The first data from the comparative analysis of the results on TIMSS-2011 and PISA-2012 tests, administrated to the same sample of Russian students

PISA

TIMSS

Dr. Yulia Tyumeneva, Senior Researcher, Laboratory for analysis of educational police HSE
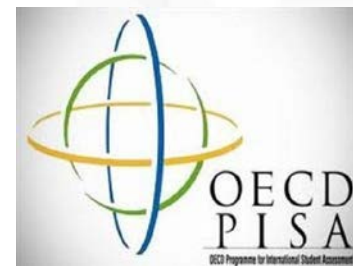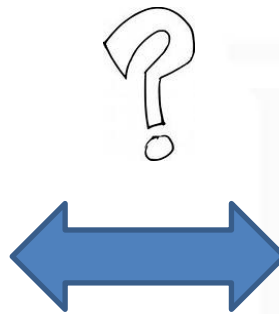
Alena Valdman, student on «Measurements in psychology and education» master program HSE

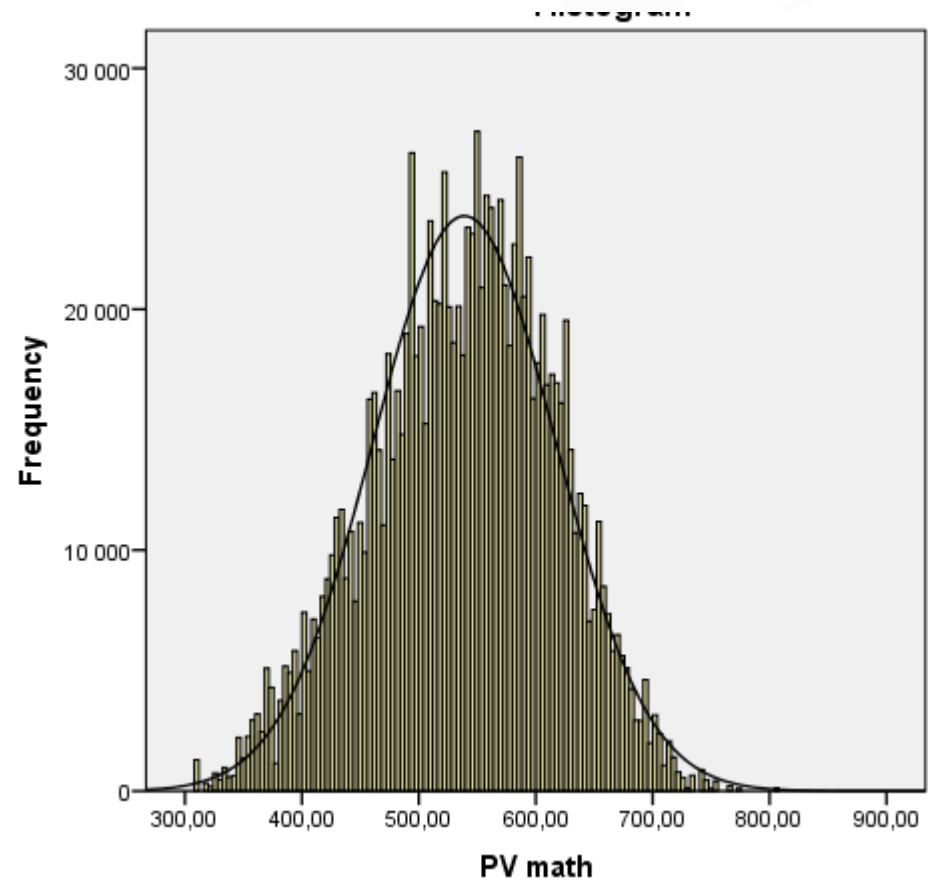# Russian sample (TIMSS-2011/PISA-2012)

Sample TIMSS-2011:
 4893 pupils from 229 classes
(49,3% girls and 50,7% boys)

Sample PISA-2012:
4399 pupils from 229 classes
(49,6% girls and 50,4% boys)

Статистика	TIMSS – 2011 (PV)
Mean	538,98
Medium	543,69
St. Deviation	78,27
Minimum	308,69
Maximum	804,03

Strategy of analysis

- Divide TIMSS students into 6 groups from the top performers to poor performers

- Pick up 10 and 20 hardest PISA items

- Check what is the percent of the ten (and 20) hardest PISA items each TIMSS group did correctly

How have we divided the sample?

229 classes in TIMSS

1	2	3	4	5	6
35 classes	39 classes	39 classes	39 classes	39 classes	38 classes
15,3%	17,0%	17,0%	17,0%	17,0%	16,6%
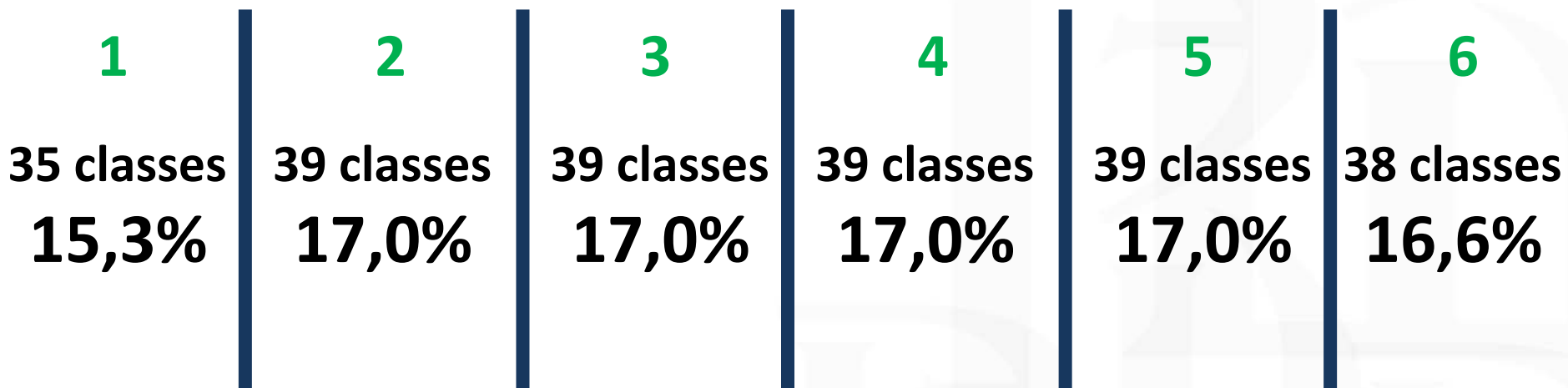
The classes have highest PVs math

The classes have lowest PVs math

One-Parameter Rasch Model (Partial-Credit)

The difficulty of each tasks in the PISA in logits

Selection of 10 (20) of the most difficult tasks PISA (highest logits)

Results: mathematics

■ % correct items of 10 hardest items in each group
■ % correct items of 20 hardest items in each group

Only highly developed "TIMSS" skills differentiate success in PISA

	10 hardest	20 hardest
TIMSS classes with highest PV math	19.15	27.48
2	9.11	15.64
3	8.10	13.55
4	6.37	10.02
5	6.06	9.92
TIMSS classes with lowest PV math	3.20	5.31
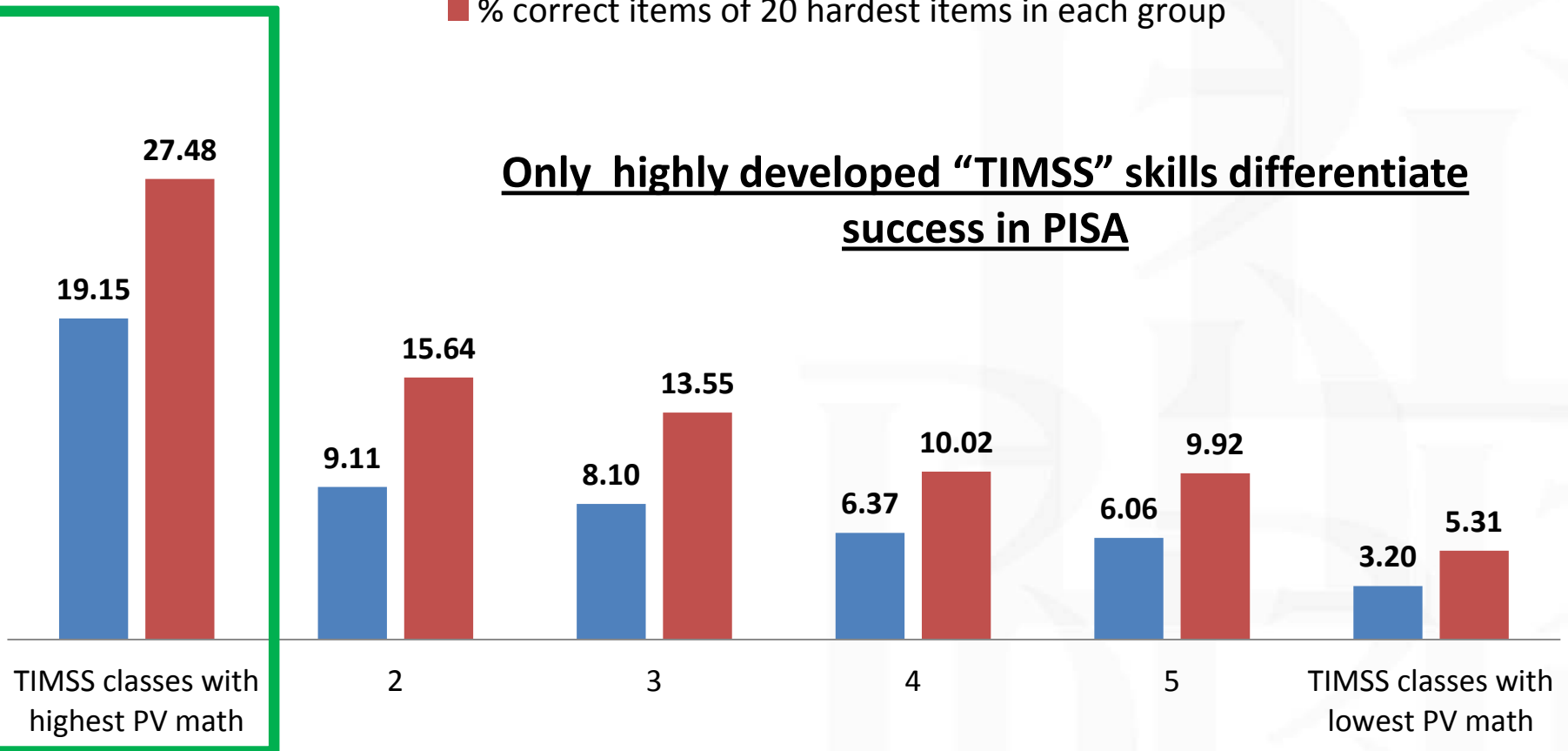
Results: content domains

% correct items of 10 hardest items in each group

№ group	Algebra	Data and chance	Number	Geometry
1	17,76	17,89	18,31	18,20
2	10,84	9,91	10,28	11,23
3	7,07	6,80	7,45	6,72
4	7,41	6,28	7,11	7,67
5	6,17	7,12	5,73	5,47
6	2,84	3,43	3,08	3,17

The same situation.
Only knowledge of the geometry has a smoother effect on the ability to solve difficult tasks PISA.

Results: cognitive domains

% correct items of 10 hardest items in each group

№ group	Knowing	Applying	Reasoning
1	18,82	18,03	18,25
2	9,85	10,10	10,64
3	6,97	8,04	7,45
4	5,95	5,40	6,50
5	7,44	7,51	6,21
6	2,88	2,87	3,07

The same situation.

- To associate information presented in different ways
- To keep relationships between things (or concepts) through time
- To use information from one domain to solve a problem in another domain
- To model relationships and changes mathematically

In terms of PISA and TIMSS tests we can say that "TIMSS" skills very weakly differentiate "PISA" skills. Factually only highest level of mastery of TIMSS skills enable success in PISA BUT!

We can consider TIMSS skills as mastery of subject content; PISA skills as ability to transfer knowledge from one domain to another. Then

ALSO

We can consider TIMSS skills as mastery of subject content; PISA skills - as ability to transfer knowledge from one domain to another.

Then our results mean that **only highest level of mastery of subject content enables the meta-domain transition**.

- To check how overall TIMSS success can affect solving the hardest TIMSS items
- To specify what TIMSS domain/items/cognitive process affect success in different PISA domain/items/cognitive process
- To define other cognitive abilities, except subject knowledge, (e.g. analogical thinking) that can affect meta-domain transferring

Thank you for your attention!

Questions?
Comments?
Suggestions?

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