

Deliverable D8.4: Final Meeting

Introduction

This deliverable sits within Work Package 8 – Scientific Co-ordination, which runs throughout the whole life of the FaSMEd project, but culminates in the Final Meeting, due in month 36 (December 2016 in our Description of Work). Our Mid-Term Reviewers in month 20 suggested we economised for the remainder of the project and that we should consider limiting or combining the numbers of meetings we held. We therefore proposed at our Phase 3 launch meeting (Deliverable 8.3) that we should merge our two forthcoming events as suggested: our International Conference (Deliverable D7.6) and our Final Meeting (Deliverable D8.4).

We agreed to merge these two events into a single two-day event (the joint International Conference and Final Meeting) which took place in November 2016 (month 35) at the University of Maynooth, Ireland. The event drew together the consortium partners, members of the Strategic Advisory Committee, Evaluation team and key invited participants. This represented a significant international academic community of experience, expertise and practice in science and mathematics education with specific knowledge of digital technologies and Formative Assessment. The conference focused on disseminating the outcomes of the project and was more ‘outward’ facing. The Final Meeting facilitated discussions around raising achievement in mathematics and science education with a focus on implications for future research and policies and our final deliverables due at the end of the project:

D3.3 Final Toolkit

D3.6 Final Professional Development Package;

D6.1 Approaches to raising attainment: Socio-technical approaches to the raising of achievement in Mathematics and Science Education;

D6.2 Policy Guidelines: National, regional and EU policy guidelines for the provision of approaches to the raising of achievement in mathematics and science education;

D6.3 Future research: Recommendations for future research.

This document reports on the second Deliverable (D8.4): the Final Meeting.

The programme

Details of the programme for our Final Meeting can be seen in Annex 1. The event was publicised through a variety of ways to encourage attendance and participants could register for single days or both. We included it in our FaSMEd Newsletter (Issue 11, Deliverable D7.2¹), it was submitted to the Scientix website (with subsequent social media publicity), it was advertised on our Facebook and Twitter feeds, we invited specific individuals, and each partner circulated invitations through their own networks.

The FaSMEd Toolkit: Reflections and next steps

Our Final Meeting began with a session led by our partners from Germany and South Africa which reflected on the final draft version of the Toolkit website and facilitated discussion

¹ <https://research.ncl.ac.uk/fasmed/newsletters/>

around issues such as raising awareness of the Toolkit, teacher engagement with the Toolkit and sustainability.

Case study posters

In addition to our individual case study presentations, each partner prepared a poster displaying key information on the case study. Our Irish partners prepared a template for the poster but the content was decided by each partner. The posters (A1 size) were professionally printed and laminated and then were displayed at the venue on both days. These posters can also be downloaded from our website². The posters were not only to display information, but they served as a stimulus for discussion throughout the final meeting.

Parallel symposia sessions

A key purpose of the final meeting was to facilitate discussion amongst participants, who represented a significant international academic community of experience, expertise and practice in science and mathematics education with specific knowledge of digital technologies and Formative Assessment.

For this session, participants were invited to join the particular symposia meeting that they felt was most relevant or where they could contribute more to: mathematics or science. Partner teams mostly split evenly into the different areas, especially for those teams where they had worked with both mathematics and science teachers during the interventions and case studies. In preparation for these sessions, we requested that facilitators familiarised themselves with two of our key deliverables: the case study cross comparison report (Deliverable D5.2) and the cross comparison of country studies (Deliverable D5.3).

Parallel symposia on FaSMEd and Policy: Formative Assessment in Mathematics

The mathematics symposia was chaired and facilitated by Dr Alf Coles (Bristol University, UK). His research interests are listening and hearing in the mathematics classroom; the development of classroom cultures; teacher development; ways of working with video; metacognition. In addition, Alf is a member of the Outer Circle of the Advisory Committee on Mathematics Education (ACME) and takes an active role as one of the members of the FaSMEd Evaluation team.

The symposia group had slides to stimulate discussion and relate this discussion to the FaSMEd research questions:

1. How can research-informed approaches help to understand and address key challenges in enhancing participation, engagement and achievement in mathematics [in particular to address differences linked to socio-economic status, gender, and ethnicity which appear to be linked to low achievement]?

² <https://research.ncl.ac.uk/fasmed/disseminationactivity/>

2. What specific new interventions, or changes in policy or practice, offer the greatest potential to improve engagement and learning in mathematics and how could their potential effectiveness and feasibility be assessed more fully?

The presentation can be found in Annex 2.

This served to facilitate a discussion amongst participants about the reality of FaSMEd activities and tools enacted in mathematics classrooms across the partner countries. The interaction between Formative Assessment, technology and engaging tasks was discussed with a particular focus on accessibility for lower attaining students.

Parallel symposia on FaSMEd and Policy: Formative Assessment in Science

The science symposia was chaired by Dr Eilish McLoughlin from Dublin City University, Ireland. We chose Eilish to facilitate our science symposia as she plays a leading role in two major pan-European projects focussed on teacher education in Inquiry Based Science Education (IBSE). These include coordinator of the FP7 ESTABLISH project³ (2010-2014) and a member of the coordinating team on the FP7 SAILS project⁴ (2012-2015).

Each symposia group had slides to stimulate discussion and relate this discussion to the FaSMEd research questions:

1. How can research-informed approaches help to understand and address key challenges in enhancing participation, engagement and achievement in science [in particular to address differences linked to socio-economic status, gender, and ethnicity which appear to be linked to low achievement]?
2. What specific new interventions, or changes in policy or practice, offer the greatest potential to improve engagement and learning in science and how could their potential effectiveness and feasibility be assessed more fully?

This session facilitated discussion around the areas of how can we support science teachers in changing their assessment practices and recognising and valuing scientific skills and competences that can be developed in science at secondary level. Further, participants discussed how teachers use and view formative assessment and feedback in science classrooms.

³ <http://www.establish-fp7.eu/>

⁴ <http://www.sails-project.eu/>

Symposium on FaSMEd and Policy: Technology

The second symposium brought all participants together again and focused on the role of technology and Formative Assessment in the mathematics and science classrooms. This session was chaired and facilitated by Professor Kenneth Ruthven of the University of Cambridge, UK. His teaching and research focus on curriculum, pedagogy and assessment, especially in mathematics, and particularly in the light of technological change and he takes an active role as one of the members of the FaSMEd Evaluation team.

The following research questions were used as a starting point:

1. How do teachers process formative assessment data from students using a range of technologies?
2. How do teachers inform their future teaching using such data?
3. How is Formative Assessment data used by students to inform their learning trajectories?
4. When technology is positioned as a learning tool rather than a data logger for the teacher, what issues does this pose for the teacher in terms of their being able become more informed about student understanding?

The presentation from Ken Ruthven can be found in Annex 3.

Discussions focused upon FaSMEd recommendations for raising achievement of lower attainers in science and mathematics and the role of technology. Within this there was an emphasis upon recommendations for policy guidelines and recommendations for further research. These discussions have fed directly into deliverables D6.1, D6.2 and D6.3.



FaSMEd Final Meeting



**FaSMEd Improving Progress through
Formative Assessment in
Science and Mathematics Education**
A Science in Society Collaborative Project of the European Community

2nd November 2016

Education Building, Maynooth University, Ireland.

9.00	Coffee and Welcome
9.30	The FaSMEd toolkit: reflections and next steps
10.30	Refreshments
11.00	Parallel symposia on FaSMEd and Policy: Formative Assessment in Mathematics/Science
12.30	Lunch
1.30	Symposium on FaSMEd and Policy: Formative Assessment using Technology
15:00	Refreshments
15.30	FaSMEd Panel Q & A: Next steps
17.00	Finish

To attend, please register at: <http://bit.ly/2cQdBnV>

Registration will remain open until all places are allocated.

For further information about the event please email: majella.dempsey@nuim.ie

For further information about the project please see <https://research.ncl.ac.uk/fasmed/> or email fasmed@ncl.ac.uk

Working with:



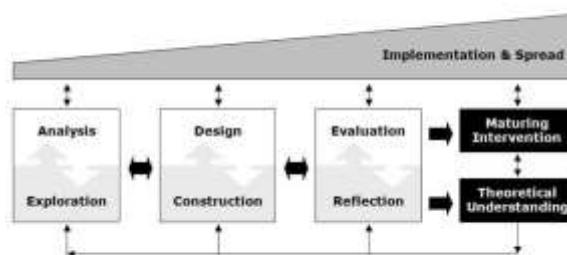


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Mathematics and formative assessment

Alf Coles
University of Bristol

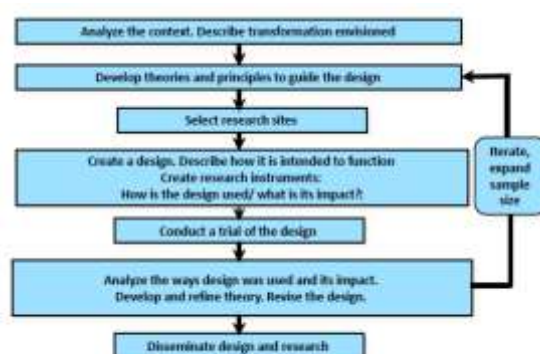
The design research process



McKenney and Reeves (2012)

SUCCESSIVE TRIALS

Level	Variables	TYPICAL RESEARCH AND DEVELOPMENT FOC
LEARNING STUDIES	STUDENT TASK	R: CONCEPTUAL DIFFICULTIES, PRACTICAL IT ISSUES D: CLASSROOM ACTIVITIES, DATA CAPTURE
ENTHUSIASTIC TEACHERS	INSTRUCTION STUDENT TASK	R: TEACHING TACTICS AND STRATEGIES, STUDENT LEARNING D: CLASSROOM MATERIALS OR PER SOME
REPRESENTATIVE TEACHERS	TEACHER INSTRUCTION STUDENT TASK	R: PERFORMANCE OF TYPICAL TEACHERS WITH REALISTIC SUPPORT, BASIC STUDIES OF TEACHER KNOWLEDGE AND COMPETENCY D: CLASSROOM MATERIALS THAT WORK FOR MOST TEACHERS
SYSTEM CHANGE	SYSTEM SCHOOLS TEACHERS INSTRUCTION STUDENT TASK	R: SYSTEM AND CULTURAL VARIABLES D: TOOLS FOR CHANGE - MATERIALS FOR ASSESSMENT, PROFESSIONAL DEVELOPMENT, COMMUNITY RELATIONS



Some prompts for discussion_1

- To what extent are research questions or methods of analysis subject-specific or speaking to more general issues?
- What is subject-specific and what is generic in the answers to the research questions?

Some prompts for reflection_2

- What can the project say to help {teachers, teacher-leaders, policy makers} make sensible decisions with regard to improving attainment via a focus on:
 - technology for learning
 - engaging tasks
 - formative assessment
 - formative assessment with technology
 - professional development.
- Is there any evidence that the synergy between project areas of focus provoked added progress?

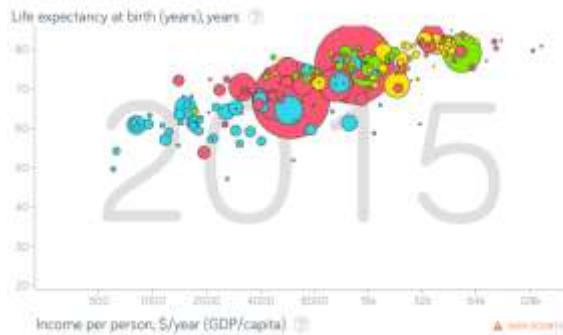
Some prompts for reflection_3

- '... the use of the tool in a *meaningful* way ... seemed to determine the "success"' (D5.2: 8)
- 'Representing their knowledge in a *meaningful* way was perceived to be especially beneficial to low-achieving students ...' (D5.2: 10)
- 'Appropriate software for *meaningful* use in the learning of mathematics and science is still scarce' (D5.3: 43)
- Could the concept of 'meaningful' be pulled apart to allow more to be said about effective tool use, representations and software?

Some prompts for reflection_4

- The explicit focus on low attaining students was, I think, seen as too problematic and so put to one side in the outward framing of the project.
- There is some evidence of this strand e.g., in Norway the teachers working on Distance-Time graphs with groups they did not initially think would be able to handle it.
- Is there any evidence of particular benefits from the project for low-attaining students and/or a challenging of teachers' preconceptions of their students?

A final heresy



In relation to theory and design principles ...

- What is subject-specific and what is generic in the answers to the research questions?
- Is there any evidence that the synergy between project areas of focus provoked added progress?
- Could the concept of 'meaningful' be pulled apart to allow more to be said about effective tool use, representations and software?
- Is there any evidence of particular benefits from the project for low-attaining students and/or a challenging of teachers' preconceptions of their students?

Annex 3 – Presentation from Ken Ruthven

In relation to theory and design principles ...

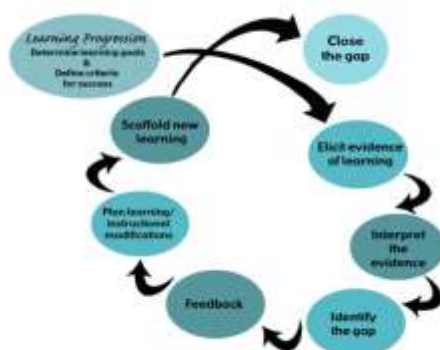
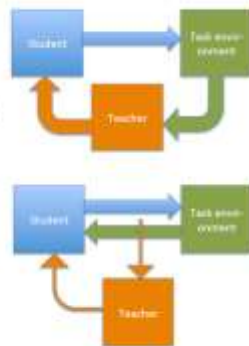
- What is subject-specific and what is generic in the answers to the research questions?
- Is there any evidence that the synergy between project areas of focus provoked added progress?
- Could the concept of 'meaningful' be pulled apart to allow more to be said about effective tool use, representations and software?
- Is there any evidence of particular benefits from the project for low-attaining students and/or a challenging of teachers' preconceptions of their students?

Synthesised research findings (1)

- Using technology to support teacher-mediated formative assessment calls for high levels of teacher expertise.
 - "[U]nless teachers were experienced and confident teachers... with high level of pedagogical content knowledge... the combination of formative assessment practices and technology for the purpose of becoming more informed about student learning and understanding was a daunting task."
- It is not clear that, in general, returns on investment in seeking such teacher development are cost-effective:
 - "With the help of the project, selected teachers managed to build the formative assessment tools into their teaching... In most cases, however, we saw attempts to use the technology, but these were not further seen through to subsequent stages of the formative assessment process"

Hypotheses to test

- Most cost-effective use of technology for formative assessment is where:
 - Task environment provides direct feedback to student.
 - Such feedback is readily interpretable by student (or involves adaptation of task environment).
 - Necessity for teacher to interpret and mediate feedback is reduced.
- i.e. closer to second diagram than to first.

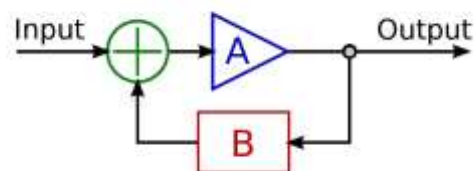


Main research questions

- How do teachers process formative assessment data from students using a range of technologies?
- How do teachers inform their future teaching using such data?
- How is formative assessment data used by students to inform their learning trajectories?
- When technology is positioned as a learning tool rather than a data logger for the teacher, what issues does this pose for the teacher in terms of their being able become more informed about student understanding?

Synthesised research findings (2)

- Students were receptive to feedback.
 - "[S]tudents seemed to welcome the formative assessment data provided by the technology (and the teacher/s) and they were ready to usefully build it into their learning strategies."
- This was particularly so where technology enabled students to make sense of feedback and gave them confidence in it.
 - "Technology appears to provide an 'objective' and meaningful way for representing problems and misunderstandings."
- However, this depended on the quality of the feedback provided by the technology (including its representation to the user and its integration into the task environment).
 - "[T]he success of the technological resources/tools for FA is to some extent influenced (limited) by suboptimal characteristics of those resources/tools."



Techniques to use **before** you provide any feedback...

- They **self** assess
- They find "faults and fix"
- They **peer** assess
- They provide **critique**
- You return sub-standard work



"Feedback should be more work for the recipient than the donor"