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Methods of formative assessment for inquiry learning

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Introduction

Formative assessment has the purpose of assisting learning and
for that reason is also called 'assessment for learning'.

It involves processes of seeking and interpreting evidence
for use by learners and their teachers
to decide where the learners are in their learning and
where they need to go and how best to get there.

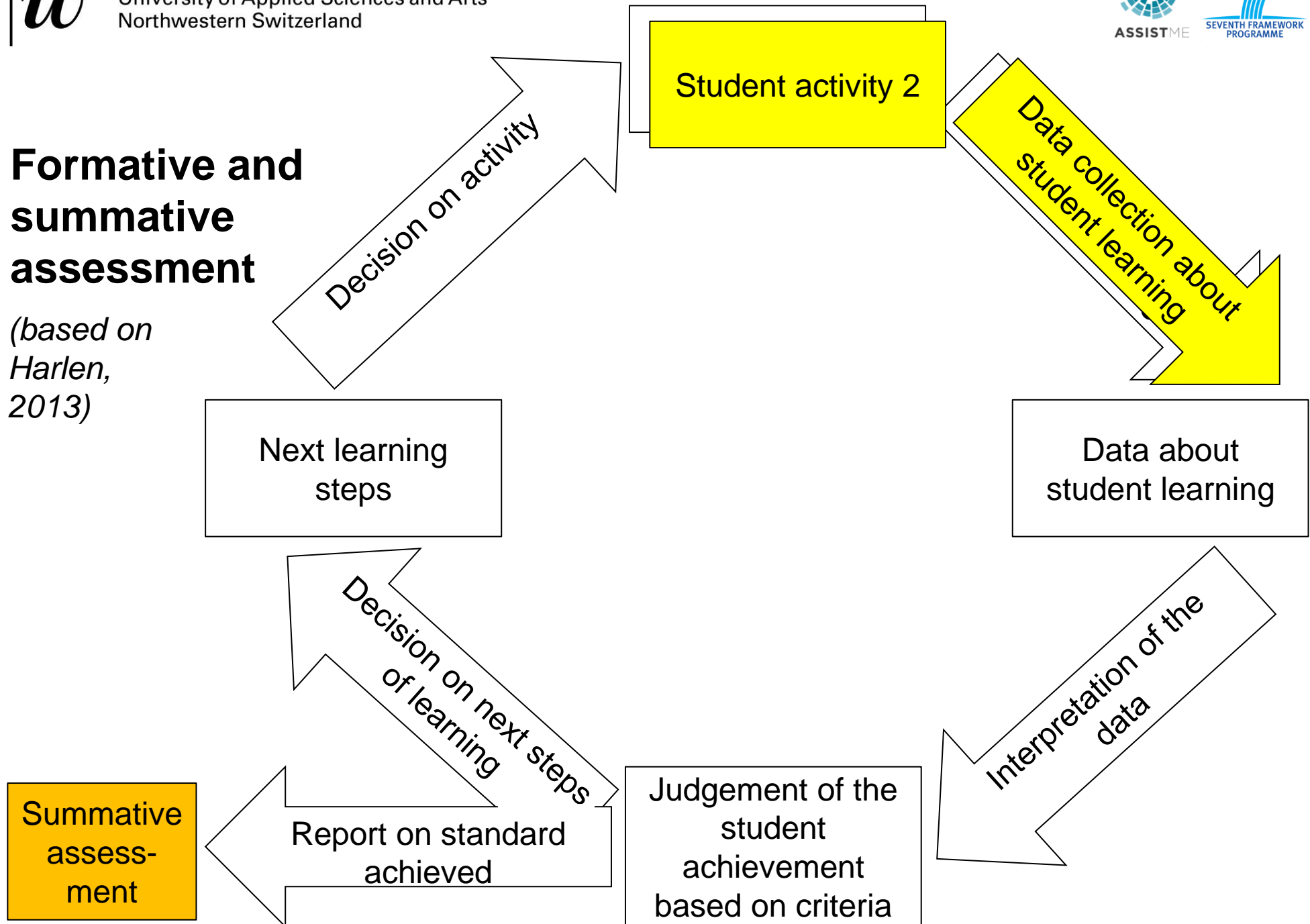*Assessment Reform Group 2002*

Aims of this paper

- Link concept of formative assessment with concrete methods

- Select formative assessment methods and competences for trial in inquiry-based education in different European cultures

- Inspire teachers with examples of formative assessment in inquiry-based education for different subjects, school levels, and European countries
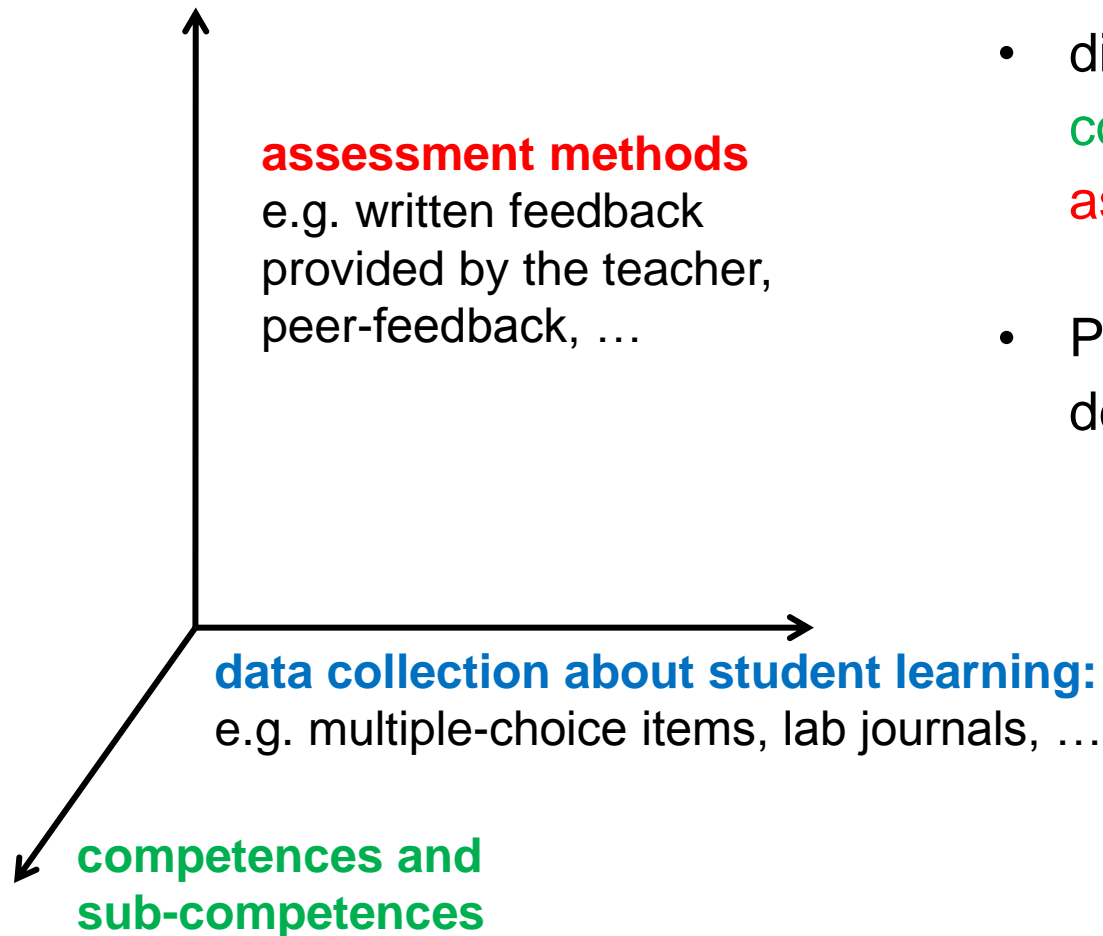
Content

- Introduction

- Connecting the concept of formative assessment with concrete methods

- Illustrating the methods with paradigmatic examples

- Interactive part

- Conclusion and prospects

Formative and summative assessment

(based on Harlen, 2013)

Student activity 2

Data collection about student learning

Decision on activity

Data about student learning

Next learning steps

Interpretation of the data

Decision on next steps of learning

Judgement of the student achievement based on criteria

Report on standard achieved

Summative assess-ment

Organisation of the materials developed

assessment methods
e.g. written feedback
provided by the teacher,
peer-feedback, …

data collection about student learning:
e.g. multiple-choice items, lab journals, …

**competences and
sub-competences**

- different combinations of data, competences / sub-competences, and assessment method are possible

- Paradigmatic examples were developed for illustration
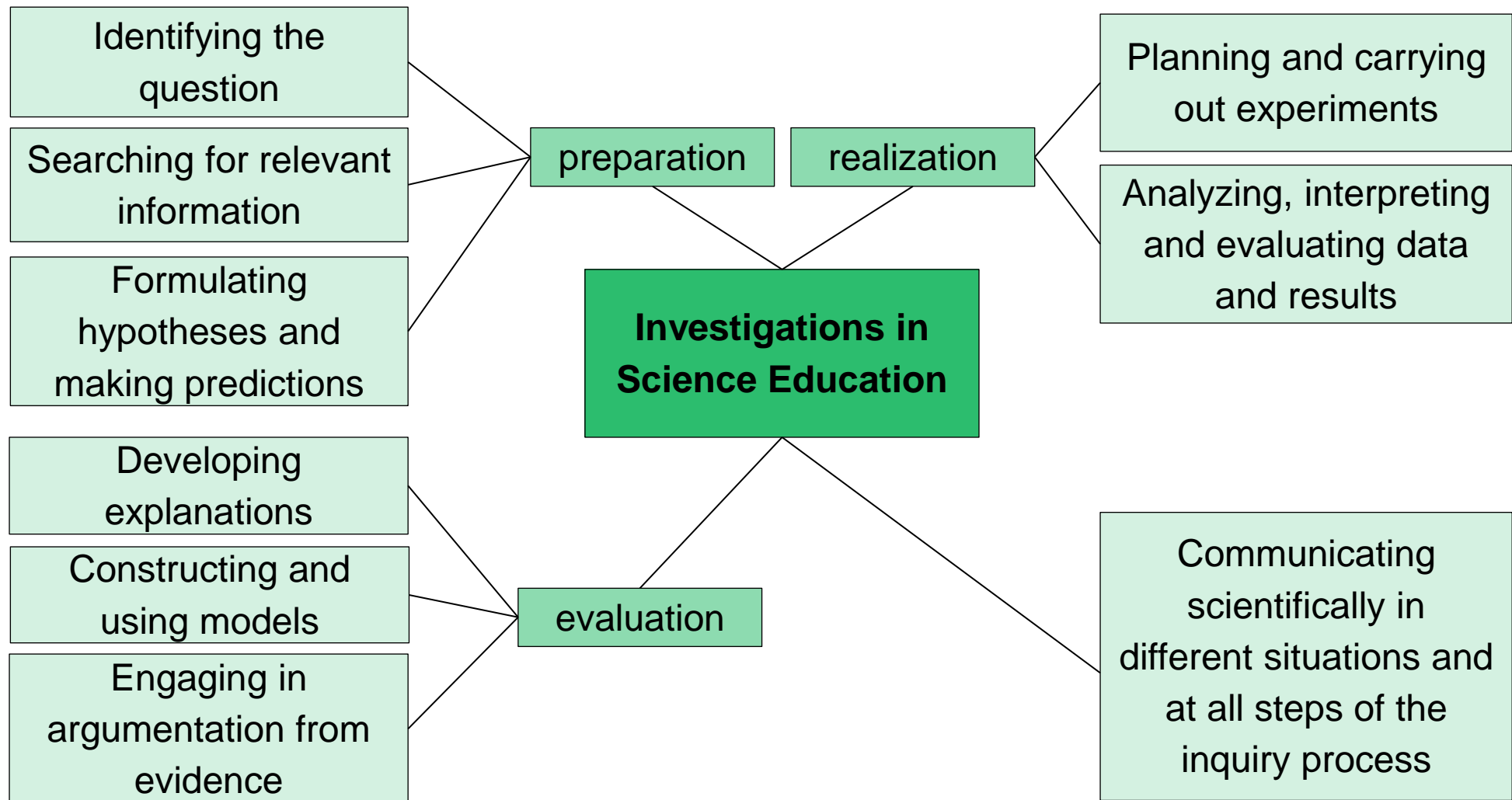
Four assessment methods

- On the fly *(e.g. Ruiz-Primo & Furtak, 2006)*

- Written feedback provided by the teacher *(e.g. Smit & Birri, 2014; Black & Harrison, 2004)*

- Peer-assessment *(e.g. Black & Harrison, 2004)*

- Structured classroom dialogues *(Christensen, 2004)*

Six competences

1) **Investigations** in Science education

2) **Problem solving** in Mathematics education

3) **Design** in Technology education

4) **Argumentation** (in all subject areas)

5) **Modeling** (in all subject areas)

6) **Innovation** (in all subject areas)

→ **Sub-competences for each of the competences**

Investigations in Science Education

Identifying the question		Planning and carrying out experiments
Searching for relevant information	preparation — realization	Analyzing, interpreting and evaluating data and results
Formulating hypotheses and making predictions	**Investigations in Science Education**	
Developing explanations		
Constructing and using models	evaluation	Communicating scientifically in different situations and at all steps of the inquiry process
Engaging in argumentation from evidence		

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Paradigmatic example in Physics

- Students try to verify an already known law; e.g. R=U/I

- Measurement results are documented in lab journals

- Work is interrupted; students exchange lab journals with peers

- Peers provide feedback structured by guidelines: on experimental design (usability of data to verify the law, …) as well as on documentation (labelling and organization of measurement data)

- Students consider feedback and continue data collection

Paradigmatic example in Physics (II)

- **Data about student learning:**
  lab journal

- **Competence and sub – competences:**
  Investigations in Science education / Planning and carrying out experiments

- **Assessment method:**
  Peer - feedback

assessment methods
e.g. written feedback
provided by the teacher,
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data collection about student lear
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**competences and
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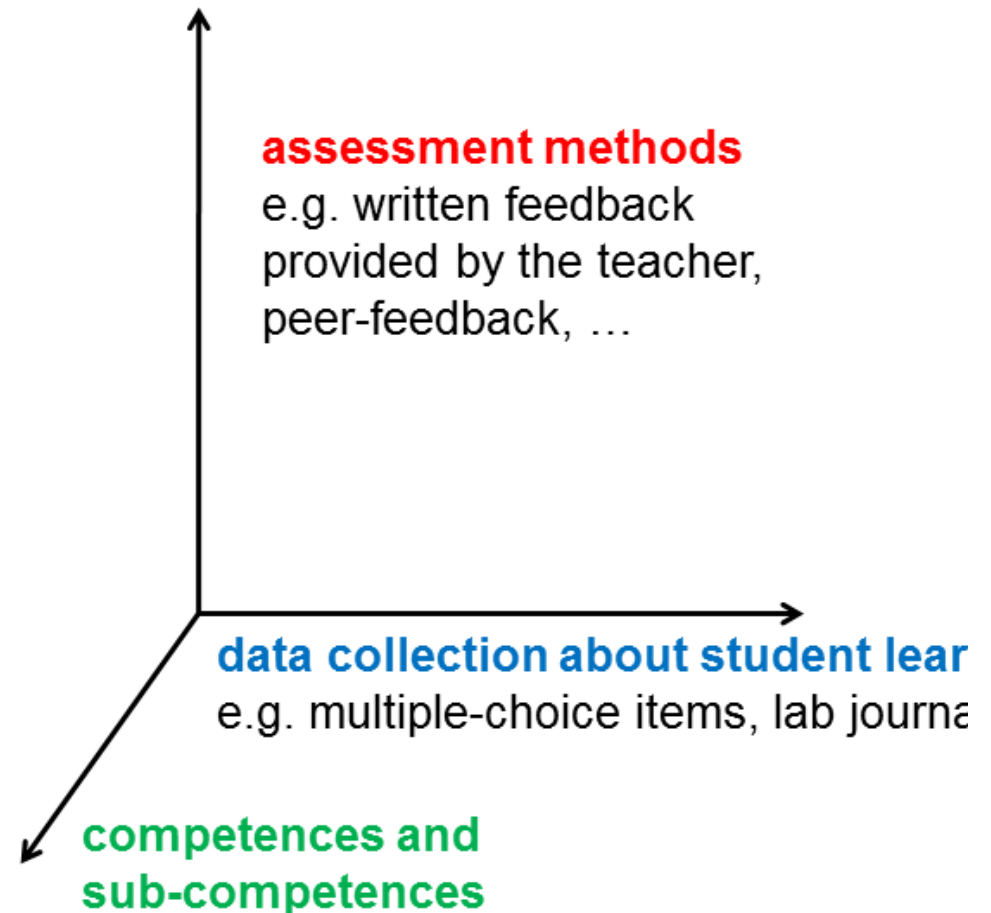
Interactive part

How would teachers in your country react, if you showed them the example of formative assessment in inquiry-based education that was just introduced?

- What advantages and problems would they foresee?

- How would they adapt or change the example before using it
  in the classrooom?

Please discuss with the person sitting next to you (2').

Conclusion and prospects

- Connection between concept of formative assessment with concrete methods

- Selection of formative assessment methods and competences

- Examples that provide inspiration for teachers on how to do formative assessment in inquiry-based education in different subjects, school levels, and European countries

- Trial of the assessment methods in inquiry-based education in different eduational cultures → following papers

Thank you!

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