TIMSS 2011

The TIMSS 2011 Early Numeracy Activities Before Beginning Primary School Scale, Fourth Grade

The Early Numeracy Activities Before Beginning Primary School (ENA) scale was created based on parents' responses to the six statements described below. See **Creating and Interpreting TIMSS and PIRLS 2011 Context Questionnaire Scales** for more information on how the scales were formed. Because the ENA scale was derived using responses to items in the PIRLS Home Questionnaire, results reported in Exhibits 2–5 were estimated from the PIRLS 2011 data. Results reported in Exhibit 6 were estimated from the TIMSS 2011 data.

Exhibit 1: Items in the TIMSS 2011 Early Numeracy Activities Before Beginning Primary School Scale, Fourth Grade

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

		Often	Sometimes	Never or almost never
ASBH02J	1) Say counting rhymes or sing counting songs	○	○	○
ASBH02K	2) Play with number toys (e.g., blocks with numbers)	○	○	○
ASBH02L	3) Count different things	○	○	○
ASBH02M	4) Play games involving shapes (e.g., shape sorting toys, puzzles)	○	○	○
ASBH02N	5) Play with building blocks or construction toys	○	○	○
ASBH02O	6) Play board games or card games	○	○	○

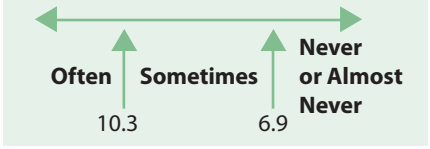

Exhibit 2: Item Parameters for the TIMSS 2011 Early Numeracy Activities Before Beginning Primary School Scale, Fourth Grade

Item	delta	tau_1	tau_2
ASBH02J	-0.52693	-1.06420	1.06420
ASBH02K	-0.60544	-1.15654	1.15654
ASBH02L	-1.79589	-1.30944	1.30944
ASBH02M	-1.46045	-1.08468	1.08468
ASBH02N	-1.44917	-0.93976	0.93976
ASBH02O	-0.97417	-1.27222	1.27222

Exhibit 3: Scale Transformation Constants

Scale Transformation Constants	
A = 10.07102 B = 1.33308	Transformed Scale Score = 10.07102 + 1.33308 • Logit Scale Score

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

Raw Score	Transformed Scale Score	Cutpoint
0	3.46303	
1	5.16069	
2	6.09512	
3	6.80970	6.9
4	7.43006	
5	8.00444	
6	8.56196	
7	9.11880	
8	9.69544	
9	10.31064	10.3
10	11.02336	
11	11.93921	
12	13.62208	

Exhibit 5: Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Early Numeracy Activities Before Beginning Primary School Scale, Fourth Grade[75]

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item					
			ASBH02J	ASBH02K	ASBH02L	ASBH02M	ASBH02N	ASBH02O
Australia	0.79	50	0.67	0.76	0.73	0.79	0.70	0.57
Austria	0.68	40	0.55	0.61	0.67	0.72	0.69	0.56
Azerbaijan	0.70	40	0.55	0.71	0.57	0.71	0.67	0.57
Chinese Taipei	0.84	56	0.72	0.83	0.80	0.81	0.80	0.49
Croatia	0.70	41	0.57	0.68	0.66	0.69	0.66	0.56
Czech Republic	0.64	37	0.54	0.63	0.64	0.70	0.62	0.49
Finland	0.67	38	0.51	0.64	0.64	0.68	0.63	0.58
Georgia	0.75	45	0.60	0.75	0.63	0.73	0.71	0.60
Germany	0.66	38	0.59	0.65	0.65	0.69	0.58	0.53
Hong Kong SAR	0.81	53	0.68	0.79	0.77	0.80	0.78	0.48
Hungary	0.68	39	0.64	0.65	0.66	0.64	0.60	0.54
Iran, Islamic Rep. of	0.75	45	0.58	0.63	0.65	0.76	0.73	0.67
Ireland	0.79	50	0.68	0.77	0.76	0.78	0.70	0.52
Italy	0.66	38	0.56	0.70	0.64	0.68	0.66	0.44
Lithuania	0.67	39	0.55	0.71	0.66	0.67	0.66	0.46
Malta	0.77	48	0.69	0.79	0.73	0.78	0.73	0.34
Morocco	0.71	41	0.59	0.68	0.59	0.65	0.71	0.61
Northern Ireland	0.80	51	0.68	0.77	0.76	0.76	0.70	0.59
Norway	0.70	40	0.62	0.71	0.67	0.67	0.54	0.57
Oman	0.72	42	0.59	0.70	0.60	0.67	0.68	0.65
Poland	0.68	39	0.55	0.67	0.65	0.68	0.62	0.56
Portugal	0.75	45	0.58	0.74	0.60	0.77	0.75	0.56

Exhibit 5: Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS 2011 Early Numeracy Activities Before Beginning Primary School Scale, Fourth Grade[5] (Continued)

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Factor Loadings for Each Item					
			ASBH02J	ASBH02K	ASBH02L	ASBH02M	ASBH02N	ASBH02O
Qatar	0.80	50	0.64	0.77	0.70	0.76	0.73	0.64
Romania	0.87	61	0.70	0.81	0.76	0.83	0.82	0.76
Russian Federation	0.76	46	0.60	0.72	0.65	0.70	0.73	0.67
Saudi Arabia	0.74	44	0.65	0.71	0.62	0.66	0.66	0.66
Singapore	0.84	57	0.71	0.81	0.79	0.83	0.78	0.59
Slovak Republic	0.74	44	0.61	0.72	0.68	0.74	0.68	0.54
Slovenia	0.70	40	0.62	0.71	0.70	0.71	0.55	0.49
Spain	0.70	41	0.60	0.74	0.56	0.73	0.70	0.46
Sweden	0.73	43	0.64	0.72	0.67	0.72	0.60	0.56
United Arab Emirates	0.76	46	0.62	0.74	0.69	0.73	0.71	0.58
Sixth Grade Participants								
Botswana	0.77	46	0.63	0.74	0.57	0.76	0.71	0.65
Honduras	0.78	48	0.69	0.77	0.65	0.70	0.77	0.56
Benchmarking Participants								
Quebec, Canada	0.72	42	0.61	0.75	0.68	0.72	0.62	0.50
Abu Dhabi, UAE	0.76	46	0.61	0.73	0.69	0.71	0.72	0.59
Dubai, UAE	0.77	47	0.63	0.75	0.70	0.75	0.71	0.55

[5] Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because the items for this scale were included in the PIRLS Home Questionnaire completed by parents.

Exhibit 6: Relationship Between the TIMSS 2011 Early Numeracy Activities Before Beginning Primary School Scale, Fourth Grade, and TIMSS 2011 Mathematics Achievement[5]

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)	
Australia	0.15	0.02	0.02
Austria	0.15	0.02	0.02
Azerbaijan	0.05	0.00	0.00
Chinese Taipei	0.24	0.06	0.05
Croatia	0.13	0.02	0.01
Czech Republic	0.05	0.00	0.00
Finland	0.11	0.01	0.01
Georgia	0.15	0.02	0.02
Germany	0.11	0.01	0.01
Hong Kong SAR	0.13	0.02	0.01
Hungary	0.25	0.06	0.06
Iran, Islamic Rep. of	0.21	0.04	0.04
Ireland	0.16	0.02	0.02

Exhibit 6: Relationship Between the TIMSS 2011 Early Numeracy Activities Before Beginning Primary School Scale, Fourth Grade, and TIMSS 2011 Mathematics Achievement[ђ] (Continued)

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)	
Italy	0.10	0.01	0.01
Lithuania	0.13	0.02	0.02
Malta	0.20	0.04	0.03
Morocco	–0.03	0.00	0.00
Northern Ireland	0.13	0.02	0.01
Norway	0.13	0.02	0.01
Oman	0.19	0.03	0.03
Poland	0.14	0.02	0.01
Portugal	0.13	0.02	0.02
Qatar	0.18	0.03	0.03
Romania	0.29	0.08	0.08
Russian Federation	0.11	0.01	0.01
Saudi Arabia	0.12	0.02	0.01
Singapore	0.15	0.02	0.02
Slovak Republic	0.12	0.01	0.01
Slovenia	0.07	0.01	0.00
Spain	0.15	0.02	0.02
Sweden	0.14	0.02	0.01
United Arab Emirates	0.19	0.04	0.03
International Median	**0.14**	**0.02**	**0.02**
Sixth Grade Participants			
Botswana	0.23	0.05	0.05
Honduras	0.12	0.01	0.01
Benchmarking Participants			
Quebec, Canada	0.08	0.01	0.01
Abu Dhabi, UAE	0.21	0.04	0.04
Dubai, UAE	0.25	0.06	0.05

ђ Available only for countries that administered both TIMSS and PIRLS to the same fourth grade students because the items for this scale were included in the PIRLS Home Questionnaire completed by parents.