Formative Assessment Methods 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)
Organisation of the materials developed

- Teachers chose – depending on their unit – a suitable combination of competences / sub-competences, data and assessment method

- Paradigmatic examples were developed for illustration

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

**competences and sub-competences**

**assessment methods**
e.g. comment-only marking, peer-feedback, …
Four assessment methods

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

- Marking provided by the teacher:
  - formative use of assessment rubric (e.g. Smit & Birri, 2014) and
  - written comments (e.g. Black & Harrison, 2004)

- Self- and 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  realization  evaluation

Planning and carrying out experiments
Analyzing, interpreting and evaluating data and results
Communicating scientifically in different situations and at all steps of the inquiry process

Centre for Science and Technology Education ZNTD
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Paradigmatic example in Physics

- Students try to prove an already known law
- Measurement results are documented in lab journals
- Work is interrupted; students exchange lab journals with peers
- Peers provide feedback structured by guidelines: on documentation (labelling and organization of measurement data) as well as on experimental design (usability of data to prove the law, …)
- Students consider feedback and continue data collection
Paradigmatic example in Physics (II)

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

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

- **Assessment method:**
  Peer - feedback
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 would 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 (4’).
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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