Why we need evidence-based practices in education … and why we should develop them together with teachers

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20.05.2019

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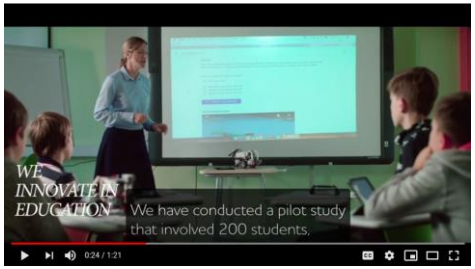
1. Introducing innovations in schools – evidence-based or gut feeling?
2. The Innovation Laboratory
3. How we implement the models in cooperation with schools

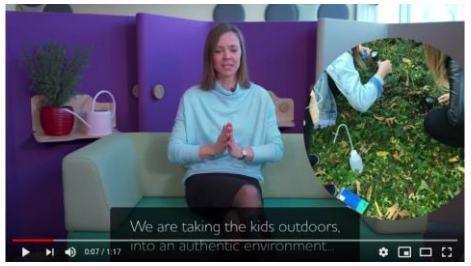
WHAT MAKES A GOOD EDUCATIONAL INNOVATION?

- A change that leads to new practices
- Positive impact on stakeholders (students, teachers, school leaders, researchers, society)
- Evidence-based
- Sustainable change
- Scalable change

Examples:
Student-centered Learning



[Robots in Mathematics]



[Mobile Outdoor Learning]

Investment into ICT in Schools?

"... success in initiating change does not guarantee that **such changes can be sustained** over time"

Technology and Open Educational Resources as opportunities to reshape EU education , Communication of the European Commission, 2011

What then ?

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EVIDENCE-BASED! Research first?

The linear model of knowledge transmission

Or maybe gut feeling?

Teachers develop **expertise** and **professional practices**

Develop **automatic reaction patterns** to frequently appearing situations, e.g. how a lesson is started, evaluate homework, asking questions

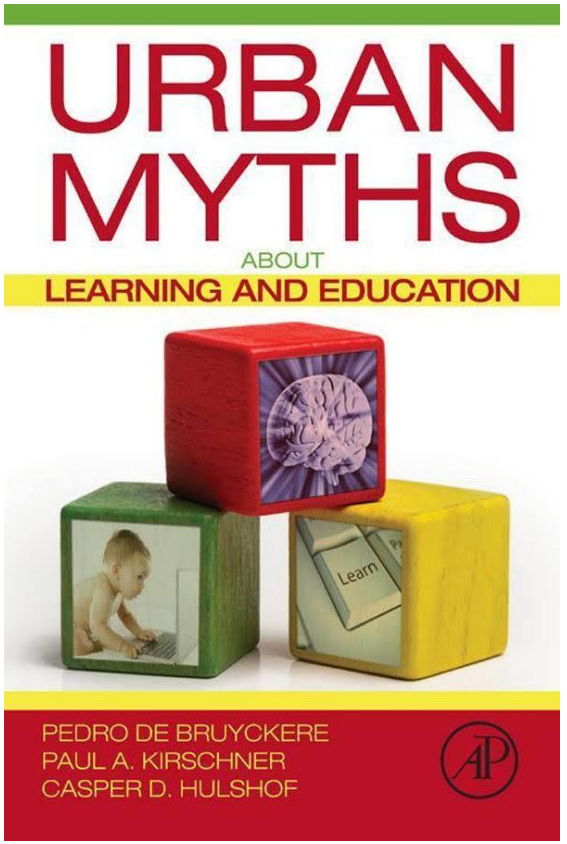
This allows

- Decision Making in complex, dynamic and unpredictable situations (e.g. the classroom)
- **Improvisation** and being more **responsive** and **adaptive** in their teaching to changing circumstances

Dual process theories of decision making (rational vs. intuitive)

Or maybe gut feeling?

- **Over 90% of teachers** believe students should be taught according to students' **individual learning style**
- There is no coherent scientific evidence that supports such claims
- Stronger effects on student learning can be achieved by other means (e.g. more effective questioning, feedback and scaffolding)
- Teacher collected evidence often is biased (we all like to **confirm our assumptions**)

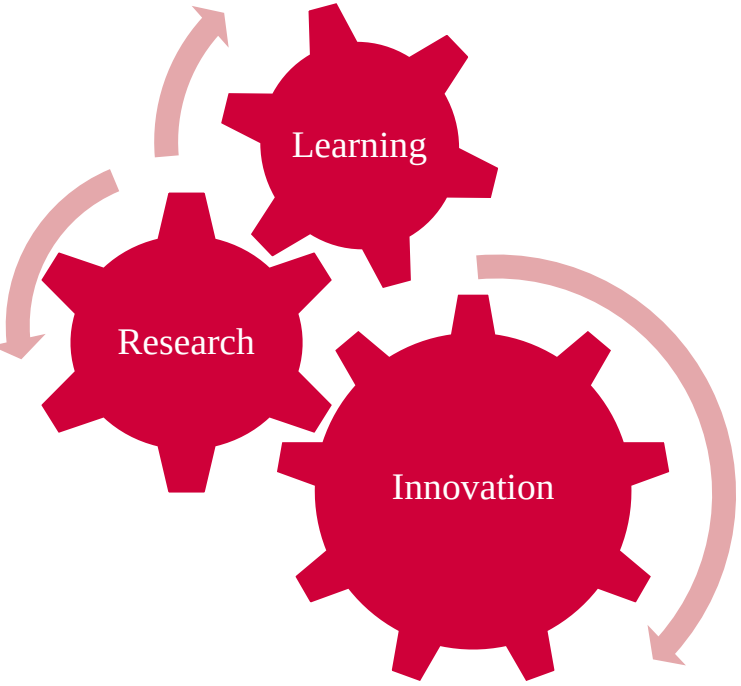


Or maybe gut feeling?

Also, scientific evidence often ...

- is hard to understand
- comes too late
- does not take into account the special circumstances of the classroom

LIVING LABS ARE **COMMON CONTEXTS** THAT ALLOW ...



- Practice-based Educational Research
  - Studying the effects of new pedagogical methods
- Teacher Training
  - Professional learning through “boundary crossing” and “teacher-led research”
- Innovation Adoption
  - Incubators for leading to sustainable change in Schools

Innovation Laboratory

An approach to integrate educational research and teacher training

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- Long-term Teacher Training (6-12 months)
- Implementation of new teaching practice
- Action research in their own classroom
- Reflection on student learning

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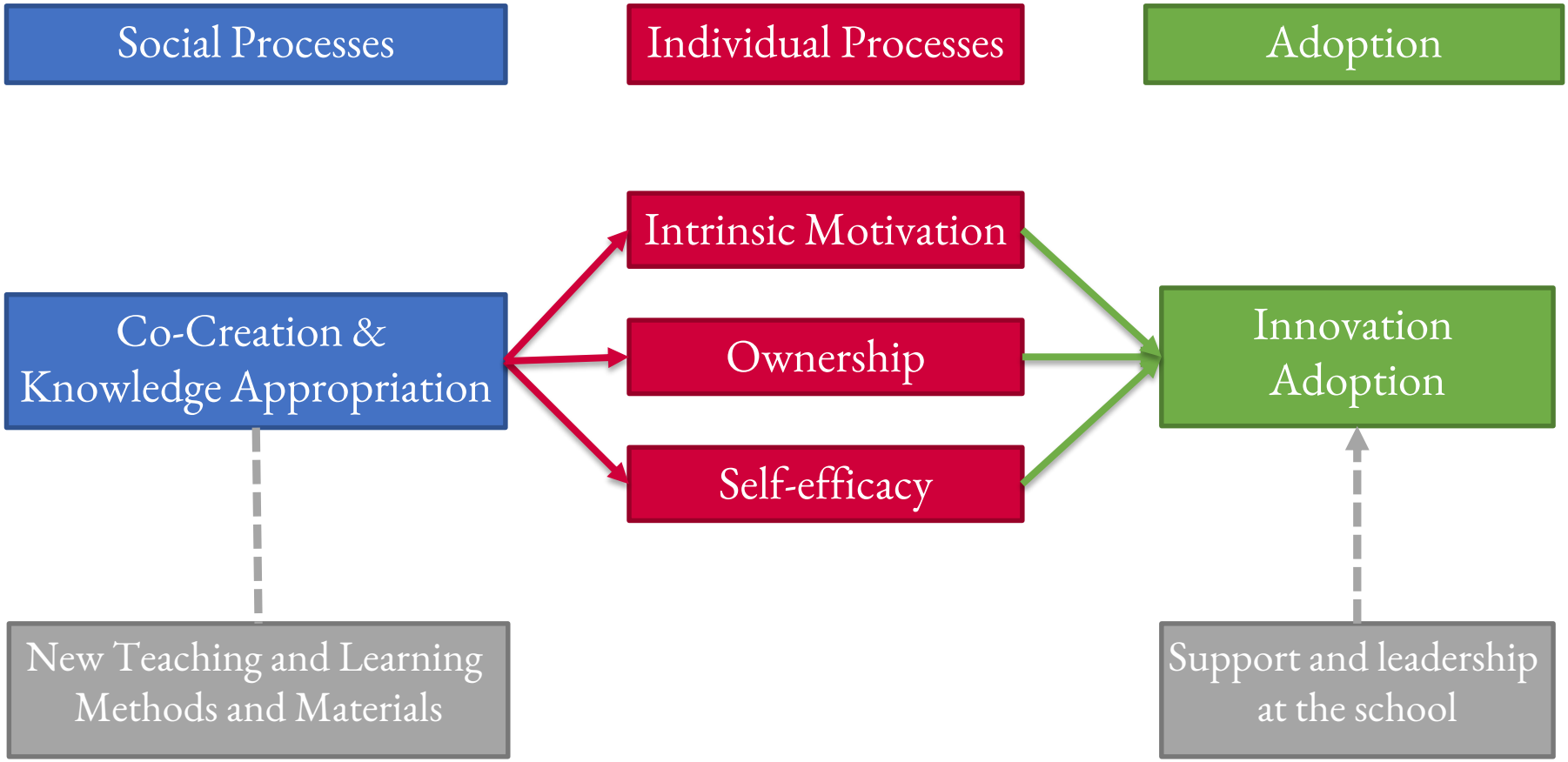
Important Components

- Co-creating lesson plans and materials
- Implementing in own classroom
- Inquiry tools and processes (TISL)
- Educational Technology
- Psychology of Student Learning

Does teacher co-creation lead to higher adoption?



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	Intrinsic Motivation	Extrinsic Motivation	Controlled Motivation	Self-Efficacy	Ownership	Support	Adoption
T1	4.43	4.14	2.86	3.93	3.86	4.14	4.071
T2	4.36	4	3.07	3.79	4.07	4.07	4.286
T3	4.43	4.43	3.14	4	4.07	4.29	4.5

Motivation, self-efficacy, ownership and intended adoption

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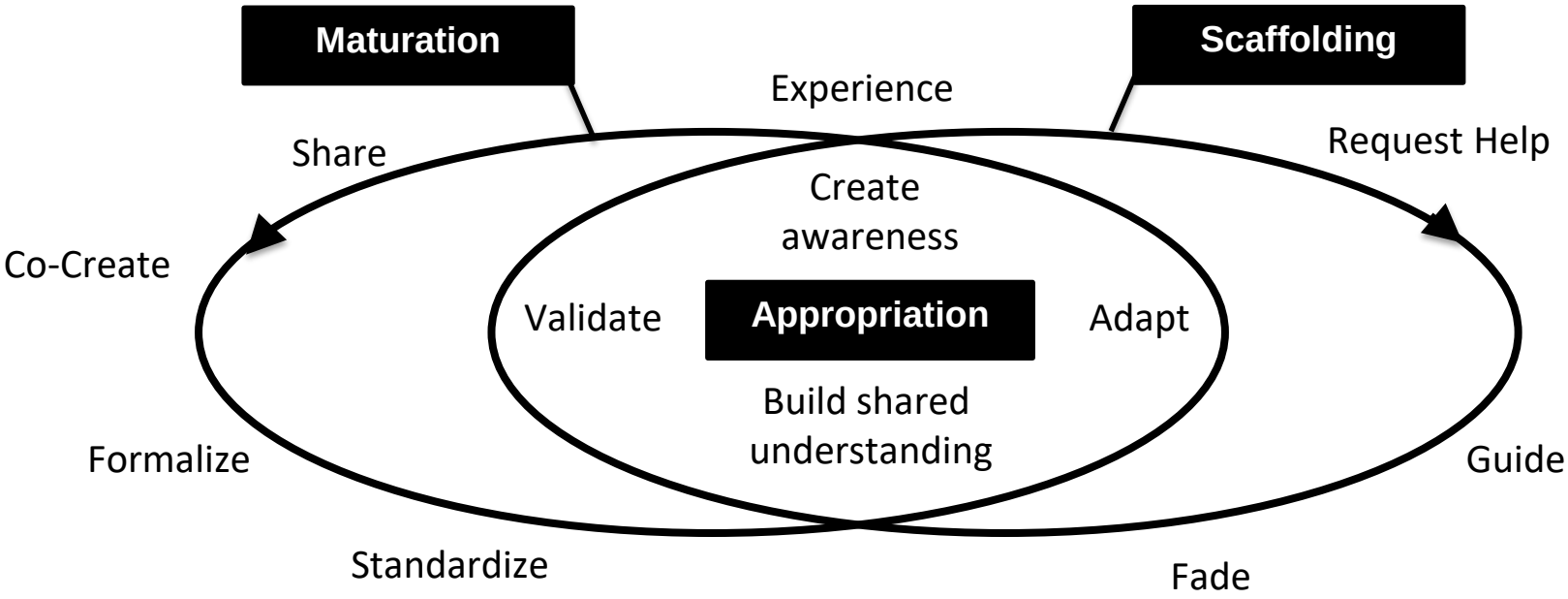
Co-Creation as a form of Knowledge Appropriation



Qualitative Evidence for Social Practices supporting the program

Evidence for Knowledge Maturation especially sharing and co-creation

- "*Working together with other math teachers, supporting each other, was one the main values of the program*"

Strong evidence for scaffolding

- "*We were two of us from our schools and had a chance to discuss the challenges, but we also communicated with other program participants to ask advice*

Some evidence for Knowledge Appropriation

- *Several teachers integrated elements of the program into their teaching*

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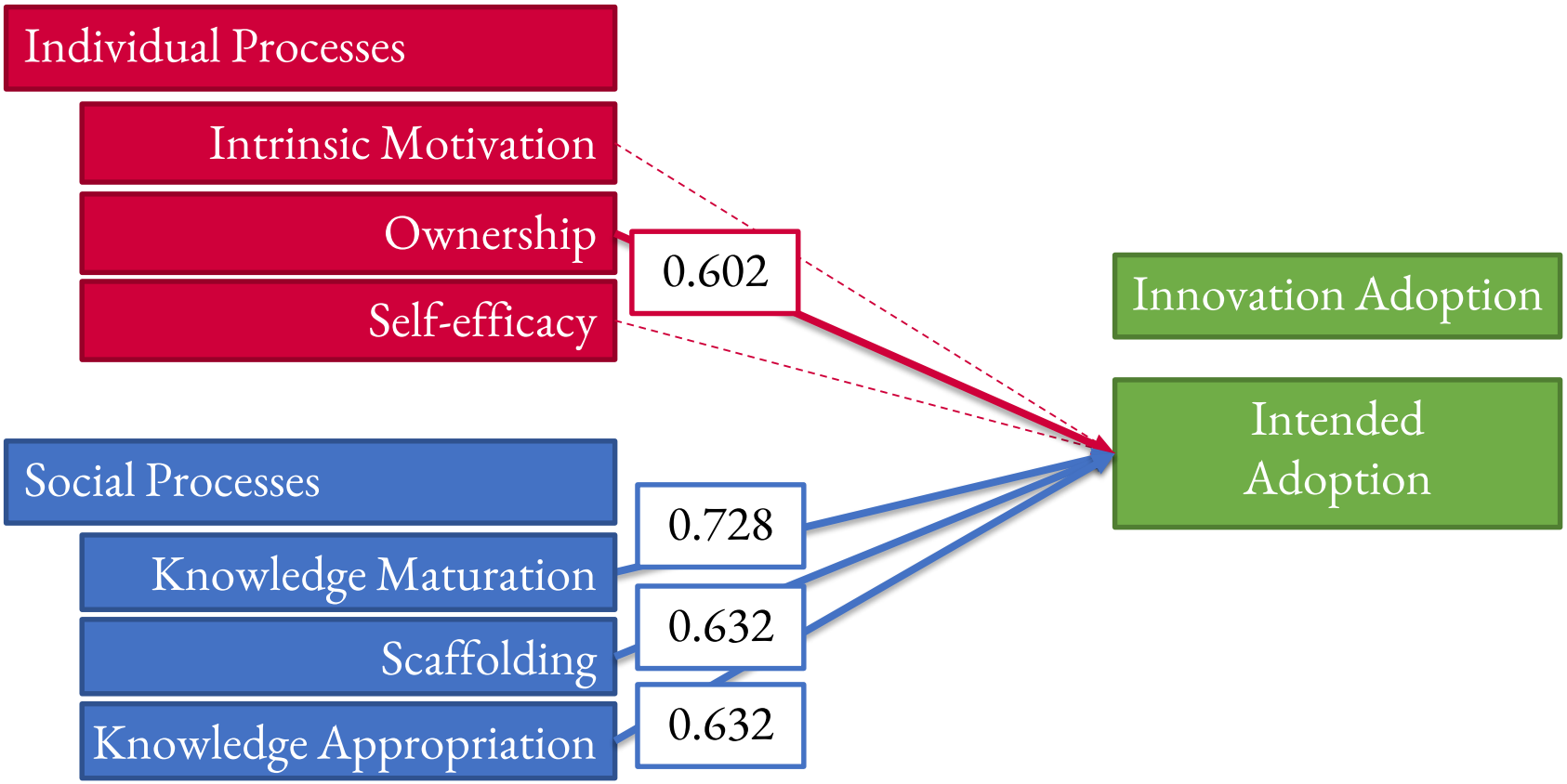
Social practices seem more strongly related to intended adoption than individual practices



Especially important: Sharing, Co-creating, Seeking Help

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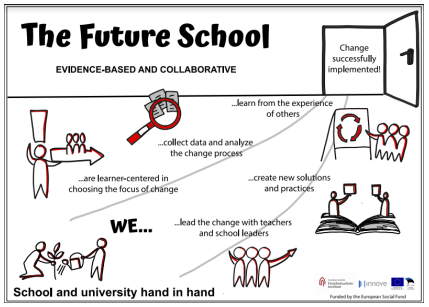
Implementation Models at Tallinn University



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https://edulabs.ee

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4 EDULAB Cases for STEM Learning

Science Technology, Engineering and Math

- Robomathematics
- Inquiry Learning outside the Classroom
- Smart Sensors for STEM
- Digital Learning Resources in Math

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With large involvement so far …

- 100+ Estonian schools
- 300+ teachers
- 3000+ students

Co-creating Educational Innovation

EDU LAB

INVENTING

Phase 0

Co-Creation in Research Projects
Teachers involved in early research

Teachers and Museum Staff designing for learning outside the classroom

INVESTIGATING

Phase 1

HIK Projektipäevad
Open Days for local schools
Testing new teaching methods and new research instruments

Students participating in project days

SCALING

Phase 2

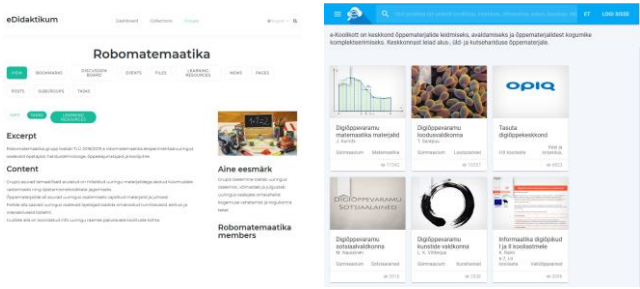
Innovatsioonilabor
In-Service Teacher Training
Teachers as Researchers

Teacher Training for using robots in Math

SUSTAINING

Phase 3

Innovation Community & Digital Learning Resources
eDidaktikum
Interactive Digital Materials and tests



Robomathematics Teacher Community
Digital Learning Resources

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Co-creating Educational Innovation

EDU LAB

INVENTING — Phase 0

INVESTIGATING — Phase 1

SCALING — Phase 2

SUSTAINING — Phase 3

Methods and tools for data collection

Creation of data collection instruments and application in research project context

Researcher-led inquiry
Multimodal measures of learning processes

MM Tracker

Graasp

DinoNimi

sea sense Cognitive Test Battery

Observata

Prolearning

Teacher-led inquiry
Toolbox of research instruments

Dashoard

EduLog

LePlanner

Research Instruments integrated with teaching materials and tools

eDidaktikum
Õppimise ja õpetamise ruum

eKoolikott

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Work with Luis Pablo Prieto, Maria Rodriguez, Kairit Tammets, Mart Laanpere etc.

CEITER Team

- 2 Professors
- 5 Post-doctoral Researchers
- 14 PhD Students & Junior Researchers
- 4 Administrative Staff (Research Coordination, Marketing, Training Coordination, Ethics & Data)

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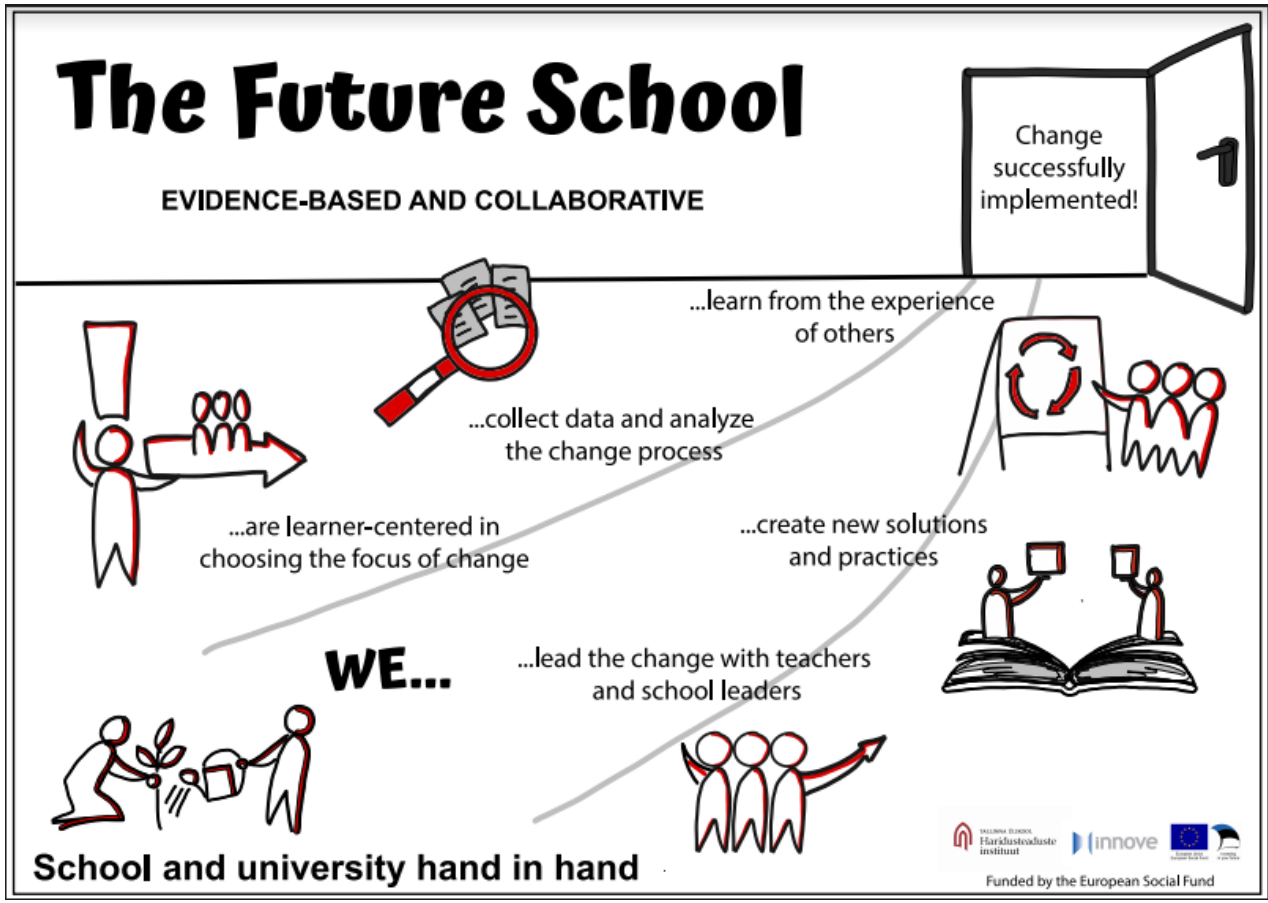
http://ceiter.tlu.ee

Future School Program
Tulevikukool

Whole School Approach to School Development



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Work with Eve Eisenschmidt, Kairit Tammets

Tobias Ley

Professor for Learning Analytics and Educational Innovation

CEITER Project

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