

Building the Finnish digital research ecosystem for assessment and interventions of dyscalculia

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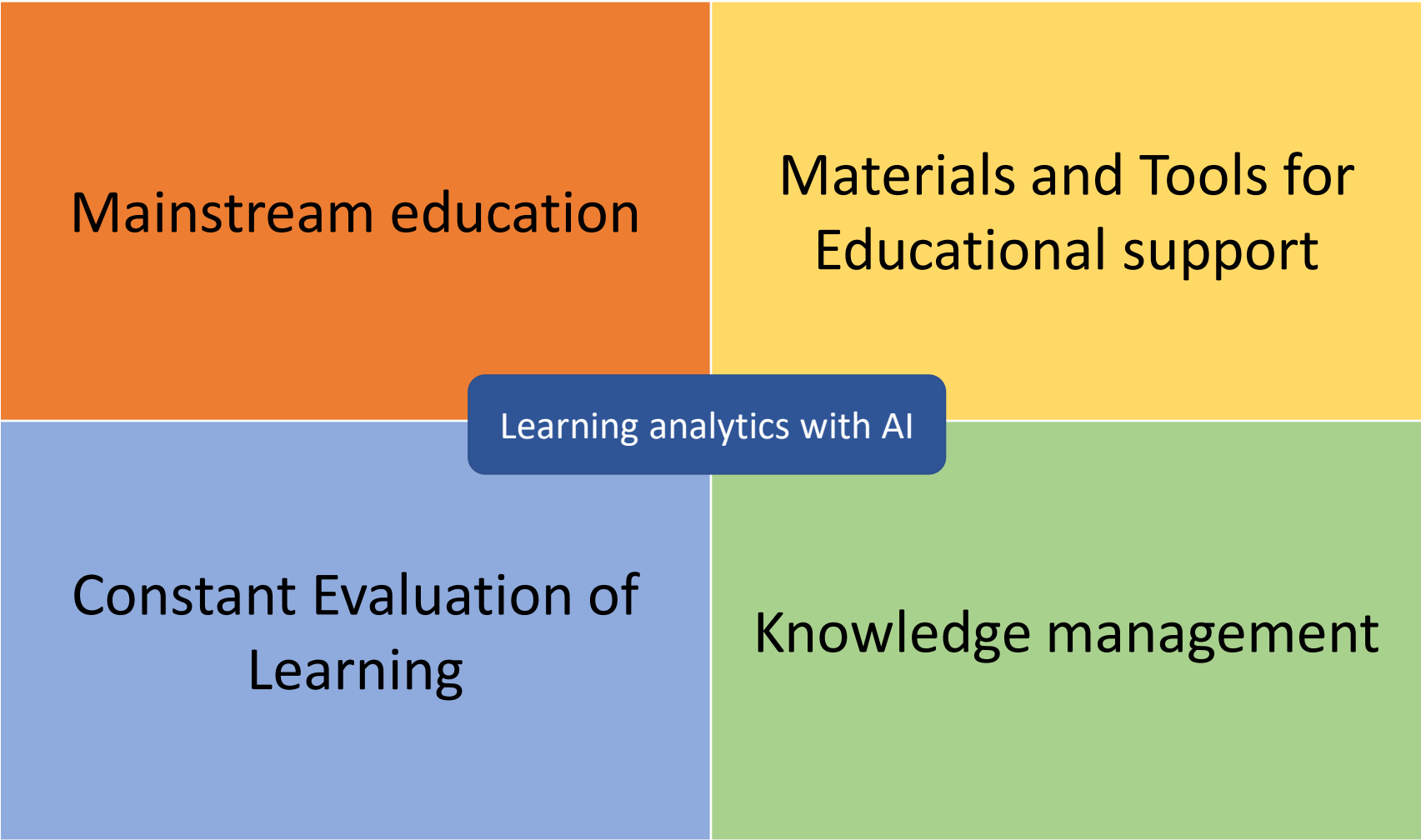
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TRILA

- A research group focused on different learning technologies & digital learning solutions
- Our research is mainly focused in learning analytics, digital learning tools, communal learning & pedagogics of programming
- We are maintaining digital platform called ViLLE (Visual Learning Environment)
 - ViLLE is used widely in Finland with every third school - (Eduten Oy in international contexts)
 - ViLLE is widely used in schools, universities, and universities of applied sciences.
 - UNESCO (2020) & UNICEF (2022) -awards
- Experts from all kinds of fields: Researchers, IT-experts, Teachers, Language experts etc.

Nationwide Ecosystem of Teaching and Learning



Personalisation within inclusive education

Individualized learning

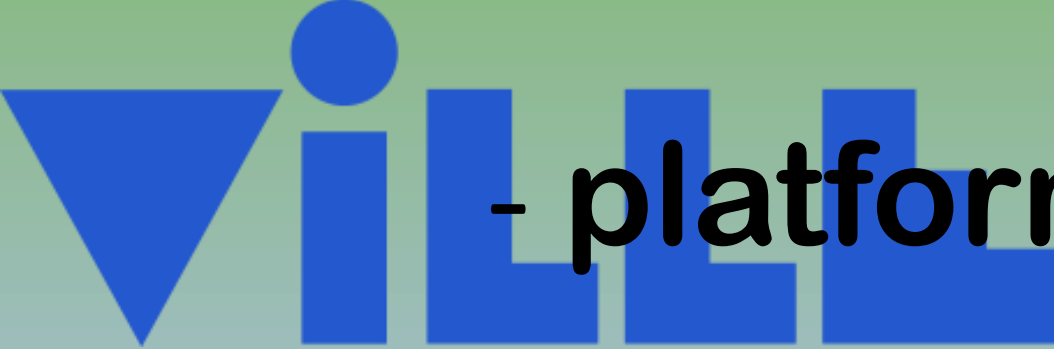
Analytics that identifies learning losses and needs

Evaluation of the system level changes

VILLE – the collaborative education tool



Personalisation within
inclusive education

 - platform



Digital learning platform

Learning paths:

- Mathematics
- Native language
- Computational thinking
- English

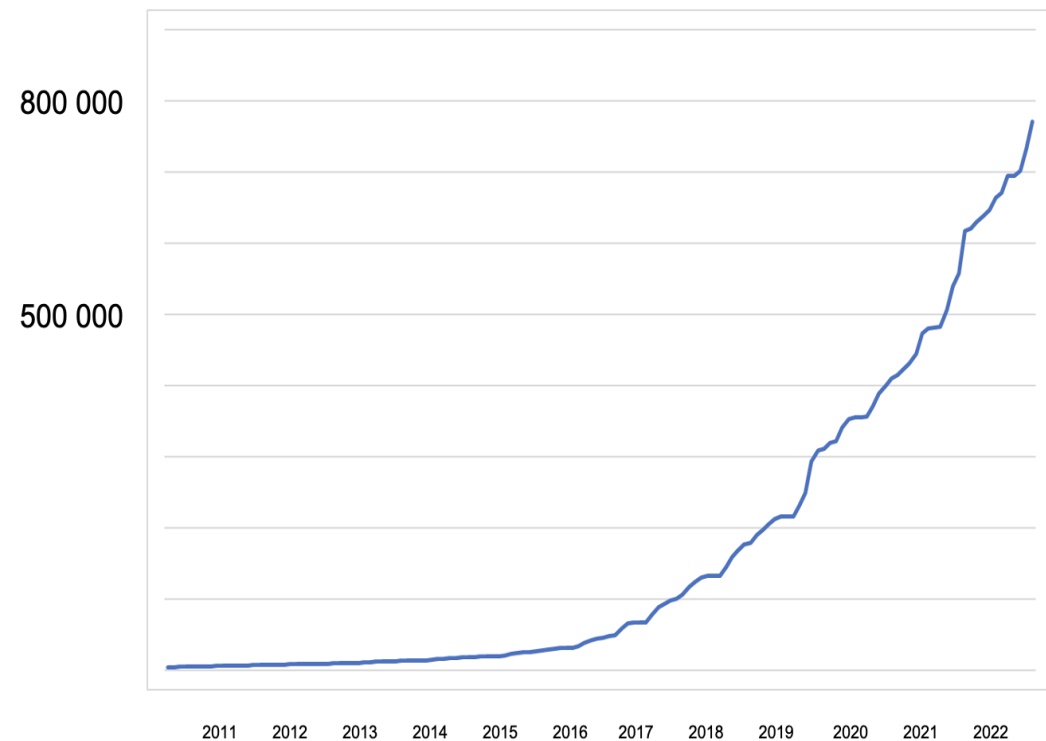
Detailed information regarding students learning process

273 968 users in 2022

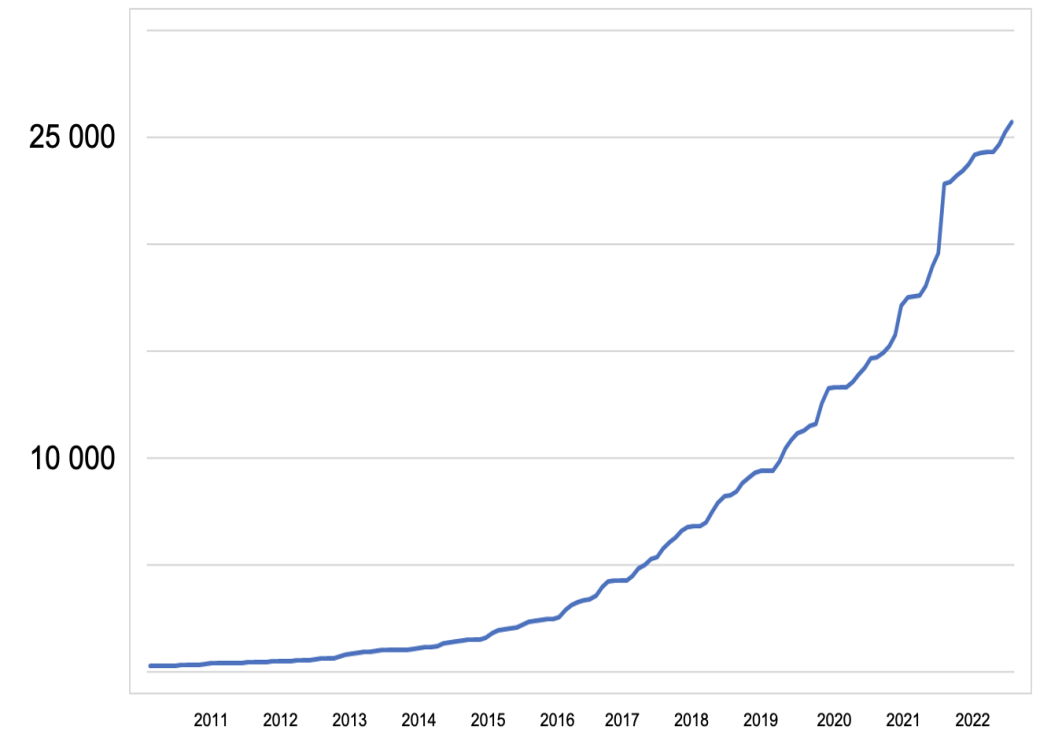
Learning analytics:
Immediate feedback,
automatic assessment

Teachers can create exercises for their personal use & give personalized exercises

Development of student users



Development of teacher users



ViLLE is a learning platform where students can work no matter the time or place



Automatically
assessed exercises

Manually graded
exercises

Exams

Collaboration

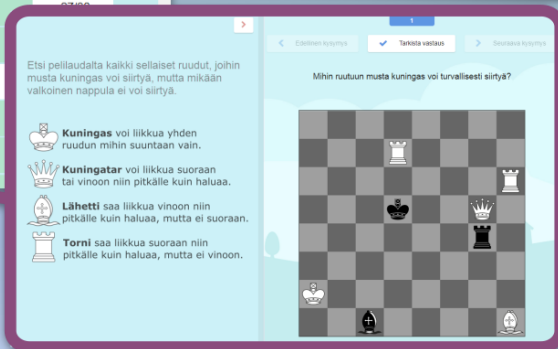
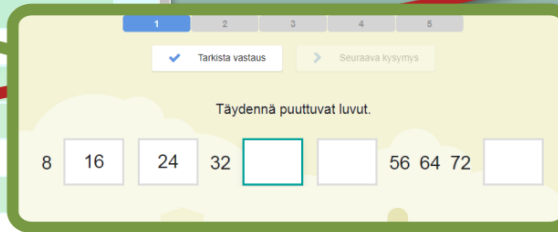
Lectures and
attendance

Tutorials

8:n ja 9:n kertotaulut

478 / 1700

1. Kertotaulutikkaat (1-7)
2. Kokoa kertolasku (kahdeksan kertotaulu)
3. Kirjoita kahdeksan kertotaulu
4. Kirjoita yhdeksän kertotaulu
5. Harjoitellaan kahdeksan kertotaulua
6. Kertotaulurata, 8:n kertotaulu
7. Harjoitellaan yhdeksän kertotaulua
8. Kertotaulurata, 9:n kertotaulu
9. Kertotaulutikkaat
10. Kertolaskuralli
11. Yhteen- ja vähennyslaskuja
12. Kertotaululaskuja
13. Täydennä kertoja ja kerrottava
14. Yhdeksän kertotaulu
15. Shakki
16. Mikä ei kuulu joukkoon?





473 / 1720



1. Multiplication ladders
2. Kokoa kertolasku (kahdeksan kertotaulu)
3. Write the eight times table
4. Kirjoita yhdeksän kertotaulu
5. Harjoitellaan kahdeksan kertotaulua
6. Kertotaulurata, 8:n kertotaulu
7. Harjoitellaan yhdeksän kertotaulua
8. Kertotaulurata, 9:n kertotaulu
9. Kertotaulutikkaat
10. Multiplication rally
11. Yhteen- ja vähennyslaskuja
12. Kertotaululaskuja
13. Täydennä kertoja ja kerrottava
14. Yhdeksän kertotaulu
15. Chess
16. Mikä ei kuulu joukkoon?

60



7*3

21

24

12



1

2

3

4

5

✓ Check the answer

➤ Next question

Täydennä puuttuvat luvut.

8

16

24

32

56 64 72



Etsi pelilaudalta kaikki sellaiset ruudut, joihin musta kuningas voi siirtyä, mutta mikään valkoinen nappula ei voi siirtyä.



Kuningas voi liikkua yhden ruudun mihin suuntaan vain.



Kuningatar voi liikkua suoraan tai vinoon niin pitkälle kuin haluaa.



Lähetti saa liikkua vinoon niin pitkälle kuin haluaa, mutta ei suoraan.



Torni saa liikkua suoraan niin pitkälle kuin haluaa, mutta ei vinoon.

1



Edellinen kysymys

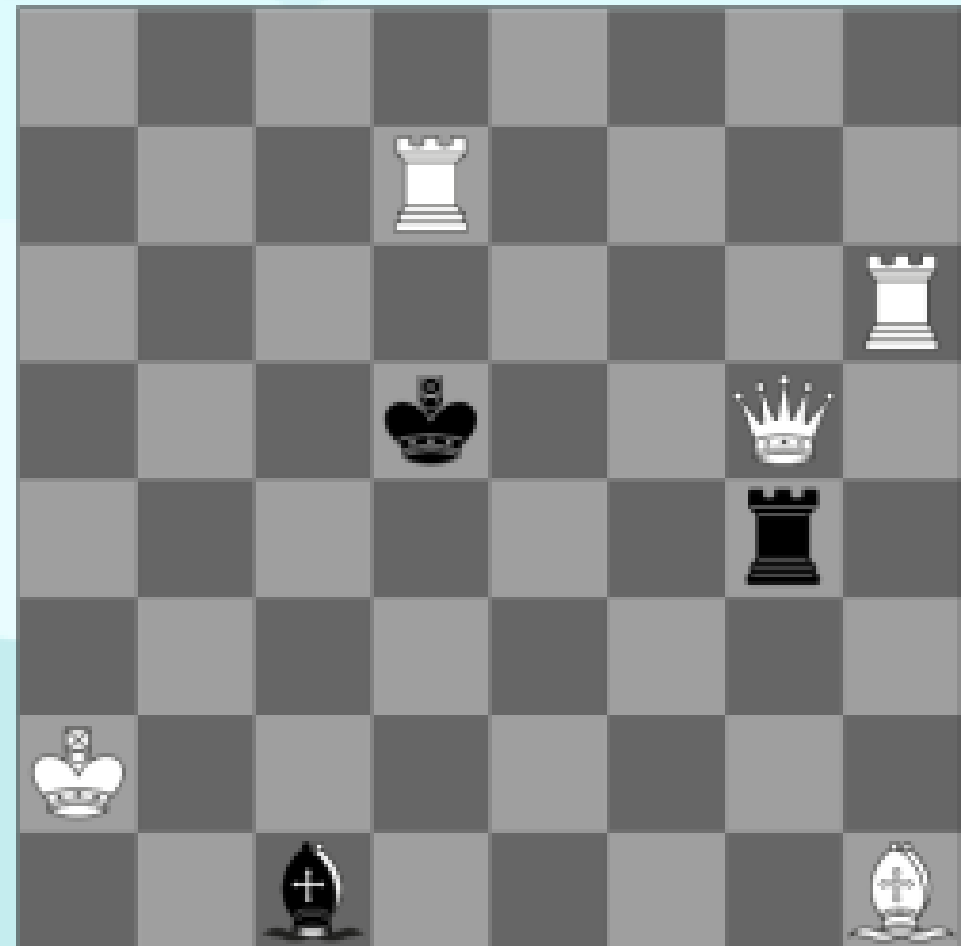


Tarkista vastaus



Seuraava kysymys

Mihin ruutuun musta kuningas voi turvallisesti siirtyä?





The eight times table

64	68	57	43
----	----	----	----



1

2

3

4

5

6

 Check the answer Next question

$$682+753$$

		S	K	Y	
		1			
		6	8	2	
	+	7	5	3	
			3	5	

Analytics that
identifies learning
losses and and needs

FUNNA

FUNCTIONAL NUMERACY ASSESSMENT

FUNNA

FUNCTIONAL NUMERACY ASSESSMENT

- Developed by the TRILA consortium
- Assessment tool for math & reading
 - To improve **research-based understanding about learning**
 - To offer teachers and schools reliable practical information
 - To offer educational administration tools for **knowledge-based decision making in education**

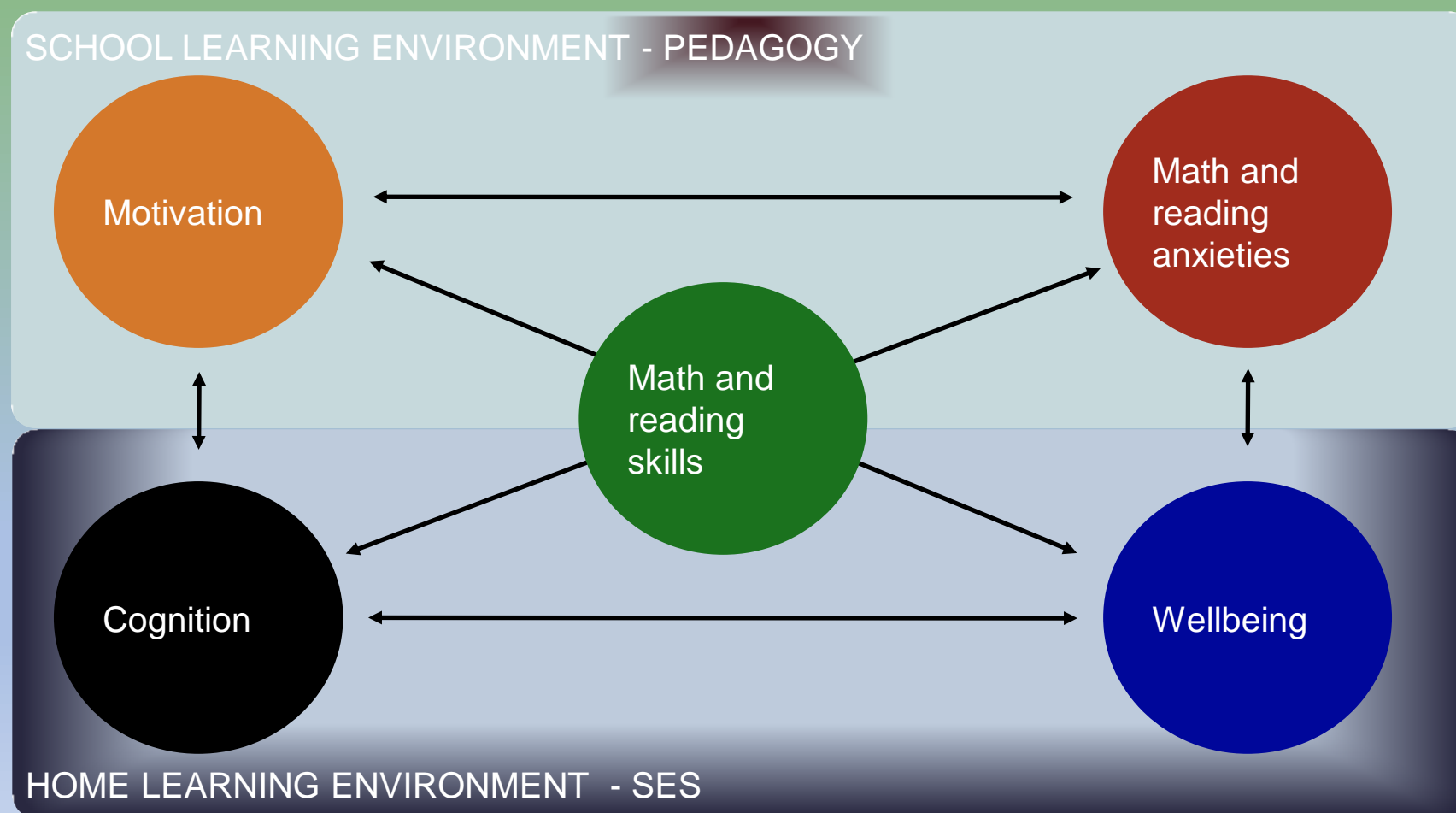


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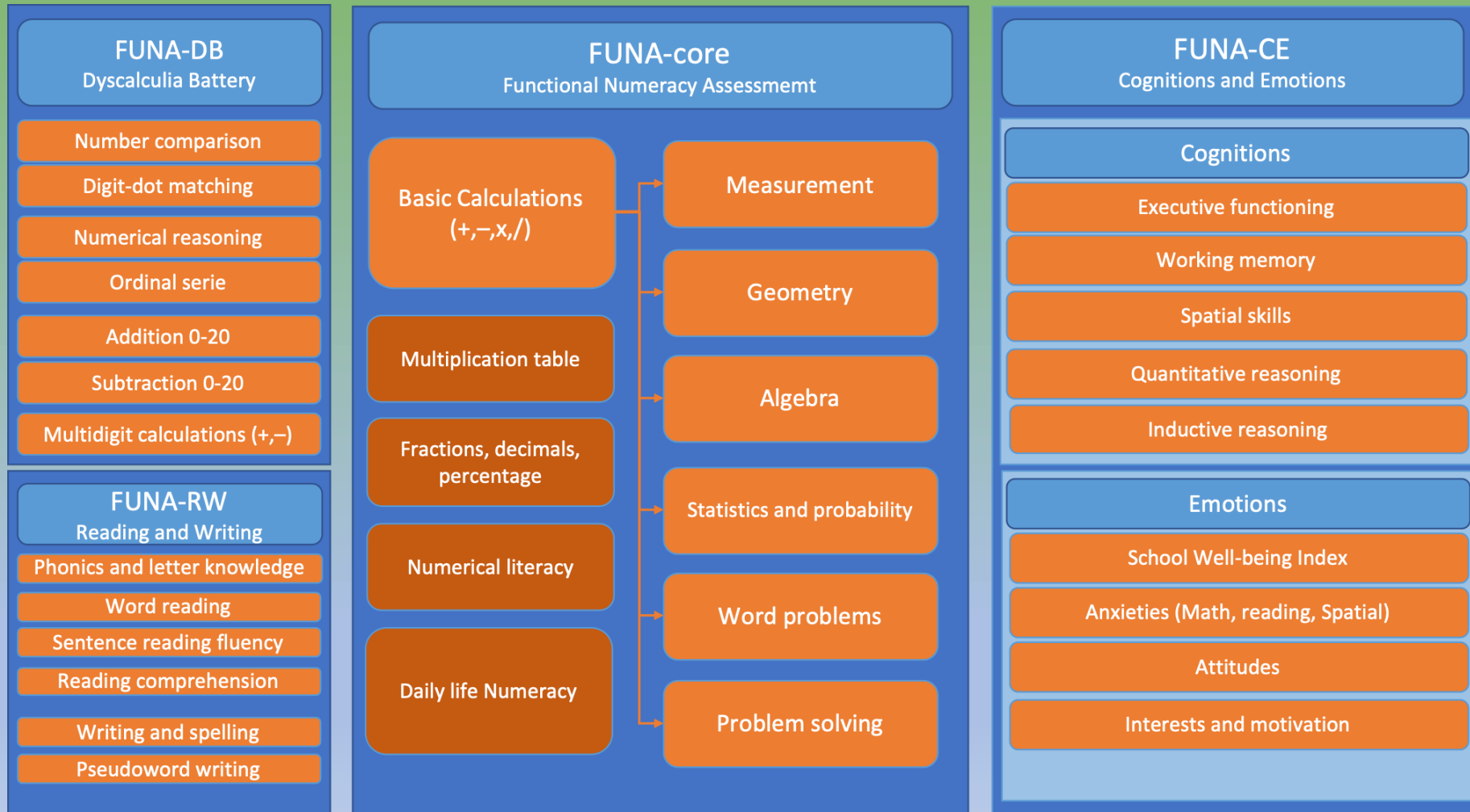
The framework on assessing dyslexia and dyscalculia

A Cross-cultural studies on learning difficulties, learning anxieties, motivation, cognitive skills and wellbeing



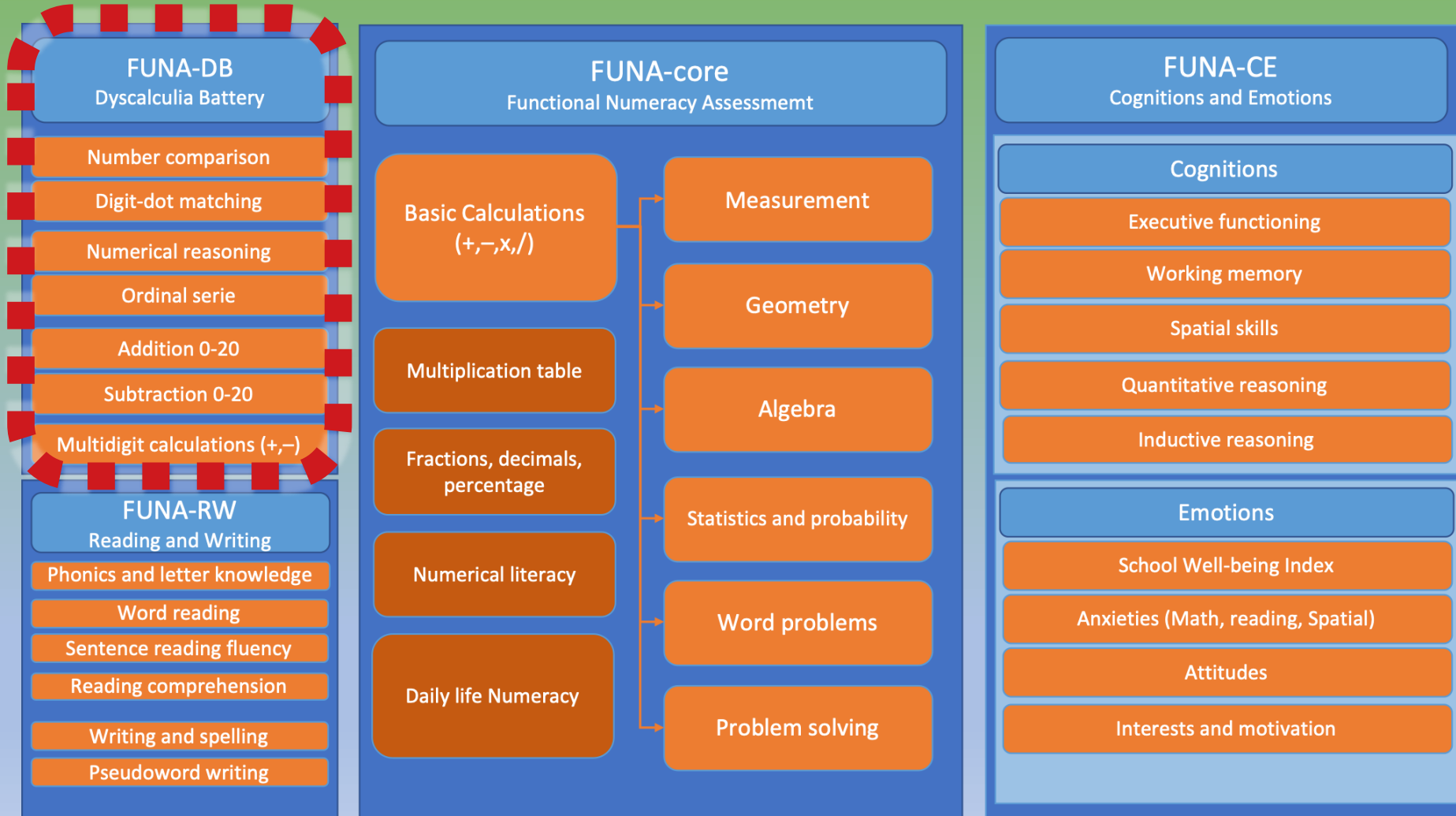
FUNNA

STRUCTURE



FUNNA

FUNCTIONAL NUMERACY ASSESSMENT



FUNA - Dyscalculia Battery

- Online assessment tool
- It measures accuracy & reaction time
- Two-factor model: **number processing skills** and **arithmetic fluency**
- Current version for grade levels from 3 to 9, (i.e. 9 to 15 years-old)
- Automatic scoring system and visual feedback for teachers
- Current norms based on 80 000 pupils
- High reliability and validity. Technical manual soon available in English.
- Planning of the “FUNA-DB 4-8” and “FUNA-DB secondary education” started (early phase)



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FUNA

Basic Number Processing

Number comparison

Which is greater?


<input type="text" value="9"/> S	<input type="text" value="2"/> L
-------------------------------------	-------------------------------------


Which is greater?

<input type="text" value="6"/> S	<input type="text" value="5"/> L
-------------------------------------	-------------------------------------

Equivalence

Is the number below equal to the amount of balls in the picture?

<input type="text" value="2"/>	
<input type="text" value="="/> Same S	<input type="text" value="<>"/> Not same L

<input type="text" value="7"/>	
<input type="text" value="="/> Same S	<input type="text" value="<>"/> Not same L

Arithmetic Fluency

Addition

$$1 + 4 = \boxed{}$$

Subtraction

$$3 - 2 = \boxed{}$$

Number series

Complete the number sequence:

53 55 57 59

Calculations

$$46 - 43 = \boxed{}$$

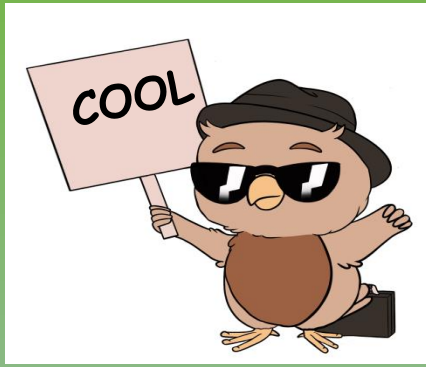
ASSESSMENT FOR WHAT?



Individualized learning



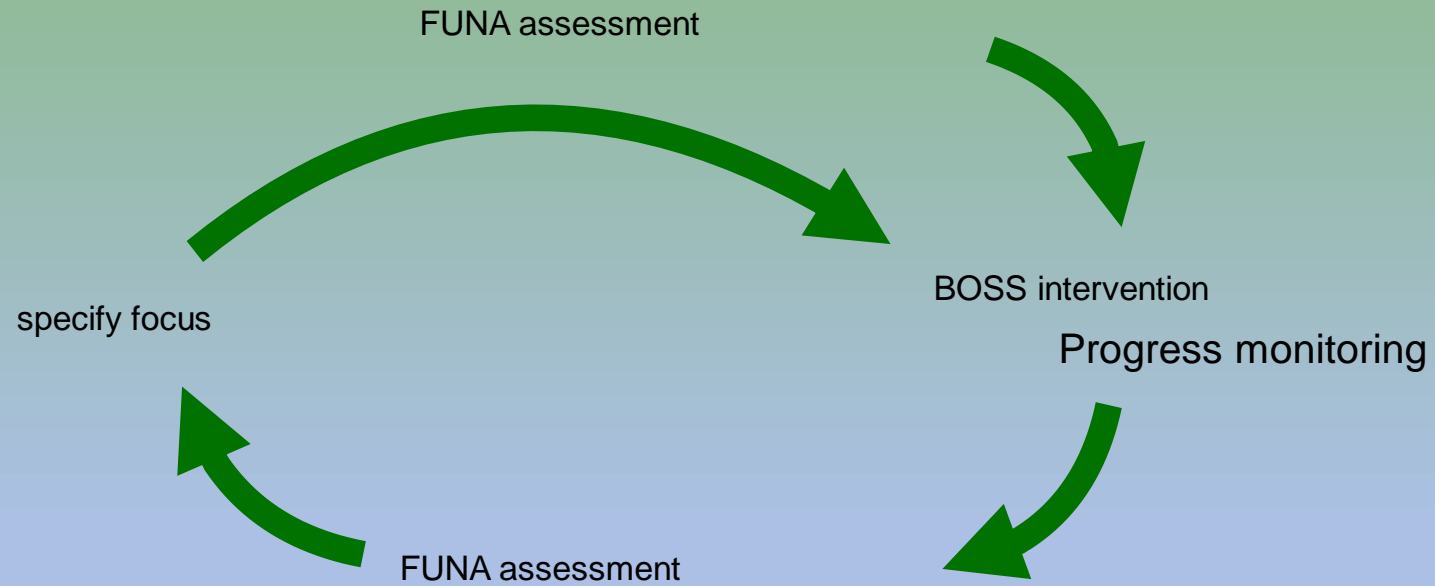
BOSS-Briefcase



BOSS - Briefcase of Special Support

- 2-3 months of digital intervention materials for different math contents or different levels of reading development
- Exercise packages to students with special support who have difficulties in learning
- Focus is on mathematics and native language (in Finnish & Swedish)
- Target: basic skills for life and future
- The briefcases have no age/grade limits - **f.example a fourth grade student can do third grade exercises without knowing it** → based on student skills

Response to Intervention model integrated



TRILA – teacher network

- All teachers or rehabilitation workers in Finland can join this network
- TRILA-teacher will get free access to BOSS materials and, in the future, also to selected FUNA assessment tools
- Free access is given for two years, which can be renewed by participating in one TRILA-consortium study
- Over 600 teachers

→ Researchers have the possibility:

- to develop digital assessment tools and rehabilitation materials
- to conduct diagnostic and intervention studies

Without the need to develop, maintain or administer a digital platform.



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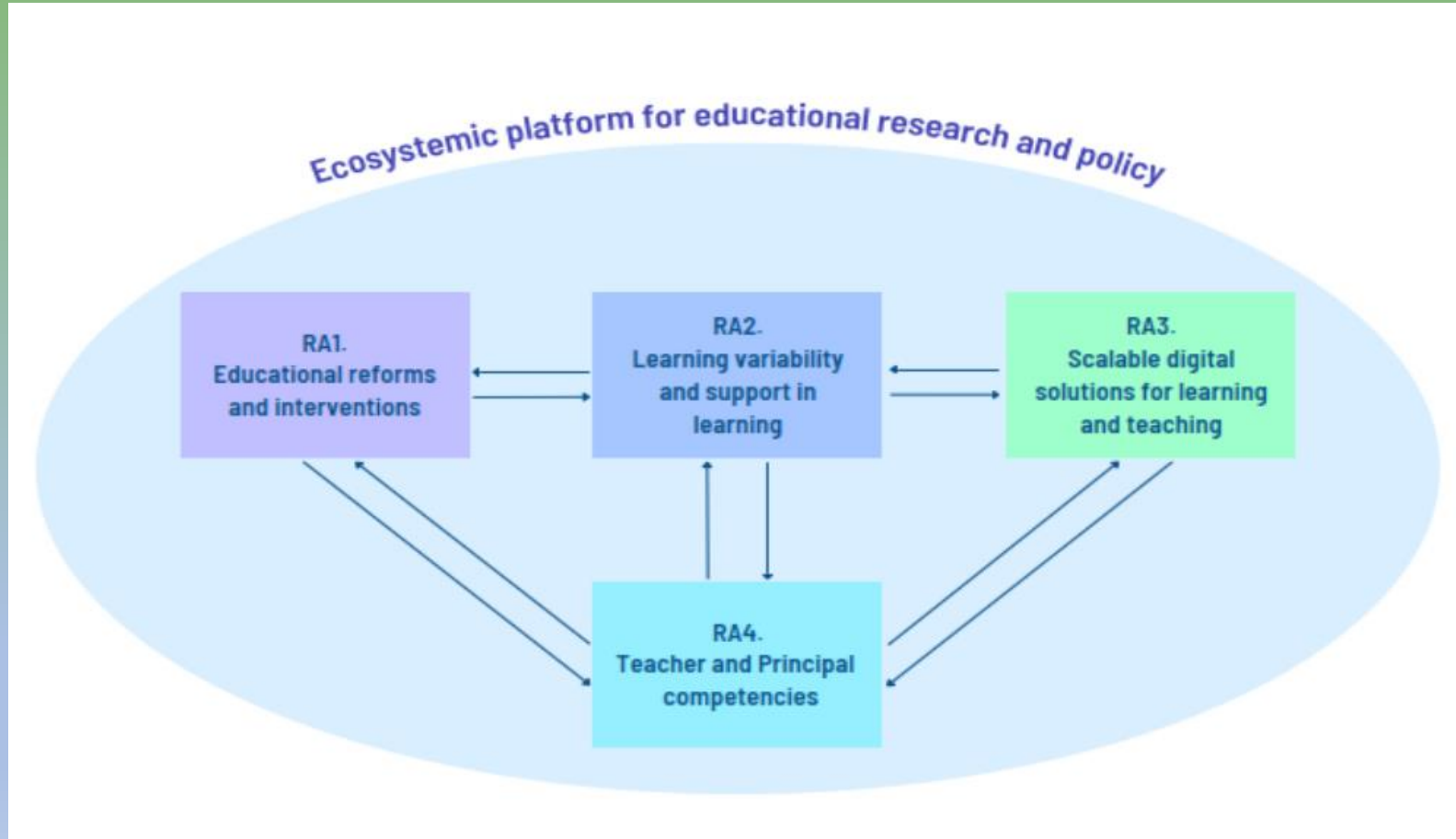
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Evaluation of the system
level changes

Knowledge management

Knowledge management tools in use in 20
municipalities

Knowledge management



SUMMARY | FUTURE PLANS

Some interesting projects

- **Effectiveness of a 2-year preschool (compared to 1-year preschool)**
 - A follow-up study of two samples (born 2016 and 2017), both $n \approx 17000$, total $\approx 40\ 000$ (cf. one generation in Finland about 45 000)
 - 10 000 of them participate in a 2-year preschool
 - Measures: reading, math and social skills
- **National assessments (subcontractor for FEEC)**
 - Sample-based, last 9th grade math $n \approx 8000$
CBM to all + smaller samples for high performers (problem solving skills) and average+lower performers (FUNA-DB)
- **University STEM studies dropout study**
 - Secondary and tertiary education (STEM)
 - Building predictive models for risk -> multiple interventions
- **Teacher students' basic number skills, math anxiety and attitudes towards math teaching**
 - Almost all Educ. faculties in the Finnish universities participating
- **Computational thinking skills**
 - Including Bebras collaboration and assessments
- **Development of Standardised Test Batteries on Learning and Cognition**
 - Multinational project to develop digital assessment on learning disorders

Education for the Future

- A major flagship funding from Finnish academy to answering three key challenges:
 - Decreasing learning performance
 - Utilization of Educational Technologies & Learning Analytics
 - Increasing Learning Variability in Education
- Collaboration with other Universities
- LA & AI
- To establish evidence-based co-creation of the educational ecosystem with stakeholders and business partners.



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Thank you!



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