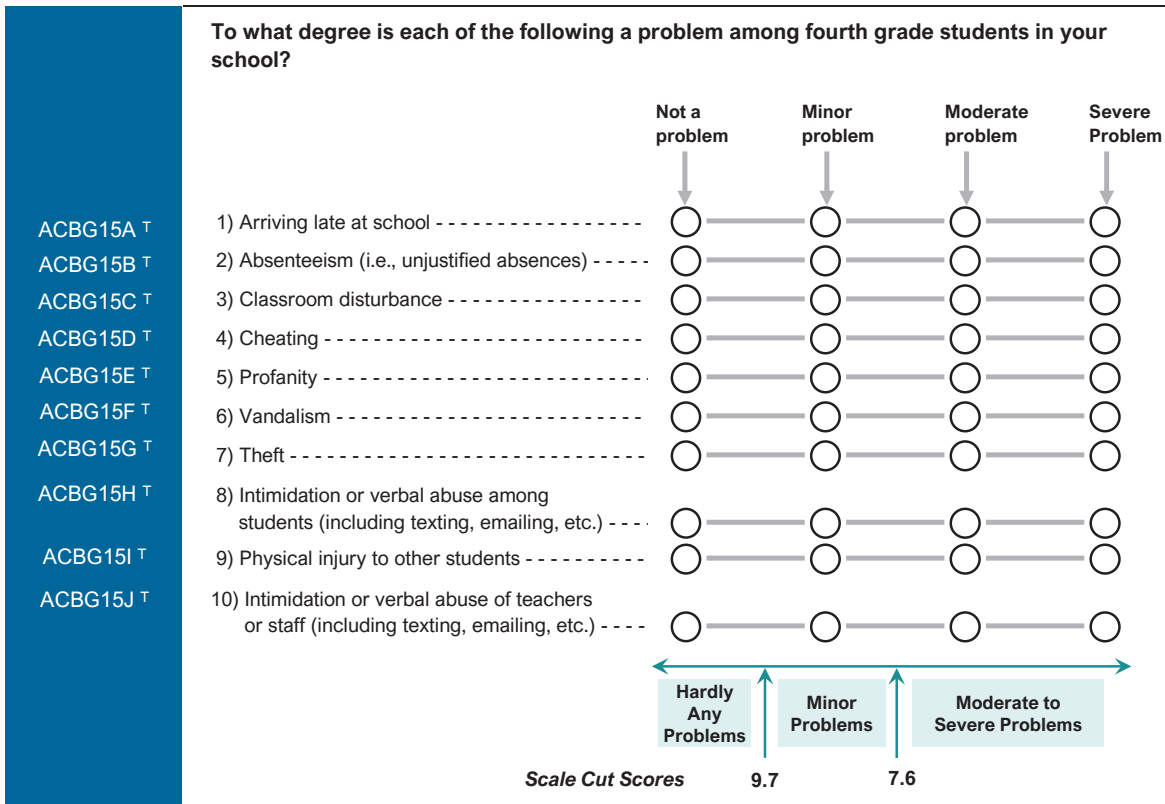
Relationship Between the TIMSS 2019 *Instruction Affected by Science Resource Shortages* Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.10	0.01	0.01
Northern Ireland	0.02	0.00	0.00
Norway (5)	0.04	0.00	0.00
Oman	0.04	0.00	0.00
Pakistan	-0.16	0.03	0.03
Philippines	-0.02	0.00	0.02
Poland	0.04	0.00	0.00
Portugal	0.06	0.00	0.00
Qatar	0.20	0.04	0.04
Russian Federation	0.08	0.01	0.00
Saudi Arabia	-0.04	0.00	0.01
Serbia	0.12	0.01	0.01
Singapore	0.01	0.00	0.00
Slovak Republic	0.11	0.01	0.01
South Africa (5)	0.10	0.01	0.05
Spain	0.15	0.02	0.02
Sweden	0.06	0.00	0.01
Turkey (5)	0.09	0.01	0.01
United Arab Emirates	0.15	0.02	0.06
United States	0.05	0.00	0.00
International Median	0.05	0.00	0.01
Benchmarking Participants			
Ontario, Canada	0.10	0.01	0.01
Quebec, Canada	0.02	0.00	0.00
Moscow City, Russian Fed.	-0.05	0.00	0.00
Madrid, Spain	0.05	0.00	0.00
Abu Dhabi, UAE	0.21	0.05	0.07
Dubai, UAE	-0.02	0.00	0.03

School Discipline – Grade 4

About the Scale

The *School Discipline* scale was created based on principals’ responses to ten items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 School Discipline Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ACBG15A	-0.04835	-2.12043	-0.42165	2.54208	1.27
ACBG15B	0.28790	-1.45910	-0.51461	1.97371	1.22
ACBG15C	0.78849	-2.13154	-0.25288	2.38442	1.00
ACBG15D	-0.50395	-1.36108	-0.70227	2.06335	1.07
ACBG15E	0.48418	-1.65568	-0.39478	2.05046	0.91
ACBG15F	-0.31766	-0.47898	-0.62657	1.10555	0.86
ACBG15G	-0.53958	0.31575	-1.17406	0.85831	0.77
ACBG15H	0.21488	-1.40063	-0.58577	1.98640	0.94
ACBG15I	0.30591	-1.40756	-0.73711	2.14467	0.85
ACBG15J	-0.67182	0.16233	-0.91357	0.75124	0.87

Scale Transformation Constants for the TIMSS 2019 School Discipline Scale – Grade 4

Scale Transformation Constants

A = 7.809340

B = 0.952078

Transformed Scale Score = 7.809340 + 0.952078 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 School Discipline Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	3.70440	
1	4.77250	
2	5.27812	
3	5.61661	
4	5.87500	
5	6.08629	
6	6.26778	
7	6.42945	
8	6.57768	
9	6.71549	
10	6.84975	
11	6.98118	
12	7.11207	
13	7.24453	
14	7.38070	
15	7.52341	7.6
16	7.67299	
17	7.83372	
18	8.00732	
19	8.19660	
20	8.40499	
21	8.63392	
22	8.88534	
23	9.16002	
24	9.45841	
25	9.78042	9.7
26	10.13101	
27	10.52330	
28	10.98914	
29	11.61576	
30	12.79234	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 School Discipline Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ACBG15A	ACBG15B	ACBG15C	ACBG15D	ACBG15E	ACBG15F	ACBG15G	ACBG15H	ACBG15I	ACBG15J
Albania	0.92	61	0.67	0.80	0.63	0.73	0.75	0.86	0.88	0.83	0.80	0.85
Armenia	0.95	67	0.68	0.77	0.83	0.67	0.88	0.87	0.84	0.88	0.87	0.88
Australia	0.89	52	0.61	0.67	0.75	0.65	0.82	0.74	0.63	0.76	0.80	0.74
Austria	0.89	51	0.59	0.68	0.73	0.65	0.82	0.73	0.70	0.76	0.84	0.62
Azerbaijan	0.96	76	0.73	0.85	0.88	0.73	0.88	0.93	0.94	0.92	0.90	0.93
Bahrain	0.97	80	0.83	0.86	0.83	0.93	0.90	0.93	0.91	0.93	0.93	0.88
Belgium (Flemish)	0.85	45	0.48	0.52	0.76	0.52	0.78	0.71	0.58	0.78	0.80	0.69
Bosnia and Herzegovina	0.96	75	0.74	0.83	0.88	0.75	0.85	0.93	0.94	0.88	0.90	0.92
Bulgaria	0.94	67	0.69	0.82	0.80	0.85	0.81	0.89	0.88	0.81	0.81	0.81
Canada	0.88	49	0.61	0.64	0.70	0.62	0.81	0.76	0.68	0.70	0.74	0.72
Chile	0.90	55	0.54	0.63	0.76	0.76	0.82	0.76	0.75	0.80	0.78	0.75
Chinese Taipei	0.90	54	0.69	0.65	0.69	0.73	0.78	0.81	0.82	0.80	0.79	0.56
Croatia	0.86	45	0.63	0.56	0.63	0.71	0.68	0.76	0.60	0.73	0.74	0.66
Cyprus	0.90	55	0.66	0.72	0.79	0.63	0.80	0.73	0.69	0.82	0.81	0.72
Czech Republic	0.87	47	0.52	0.47	0.67	0.77	0.81	0.76	0.72	0.75	0.76	0.58
Denmark	0.80	36	0.61	0.57	0.61	0.23	0.71	0.58	0.49	0.70	0.76	0.62
England	0.63	24	0.28	0.31	0.50	0.38	0.64	0.60	0.24	0.48	0.63	0.64
Finland	0.84	42	0.50	0.57	0.76	0.43	0.77	0.68	0.59	0.80	0.71	0.58
France	0.88	49	0.53	0.64	0.62	0.64	0.77	0.72	0.67	0.77	0.84	0.74
Georgia	0.97	76	0.77	0.77	0.85	0.80	0.92	0.93	0.93	0.93	0.89	0.89
Germany	0.88	49	0.63	0.61	0.75	0.67	0.79	0.77	0.73	0.70	0.75	0.61
Hong Kong SAR	0.88	49	0.70	0.60	0.71	0.71	0.82	0.79	0.73	0.58	0.77	0.56
Hungary	0.88	50	0.61	0.71	0.72	0.74	0.72	0.71	0.74	0.77	0.71	0.65
Iran, Islamic Rep. of	0.91	55	0.69	0.70	0.74	0.76	0.83	0.78	0.79	0.75	0.70	0.62
Ireland	0.82	41	0.58	0.60	0.80	0.64	0.73	0.51	0.64	0.73	0.63	0.47
Italy	0.91	58	0.45	0.73	0.66	0.61	0.68	0.88	0.87	0.83	0.89	0.86
Japan	0.88	54	0.56	0.42	0.82	0.80	0.87	0.78	0.78	0.80	0.60	0.80
Kazakhstan	0.97	82	0.71	0.92	0.90	0.76	0.90	0.96	0.96	0.96	0.95	0.96
Korea, Rep. of	0.96	73	0.70	0.81	0.78	0.90	0.84	0.91	0.92	0.89	0.89	0.87
Kosovo	0.96	75	0.76	0.79	0.85	0.84	0.87	0.92	0.91	0.92	0.88	0.90
Kuwait	0.94	63	0.61	0.67	0.82	0.83	0.85	0.86	0.83	0.84	0.79	0.80
Latvia	0.79	35	0.47	0.48	0.57	0.51	0.76	0.58	0.60	0.68	0.73	0.44
Lithuania	0.82	40	0.68	0.66	0.60	0.72	0.63	0.71	0.51	0.56	0.51	0.67
Malta	0.88	50	0.68	0.65	0.68	0.69	0.72	0.79	0.69	0.75	0.71	0.72
Montenegro	0.96	73	0.69	0.82	0.86	0.67	0.89	0.91	0.91	0.91	0.89	0.92
Morocco	0.96	76	0.63	0.76	0.87	0.91	0.92	0.93	0.94	0.89	0.91	0.87
Netherlands	0.72	31	0.28	0.41	0.75	0.43	0.59	0.44	0.49	0.68	0.59	0.70
New Zealand	0.89	52	0.65	0.67	0.76	0.55	0.80	0.69	0.74	0.75	0.83	0.76
North Macedonia	0.95	68	0.64	0.73	0.87	0.81	0.84	0.85	0.89	0.86	0.88	0.86
Northern Ireland	0.79	38	0.48	0.53	0.72	0.63	0.71	0.40	0.53	0.64	0.76	0.62

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 School Discipline Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			ACBG15A	ACBG15B	ACBG15C	ACBG15D	ACBG15E	ACBG15F	ACBG15G	ACBG15H	ACBG15I	ACBG15J
Norway (5)	0.88	51	0.64	0.52	0.75	0.68	0.77	0.76	0.69	0.73	0.76	0.79
Oman	0.96	75	0.73	0.82	0.76	0.92	0.89	0.92	0.92	0.91	0.87	0.88
Pakistan	0.91	56	0.65	0.64	0.65	0.79	0.84	0.78	0.86	0.80	0.77	0.69
Philippines	0.87	47	0.55	0.67	0.60	0.76	0.74	0.73	0.73	0.68	0.70	0.65
Poland	0.84	42	0.52	0.64	0.69	0.58	0.74	0.79	0.64	0.66	0.68	0.44
Portugal	0.93	63	0.55	0.83	0.77	0.69	0.75	0.86	0.88	0.85	0.81	0.87
Qatar	0.95	69	0.71	0.77	0.80	0.90	0.82	0.86	0.86	0.84	0.86	0.86
Russian Federation	0.82	40	0.58	0.51	0.58	0.42	0.62	0.73	0.75	0.75	0.70	0.59
Saudi Arabia	0.96	75	0.59	0.73	0.80	0.91	0.91	0.93	0.94	0.93	0.94	0.92
Serbia	0.96	72	0.83	0.80	0.85	0.81	0.81	0.91	0.91	0.87	0.84	0.87
Singapore	0.84	42	0.61	0.61	0.69	0.62	0.73	0.67	0.64	0.66	0.75	0.49
Slovak Republic	0.90	54	0.69	0.71	0.70	0.69	0.82	0.81	0.76	0.74	0.70	0.73
South Africa (5)	0.89	51	0.63	0.65	0.75	0.70	0.73	0.75	0.73	0.76	0.82	0.58
Spain	0.91	57	0.59	0.72	0.66	0.66	0.74	0.86	0.78	0.80	0.83	0.84
Sweden	0.81	38	0.58	0.55	0.73	0.45	0.70	0.63	0.26	0.64	0.73	0.72
Turkey (5)	0.96	73	0.74	0.79	0.85	0.88	0.82	0.88	0.89	0.90	0.84	0.90
United Arab Emirates	0.93	63	0.65	0.70	0.74	0.81	0.81	0.85	0.85	0.85	0.84	0.81
United States	0.89	53	0.64	0.66	0.65	0.68	0.76	0.76	0.79	0.77	0.78	0.75
Benchmarking Participants												
Ontario, Canada	0.88	50	0.62	0.65	0.73	0.55	0.82	0.75	0.71	0.73	0.75	0.72
Quebec, Canada	0.87	48	0.56	0.66	0.61	0.69	0.78	0.78	0.68	0.69	0.69	0.74
Moscow City, Russian Fed.	0.87	48	0.59	0.61	0.64	0.65	0.72	0.78	0.76	0.75	0.70	0.73
Madrid, Spain	0.93	62	0.60	0.79	0.77	0.77	0.81	0.89	0.79	0.81	0.82	0.81
Abu Dhabi, UAE	0.90	53	0.64	0.64	0.71	0.69	0.75	0.76	0.76	0.83	0.83	0.67
Dubai, UAE	0.83	45	0.47	0.57	0.61	0.70	0.75	0.77	0.73	0.62	0.68	0.74

Relationship Between the TIMSS 2019 School Discipline Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.02	0.00	0.00	0.03	0.00	0.00
Armenia	0.05	0.00	0.01	0.06	0.00	0.01
Australia	0.24	0.06	0.05	0.23	0.05	0.05
Austria	0.16	0.02	0.02	0.19	0.04	0.03
Azerbaijan	0.00	0.00	0.01	-0.01	0.00	0.01
Bahrain	0.16	0.03	0.02	0.26	0.07	0.05
Belgium (Flemish)	0.14	0.02	0.02	0.16	0.03	0.02
Bosnia and Herzegovina	0.01	0.00	0.00	0.05	0.00	0.00
Bulgaria	0.21	0.04	0.06	0.21	0.04	0.06
Canada	0.12	0.01	0.02	0.10	0.01	0.01
Chile	0.18	0.03	0.03	0.18	0.03	0.02
Chinese Taipei	0.01	0.00	0.00	0.01	0.00	0.00
Croatia	-0.04	0.00	0.00	-0.03	0.00	0.00
Cyprus	0.13	0.02	0.02	0.12	0.01	0.01
Czech Republic	0.11	0.01	0.01	0.11	0.01	0.01
Denmark	0.10	0.01	0.01	0.09	0.01	0.01
England	0.23	0.05	0.02	0.26	0.07	0.02
Finland	0.08	0.01	0.01	0.08	0.01	0.02
France	0.17	0.03	0.02	0.17	0.03	0.03
Georgia	0.03	0.00	0.00	0.04	0.00	0.00
Germany	0.25	0.06	0.06	0.26	0.07	0.07
Hong Kong SAR	0.15	0.02	0.02	0.18	0.03	0.03
Hungary	0.18	0.03	0.04	0.17	0.03	0.04
Iran, Islamic Rep. of	0.14	0.02	0.01	0.15	0.02	0.01
Ireland	0.15	0.02	0.01	0.15	0.02	0.01
Italy	0.06	0.00	0.00	0.07	0.01	0.00
Japan	0.05	0.00	0.00	0.04	0.00	0.00
Kazakhstan	0.05	0.00	0.00	0.05	0.00	0.00
Korea, Rep. of	0.07	0.00	0.01	0.06	0.00	0.00
Kosovo	-0.07	0.00	0.00	-0.08	0.01	0.01
Kuwait	0.14	0.02	0.02	0.20	0.04	0.04
Latvia	0.00	0.00	0.00	0.01	0.00	0.00
Lithuania	-0.11	0.01	0.01	-0.12	0.01	0.01
Malta	0.17	0.03	0.04	0.17	0.03	0.04
Montenegro	-0.02	0.00	0.00	-0.02	0.00	0.00
Morocco	0.03	0.00	0.02	0.02	0.00	0.02
Netherlands	0.11	0.01	0.01	0.15	0.02	0.01

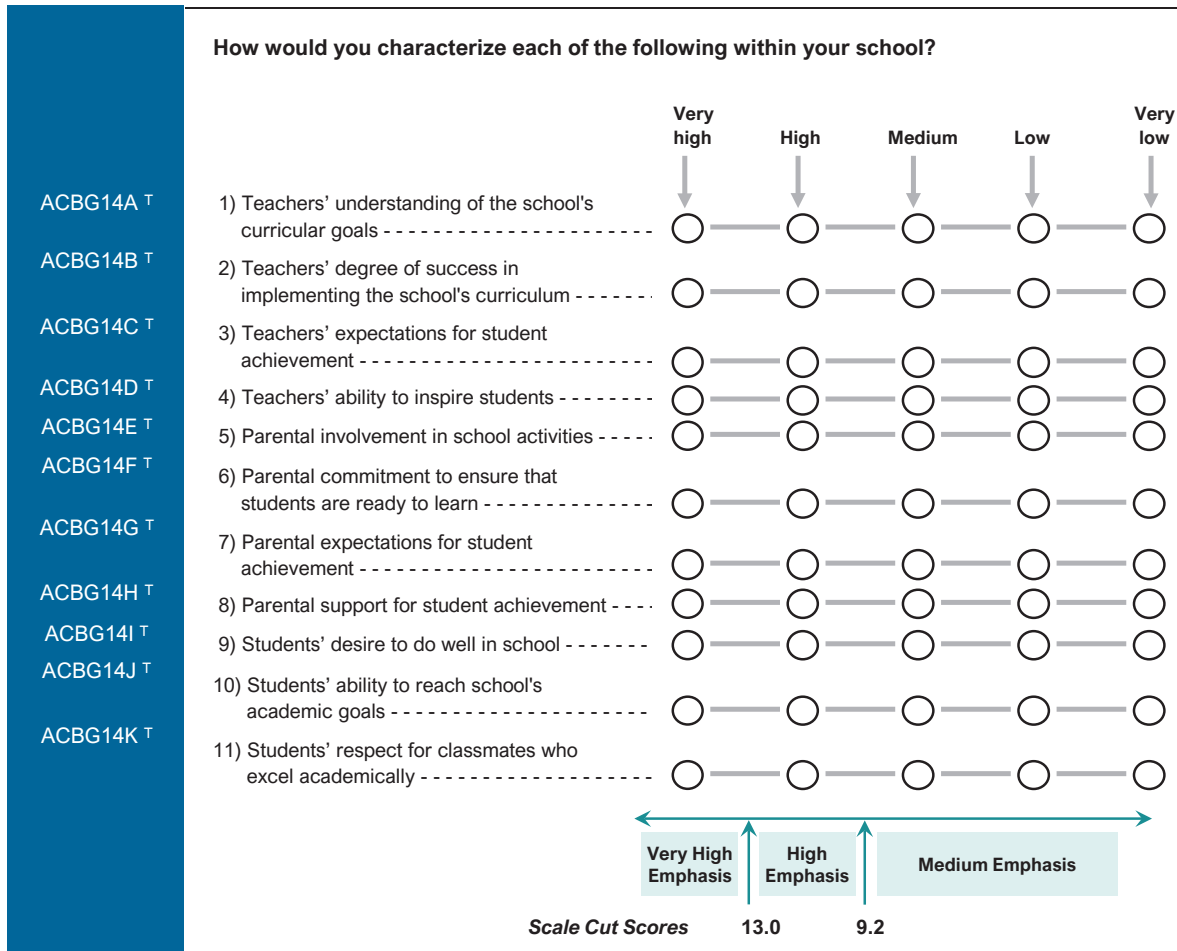
Relationship Between the TIMSS 2019 School Discipline Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.25	0.06	0.05	0.26	0.07	0.06
North Macedonia	0.08	0.01	0.01	0.09	0.01	0.01
Northern Ireland	0.15	0.02	0.02	0.13	0.02	0.01
Norway (5)	0.06	0.00	0.00	0.06	0.00	0.01
Oman	0.01	0.00	0.00	0.01	0.00	0.00
Pakistan	-0.06	0.00	0.01	-0.06	0.00	0.01
Philippines	0.13	0.02	0.04	0.13	0.02	0.04
Poland	-0.01	0.00	0.00	-0.01	0.00	0.00
Portugal	0.09	0.01	0.01	0.08	0.01	0.01
Qatar	0.05	0.00	0.01	0.06	0.00	0.01
Russian Federation	0.03	0.00	0.00	0.02	0.00	0.00
Saudi Arabia	0.07	0.00	0.00	0.07	0.01	0.01
Serbia	-0.03	0.00	0.00	-0.03	0.00	0.00
Singapore	0.05	0.00	0.00	0.06	0.00	0.00
Slovak Republic	0.17	0.03	0.05	0.20	0.04	0.09
South Africa (5)	0.13	0.02	0.01	0.12	0.02	0.01
Spain	0.15	0.02	0.02	0.16	0.03	0.02
Sweden	0.17	0.03	0.01	0.17	0.03	0.01
Turkey (5)	0.20	0.04	0.05	0.20	0.04	0.05
United Arab Emirates	0.22	0.05	0.05	0.24	0.06	0.06
United States	0.18	0.03	0.03	0.20	0.04	0.03
International Median	0.11	0.01	0.01	0.10	0.01	0.01
Benchmarking Participants						
Ontario, Canada	0.17	0.03	0.04	0.13	0.02	0.02
Quebec, Canada	0.03	0.00	0.01	0.02	0.00	0.00
Moscow City, Russian Fed.	0.00	0.00	0.00	0.00	0.00	0.00
Madrid, Spain	0.10	0.01	0.03	0.10	0.01	0.02
Abu Dhabi, UAE	0.22	0.05	0.04	0.25	0.06	0.05
Dubai, UAE	0.04	0.00	0.00	0.05	0.00	0.00

School Emphasis on Academic Success— Principals’ Reports – Grade 4

About the Scale

The *School Emphasis on Academic Success* scale was created based on principals’ responses to eleven items listed below.¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Low” and “Very low” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 School Emphasis on Academic Success—Principals' Reports Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ACBG14A	-1.51453	-3.71990	0.14195	3.57795	1.12
ACBG14B	-1.06786	-3.81822	0.14006	3.67816	0.98
ACBG14C	-0.77174	-3.36668	-0.07105	3.43773	1.03
ACBG14D	-0.86155	-3.51615	0.09339	3.42276	1.03
ACBG14E	1.29590	-2.49610	0.11848	2.37762	1.15
ACBG14F	1.41750	-2.64527	0.12898	2.51629	0.95
ACBG14G	-0.15848	-2.55875	-0.22955	2.78830	1.14
ACBG14H	1.31862	-2.82962	0.18549	2.64413	0.90
ACBG14I	0.06237	-3.37852	0.05400	3.32452	0.92
ACBG14J	0.48757	-3.88724	0.26174	3.62550	0.88
ACBG14K	-0.20780	-3.11968	-0.13994	3.25962	1.14

Scale Transformation Constants for the TIMSS 2019 School Emphasis on Academic Success—Principals' Reports Scale – Grade 4

Scale Transformation Constants

A = 9.213867

B = 1.105570

Transformed Scale Score = 9.213867 + 1.105570 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019
School Emphasis on Academic Success—Principals' Reports Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	1.33825	
1	2.77163	
2	3.56947	
3	4.18606	
4	4.71768	
5	5.20235	
6	5.65593	
7	6.08580	
8	6.49334	
9	6.87782	
10	7.23985	
11	7.58308	
12	7.91194	
13	8.23156	
14	8.54700	
15	8.86258	
16	9.18132	9.2
17	9.50476	
18	9.83206	
19	10.16093	
20	10.48841	
21	10.81202	
22	11.13070	
23	11.44500	
24	11.75683	
25	12.06931	
26	12.38668	
27	12.71485	
28	13.06080	13.0
29	13.43532	
30	13.85847	
31	14.36918	
32	15.06494	
33	16.40427	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 School Emphasis on Academic Success—Principals' Reports Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item										
			ACBG14A	ACBG14B	ACBG14C	ACBG14D	ACBG14E	ACBG14F	ACBG14G	ACBG14H	ACBG14I	ACBG14J	ACBG14K
Albania	0.86	42	0.62	0.63	0.55	0.62	0.65	0.74	0.63	0.73	0.69	0.73	0.54
Armenia	0.86	43	0.55	0.55	0.63	0.64	0.60	0.81	0.61	0.79	0.73	0.61	0.67
Australia	0.92	55	0.69	0.78	0.74	0.70	0.77	0.75	0.71	0.77	0.78	0.77	0.72
Austria	0.85	41	0.43	0.68	0.68	0.47	0.75	0.80	0.59	0.72	0.60	0.72	0.45
Azerbaijan	0.89	48	0.62	0.73	0.77	0.72	0.65	0.76	0.71	0.70	0.70	0.72	0.55
Bahrain	0.94	63	0.78	0.81	0.83	0.78	0.69	0.79	0.79	0.85	0.85	0.84	0.72
Belgium (Flemish)	0.82	37	0.29	0.48	0.47	0.44	0.74	0.80	0.50	0.74	0.72	0.69	0.60
Bosnia and Herzegovina	0.88	47	0.65	0.65	0.62	0.76	0.68	0.79	0.39	0.67	0.72	0.77	0.73
Bulgaria	0.92	56	0.60	0.69	0.73	0.71	0.77	0.80	0.71	0.82	0.80	0.82	0.72
Canada	0.91	52	0.61	0.68	0.71	0.68	0.76	0.78	0.73	0.81	0.74	0.76	0.68
Chile	0.92	55	0.71	0.78	0.79	0.77	0.70	0.76	0.78	0.79	0.78	0.63	0.69
Chinese Taipei	0.91	53	0.65	0.73	0.66	0.75	0.66	0.77	0.70	0.81	0.78	0.81	0.67
Croatia	0.83	38	0.42	0.64	0.75	0.69	0.62	0.67	0.55	0.65	0.64	0.58	0.52
Cyprus	0.92	55	0.54	0.68	0.59	0.61	0.76	0.88	0.81	0.87	0.82	0.88	0.65
Czech Republic	0.87	44	0.46	0.63	0.58	0.66	0.74	0.73	0.65	0.72	0.75	0.68	0.64
Denmark	0.92	56	0.71	0.74	0.73	0.66	0.73	0.81	0.81	0.85	0.72	0.73	0.69
England	0.88	47	0.70	0.68	0.58	0.63	0.79	0.83	0.81	0.83	0.60	0.63	0.29
Finland	0.88	47	0.57	0.59	0.70	0.61	0.70	0.77	0.71	0.75	0.77	0.73	0.62
France	0.83	40	0.46	0.45	0.43	0.67	0.67	0.79	0.59	0.81	0.76	0.72	0.41
Georgia	0.90	49	0.68	0.68	0.78	0.70	0.74	0.78	0.65	0.78	0.74	0.58	0.58
Germany	0.86	42	0.51	0.56	0.68	0.52	0.73	0.80	0.64	0.78	0.62	0.70	0.54
Hong Kong SAR	0.92	57	0.65	0.78	0.74	0.78	0.66	0.84	0.82	0.81	0.73	0.83	0.65
Hungary	0.89	50	0.37	0.68	0.67	0.75	0.69	0.83	0.59	0.82	0.79	0.75	0.67
Iran, Islamic Rep. of	0.89	49	0.64	0.76	0.55	0.68	0.72	0.76	0.69	0.73	0.69	0.77	0.68
Ireland	0.92	56	0.65	0.66	0.73	0.70	0.77	0.86	0.83	0.80	0.78	0.81	0.58
Italy	0.87	45	0.68	0.73	0.67	0.67	0.58	0.72	0.54	0.77	0.67	0.78	0.53
Japan	0.89	47	0.56	0.58	0.72	0.59	0.68	0.79	0.77	0.82	0.72	0.75	0.47
Kazakhstan	0.90	50	0.63	0.67	0.70	0.74	0.66	0.77	0.70	0.80	0.68	0.71	0.72
Korea, Rep. of	0.92	56	0.64	0.70	0.73	0.70	0.79	0.78	0.72	0.82	0.81	0.78	0.76
Kosovo	0.85	41	0.62	0.61	0.64	0.68	0.65	0.72	0.60	0.63	0.67	0.75	0.43
Kuwait	0.92	57	0.72	0.70	0.78	0.77	0.75	0.80	0.77	0.80	0.77	0.78	0.65
Latvia	0.78	32	0.47	0.46	0.53	0.63	0.62	0.65	0.43	0.72	0.64	0.53	0.41
Lithuania	0.87	43	0.67	0.72	0.71	0.73	0.72	0.71	0.59	0.68	0.55	0.59	0.50
Malta	0.89	48	0.41	0.58	0.71	0.67	0.60	0.84	0.78	0.77	0.75	0.76	0.66
Montenegro	0.82	37	0.69	0.68	0.39	0.53	0.68	0.72	0.34	0.67	0.58	0.68	0.62
Morocco	0.90	51	0.66	0.65	0.74	0.71	0.75	0.81	0.74	0.76	0.67	0.74	0.57
Netherlands	0.81	37	0.55	0.67	0.62	0.60	0.12	0.53	0.65	0.64	0.67	0.77	0.59
New Zealand	0.90	52	0.60	0.71	0.72	0.69	0.63	0.74	0.77	0.79	0.77	0.77	0.67
North Macedonia	0.90	52	0.68	0.70	0.74	0.72	0.71	0.81	0.61	0.72	0.74	0.79	0.68
Northern Ireland	0.90	51	0.43	0.62	0.80	0.60	0.69	0.82	0.84	0.77	0.81	0.72	0.64

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 School Emphasis on Academic Success—Principals' Reports Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item										
			ACBG14A	ACBG14B	ACBG14C	ACBG14D	ACBG14E	ACBG14F	ACBG14G	ACBG14H	ACBG14I	ACBG14J	ACBG14K
Norway (5)	0.85	41	0.61	0.54	0.72	0.64	0.79	0.71	0.67	0.75	0.55	0.43	0.54
Oman	0.90	50	0.62	0.67	0.73	0.70	0.73	0.80	0.65	0.77	0.72	0.71	0.62
Pakistan	0.89	48	0.60	0.70	0.70	0.52	0.69	0.73	0.61	0.79	0.76	0.73	0.75
Philippines	0.91	52	0.53	0.60	0.56	0.67	0.75	0.87	0.81	0.83	0.79	0.78	0.66
Poland	0.88	46	0.60	0.67	0.65	0.67	0.68	0.72	0.63	0.76	0.78	0.68	0.61
Portugal	0.88	47	0.58	0.67	0.72	0.61	0.72	0.78	0.67	0.78	0.72	0.67	0.60
Qatar	0.91	53	0.64	0.67	0.74	0.74	0.69	0.79	0.63	0.76	0.80	0.81	0.69
Russian Federation	0.87	43	0.62	0.72	0.63	0.61	0.73	0.69	0.51	0.71	0.70	0.72	0.58
Saudi Arabia	0.90	51	0.68	0.71	0.66	0.63	0.71	0.78	0.69	0.80	0.79	0.77	0.62
Serbia	0.86	42	0.66	0.75	0.66	0.67	0.60	0.74	0.47	0.64	0.65	0.62	0.60
Singapore	0.91	53	0.55	0.71	0.77	0.58	0.72	0.80	0.81	0.79	0.81	0.80	0.62
Slovak Republic	0.87	44	0.59	0.69	0.59	0.55	0.68	0.74	0.54	0.79	0.81	0.71	0.53
South Africa (5)	0.90	49	0.58	0.66	0.65	0.67	0.77	0.78	0.72	0.79	0.67	0.67	0.72
Spain	0.89	47	0.47	0.65	0.74	0.63	0.78	0.82	0.75	0.81	0.63	0.69	0.52
Sweden	0.91	54	0.67	0.76	0.76	0.65	0.76	0.81	0.76	0.81	0.72	0.80	0.52
Turkey (5)	0.89	49	0.62	0.69	0.72	0.60	0.78	0.81	0.63	0.78	0.70	0.74	0.57
United Arab Emirates	0.94	63	0.81	0.82	0.84	0.81	0.75	0.83	0.67	0.81	0.83	0.83	0.73
United States	0.92	55	0.61	0.69	0.66	0.68	0.80	0.86	0.76	0.85	0.79	0.74	0.70
Benchmarking Participants													
Ontario, Canada	0.91	53	0.58	0.67	0.69	0.69	0.80	0.81	0.70	0.84	0.74	0.78	0.69
Quebec, Canada	0.89	47	0.71	0.70	0.69	0.64	0.69	0.71	0.75	0.75	0.71	0.64	0.58
Moscow City, Russian Fed.	0.87	43	0.63	0.66	0.62	0.76	0.69	0.74	0.39	0.67	0.70	0.63	0.64
Madrid, Spain	0.89	48	0.43	0.68	0.79	0.50	0.78	0.84	0.75	0.81	0.70	0.67	0.57
Abu Dhabi, UAE	0.94	64	0.83	0.80	0.85	0.79	0.74	0.82	0.65	0.85	0.84	0.85	0.77
Dubai, UAE	0.94	62	0.82	0.80	0.84	0.80	0.78	0.84	0.72	0.82	0.78	0.80	0.67

Relationship Between the TIMSS 2019 School Emphasis on Academic Success—Principals' Reports Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.21	0.04	0.03	0.22	0.05	0.03
Armenia	0.06	0.00	0.00	0.04	0.00	0.00
Australia	0.22	0.05	0.04	0.21	0.04	0.04
Austria	0.21	0.04	0.03	0.26	0.07	0.06
Azerbaijan	-0.01	0.00	0.00	0.01	0.00	0.00
Bahrain	0.05	0.00	0.00	0.13	0.02	0.03
Belgium (Flemish)	0.16	0.03	0.01	0.16	0.02	0.01
Bosnia and Herzegovina	0.02	0.00	0.01	0.03	0.00	0.01
Bulgaria	0.39	0.15	0.12	0.42	0.18	0.15
Canada	0.14	0.02	0.02	0.13	0.02	0.01
Chile	0.24	0.06	0.05	0.22	0.05	0.04
Chinese Taipei	0.10	0.01	0.01	0.09	0.01	0.01
Croatia	0.06	0.00	0.00	0.07	0.00	0.01
Cyprus	0.16	0.03	0.02	0.14	0.02	0.02
Czech Republic	0.21	0.05	0.04	0.19	0.04	0.03
Denmark	0.10	0.01	0.01	0.09	0.01	0.01
England	0.21	0.05	0.05	0.25	0.06	0.07
Finland	0.11	0.01	0.01	0.13	0.02	0.01
France	0.22	0.05	0.03	0.23	0.05	0.04
Georgia	0.07	0.01	0.01	0.06	0.00	0.01
Germany	0.28	0.08	0.05	0.27	0.07	0.05
Hong Kong SAR	0.17	0.03	0.02	0.21	0.05	0.03
Hungary	0.29	0.08	0.04	0.26	0.07	0.03
Iran, Islamic Rep. of	0.20	0.04	0.02	0.22	0.05	0.03
Ireland	0.17	0.03	0.03	0.15	0.02	0.03
Italy	0.06	0.00	0.00	0.08	0.01	0.00
Japan	0.13	0.02	0.01	0.11	0.01	0.01
Kazakhstan	0.03	0.00	0.01	0.02	0.00	0.01
Korea, Rep. of	0.18	0.03	0.02	0.16	0.03	0.02
Kosovo	0.13	0.02	0.01	0.15	0.02	0.02
Kuwait	0.19	0.04	0.04	0.20	0.04	0.04
Latvia	0.11	0.01	0.01	0.12	0.01	0.01
Lithuania	0.19	0.04	0.01	0.19	0.04	0.01
Malta	0.23	0.05	0.04	0.26	0.07	0.05
Montenegro	0.02	0.00	0.00	0.03	0.00	0.00
Morocco	0.21	0.04	0.04	0.20	0.04	0.03
Netherlands	0.10	0.01	0.01	0.14	0.02	0.02

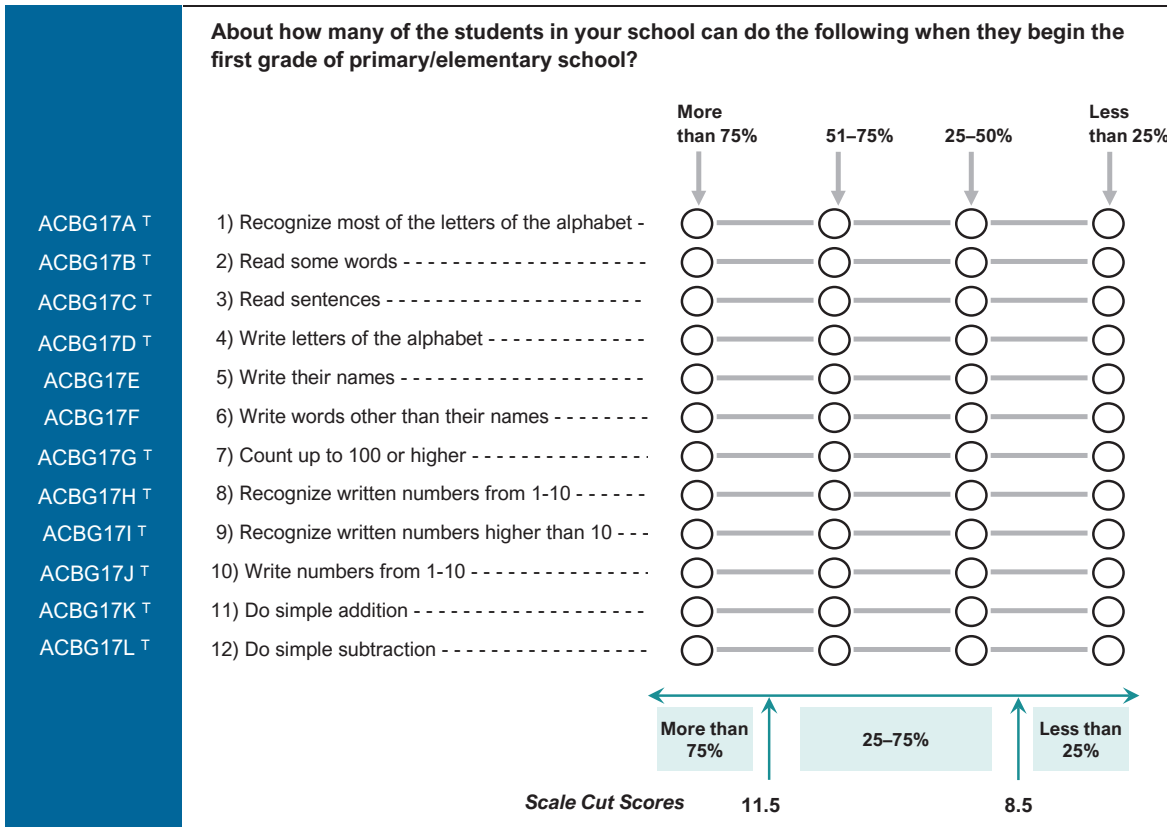
Relationship Between the TIMSS 2019 School Emphasis on Academic Success—Principals' Reports Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.27	0.07	0.07	0.27	0.07	0.07
North Macedonia	0.21	0.04	0.02	0.23	0.05	0.03
Northern Ireland	0.18	0.03	0.03	0.14	0.02	0.02
Norway (5)	0.15	0.02	0.01	0.17	0.03	0.01
Oman	0.17	0.03	0.02	0.20	0.04	0.02
Pakistan	0.23	0.05	0.03	0.24	0.06	0.05
Philippines	0.09	0.01	0.01	0.10	0.01	0.01
Poland	0.14	0.02	0.01	0.14	0.02	0.01
Portugal	0.18	0.03	0.02	0.16	0.02	0.02
Qatar	0.08	0.01	0.00	0.09	0.01	0.01
Russian Federation	0.14	0.02	0.03	0.13	0.02	0.03
Saudi Arabia	0.14	0.02	0.02	0.18	0.03	0.03
Serbia	0.14	0.02	0.02	0.14	0.02	0.02
Singapore	0.15	0.02	0.02	0.16	0.03	0.02
Slovak Republic	0.31	0.10	0.04	0.35	0.12	0.04
South Africa (5)	0.26	0.07	0.06	0.26	0.07	0.06
Spain	0.21	0.04	0.03	0.19	0.04	0.03
Sweden	0.23	0.05	0.05	0.25	0.06	0.06
Turkey (5)	0.30	0.09	0.07	0.28	0.08	0.06
United Arab Emirates	0.37	0.14	0.13	0.40	0.16	0.16
United States	0.26	0.07	0.06	0.28	0.08	0.06
International Median	0.17	0.03	0.02	0.16	0.03	0.03
Benchmarking Participants						
Ontario, Canada	0.14	0.02	0.02	0.11	0.01	0.01
Quebec, Canada	0.14	0.02	0.02	0.13	0.02	0.02
Moscow City, Russian Fed.	0.04	0.00	0.00	0.05	0.00	0.00
Madrid, Spain	0.22	0.05	0.04	0.20	0.04	0.03
Abu Dhabi, UAE	0.39	0.15	0.17	0.43	0.18	0.20
Dubai, UAE	0.20	0.04	0.04	0.20	0.04	0.04

Schools Where Students Enter with Literacy and Numeracy Skills – Grade 4

About the Scale

The *Schools Where Students Enter with Literacy and Numeracy Skills* scale was created based on principals' responses to twelve items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 Schools Where Students Enter with Literacy and Numeracy Skills Scale – Grade 4

Item	delta	tau_1	tau_2	tau_3	Infit
ACBG17A	-0.72531	-1.60124	0.01778	1.58346	1.28
ACBG17B	0.28400	-1.70182	-0.01923	1.72105	1.14
ACBG17C	1.50852	-1.39085	-0.20204	1.59289	1.12
ACBG17D	-0.58439	-1.95844	0.18365	1.77479	1.16
ACBG17E	-1.66731	-1.47535	0.11321	1.36214	1.61
ACBG17F	0.54604	-1.72628	-0.06684	1.79312	0.97
ACBG17G	1.07922	-1.89888	-0.16212	2.06100	1.46
ACBG17H	-1.89417	-2.02701	0.38834	1.63867	1.15
ACBG17I	0.07560	-1.89253	-0.09470	1.98723	1.08
ACBG17J	-0.88472	-1.53692	0.16155	1.37537	1.08
ACBG17K	0.86027	-1.92773	-0.05223	1.97996	1.03
ACBG17L	1.40225	-1.74952	-0.13408	1.88360	1.16

Scale Transformation Constants for the TIMSS 2019 Schools Where Students Enter with Literacy and Numeracy Skills Scale – Grade 4

Scale Transformation Constants

A = 10.004848

B = 0.6920950

Transformed Scale Score = 10.004848 + 0.6920950 • Logit Scale Score

**Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS
2019 Schools Where Students Enter with Literacy and Numeracy Skills
Scale – Grade 4**

Raw Score	Transformed Scale Score	Cutpoint
0	6.11923	
1	6.99979	
2	7.45729	
3	7.78264	
4	8.04034	
5	8.25669	
6	8.44586	8.5
7	8.61529	
8	8.77012	
9	8.91382	
10	9.04893	
11	9.17718	
12	9.30061	
13	9.42002	
14	9.53638	
15	9.65056	
16	9.76331	
17	9.87533	
18	9.98694	
19	10.09967	
20	10.21320	
21	10.32848	
22	10.44619	
23	10.56707	
24	10.69194	
25	10.82142	
26	10.95725	
27	11.10057	
28	11.25305	
29	11.41684	
30	11.59476	11.5
31	11.79087	
32	12.01080	
33	12.26650	
34	12.58081	
35	13.01404	
36	13.85372	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Schools Where Students Enter with Literacy and Numeracy Skills Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item												
			ACBG17A	ACBG17B	ACBG17C	ACBG17D	ACBG17E	ACBG17F	ACBG17G	ACBG17H	ACBG17I	ACBG17J	ACBG17K	ACBG17L	
Albania	0.94	59	0.73	0.76	0.78	0.80	0.72	0.82	0.68	0.73	0.80	0.74	0.84	0.81	
Armenia	0.95	65	0.72	0.85	0.83	0.85	0.83	0.88	0.76	0.70	0.77	0.79	0.84	0.84	
Australia	0.97	76	0.86	0.91	0.90	0.87	0.73	0.91	0.85	0.85	0.91	0.91	0.85	0.86	
Austria	0.91	52	0.82	0.83	0.75	0.66	0.41	0.77	0.67	0.59	0.75	0.75	0.80	0.76	
Azerbaijan	0.97	72	0.76	0.88	0.82	0.88	0.88	0.88	0.75	0.82	0.86	0.85	0.90	0.91	
Bahrain	0.97	73	0.82	0.90	0.87	0.88	0.88	0.90	0.83	0.79	0.90	0.82	0.84	0.82	
Belgium (Flemish)	0.86	42	0.63	0.68	0.46	0.74	0.56	0.66	0.49	0.62	0.69	0.66	0.73	0.73	
Bosnia and Herzegovina	0.94	61	0.78	0.83	0.77	0.81	0.73	0.84	0.74	0.71	0.82	0.80	0.74	0.75	
Bulgaria	0.97	76	0.85	0.86	0.81	0.89	0.89	0.89	0.86	0.84	0.90	0.88	0.89	0.89	
Canada	0.95	64	0.79	0.85	0.77	0.83	0.77	0.86	0.75	0.80	0.82	0.83	0.78	0.78	
Chile	0.96	70	0.82	0.86	0.83	0.86	0.81	0.88	0.80	0.79	0.89	0.82	0.83	0.82	
Chinese Taipei	0.96	71	0.88	0.85	0.81	0.88	0.82	0.85	0.82	0.82	0.85	0.80	0.86	0.87	
Croatia	0.94	60	0.80	0.84	0.75	0.81	0.71	0.79	0.65	0.74	0.80	0.82	0.79	0.76	
Cyprus	0.93	59	0.77	0.84	0.80	0.76	0.62	0.81	0.79	0.70	0.79	0.71	0.83	0.78	
Czech Republic	0.88	45	0.73	0.74	0.58	0.68	0.58	0.67	0.55	0.72	0.69	0.76	0.67	0.62	
Denmark	0.92	55	0.80	0.82	0.68	0.64	0.55	0.70	0.77	0.76	0.81	0.80	0.79	0.75	
England	0.96	72	0.89	0.88	0.82	0.83	0.86	0.86	0.76	0.85	0.87	0.89	0.83	0.80	
Finland	0.91	50	0.68	0.69	0.67	0.66	0.55	0.73	0.63	0.72	0.75	0.78	0.80	0.79	
France	0.91	51	0.70	0.74	0.67	0.75	0.53	0.81	0.73	0.65	0.80	0.71	0.76	0.72	
Georgia	0.97	74	0.78	0.83	0.90	0.91	0.86	0.94	0.84	0.73	0.91	0.83	0.86	0.87	
Germany	0.87	43	0.68	0.71	0.62	0.67	0.56	0.61	0.52	0.69	0.70	0.73	0.68	0.69	
Hong Kong SAR	0.95	64	0.77	0.87	0.82	0.83	0.81	0.83	0.78	0.73	0.78	0.74	0.83	0.80	
Hungary	0.90	51	0.76	0.72	0.55	0.75	0.80	0.72	0.60	0.79	0.75	0.81	0.66	0.57	
Iran, Islamic Rep. of	0.96	69	0.83	0.85	0.85	0.86	0.89	0.71	0.77	0.81	0.85	0.80	0.89	0.86	
Ireland	0.88	54	0.84	0.83	0.84	0.82	0.63	0.82	0.41	0.76	0.62	0.76	0.82	0.54	
Italy	0.93	57	0.72	0.78	0.79	0.71	0.52	0.82	0.72	0.80	0.83	0.79	0.79	0.75	
Japan	0.94	62	0.70	0.77	0.85	0.81	0.68	0.84	0.74	0.80	0.84	0.84	0.80	0.78	
Kazakhstan	0.95	63	0.63	0.77	0.75	0.76	0.86	0.87	0.78	0.77	0.82	0.78	0.88	0.85	
Korea, Rep. of	0.96	73	0.84	0.85	0.88	0.90	0.72	0.89	0.86	0.80	0.88	0.86	0.88	0.87	
Kosovo	0.95	64	0.77	0.84	0.79	0.84	0.76	0.85	0.74	0.71	0.81	0.81	0.84	0.83	
Kuwait	0.97	77	0.86	0.90	0.87	0.90	0.86	0.92	0.85	0.82	0.92	0.87	0.90	0.85	
Latvia	0.89	46	0.48	0.63	0.74	0.66	0.67	0.69	0.60	0.74	0.74	0.75	0.72	0.68	
Lithuania	0.94	62	0.73	0.79	0.84	0.79	0.62	0.81	0.73	0.75	0.86	0.79	0.86	0.86	
Malta	0.96	68	0.79	0.88	0.84	0.89	0.87	0.87	0.64	0.76	0.85	0.82	0.87	0.81	
Montenegro	0.92	54	0.76	0.75	0.71	0.78	0.76	0.80	0.57	0.72	0.77	0.75	0.73	0.67	
Morocco	0.97	77	0.91	0.93	0.89	0.92	0.91	0.90	0.84	0.89	0.90	0.87	0.86	0.68	
Netherlands	0.93	57	0.79	0.73	0.79	0.70	0.57	0.79	0.72	0.76	0.77	0.79	0.83	0.79	
New Zealand	0.95	66	0.85	0.87	0.81	0.85	0.74	0.88	0.79	0.85	0.84	0.85	0.75	0.69	
North Macedonia	0.93	56	0.76	0.78	0.67	0.82	0.68	0.74	0.78	0.59	0.78	0.71	0.82	0.78	
Northern Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Schools Where Students Enter with Literacy and Numeracy Skills Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item												
			ACBG17A	ACBG17B	ACBG17C	ACBG17D	ACBG17E	ACBG17F	ACBG17G	ACBG17H	ACBG17I	ACBG17J	ACBG17K	ACBG17L	
Norway (5)	0.92	53	0.78	0.77	0.62	0.75	0.67	0.75	0.63	0.80	0.78	0.78	0.73	0.67	
Oman	0.95	66	0.75	0.85	0.81	0.83	0.80	0.86	0.81	0.75	0.84	0.76	0.86	0.81	
Pakistan	0.96	70	0.78	0.79	0.76	0.91	0.90	0.87	0.85	0.81	0.85	0.80	0.88	0.86	
Philippines	0.96	70	0.72	0.88	0.83	0.84	0.77	0.82	0.88	0.81	0.87	0.85	0.90	0.90	
Poland	0.93	58	0.74	0.74	0.72	0.82	0.77	0.82	0.63	0.69	0.78	0.85	0.80	0.79	
Portugal	0.94	59	0.76	0.82	0.72	0.75	0.66	0.85	0.73	0.72	0.84	0.78	0.79	0.79	
Qatar	0.98	79	0.89	0.91	0.89	0.91	0.91	0.93	0.88	0.85	0.89	0.87	0.89	0.87	
Russian Federation	0.96	68	0.79	0.86	0.84	0.83	0.81	0.84	0.71	0.82	0.87	0.81	0.84	0.84	
Saudi Arabia	0.96	72	0.82	0.89	0.81	0.89	0.87	0.90	0.83	0.78	0.86	0.84	0.86	0.86	
Serbia	0.93	58	0.77	0.79	0.68	0.77	0.81	0.79	0.63	0.80	0.78	0.81	0.80	0.72	
Singapore	0.95	71	0.85	0.88	0.80	0.93	0.90	0.87	0.59	0.87	0.86	0.90	0.83	0.79	
Slovak Republic	0.91	52	0.71	0.80	0.63	0.74	0.69	0.79	0.64	0.72	0.67	0.75	0.76	0.70	
South Africa (5)	0.94	60	0.75	0.80	0.69	0.79	0.76	0.83	0.70	0.79	0.81	0.79	0.78	0.80	
Spain	0.90	51	0.69	0.85	0.82	0.73	0.60	0.87	0.62	0.64	0.63	0.67	0.73	0.64	
Sweden	0.95	66	0.74	0.82	0.81	0.81	0.79	0.83	0.79	0.80	0.79	0.84	0.86	0.82	
Turkey (5)	0.98	79	0.88	0.92	0.92	0.92	0.90	0.93	0.84	0.79	0.90	0.84	0.92	0.91	
United Arab Emirates	0.98	80	0.89	0.93	0.88	0.92	0.90	0.92	0.89	0.85	0.91	0.89	0.89	0.88	
United States	0.98	83	0.91	0.93	0.87	0.93	0.91	0.93	0.91	0.92	0.94	0.92	0.90	0.85	
Benchmarking Participants															
Ontario, Canada	0.96	69	0.82	0.88	0.82	0.87	0.82	0.90	0.78	0.82	0.83	0.84	0.80	0.80	
Quebec, Canada	0.93	58	0.78	0.81	0.71	0.79	0.70	0.78	0.70	0.75	0.80	0.80	0.74	0.73	
Moscow City, Russian Fed	0.94	60	0.69	0.78	0.81	0.79	0.77	0.83	0.65	0.68	0.72	0.85	0.83	0.84	
Madrid, Spain	0.92	56	0.61	0.79	0.82	0.73	0.59	0.86	0.59	0.72	0.82	0.79	0.82	0.78	
Abu Dhabi, UAE	0.98	82	0.91	0.92	0.90	0.92	0.90	0.90	0.89	0.88	0.93	0.89	0.91	0.90	
Dubai, UAE	0.98	84	0.95	0.95	0.89	0.94	0.89	0.94	0.90	0.88	0.92	0.92	0.90	0.88	

A dash (–) indicates comparable data not available.

Relationship Between the TIMSS 2019 Schools Where Students Enter with Literacy and Numeracy Skills Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.06	0.00	0.01	0.07	0.00	0.01
Armenia	-0.01	0.00	0.01	-0.01	0.00	0.01
Australia	0.20	0.04	0.03	0.21	0.05	0.03
Austria	0.11	0.01	0.01	0.16	0.02	0.02
Azerbaijan	0.02	0.00	0.00	0.03	0.00	0.00
Bahrain	0.04	0.00	0.00	0.11	0.01	0.01
Belgium (Flemish)	0.14	0.02	0.01	0.16	0.03	0.01
Bosnia and Herzegovina	0.05	0.00	0.00	0.03	0.00	0.00
Bulgaria	0.39	0.15	0.12	0.44	0.19	0.15
Canada	0.10	0.01	0.01	0.10	0.01	0.01
Chile	0.22	0.05	0.05	0.19	0.04	0.04
Chinese Taipei	0.03	0.00	0.00	0.04	0.00	0.00
Croatia	0.07	0.01	0.00	0.10	0.01	0.00
Cyprus	0.10	0.01	0.01	0.11	0.01	0.01
Czech Republic	0.09	0.01	0.01	0.08	0.01	0.01
Denmark	0.06	0.00	0.00	0.05	0.00	0.00
England	0.21	0.04	0.01	0.24	0.06	0.02
Finland	0.08	0.01	0.01	0.08	0.01	0.01
France	0.17	0.03	0.01	0.16	0.02	0.01
Georgia	0.07	0.00	0.01	0.09	0.01	0.01
Germany	0.18	0.03	0.02	0.17	0.03	0.02
Hong Kong SAR	0.13	0.02	0.01	0.13	0.02	0.01
Hungary	0.15	0.02	0.01	0.12	0.01	0.01
Iran, Islamic Rep. of	0.03	0.00	0.00	0.05	0.00	0.00
Ireland	0.14	0.02	0.02	0.14	0.02	0.01
Italy	-0.03	0.00	0.00	-0.03	0.00	0.00
Japan	0.06	0.00	0.00	0.06	0.00	0.00
Kazakhstan	0.11	0.01	0.01	0.08	0.01	0.00
Korea, Rep. of	0.08	0.01	0.01	0.08	0.01	0.01
Kosovo	0.04	0.00	0.00	0.06	0.00	0.00
Kuwait	0.14	0.02	0.03	0.09	0.01	0.01
Latvia	0.02	0.00	0.00	0.02	0.00	0.00
Lithuania	0.12	0.01	0.01	0.11	0.01	0.01
Malta	0.14	0.02	0.01	0.14	0.02	0.02
Montenegro	0.01	0.00	0.00	0.02	0.00	0.00
Morocco	0.20	0.04	0.02	0.19	0.04	0.02
Netherlands	0.05	0.00	0.00	0.05	0.00	0.00

Relationship Between the TIMSS 2019 Schools Where Students Enter with Literacy and Numeracy Skills Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.24	0.06	0.05	0.25	0.06	0.05
North Macedonia	0.11	0.01	0.02	0.07	0.01	0.02
Northern Ireland	-	-	-	-	-	-
Norway (5)	0.10	0.01	0.02	0.13	0.02	0.02
Oman	0.10	0.01	0.01	0.12	0.01	0.01
Pakistan	0.09	0.01	0.05	0.14	0.02	0.04
Philippines	0.13	0.02	0.01	0.16	0.02	0.01
Poland	0.03	0.00	0.00	0.05	0.00	0.00
Portugal	0.04	0.00	0.00	0.05	0.00	0.00
Qatar	0.18	0.03	0.03	0.18	0.03	0.03
Russian Federation	0.15	0.02	0.02	0.18	0.03	0.02
Saudi Arabia	0.10	0.01	0.01	0.11	0.01	0.02
Serbia	0.19	0.04	0.02	0.20	0.04	0.02
Singapore	0.10	0.01	0.00	0.11	0.01	0.00
Slovak Republic	0.31	0.10	0.07	0.35	0.12	0.08
South Africa (5)	0.01	0.00	0.04	0.00	0.00	0.05
Spain	0.20	0.04	0.04	0.20	0.04	0.03
Sweden	0.13	0.02	0.01	0.17	0.03	0.02
Turkey (5)	0.14	0.02	0.02	0.15	0.02	0.02
United Arab Emirates	0.30	0.09	0.09	0.30	0.09	0.09
United States	0.15	0.02	0.02	0.15	0.02	0.02
International Median	0.10	0.01	0.01	0.11	0.01	0.01
Benchmarking Participants						
Ontario, Canada	0.16	0.03	0.02	0.13	0.02	0.02
Quebec, Canada	0.03	0.00	0.00	0.05	0.00	0.00
Moscow City, Russian Fed.	0.02	0.00	0.00	0.02	0.00	0.00
Madrid, Spain	0.08	0.01	0.01	0.08	0.01	0.01
Abu Dhabi, UAE	0.32	0.10	0.10	0.35	0.12	0.13
Dubai, UAE	0.28	0.08	0.05	0.26	0.07	0.05

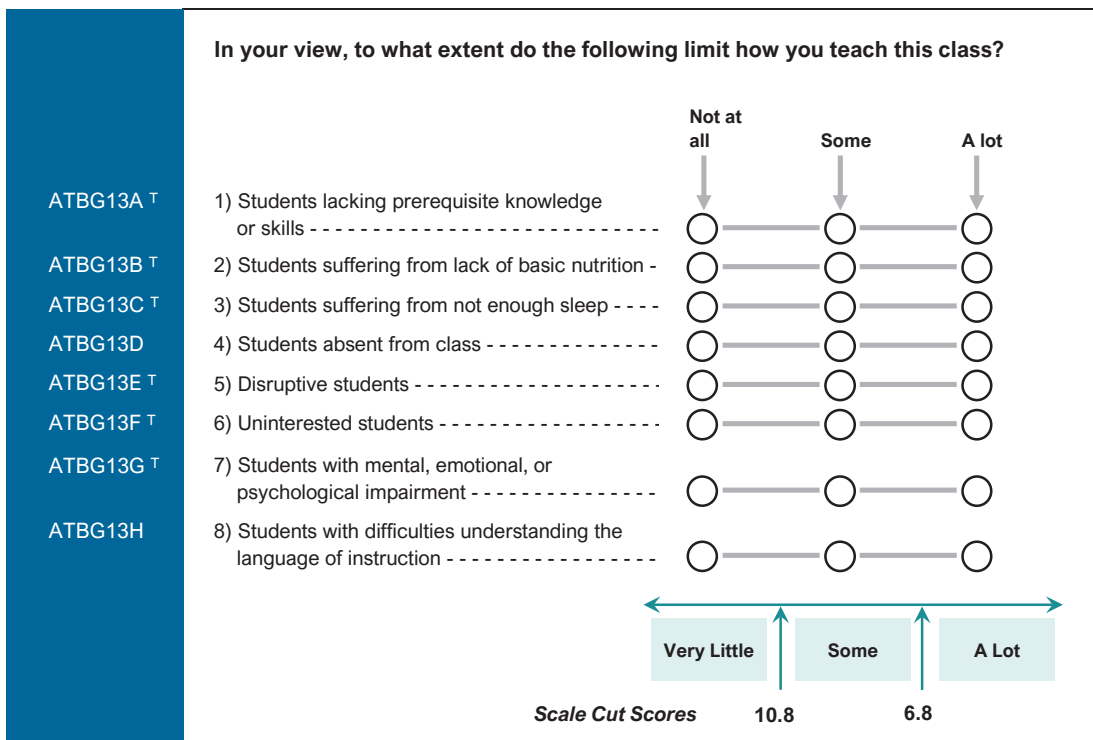
A dash (–) indicates comparable data not available.

Scales Based on Teachers' Reports

Classroom Teaching Limited by Students Not Ready for Instruction – Grade 4

About the Scale

The *Classroom Teaching Limited by Students Not Ready for Instruction* scale was created based on teachers' responses to eight items listed below.



^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 Classroom Teaching Limited by Students Not Ready for Instruction Scale – Grade 4

Item	delta	tau_1	tau_2	Infit
ATBG13A	0.91125	-2.07515	2.07515	1.04
ATBG13B	-1.09075	-1.07877	1.07877	1.08
ATBG13C	-0.28607	-1.55578	1.55578	0.96
ATBG13D	-0.02520	-1.59451	1.59451	1.00
ATBG13E	0.52548	-1.39807	1.39807	0.97
ATBG13F	0.51002	-1.82889	1.82889	0.94
ATBG13G	-0.04183	-1.36843	1.36843	1.02
ATBG13H	-0.50290	-1.21050	1.21050	1.05

Scale Transformation Constants for the TIMSS 2019 Classroom Teaching Limited by Students Not Ready for Instruction Scale – Grade 4

Scale Transformation Constants

$$A = 8.854136$$

$$B = 1.257770$$

$$\text{Transformed Scale Score} = 8.854136 + 1.257770 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 Classroom Teaching Limited by Students Not Ready for Instruction Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	3.29994	
1	4.83892	
2	5.65218	
3	6.26163	
4	6.78649	6.8
5	7.27293	
6	7.74710	
7	8.22648	
8	8.72059	
9	9.23472	
10	9.76704	
11	10.31572	
12	10.88870	10.8
13	11.50809	
14	12.22222	
15	13.14707	
16	14.80460	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Classroom Teaching Limited by Students Not Ready for Instruction Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			ATBG13A	ATBG13B	ATBG13C	ATBG13D	ATBG13E	ATBG13F	ATBG13G	ATBG13H
Albania	0.81	43	0.46	0.69	0.77	0.61	0.61	0.75	0.73	0.59
Armenia	0.80	42	0.39	0.61	0.71	0.70	0.67	0.72	0.66	0.65
Australia	0.81	43	0.66	0.71	0.72	0.69	0.69	0.62	0.61	0.51
Austria	0.75	37	0.74	0.18	0.71	0.61	0.51	0.60	0.64	0.66
Azerbaijan	0.71	34	0.52	0.41	0.64	0.65	0.58	0.58	0.63	0.63
Bahrain	0.76	38	0.55	0.50	0.64	0.55	0.62	0.74	0.66	0.62
Belgium (Flemish)	0.77	38	0.67	0.52	0.57	0.55	0.70	0.67	0.67	0.59
Bosnia and Herzegovina	0.82	45	0.47	0.66	0.71	0.68	0.69	0.71	0.68	0.72
Bulgaria	0.83	46	0.69	0.66	0.63	0.70	0.63	0.74	0.65	0.70
Canada	0.78	40	0.62	0.71	0.70	0.61	0.61	0.58	0.69	0.53
Chile	0.81	43	0.58	0.72	0.76	0.69	0.56	0.74	0.68	0.46
Chinese Taipei	0.82	45	0.53	0.60	0.65	0.68	0.70	0.72	0.71	0.74
Croatia	0.80	41	0.53	0.61	0.70	0.63	0.72	0.70	0.59	0.64
Cyprus	0.76	38	0.47	0.54	0.64	0.64	0.62	0.69	0.67	0.64
Czech Republic	0.68	32	0.61	0.44	0.64	0.49	0.52	0.70	0.59	0.48
Denmark	0.76	38	0.60	0.64	0.63	0.56	0.68	0.62	0.71	0.42
England	0.76	37	0.62	0.52	0.74	0.53	0.55	0.58	0.70	0.57
Finland	0.74	36	0.59	0.53	0.64	0.49	0.67	0.60	0.69	0.57
France	0.78	39	0.48	0.62	0.66	0.65	0.71	0.66	0.51	0.68
Georgia	0.71	34	0.57	0.49	0.58	0.59	0.66	0.60	0.54	0.59
Germany	0.78	41	0.72	0.62	0.67	0.57	0.55	0.67	0.67	0.63
Hong Kong SAR	0.76	38	0.66	0.54	0.61	0.64	0.57	0.64	0.66	0.62
Hungary	0.78	40	0.65	0.59	0.67	0.58	0.56	0.70	0.71	0.62
Iran, Islamic Rep. of	0.84	48	0.56	0.74	0.75	0.67	0.69	0.70	0.77	0.64
Ireland	0.79	40	0.61	0.61	0.64	0.72	0.67	0.66	0.54	0.60
Italy	0.82	44	0.70	0.58	0.64	0.74	0.69	0.65	0.64	0.67
Japan	0.76	38	0.67	0.29	0.50	0.47	0.69	0.77	0.75	0.66
Kazakhstan	0.87	53	0.53	0.56	0.75	0.71	0.80	0.78	0.81	0.81
Korea, Rep. of	0.87	53	0.50	0.70	0.81	0.80	0.66	0.73	0.80	0.76
Kosovo	0.65	30	0.62	0.61	0.69	0.46	0.32	0.61	0.54	0.43
Kuwait	0.75	37	0.55	0.57	0.67	0.46	0.70	0.68	0.58	0.62
Latvia	0.75	37	0.57	0.38	0.60	0.68	0.69	0.68	0.71	0.46
Lithuania	0.83	46	0.49	0.69	0.74	0.72	0.77	0.70	0.66	0.64
Malta	0.85	50	0.49	0.74	0.76	0.74	0.68	0.74	0.68	0.76
Montenegro	0.78	40	0.40	0.59	0.65	0.72	0.62	0.69	0.68	0.69
Morocco	0.73	35	0.57	0.61	0.56	0.45	0.65	0.66	0.53	0.64
Netherlands	0.79	41	0.49	0.61	0.75	0.67	0.76	0.63	0.52	0.61
New Zealand	0.76	37	0.46	0.65	0.68	0.61	0.70	0.66	0.62	0.46
North Macedonia	0.65	29	0.50	0.33	0.47	0.59	0.69	0.68	0.61	0.32
Northern Ireland	0.71	35	0.45	0.56	0.74	0.60	0.65	0.73	0.56	0.27

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Classroom Teaching Limited by Students Not Ready for Instruction Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			ATBG13A	ATBG13B	ATBG13C	ATBG13D	ATBG13E	ATBG13F	ATBG13G	ATBG13H
Norway (5)	0.81	43	0.62	0.65	0.74	0.67	0.72	0.76	0.62	0.42
Oman	0.84	46	0.53	0.65	0.67	0.72	0.70	0.75	0.69	0.71
Pakistan	0.66	29	0.57	0.70	0.52	0.34	0.48	0.54	0.63	0.45
Philippines	0.81	43	0.63	0.65	0.66	0.66	0.76	0.75	0.58	0.50
Poland	0.74	36	0.66	0.39	0.58	0.60	0.60	0.75	0.68	0.47
Portugal	0.83	47	0.47	0.78	0.78	0.76	0.74	0.74	0.54	0.59
Qatar	0.78	40	0.59	0.59	0.72	0.59	0.66	0.66	0.59	0.62
Russian Federation	0.86	52	0.48	0.64	0.73	0.81	0.76	0.79	0.78	0.70
Saudi Arabia	0.71	33	0.48	0.47	0.59	0.59	0.66	0.75	0.50	0.51
Serbia	0.81	44	0.40	0.62	0.69	0.71	0.72	0.65	0.75	0.71
Singapore	0.83	47	0.65	0.59	0.69	0.74	0.63	0.66	0.71	0.77
Slovak Republic	0.87	53	0.70	0.65	0.75	0.65	0.80	0.76	0.74	0.75
South Africa (5)	0.78	40	0.60	0.61	0.69	0.59	0.68	0.75	0.63	0.45
Spain	0.77	38	0.62	0.57	0.68	0.62	0.73	0.64	0.58	0.50
Sweden	0.68	32	0.53	0.08	0.51	0.55	0.72	0.64	0.67	0.58
Turkey (5)	0.82	44	0.55	0.62	0.69	0.62	0.74	0.72	0.69	0.67
United Arab Emirates	0.83	46	0.65	0.60	0.72	0.62	0.73	0.75	0.67	0.68
United States	0.79	42	0.64	0.68	0.73	0.65	0.67	0.67	0.66	0.41
Benchmarking Participants										
Ontario, Canada	0.82	45	0.62	0.78	0.73	0.63	0.66	0.59	0.71	0.63
Quebec, Canada	0.69	32	0.64	0.59	0.58	0.54	0.52	0.59	0.62	0.40
Moscow City, Russian Fed.	0.84	49	0.40	0.69	0.76	0.77	0.68	0.71	0.73	0.76
Madrid, Spain	0.77	39	0.68	0.57	0.69	0.57	0.63	0.67	0.59	0.56
Abu Dhabi, UAE	0.83	46	0.67	0.54	0.68	0.64	0.71	0.73	0.69	0.72
Dubai, UAE	0.82	45	0.68	0.66	0.71	0.60	0.71	0.74	0.63	0.61

Relationship Between the TIMSS 2019 Classroom Teaching Limited by Students Not Ready for Instruction Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.09	0.01	0.02	0.07	0.01	0.02
Armenia	0.05	0.00	0.01	0.04	0.00	0.00
Australia	0.28	0.08	0.06	0.26	0.07	0.06
Austria	0.22	0.05	0.03	0.25	0.06	0.04
Azerbaijan	0.01	0.00	0.00	-0.01	0.00	0.00
Bahrain	0.05	0.00	0.00	0.18	0.03	0.02
Belgium (Flemish)	0.16	0.03	0.02	0.17	0.03	0.03
Bosnia and Herzegovina	0.06	0.00	0.00	0.05	0.00	0.00
Bulgaria	0.23	0.05	0.07	0.27	0.07	0.08
Canada	0.22	0.05	0.04	0.19	0.04	0.03
Chile	0.18	0.03	0.04	0.20	0.04	0.04
Chinese Taipei	0.04	0.00	0.00	0.04	0.00	0.00
Croatia	-0.01	0.00	0.00	-0.01	0.00	0.00
Cyprus	0.14	0.02	0.02	0.12	0.02	0.01
Czech Republic	0.22	0.05	0.03	0.19	0.04	0.03
Denmark	0.09	0.01	0.01	0.07	0.01	0.00
England	0.09	0.01	0.01	0.10	0.01	0.02
Finland	0.14	0.02	0.02	0.15	0.02	0.03
France	0.21	0.04	0.04	0.20	0.04	0.04
Georgia	0.01	0.00	0.00	0.03	0.00	0.00
Germany	0.26	0.07	0.07	0.22	0.05	0.05
Hong Kong SAR	0.26	0.07	0.03	0.26	0.07	0.05
Hungary	0.21	0.05	0.03	0.20	0.04	0.02
Iran, Islamic Rep. of	0.16	0.03	0.02	0.14	0.02	0.01
Ireland	0.15	0.02	0.01	0.14	0.02	0.01
Italy	0.06	0.00	0.00	0.07	0.00	0.00
Japan	0.06	0.00	0.00	0.03	0.00	0.00
Kazakhstan	0.07	0.01	0.00	0.06	0.00	0.00
Korea, Rep. of	0.06	0.00	0.01	0.08	0.01	0.01
Kosovo	0.05	0.00	0.00	0.06	0.00	0.00
Kuwait	0.16	0.02	0.03	0.15	0.02	0.02
Latvia	0.14	0.02	0.01	0.05	0.00	0.01
Lithuania	0.13	0.02	0.02	0.14	0.02	0.02
Malta	0.18	0.03	0.04	0.18	0.03	0.04
Montenegro	0.10	0.01	0.01	0.10	0.01	0.01
Morocco	0.09	0.01	0.02	0.03	0.00	0.01
Netherlands	0.15	0.02	0.03	0.19	0.04	0.04

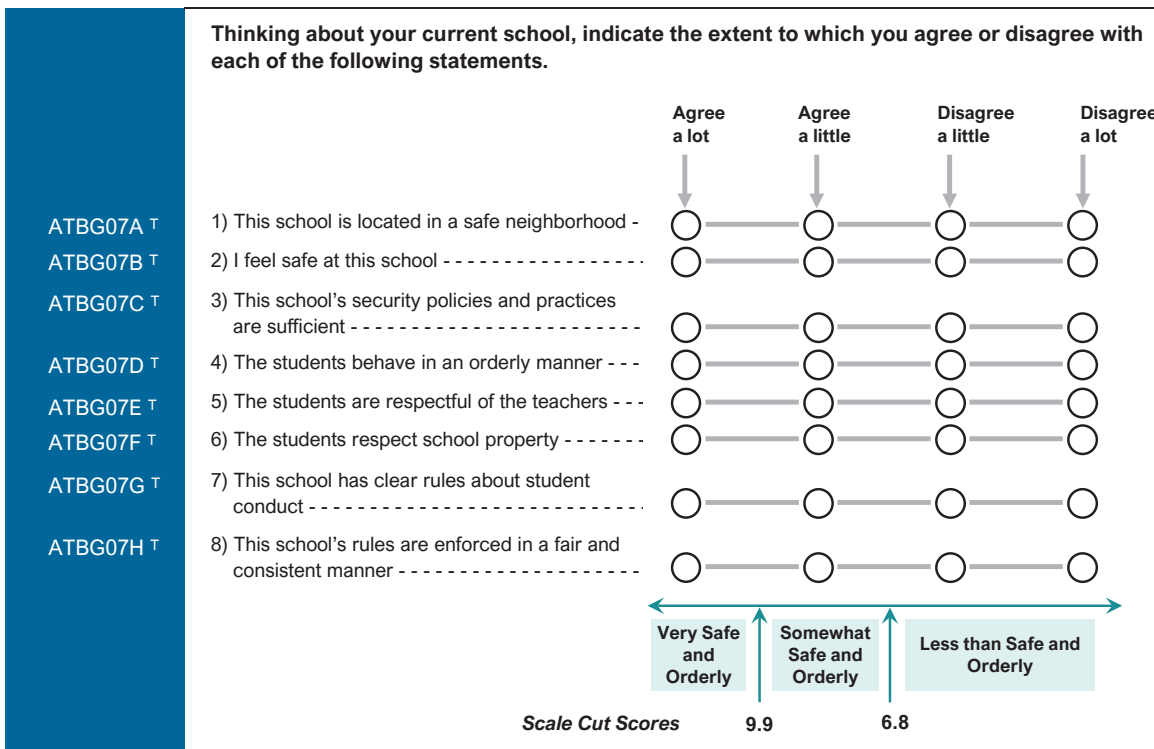
Relationship Between the TIMSS 2019 Classroom Teaching Limited by Students Not Ready for Instruction Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.23	0.05	0.04	0.23	0.05	0.04
North Macedonia	0.14	0.02	0.02	0.13	0.02	0.02
Northern Ireland	0.17	0.03	0.02	0.15	0.02	0.02
Norway (5)	0.13	0.02	0.02	0.13	0.02	0.02
Oman	0.08	0.01	0.02	0.08	0.01	0.01
Pakistan	-0.01	0.00	0.01	-0.04	0.00	0.01
Philippines	0.15	0.02	0.02	0.19	0.04	0.04
Poland	0.16	0.03	0.02	0.08	0.01	0.01
Portugal	0.14	0.02	0.02	0.12	0.01	0.01
Qatar	0.05	0.00	0.01	0.10	0.01	0.01
Russian Federation	0.02	0.00	0.00	0.03	0.00	0.00
Saudi Arabia	0.12	0.02	0.01	0.07	0.00	0.00
Serbia	0.01	0.00	0.00	0.02	0.00	0.00
Singapore	0.40	0.16	0.16	0.40	0.16	0.12
Slovak Republic	0.21	0.04	0.03	0.28	0.08	0.07
South Africa (5)	0.12	0.01	0.02	0.12	0.01	0.01
Spain	0.18	0.03	0.02	0.17	0.03	0.02
Sweden	0.16	0.03	0.01	0.16	0.03	0.01
Turkey (5)	0.27	0.07	0.07	0.19	0.04	0.04
United Arab Emirates	0.27	0.07	0.08	0.29	0.08	0.07
United States	0.26	0.07	0.04	0.27	0.07	0.05
International Median	0.14	0.02	0.02	0.13	0.02	0.02
Benchmarking Participants						
Ontario, Canada	0.26	0.07	0.05	0.21	0.04	0.03
Quebec, Canada	0.12	0.02	0.01	0.13	0.02	0.01
Moscow City, Russian Fed.	0.09	0.01	0.01	0.09	0.01	0.01
Madrid, Spain	0.15	0.02	0.01	0.21	0.04	0.03
Abu Dhabi, UAE	0.28	0.08	0.08	0.29	0.09	0.06
Dubai, UAE	0.24	0.06	0.06	0.25	0.06	0.05

Safe and Orderly School – Grade 4

About the Scale

The *Safe and Orderly School* scale was created based on teachers’ responses to eight items listed below.¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Disagree a little” and “Disagree a lot” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

† Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Safe and Orderly School* Scale – Grade 4

Item	delta	tau_1	tau_2	Infit
ATBG07A	-0.57100	-1.06224	1.06224	1.32
ATBG07B	-1.45786	-1.30539	1.30539	0.99
ATBG07C	-0.57584	-1.41575	1.41575	1.12
ATBG07D	1.15251	-2.01386	2.01386	0.87
ATBG07E	0.69114	-1.95117	1.95117	0.87
ATBG07F	1.29829	-1.92798	1.92798	0.90
ATBG07G	-0.54040	-1.37123	1.37123	1.03
ATBG07H	0.00316	-1.51773	1.51773	1.00

Scale Transformation Constants for the TIMSS 2019 *Safe and Orderly School* Scale – Grade 4

Scale Transformation Constants

A = 8.379152

B = 0.972455

Transformed Scale Score = 8.379152 + 0.972455 • Logit Scale Score

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Safe and Orderly School* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	3.88793	
1	5.11715	
2	5.77693	
3	6.27669	
4	6.70234	6.8
5	7.09225	
6	7.46639	
7	7.83877	
8	8.21647	
9	8.61043	
10	9.02958	
11	9.48469	
12	9.99265	9.9
13	10.56968	
14	11.22966	
15	12.02318	
16	13.35176	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Safe and Orderly School Scale* – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			ATBG07A	ATBG07B	ATBG07C	ATBG07D	ATBG07E	ATBG07F	ATBG07G	ATBG07H
Albania	0.76	41	0.59	0.66	0.43	0.73	0.74	0.71	0.68	0.50
Armenia	0.75	38	0.59	0.54	0.58	0.62	0.64	0.60	0.70	0.62
Australia	0.91	61	0.75	0.68	0.72	0.87	0.88	0.85	0.70	0.78
Austria	0.86	50	0.68	0.68	0.70	0.82	0.70	0.81	0.52	0.71
Azerbaijan	0.81	43	0.37	0.60	0.69	0.70	0.74	0.60	0.70	0.75
Bahrain	0.89	57	0.51	0.66	0.74	0.80	0.80	0.81	0.80	0.84
Belgium (Flemish)	0.83	47	0.52	0.66	0.68	0.73	0.69	0.75	0.69	0.75
Bosnia and Herzegovina	0.85	50	0.55	0.65	0.71	0.73	0.76	0.79	0.68	0.78
Bulgaria	0.85	50	0.67	0.71	0.75	0.73	0.69	0.75	0.69	0.67
Canada	0.89	57	0.59	0.69	0.68	0.84	0.84	0.82	0.75	0.78
Chile	0.88	54	0.70	0.69	0.67	0.82	0.75	0.79	0.76	0.72
Chinese Taipei	0.89	56	0.67	0.74	0.75	0.79	0.76	0.74	0.77	0.78
Croatia	0.89	56	0.67	0.76	0.75	0.79	0.82	0.79	0.62	0.77
Cyprus	0.85	49	0.51	0.66	0.72	0.76	0.78	0.75	0.66	0.72
Czech Republic	0.81	43	0.53	0.63	0.57	0.75	0.76	0.72	0.61	0.67
Denmark	0.88	55	0.59	0.69	0.67	0.80	0.80	0.80	0.74	0.80
England	0.84	48	0.49	0.50	0.55	0.75	0.78	0.75	0.82	0.80
Finland	0.84	49	0.54	0.66	0.54	0.83	0.81	0.72	0.67	0.78
France	0.85	49	0.72	0.69	0.66	0.81	0.77	0.75	0.56	0.58
Georgia	0.81	45	0.47	0.68	0.69	0.73	0.73	0.70	0.72	0.63
Germany	0.86	50	0.68	0.71	0.64	0.80	0.78	0.76	0.62	0.66
Hong Kong SAR	0.86	51	0.55	0.61	0.65	0.71	0.77	0.78	0.82	0.78
Hungary	0.86	51	0.57	0.65	0.74	0.78	0.72	0.77	0.70	0.74
Iran, Islamic Rep. of	0.86	50	0.66	0.67	0.67	0.75	0.68	0.76	0.78	0.67
Ireland	0.87	54	0.51	0.58	0.60	0.84	0.88	0.81	0.74	0.81
Italy	0.81	44	0.55	0.68	0.65	0.68	0.81	0.75	0.49	0.64
Japan	0.79	40	0.65	0.63	0.62	0.74	0.60	0.69	0.50	0.63
Kazakhstan	0.87	53	0.48	0.68	0.77	0.77	0.78	0.75	0.75	0.80
Korea, Rep. of	0.90	59	0.68	0.77	0.81	0.78	0.79	0.74	0.79	0.77
Kosovo	0.74	38	0.53	0.68	0.47	0.80	0.64	0.67	0.45	0.60
Kuwait	0.81	45	0.36	0.67	0.65	0.74	0.74	0.72	0.70	0.69
Latvia	0.79	41	0.37	0.60	0.62	0.67	0.73	0.74	0.65	0.69
Lithuania	0.83	46	0.49	0.59	0.70	0.78	0.78	0.76	0.56	0.72
Malta	0.85	50	0.36	0.68	0.66	0.80	0.81	0.79	0.72	0.74
Montenegro	0.86	51	0.63	0.68	0.72	0.78	0.79	0.74	0.65	0.72
Morocco	0.87	53	0.62	0.72	0.74	0.79	0.69	0.82	0.71	0.71
Netherlands	0.87	53	0.67	0.73	0.76	0.80	0.77	0.73	0.68	0.67
New Zealand	0.87	54	0.50	0.60	0.70	0.81	0.84	0.80	0.76	0.79
North Macedonia	0.82	46	0.60	0.65	0.60	0.74	0.74	0.68	0.65	0.77
Northern Ireland	0.88	55	0.63	0.52	0.50	0.83	0.85	0.85	0.81	0.81

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Safe and Orderly School Scale* – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			ATBG07A	ATBG07B	ATBG07C	ATBG07D	ATBG07E	ATBG07F	ATBG07G	ATBG07H
Norway (5)	0.86	52	0.57	0.71	0.63	0.80	0.81	0.82	0.66	0.70
Oman	0.81	45	0.42	0.57	0.67	0.76	0.74	0.73	0.68	0.71
Pakistan	0.84	48	0.69	0.66	0.63	0.75	0.69	0.63	0.71	0.74
Philippines	0.86	50	0.56	0.63	0.73	0.75	0.80	0.79	0.69	0.68
Poland	0.85	49	0.52	0.70	0.73	0.77	0.76	0.74	0.70	0.69
Portugal	0.82	44	0.67	0.68	0.66	0.77	0.76	0.74	0.50	0.48
Qatar	0.88	55	0.53	0.59	0.63	0.83	0.83	0.81	0.80	0.85
Russian Federation	0.83	47	0.58	0.69	0.60	0.70	0.77	0.77	0.54	0.78
Saudi Arabia	0.85	50	0.51	0.58	0.71	0.76	0.71	0.77	0.79	0.79
Serbia	0.86	51	0.58	0.69	0.75	0.75	0.72	0.69	0.69	0.81
Singapore	0.88	55	0.57	0.62	0.68	0.80	0.82	0.80	0.77	0.80
Slovak Republic	0.83	46	0.43	0.61	0.63	0.73	0.74	0.76	0.73	0.73
South Africa (5)	0.87	53	0.69	0.73	0.71	0.81	0.76	0.77	0.61	0.73
Spain	0.83	47	0.59	0.62	0.54	0.82	0.80	0.75	0.63	0.67
Sweden	0.84	48	0.63	0.71	0.74	0.80	0.80	0.68	0.56	0.62
Turkey (5)	0.89	58	0.73	0.76	0.77	0.78	0.79	0.79	0.72	0.73
United Arab Emirates	0.89	58	0.42	0.55	0.69	0.86	0.87	0.87	0.83	0.85
United States	0.89	58	0.64	0.68	0.67	0.85	0.85	0.85	0.73	0.78
Benchmarking Participants										
Ontario, Canada	0.91	62	0.61	0.75	0.74	0.87	0.86	0.85	0.78	0.81
Quebec, Canada	0.82	45	0.60	0.67	0.63	0.73	0.73	0.63	0.69	0.69
Moscow City, Russian Fed.	0.88	55	0.47	0.72	0.71	0.83	0.81	0.84	0.70	0.80
Madrid, Spain	0.86	51	0.58	0.64	0.67	0.82	0.83	0.75	0.71	0.71
Abu Dhabi, UAE	0.90	59	0.41	0.54	0.67	0.87	0.88	0.88	0.85	0.87
Dubai, UAE	0.88	55	0.40	0.52	0.71	0.82	0.84	0.85	0.83	0.84

Relationship Between the TIMSS 2019 *Safe and Orderly School* Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.01	0.00	0.00	-0.01	0.00	0.00
Armenia	0.09	0.01	0.01	0.04	0.00	0.00
Australia	0.18	0.03	0.03	0.20	0.04	0.04
Austria	0.18	0.03	0.03	0.22	0.05	0.05
Azerbaijan	-0.04	0.00	0.00	-0.04	0.00	0.00
Bahrain	0.03	0.00	0.00	0.21	0.04	0.02
Belgium (Flemish)	0.13	0.02	0.02	0.14	0.02	0.02
Bosnia and Herzegovina	0.04	0.00	0.00	0.06	0.00	0.00
Bulgaria	0.13	0.02	0.01	0.19	0.04	0.03
Canada	0.07	0.00	0.01	0.15	0.02	0.02
Chile	0.18	0.03	0.02	0.20	0.04	0.02
Chinese Taipei	0.01	0.00	0.00	0.04	0.00	0.00
Croatia	-0.01	0.00	0.00	0.01	0.00	0.00
Cyprus	0.02	0.00	0.00	0.05	0.00	0.00
Czech Republic	0.14	0.02	0.01	0.16	0.02	0.01
Denmark	0.11	0.01	0.01	0.10	0.01	0.01
England	0.12	0.01	0.01	0.13	0.02	0.01
Finland	0.12	0.01	0.01	0.10	0.01	0.01
France	0.19	0.03	0.02	0.18	0.03	0.02
Georgia	0.02	0.00	0.01	0.01	0.00	0.00
Germany	0.23	0.05	0.04	0.19	0.04	0.03
Hong Kong SAR	0.18	0.03	0.04	0.12	0.01	0.00
Hungary	0.17	0.03	0.03	0.10	0.01	0.02
Iran, Islamic Rep. of	0.09	0.01	0.00	0.09	0.01	0.00
Ireland	0.13	0.02	0.02	0.15	0.02	0.02
Italy	0.09	0.01	0.00	0.10	0.01	0.01
Japan	0.06	0.00	0.00	0.05	0.00	0.00
Kazakhstan	0.04	0.00	0.00	0.07	0.01	0.01
Korea, Rep. of	0.12	0.01	0.01	0.10	0.01	0.01
Kosovo	-0.02	0.00	0.00	-0.01	0.00	0.00
Kuwait	0.16	0.03	0.01	0.18	0.03	0.02
Latvia	0.08	0.01	0.02	0.05	0.00	0.00
Lithuania	0.09	0.01	0.00	0.12	0.01	0.01
Malta	0.13	0.02	0.01	0.12	0.01	0.01
Montenegro	0.00	0.00	0.00	-0.01	0.00	0.00
Morocco	0.26	0.07	0.04	0.23	0.05	0.03
Netherlands	0.12	0.01	0.01	0.17	0.03	0.02

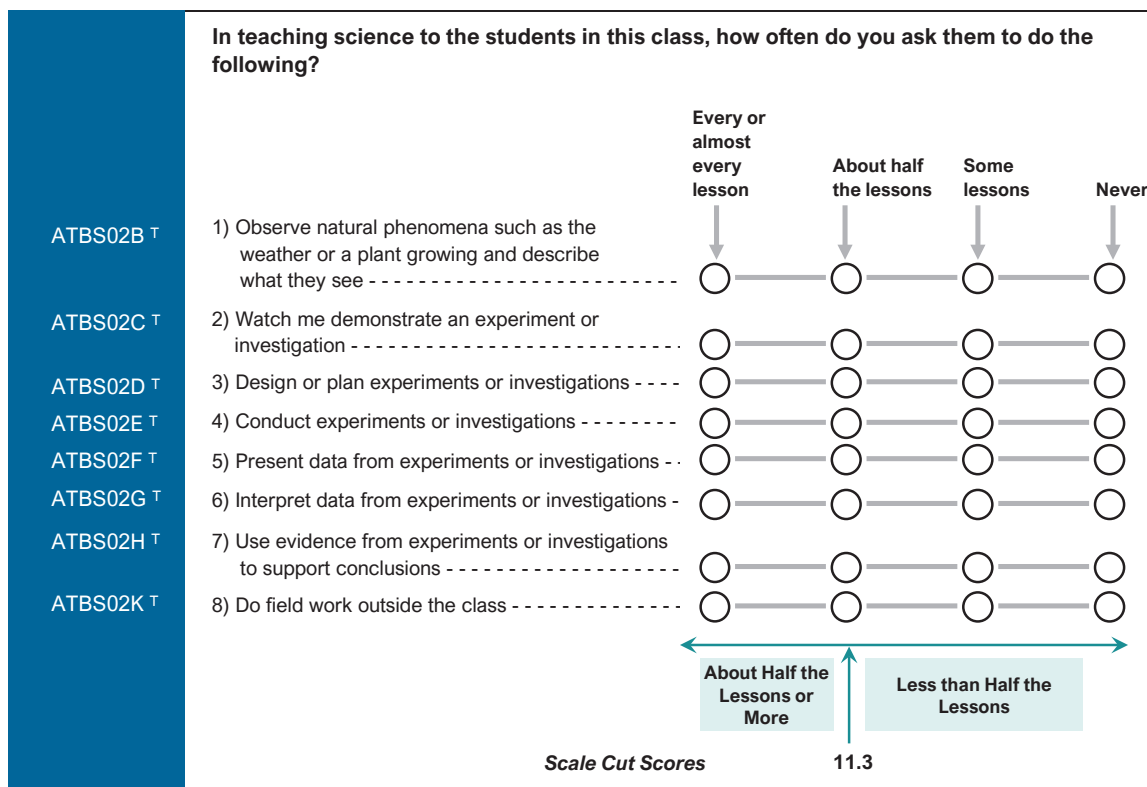
Relationship Between the TIMSS 2019 *Safe and Orderly School* Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.16	0.03	0.02	0.17	0.03	0.02
North Macedonia	0.03	0.00	0.01	0.02	0.00	0.01
Northern Ireland	0.13	0.02	0.02	0.12	0.01	0.02
Norway (5)	0.07	0.01	0.00	0.04	0.00	0.00
Oman	0.13	0.02	0.01	0.09	0.01	0.00
Pakistan	0.20	0.04	0.06	0.15	0.02	0.04
Philippines	0.15	0.02	0.02	0.14	0.02	0.00
Poland	0.02	0.00	0.00	-0.02	0.00	0.00
Portugal	0.16	0.03	0.03	0.15	0.02	0.02
Qatar	0.02	0.00	0.00	0.05	0.00	0.00
Russian Federation	0.03	0.00	0.00	-0.01	0.00	0.00
Saudi Arabia	0.11	0.01	0.02	0.14	0.02	0.03
Serbia	-0.08	0.01	0.01	-0.06	0.00	0.00
Singapore	0.06	0.00	0.00	0.03	0.00	0.00
Slovak Republic	0.09	0.01	0.01	0.11	0.01	0.01
South Africa (5)	0.12	0.01	0.01	0.08	0.01	0.01
Spain	0.18	0.03	0.04	0.17	0.03	0.03
Sweden	0.22	0.05	0.03	0.20	0.04	0.02
Turkey (5)	0.23	0.05	0.04	0.13	0.02	0.03
United Arab Emirates	0.29	0.08	0.07	0.34	0.11	0.09
United States	0.23	0.05	0.05	0.24	0.06	0.05
International Median	0.12	0.01	0.01	0.12	0.01	0.01
Benchmarking Participants						
Ontario, Canada	0.18	0.03	0.02	0.19	0.03	0.03
Quebec, Canada	0.04	0.00	0.00	0.07	0.00	0.00
Moscow City, Russian Fed.	0.04	0.00	0.00	0.02	0.00	0.00
Madrid, Spain	0.17	0.03	0.04	0.20	0.04	0.04
Abu Dhabi, UAE	0.37	0.14	0.12	0.37	0.14	0.11
Dubai, UAE	0.15	0.02	0.01	0.14	0.02	0.02

Teachers' Emphasis on Science Investigation – Grade 4

About the Scale

The *Teachers' Emphasis on Science Investigation* scale was created based on teachers' responses to eight items listed below.¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Some lessons” and “Never” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 *Teachers' Emphasis on Science Investigation* Scale – Grade 4

Item	delta	tau_1	tau_2	Infit
ATBS02B	-0.99302	-0.87415	0.87415	1.47
ATBS02C	-0.36179	-0.42328	0.42328	1.36
ATBS02D	0.14006	-0.74966	0.74966	0.83
ATBS02E	-0.03386	-0.74195	0.74195	0.82
ATBS02F	0.14169	-0.64943	0.64943	0.73
ATBS02G	-0.00064	-0.58904	0.58904	0.73
ATBS02H	-0.33626	-0.65045	0.65045	0.95
ATBS02K	1.44382	-0.54317	0.54317	1.53

Scale Transformation Constants for the TIMSS 2019 *Teachers' Emphasis on Science Investigation* Scale – Grade 4

Scale Transformation Constants

$$A = 11.370579$$

$$B = 1.2943720$$

$$\text{Transformed Scale Score} = 11.370579 + 1.2943720 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 *Teachers' Emphasis on Science Investigation* Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	6.59220	
1	8.14968	
2	8.93739	
3	9.49744	
4	9.94650	
5	10.33915	
6	10.69474	
7	11.03003	
8	11.35666	11.3
9	11.68739	
10	12.02985	
11	12.39638	
12	12.79933	
13	13.26245	
14	13.83022	
15	14.61161	
16	16.13766	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Teachers' Emphasis on Science Investigation Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item								
			ATBS02B	ATBS02C	ATBS02D	ATBS02E	ATBS02F	ATBS02G	ATBS02H	ATBS02K	
Albania	0.84	49	0.64	0.42	0.77	0.72	0.80	0.84	0.80	0.49	
Armenia	0.86	55	0.56	0.68	0.84	0.79	0.87	0.85	0.72	0.55	
Australia	0.88	56	0.63	0.60	0.82	0.87	0.88	0.88	0.72	0.50	
Austria	0.86	55	0.54	0.73	0.81	0.88	0.87	0.86	0.66	0.46	
Azerbaijan	0.86	51	0.61	0.66	0.77	0.76	0.83	0.82	0.72	0.48	
Bahrain	0.85	50	0.54	0.47	0.71	0.85	0.85	0.84	0.80	0.41	
Belgium (Flemish)	0.88	59	0.50	0.42	0.83	0.89	0.90	0.91	0.86	0.66	
Bosnia and Herzegovina	0.90	63	0.54	0.71	0.89	0.89	0.89	0.87	0.82	0.66	
Bulgaria	0.89	61	0.59	0.69	0.87	0.92	0.90	0.86	0.68	0.67	
Canada	0.85	49	0.65	0.59	0.72	0.80	0.78	0.81	0.74	0.48	
Chile	0.87	54	0.58	0.69	0.84	0.85	0.83	0.84	0.59	0.59	
Chinese Taipei	0.88	56	0.68	0.60	0.74	0.80	0.86	0.87	0.86	0.49	
Croatia	0.92	66	0.71	0.71	0.86	0.93	0.93	0.91	0.70	0.70	
Cyprus	0.82	48	0.42	0.31	0.82	0.78	0.92	0.89	0.80	0.20	
Czech Republic	0.80	49	0.55	0.65	0.84	0.83	0.82	0.78	0.57	0.46	
Denmark	0.85	50	0.54	0.51	0.83	0.79	0.84	0.80	0.72	0.50	
England	0.76	39	0.27	0.46	0.68	0.71	0.77	0.82	0.75	0.29	
Finland	0.83	53	0.47	0.60	0.78	0.81	0.87	0.87	0.74	0.56	
France	0.88	56	0.52	0.30	0.81	0.83	0.92	0.91	0.89	0.58	
Georgia	0.87	56	0.54	0.60	0.86	0.91	0.88	0.89	0.72	0.42	
Germany	0.84	49	0.62	0.54	0.67	0.85	0.80	0.83	0.76	0.43	
Hong Kong SAR	0.91	62	0.67	0.70	0.79	0.86	0.86	0.87	0.88	0.63	
Hungary	0.83	52	0.53	0.61	0.79	0.82	0.84	0.76	0.68	0.66	
Iran, Islamic Rep. of	0.87	54	0.61	0.45	0.80	0.82	0.83	0.84	0.81	0.61	
Ireland	0.83	47	0.44	0.45	0.65	0.82	0.85	0.83	0.83	0.43	
Italy	0.90	60	0.64	0.67	0.90	0.89	0.87	0.87	0.78	0.50	
Japan	0.83	47	0.65	0.46	0.74	0.81	0.77	0.80	0.71	0.45	
Kazakhstan	0.90	58	0.62	0.71	0.82	0.77	0.85	0.83	0.72	0.73	
Korea, Rep. of	0.81	47	0.45	0.44	0.75	0.84	0.85	0.86	0.70	0.35	
Kosovo	0.85	51	0.42	0.58	0.77	0.79	0.86	0.84	0.76	0.58	
Kuwait	0.88	57	0.40	0.63	0.85	0.88	0.88	0.88	0.81	0.51	
Latvia	0.87	55	0.61	0.53	0.79	0.86	0.89	0.82	0.80	0.49	
Lithuania	0.90	63	0.50	0.74	0.88	0.90	0.92	0.87	0.75	0.71	
Malta	0.90	60	0.57	0.69	0.84	0.89	0.91	0.90	0.81	0.46	
Montenegro	0.91	65	0.56	0.70	0.86	0.90	0.91	0.89	0.85	0.72	
Morocco	0.85	49	0.52	0.51	0.78	0.81	0.88	0.81	0.74	0.37	
Netherlands	0.88	57	0.62	0.48	0.91	0.92	0.85	0.86	0.81	0.34	
New Zealand	0.86	52	0.64	0.51	0.75	0.82	0.85	0.84	0.76	0.51	
North Macedonia	0.89	58	0.57	0.56	0.80	0.86	0.89	0.88	0.84	0.59	
Northern Ireland	0.89	60	0.44	0.62	0.86	0.90	0.90	0.87	0.88	0.55	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 Teachers' Emphasis on Science Investigation Scale – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item								
			ATBS02B	ATBS02C	ATBS02D	ATBS02E	ATBS02F	ATBS02G	ATBS02H	ATBS02K	
Norway (5)	0.83	49	0.46	0.52	0.75	0.80	0.85	0.83	0.76	0.49	
Oman	0.81	45	0.40	0.52	0.64	0.82	0.84	0.82	0.70	0.44	
Pakistan	0.86	54	0.54	0.69	0.81	0.81	0.86	0.87	0.81	0.25	
Philippines	0.89	58	0.55	0.62	0.80	0.86	0.87	0.87	0.86	0.55	
Poland	0.83	51	0.54	0.63	0.67	0.74	0.85	0.81	0.82	0.56	
Portugal	0.91	64	0.66	0.74	0.90	0.91	0.93	0.91	0.70	0.57	
Qatar	0.88	55	0.62	0.54	0.79	0.85	0.88	0.87	0.77	0.47	
Russian Federation	0.92	66	0.65	0.74	0.86	0.93	0.90	0.93	0.78	0.68	
Saudi Arabia	0.86	51	0.52	0.53	0.74	0.77	0.85	0.89	0.83	0.44	
Serbia	0.92	65	0.66	0.78	0.88	0.90	0.89	0.89	0.75	0.64	
Singapore	0.81	45	0.54	0.41	0.65	0.76	0.84	0.82	0.71	0.48	
Slovak Republic	0.89	60	0.59	0.57	0.88	0.90	0.91	0.90	0.78	0.53	
South Africa (5)	0.91	63	0.64	0.75	0.82	0.86	0.87	0.90	0.83	0.63	
Spain	0.89	59	0.57	0.66	0.81	0.87	0.85	0.87	0.82	0.66	
Sweden	0.88	57	0.57	0.67	0.88	0.82	0.87	0.85	0.76	0.55	
Turkey (5)	0.90	60	0.53	0.42	0.85	0.91	0.88	0.90	0.87	0.70	
United Arab Emirates	0.91	61	0.60	0.66	0.84	0.89	0.91	0.90	0.79	0.58	
United States	0.90	60	0.69	0.64	0.84	0.85	0.89	0.88	0.79	0.53	
Benchmarking Participants											
Ontario, Canada	0.87	54	0.70	0.64	0.78	0.81	0.82	0.83	0.72	0.53	
Quebec, Canada	0.81	44	0.59	0.61	0.62	0.73	0.75	0.76	0.74	0.43	
Moscow City, Russian Fed.	0.89	61	0.55	0.70	0.90	0.91	0.91	0.91	0.67	0.57	
Madrid, Spain	0.86	53	0.44	0.65	0.84	0.84	0.86	0.83	0.79	0.41	
Abu Dhabi, UAE	0.91	63	0.67	0.74	0.85	0.89	0.89	0.88	0.79	0.59	
Dubai, UAE	0.91	62	0.68	0.62	0.81	0.88	0.92	0.91	0.80	0.61	

Relationship Between the TIMSS 2019 Teachers' Emphasis on Science Investigation Scale and TIMSS 2019 Achievement – Grade 4

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	
Albania	0.02	0.00	0.00
Armenia	0.06	0.00	0.00
Australia	-0.01	0.00	0.00
Austria	0.02	0.00	0.00
Azerbaijan	0.02	0.00	0.00
Bahrain	0.05	0.00	0.00
Belgium (Flemish)	0.02	0.00	0.00
Bosnia and Herzegovina	-0.02	0.00	0.00
Bulgaria	0.03	0.00	0.01
Canada	-0.02	0.00	0.00
Chile	0.06	0.00	0.00
Chinese Taipei	-0.02	0.00	0.00
Croatia	-0.01	0.00	0.00
Cyprus	-0.01	0.00	0.00
Czech Republic	-0.02	0.00	0.00
Denmark	0.01	0.00	0.00
England	-0.02	0.00	0.00
Finland	-0.01	0.00	0.00
France	0.02	0.00	0.00
Georgia	-0.04	0.00	0.00
Germany	-0.04	0.00	0.00
Hong Kong SAR	0.16	0.03	0.00
Hungary	-0.05	0.00	0.00
Iran, Islamic Rep. of	0.06	0.00	0.01
Ireland	-0.03	0.00	0.00
Italy	0.01	0.00	0.00
Japan	-0.02	0.00	0.00
Kazakhstan	-0.04	0.00	0.00
Korea, Rep. of	0.07	0.00	0.00
Kosovo	0.03	0.00	0.00
Kuwait	0.01	0.00	0.00
Latvia	0.01	0.00	0.00
Lithuania	-0.01	0.00	0.00
Malta	0.00	0.00	0.00
Montenegro	-0.01	0.00	0.00
Morocco	0.04	0.00	0.00
Netherlands	-0.01	0.00	0.00
New Zealand	-0.01	0.00	0.00

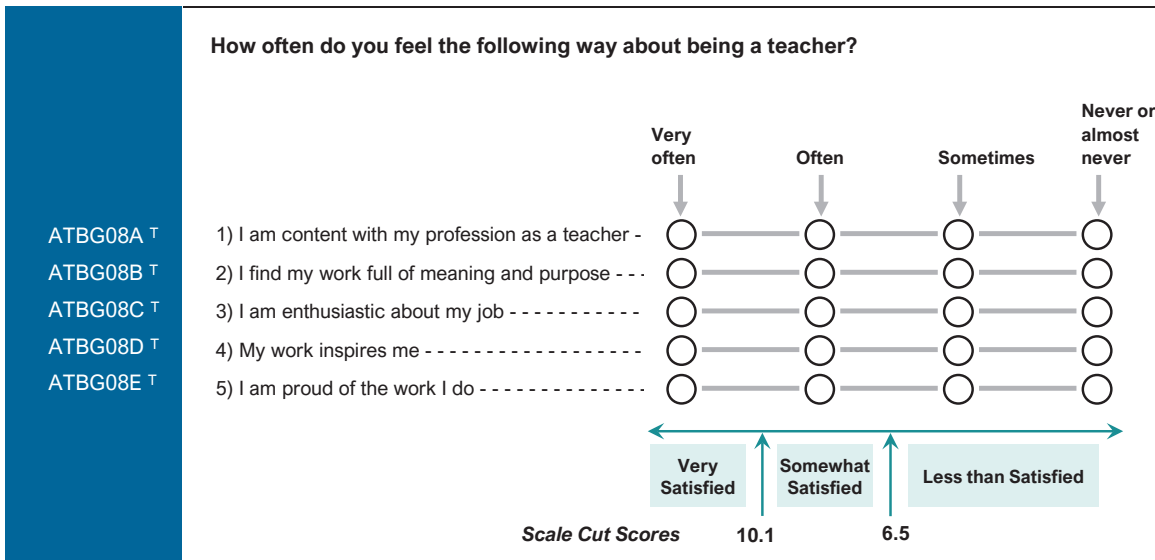
Relationship Between the TIMSS 2019 Teachers' Emphasis on Science Investigation Scale and TIMSS 2019 Achievement – Grade 4

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	
North Macedonia	0.04	0.00	0.00
Northern Ireland	0.05	0.00	0.00
Norway (5)	0.03	0.00	0.00
Oman	-0.01	0.00	0.01
Pakistan	0.20	0.04	0.01
Philippines	-0.03	0.00	0.00
Poland	0.02	0.00	0.00
Portugal	-0.05	0.00	0.00
Qatar	-0.14	0.02	0.01
Russian Federation	0.01	0.00	0.00
Saudi Arabia	0.15	0.02	0.01
Serbia	0.05	0.00	0.00
Singapore	0.07	0.00	0.00
Slovak Republic	0.07	0.00	0.01
South Africa (5)	-0.08	0.01	0.00
Spain	-0.05	0.00	0.00
Sweden	0.03	0.00	0.00
Turkey (5)	-0.02	0.00	0.00
United Arab Emirates	0.14	0.02	0.02
United States	0.08	0.01	0.00
International Median	0.01	0.00	0.00
Benchmarking Participants			
Ontario, Canada	-0.03	0.00	0.00
Quebec, Canada	-0.03	0.00	0.00
Moscow City, Russian Fed.	0.03	0.00	0.00
Madrid, Spain	0.04	0.00	0.00
Abu Dhabi, UAE	0.10	0.01	0.01
Dubai, UAE	0.07	0.00	0.01

Teachers' Job Satisfaction – Grade 4

About the Scale

The *Teachers' Job Satisfaction* scale was created based on students' responses to five items listed below.¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Sometimes” and “Never or almost never” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

^T Trend item—item was included in the same scale in TIMSS 2015 and was used for linking the TIMSS 2015 and TIMSS 2019 scales.

Item Parameters for the TIMSS 2019 Teachers' Job Satisfaction Scale – Grade 4

Item	delta	tau_1	tau_2	Infit
ATBG08A	0.26211	-2.33491	2.33491	1.09
ATBG08B	-0.67089	-2.27457	2.27457	1.10
ATBG08C	0.10245	-2.28986	2.28986	0.94
ATBG08D	0.53886	-2.12788	2.12788	0.91
ATBG08E	-0.23253	-1.97222	1.97222	1.10

Scale Transformation Constants for the TIMSS 2019 Teachers' Job Satisfaction Scale – Grade 4

Scale Transformation Constants

$$A = 8.286639$$

$$B = 0.732139$$

$$\text{Transformed Scale Score} = 8.286639 + 0.732139 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and Transformed Scale Scores for the TIMSS 2019 Teachers' Job Satisfaction Scale – Grade 4

Raw Score	Transformed Scale Score	Cutpoint
0	4.84518	
1	5.82502	
2	6.41362	6.5
3	6.92137	
4	7.47949	
5	8.28271	
6	9.09041	
7	9.65527	
8	10.16724	10.1
9	10.75160	
10	11.72115	

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Teachers' Job Satisfaction Scale* – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item				
			ATBG08A	ATBG08B	ATBG08C	ATBG08D	ATBG08E
Albania	0.74	49	0.65	0.81	0.68	0.76	0.59
Armenia	0.77	53	0.69	0.66	0.73	0.78	0.77
Australia	0.92	76	0.87	0.88	0.90	0.91	0.79
Austria	0.87	66	0.79	0.77	0.87	0.85	0.78
Azerbaijan	0.79	56	0.77	0.72	0.81	0.71	0.74
Bahrain	0.86	65	0.83	0.72	0.87	0.84	0.78
Belgium (Flemish)	0.89	70	0.82	0.77	0.88	0.86	0.83
Bosnia and Herzegovina	0.86	65	0.77	0.78	0.86	0.83	0.78
Bulgaria	0.89	69	0.81	0.75	0.86	0.89	0.84
Canada	0.92	76	0.87	0.85	0.91	0.89	0.82
Chile	0.90	71	0.86	0.81	0.85	0.90	0.80
Chinese Taipei	0.93	78	0.88	0.90	0.91	0.85	0.88
Croatia	0.88	67	0.84	0.77	0.89	0.85	0.75
Cyprus	0.91	75	0.84	0.89	0.91	0.90	0.78
Czech Republic	0.91	73	0.84	0.88	0.88	0.89	0.78
Denmark	0.89	70	0.81	0.79	0.87	0.87	0.83
England	0.82	59	0.87	0.83	0.78	0.85	0.43
Finland	0.89	69	0.83	0.76	0.89	0.87	0.79
France	0.87	67	0.77	0.74	0.88	0.89	0.79
Georgia	0.77	53	0.70	0.57	0.77	0.81	0.75
Germany	0.86	65	0.77	0.72	0.85	0.83	0.85
Hong Kong SAR	0.93	79	0.87	0.90	0.91	0.89	0.88
Hungary	0.90	72	0.83	0.81	0.87	0.89	0.84
Iran, Islamic Rep. of	0.81	60	0.77	0.79	0.78	0.86	0.65
Ireland	0.92	75	0.84	0.89	0.87	0.89	0.83
Italy	0.85	64	0.76	0.74	0.84	0.85	0.80
Japan	0.90	72	0.84	0.86	0.84	0.87	0.81
Kazakhstan	0.86	64	0.72	0.80	0.82	0.83	0.81
Korea, Rep. of	0.93	79	0.87	0.92	0.87	0.91	0.88
Kosovo	0.58	38	0.48	0.68	0.70	0.62	0.59
Kuwait	0.85	63	0.83	0.77	0.87	0.80	0.69
Latvia	0.85	62	0.82	0.71	0.74	0.84	0.83
Lithuania	0.90	72	0.85	0.70	0.90	0.90	0.88
Malta	0.94	80	0.90	0.90	0.91	0.92	0.85
Montenegro	0.84	62	0.81	0.73	0.83	0.81	0.73
Morocco	0.90	71	0.86	0.77	0.89	0.87	0.81
Netherlands	0.87	67	0.77	0.71	0.88	0.84	0.86
New Zealand	0.91	74	0.83	0.85	0.89	0.91	0.82
North Macedonia	0.86	65	0.72	0.82	0.78	0.83	0.87
Northern Ireland	0.93	80	0.87	0.90	0.93	0.93	0.82

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2019 *Teachers' Job Satisfaction Scale* – Grade 4

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item				
			ATBG08A	ATBG08B	ATBG08C	ATBG08D	ATBG08E
Norway (5)	0.89	70	0.82	0.84	0.85	0.88	0.80
Oman	0.82	59	0.80	0.66	0.82	0.81	0.76
Pakistan	0.78	53	0.70	0.70	0.79	0.68	0.77
Philippines	0.91	73	0.82	0.89	0.85	0.87	0.83
Poland	0.91	74	0.86	0.84	0.86	0.87	0.85
Portugal	0.87	66	0.82	0.77	0.88	0.87	0.71
Qatar	0.93	78	0.90	0.86	0.88	0.90	0.88
Russian Federation	0.89	70	0.78	0.83	0.88	0.86	0.85
Saudi Arabia	0.82	58	0.77	0.68	0.82	0.82	0.71
Serbia	0.86	65	0.79	0.76	0.82	0.84	0.83
Singapore	0.95	83	0.90	0.91	0.93	0.93	0.90
Slovak Republic	0.91	73	0.79	0.85	0.87	0.88	0.87
South Africa (5)	0.90	70	0.85	0.84	0.86	0.85	0.79
Spain	0.86	64	0.78	0.78	0.80	0.81	0.84
Sweden	0.89	71	0.79	0.78	0.89	0.91	0.84
Turkey (5)	0.93	77	0.84	0.83	0.94	0.92	0.87
United Arab Emirates	0.91	74	0.83	0.87	0.89	0.89	0.82
United States	0.93	79	0.83	0.92	0.92	0.93	0.84
Benchmarking Participants							
Ontario, Canada	0.92	77	0.87	0.90	0.91	0.91	0.79
Quebec, Canada	0.91	75	0.87	0.80	0.90	0.89	0.84
Moscow City, Russian Fed.	0.90	72	0.80	0.82	0.86	0.91	0.83
Madrid, Spain	0.88	68	0.83	0.83	0.84	0.85	0.78
Abu Dhabi, UAE	0.92	77	0.85	0.89	0.90	0.91	0.83
Dubai, UAE	0.92	75	0.84	0.86	0.90	0.91	0.82

Relationship Between the TIMSS 2019 Teachers' Job Satisfaction Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
Albania	0.03	0.00	0.00	0.01	0.00	0.00
Armenia	0.06	0.00	0.00	0.07	0.01	0.00
Australia	0.00	0.00	0.00	-0.03	0.00	0.00
Austria	0.05	0.00	0.00	0.06	0.00	0.00
Azerbaijan	0.05	0.00	0.00	0.04	0.00	0.00
Bahrain	0.03	0.00	0.00	0.07	0.01	0.00
Belgium (Flemish)	0.00	0.00	0.00	0.00	0.00	0.00
Bosnia and Herzegovina	0.03	0.00	0.00	0.05	0.00	0.00
Bulgaria	0.15	0.02	0.02	0.18	0.03	0.03
Canada	-0.04	0.00	0.00	0.04	0.00	0.00
Chile	0.03	0.00	0.00	-0.04	0.00	0.00
Chinese Taipei	-0.01	0.00	0.00	-0.02	0.00	0.00
Croatia	0.01	0.00	0.00	0.03	0.00	0.00
Cyprus	0.03	0.00	0.00	0.07	0.01	0.00
Czech Republic	0.05	0.00	0.00	0.04	0.00	0.00
Denmark	0.01	0.00	0.00	0.03	0.00	0.00
England	0.06	0.00	0.01	0.08	0.01	0.01
Finland	0.02	0.00	0.00	0.02	0.00	0.00
France	0.02	0.00	0.00	0.04	0.00	0.00
Georgia	-0.07	0.01	0.00	-0.03	0.00	0.00
Germany	-0.03	0.00	0.00	-0.01	0.00	0.00
Hong Kong SAR	0.18	0.03	0.02	0.10	0.01	0.01
Hungary	0.05	0.00	0.00	0.01	0.00	0.00
Iran, Islamic Rep. of	0.05	0.00	0.00	0.04	0.00	0.00
Ireland	0.04	0.00	0.00	0.03	0.00	0.01
Italy	0.01	0.00	0.00	-0.01	0.00	0.00
Japan	-0.03	0.00	0.00	-0.03	0.00	0.00
Kazakhstan	0.02	0.00	0.00	0.01	0.00	0.00
Korea, Rep. of	0.04	0.00	0.00	0.03	0.00	0.00
Kosovo	0.04	0.00	0.00	0.04	0.00	0.00
Kuwait	0.04	0.00	0.00	0.06	0.00	0.01
Latvia	-0.02	0.00	0.00	-0.01	0.00	0.00
Lithuania	0.10	0.01	0.01	0.11	0.01	0.01
Malta	0.07	0.00	0.01	0.08	0.01	0.01
Montenegro	-0.03	0.00	0.00	-0.05	0.00	0.00
Morocco	0.20	0.04	0.03	0.19	0.03	0.04
Netherlands	-0.01	0.00	0.00	0.02	0.00	0.00

Relationship Between the TIMSS 2019 Teachers' Job Satisfaction Scale and TIMSS 2019 Achievement – Grade 4

Country	Pearson's Correlation with Mathematics Achievement		Variance in Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)	Pearson's Correlation with Science Achievement		Variance in Science Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	r	r^2		r	r^2	
New Zealand	0.09	0.01	0.01	0.08	0.01	0.01
North Macedonia	-0.01	0.00	0.00	-0.03	0.00	0.00
Northern Ireland	0.04	0.00	0.00	0.03	0.00	0.00
Norway (5)	0.03	0.00	0.00	0.04	0.00	0.00
Oman	0.06	0.00	0.01	0.02	0.00	0.01
Pakistan	0.15	0.02	0.00	0.12	0.01	0.01
Philippines	-0.04	0.00	0.00	-0.04	0.00	0.00
Poland	0.01	0.00	0.00	0.00	0.00	0.00
Portugal	0.05	0.00	0.00	0.06	0.00	0.00
Qatar	-0.02	0.00	0.00	-0.01	0.00	0.00
Russian Federation	-0.01	0.00	0.00	-0.02	0.00	0.00
Saudi Arabia	0.12	0.01	0.02	0.11	0.01	0.01
Serbia	-0.04	0.00	0.00	-0.04	0.00	0.00
Singapore	0.01	0.00	0.01	-0.04	0.00	0.00
Slovak Republic	0.10	0.01	0.01	0.01	0.00	0.01
South Africa (5)	-0.07	0.00	0.01	-0.04	0.00	0.00
Spain	0.03	0.00	0.00	0.05	0.00	0.00
Sweden	0.04	0.00	0.00	0.01	0.00	0.00
Turkey (5)	0.07	0.01	0.01	0.06	0.00	0.01
United Arab Emirates	0.16	0.03	0.03	0.16	0.03	0.03
United States	0.03	0.00	0.00	0.02	0.00	0.00
International Median	0.03	0.00	0.00	0.03	0.00	0.00
Benchmarking Participants						
Ontario, Canada	0.01	0.00	0.00	0.03	0.00	0.00
Quebec, Canada	-0.02	0.00	0.00	0.02	0.00	0.00
Moscow City, Russian Fed.	0.05	0.00	0.01	0.04	0.00	0.01
Madrid, Spain	0.08	0.01	0.01	0.15	0.02	0.03
Abu Dhabi, UAE	0.22	0.05	0.05	0.19	0.04	0.04
Dubai, UAE	0.06	0.00	0.00	0.07	0.00	0.01