INTERPRETING LARGE SCALE NATIONAL LEVEL ASSESSMENT DATA IN MATHEMATICS BY USING RASCH ANALYSIS

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Context in Latvia

The proportion of students in Latvia, who can solve complex problems is on average lower than on average in OECD countries (OECD, 2016)

Revised Curriculum reform, where competence is defined as a result (Cabinet of Ministers, 2018)

School as Learning Organization (Kools, Stoll, 2016)

Data-Driven Decision Making (Mandinach et al., 2018)

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Integrated Models of The School as Learning Organization

- shared vision on the learning of all students;
- learning opportunities for all staff;
- collaboration among all staff;
- culture of inquiry;
- learning with and from the external environment;
- Learning leadership;
- collecting and exchanging knowledge.

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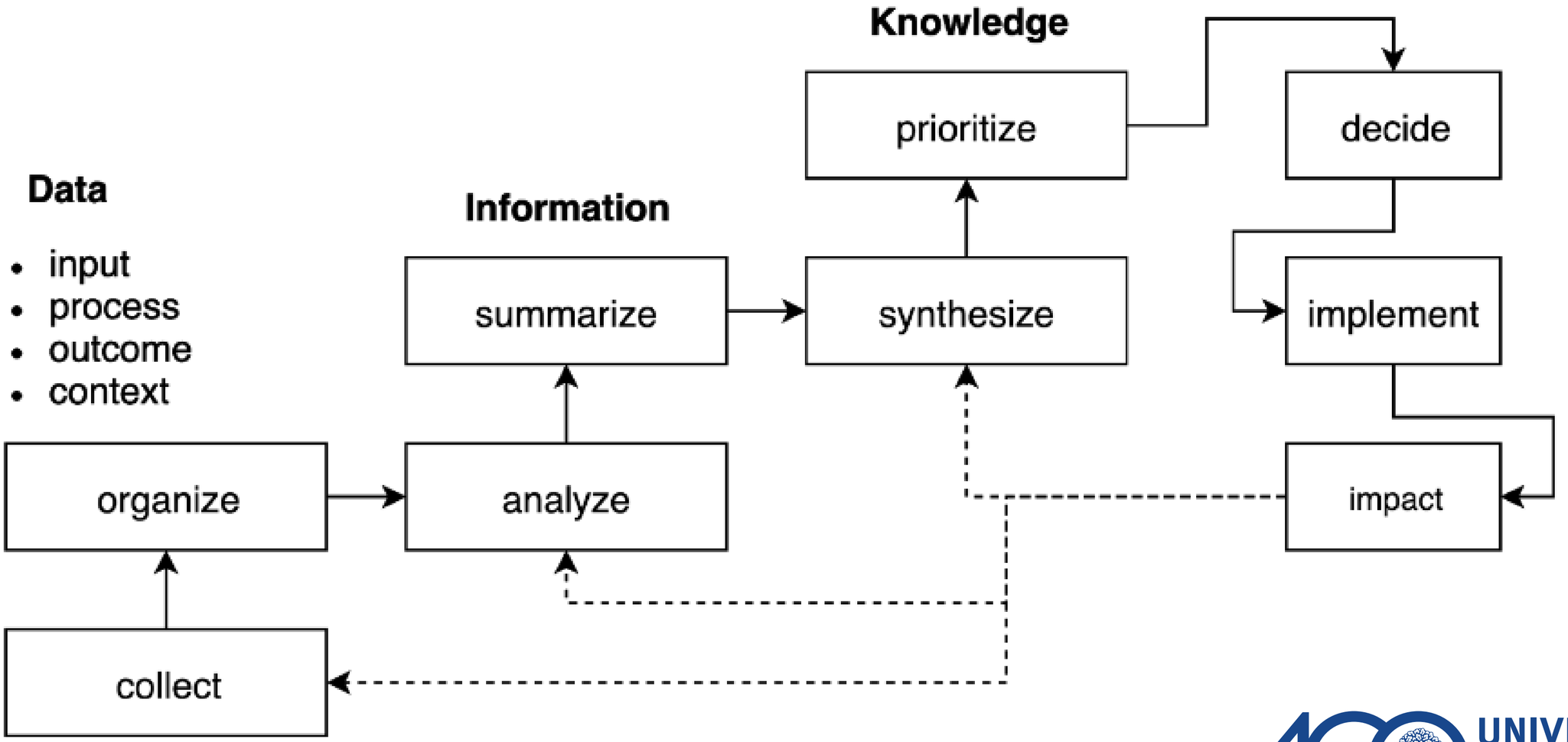
OECD. (2016). What makes a school a learning organization? A guide for policy makers, school leaders and teachers, OECD Publishing, Paris.
Retrieved: https://www.oecd.org/education/school/school-learning-organisation.pdf

Data-Driven Decision Making



Mandinach, Ellen B. (2012). A Perfect Time for Data Use: Using Data-Driven Decision Making to Inform Practice. *Educational Psychologist*, *47*(2), 71–85. https://doi.org/10.1080/00461520.2012.667064

Research Questions

1. What learning outcomes have been measured in 3rd, 6th and 9th grade national level tests?
2. How is it possible meaningful data interpretation, using *Rasch* model?

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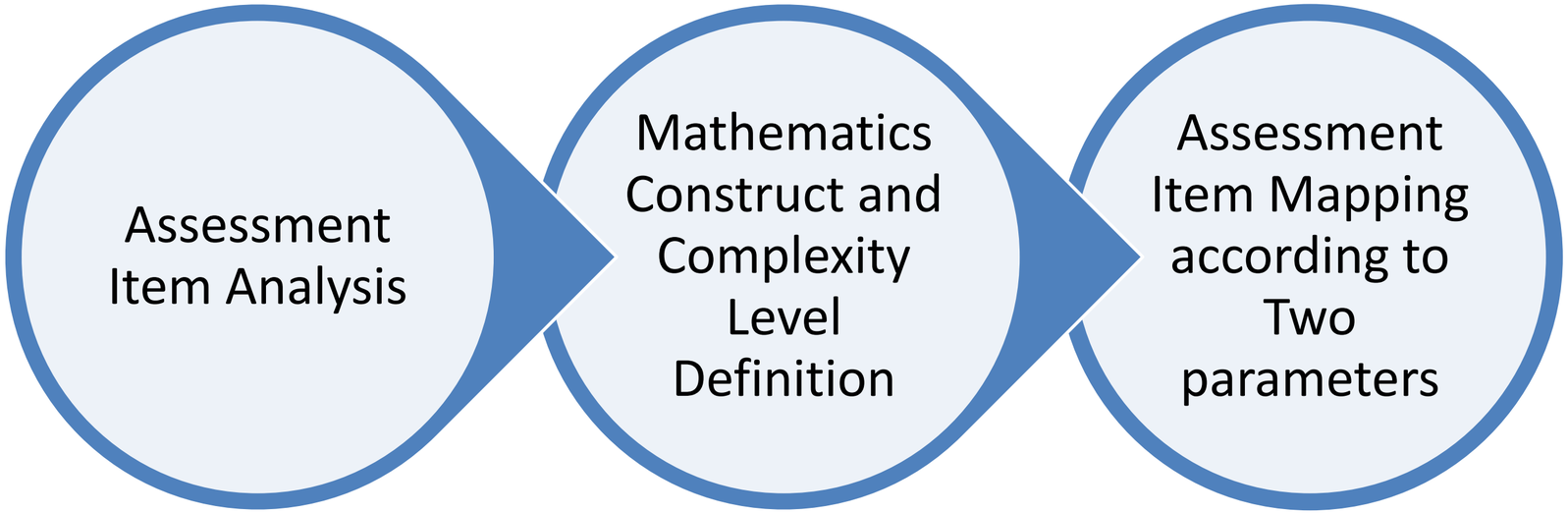
Methodology (1)



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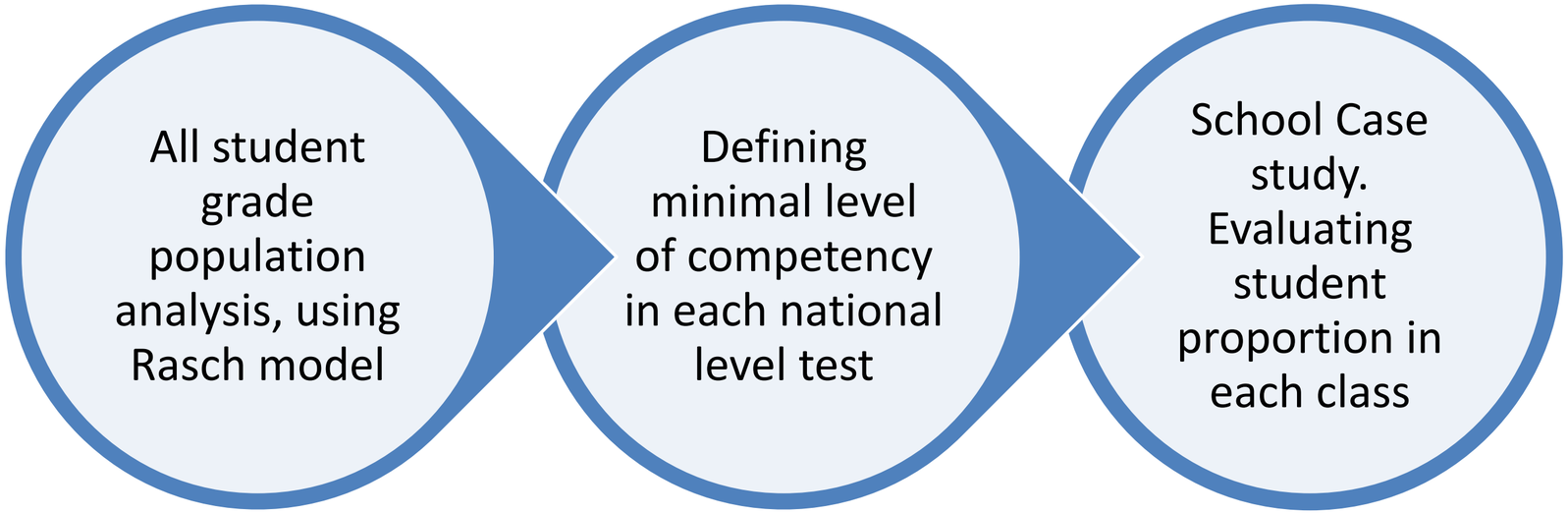
Methodology (2)



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RESULTS

Mathematics construct substrands

Construct	Construct Substrands
Mathematics	Numbers and operations with numbers
	Data analysis
	Reasoning
	Knowledge and Understanding

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3rd Grade National Level Large Scale Assessment Item Mapping According to Mathematics Literacy Construct Substrands

Construct Categories	Level 1	Level 2	Level 3	Level 4
Numbers and operations with numbers	7.1.	1., 3., 4., 5., 6., 7.3.,7.5.,7.7.,7.9.		
Data analysis	7.2., 7.4., 7.6., 7.8., 7.10.		8.5.,8.6.	
Reasoning		2.1., 2.2., 2.3. 2.4.		
Knowledge and Understanding				

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Pestovs, P., Namsone, D., Čakāne, L., & Saleniece, I. (2019). MAKROLĪMEŅA 6. KLAŠU VĒRTĒŠANAS KONSTRUKTU ATBILSTĪBA PILNVEIDOTĀ MĀCĪBU SATURA IETVARAM. *SABIEDRĪBA. INTEGRĀCIJA. IZGLĪTĪBA*, *387*, 387.

9th Grade Rasch Model

```
MEASURE    PERSON - MAP - ITEM
              <more>|<rare>
     5           .#  +
                     |
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                     |
                .##  |
     4               +
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     3           . T+
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             .#####  |
     2         .### S+  2.06
             .######  |
             .######  |  2.07.3
          .##########  |  2.07.2
             .######  |  1.21
           .########  |S 2.05
     1 .############  +  1.08    2.02
          .######## M|  1.11    2.08.2
        .##########  |  1.02    2.01.1  2.03.4
       .###########  |  2.04.2
       .###########  |  1.14    1.19    1.22    1.23    1.24    2.04.1  2.08.4
        .##########  |  2.01.2
     0  .###########  +M 1.13    1.18    1.20    1.25    2.07.1
           .###### S|  1.03    1.05    2.08.3
           .######  |  1.07    1.17
               .##  |
               .##  |  1.10
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    -2           .  +  2.03.3
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                 .  |T 2.08.1
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    -3              +
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                    |  2.03.2
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    -4           .  +
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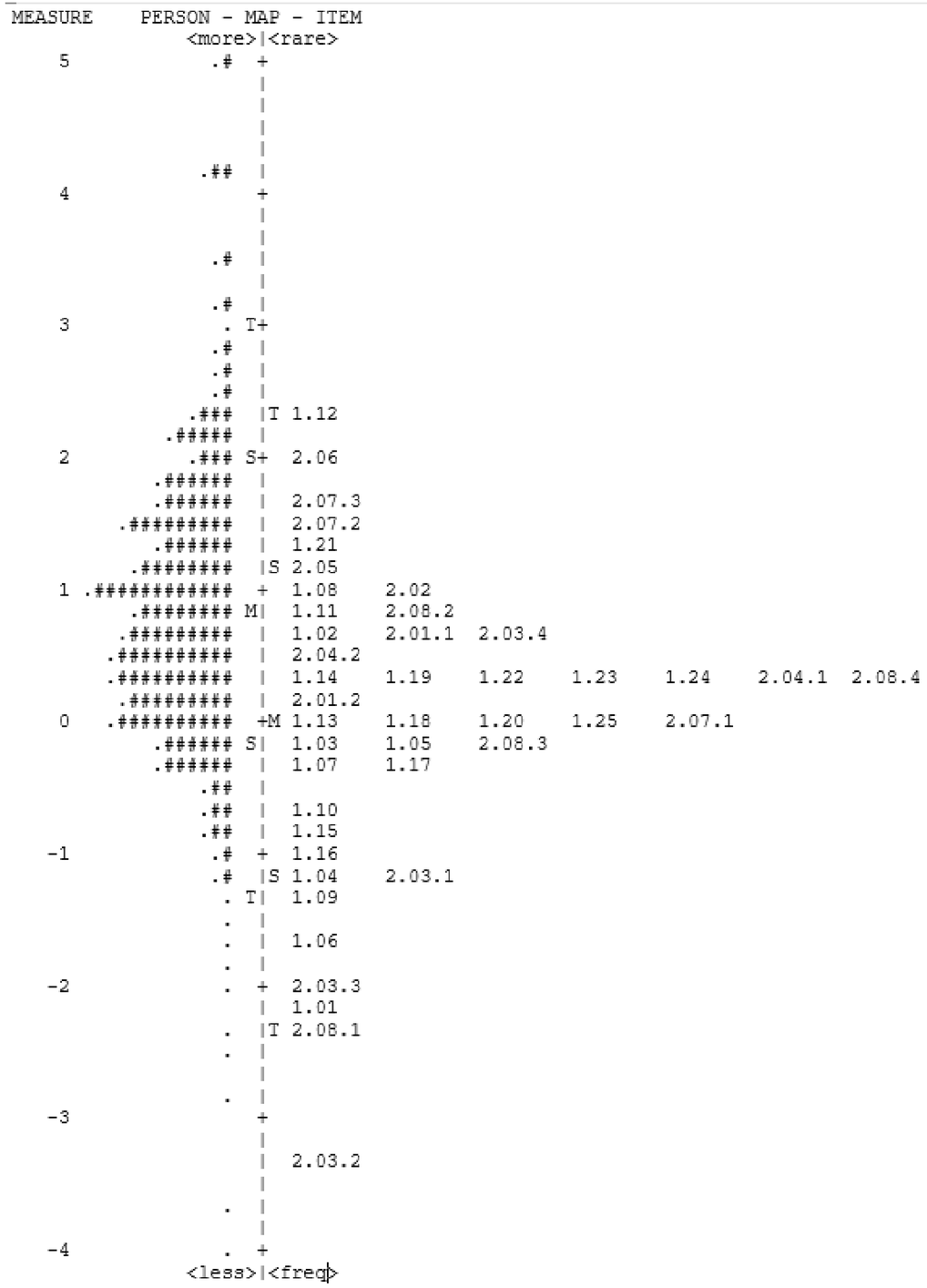
3rd Grade Rasch Model



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Case study

National Level Test	3rd grade	6th grade	9th grade
Item assessment number	2.1., 2.2., 2.4., 1.1., 1.3., 7.1., 1.4., 4.1., 5.1., 8.1., 5.2., 6.2.1., 6.2.2., 6.2.3., 8.2.	1.1., 2.1., 3.2., 2.5., 1.2., 2.2., 3.1., 2.4., 2.6.	2.3.2., 2.8.1., 1.1., 2.3.3., 1.6., 2.3.1., 1.4., 1.16., 1.15., 1.10., 1.17., 1.7.
Student number	53	48	71
Student proportion	3,8 %	18,8 %	12,7 %

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Conclusions

Different national level tests are defined differently according to the construct of mathematics, that’s why it is not possible to interpret data without additional data analyses.
In case study the proportion of students who have not reached minimal mathematics competency level
Limitation of the study is an insufficient number of test items with high complexity level and reliability issues, because of marking procedures in the schools.

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Questions?

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