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)

Next learning steps

Decision on activity

Decision on next steps of learning

Interpretation of the data

Judgement of the student achievement based on criteria

Report on standard achieved

Data about student learning

Data collection about student learning

Student activity 2

Next learning steps

Decision on activity

Summative assessment
Organisation of the materials developed

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

- Paradigmatic examples were developed for illustration

**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**
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
- Searching for relevant information
- Formulating hypotheses and making predictions
- Developing explanations
- Constructing and using models
- Engaging in argumentation from evidence

Preparation:
- Planning and carrying out experiments
- Analyzing, interpreting and evaluating data and results

Realization:
- Investigations in Science Education

Evaluation:
- Communicating scientifically in different situations and at all steps of the inquiry process
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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

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**assessments 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**
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 classroom?

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 educational cultures → following papers
Thank you!

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