

Report from the FP7 project:

Assess Inquiry in Science, Technology and Mathematics Education



ASSISTME

Recommendations for Policy Makers and Other Stakeholders

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1. Introduction

Workpackage (WP) 7 involves a synthesis of the recommendations for policy makers and other key stakeholders on how formative assessment of inquiry-based teaching and learning might be done more effectively across a range of countries. It builds on the trial implementation of the four ASSIST-ME assessment methods (i.e., Marking (Grading and Written comments), Self and Peer feedback, On the fly interaction and Structured assessment dialogue) and recommends how these approaches can be strengthened and how existing assessment systems might be modified to enable formative assessment to function effectively in STM classrooms.

2. Recommendations

A competence-oriented, inquiry-based pedagogy is important

An inquiry-based teaching and learning approach helps young people develop critical thinking and scientific reasoning that are important in creating citizens that can make sense of the world they live in and take informed decisions. Inquiry-based teaching and learning has proved its efficacy at both primary and secondary levels in increasing interest and attainments levels in STEM subjects, while at the same time stimulating teacher motivation. The ASSIST-ME project confirms this understanding and goes further, in defining and operationalising key competencies within STM subjects in order that students can more readily utilise and develop scientific knowledge and processes.

The project points at ways to implement such a competence approach in different educational cultures and recommends adjusting educational policies to make this possible.

Focus on formative assessment to support competence-based inquiry learning

Formative assessment provides both the time frames and opportunities to look at how learning of competencies is developing. ASSIST-ME has collected solid evidence of the huge learning potential of formative assessment methods via their goal orientation, making the learning journey visible and explicit and via supporting teachers in identifying optimum next steps in learning. But the project has also revealed that formative assessment is not an integrated part of current STM teaching and that, for many teachers and students, it is difficult to implement in a structured form.

It is therefore necessary to promote a teaching approach integrating formative assessment into the classroom culture and to frame the educational condition, resources and the curriculum to make it happen.

Reduce the emphasis on summative assessment to give room to formative assessment

ASSIST-ME found that the summative assessment load needs to be reduced to allow teachers time to focus more on formative aspects and to highlight and emphasise those aspects of learning that we value within the STM community. Curricular material, textbooks and resources need to include specific and detailed reference to the formative potential and use in the classroom so that both teachers and students are focused on how assessment can support learning.

It is recommended to develop national assessment policies that recognise the different roles and potential involved in the interactions between formative and summative assessment and that makes it possible to realise the full potential of formative assessment processes.

Develop new examination forms able to capture STM competencies

The ASSIST-ME implementations have made it clear that there is a big gap, in many countries, between the examinations at the end of a course and the learning processes in the course. While the teaching-learning processes are aiming at developing the learners' STM competences, the examinations often fail to assess these properly. To bridge this gap, the summative assessments should be more in alignment with the formative processes in everyday teaching and they should be designed to assess the STM competences in a valid and reliable way. We know from the project that classroom practice is heavily influenced by a backwash from summative examinations and so the development of examination forms that assess a broader range of STM competences would also have a positive impact on the teaching of these competencies.

It is necessary to develop new examination forms able to capture the central STM competencies and being aligned with the formative approaches in the classroom.

Teachers need support in implementing and enacting classroom assessment of STM competencies

ASSIST-ME has developed formative assessment tools able to support teachers in defining and articulating appropriate feedback comments for students, thereby strengthening the assessment literacy of both parties. However, assessment tools alone are insufficient as teachers need to adapt such tools to their educational contexts and this requires support from peers and educators in translating tools for specific use. The ASSIST-ME model may provide an effective format for these programs: three meetings per year, involving a team of teachers and researchers or teacher educators, in designing and testing new teaching units in an iterative process dedicated to the on-going improvement of the inquiry activities and their assessment tools.

ASSIST-ME has identified a strong need for professional development programs (pre-service, induction and in-service) that support teacher understanding of formative assessment and inquiry-based teaching and learning and facilitate the implementation and enactment of formative assessment processes in STM classrooms at both primary and secondary level.