The digital-analog spectrum of tools for formative assessment

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Introduction

This poster shows some examples from our case studies in mathematics and science, where we have used a broad range of technologies, from analog to digital.

The two case studies were done with primary school students (11-13 years old) as part of PD using lesson studies involving 4 teachers. The poster reports from the "time-distance graphs" and "microorganisms" case studies.

One of our research questions was:
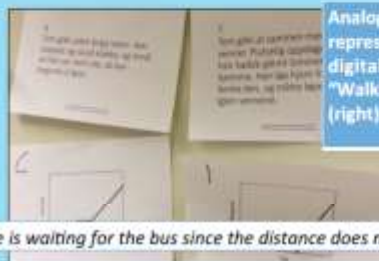"How do teachers process formative assessment data from students using a range of technologies?"

To be able to answer this question we collected a broad range of data: lesson plans, interviews, students' workbooks, notes from class observation, pictures and Q-sorting(see left bottom picture).

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Raising Achievement through Formative Assessment in Science and Mathematics Education
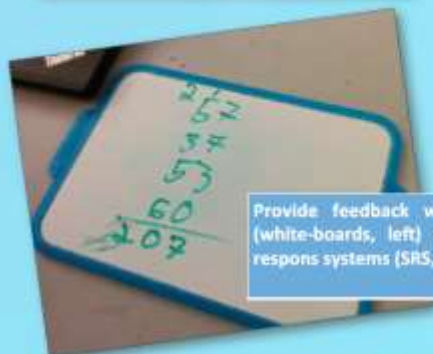

"It raises earlier because you walk faster."

Analog activities promoting understanding of representations of time-distance graphs and digital activities. The digital activity was "Walking a graph" with an echo sounder (right).

«She is waiting for the bus since the distance does not change»

Provide feedback with analog technology (white-boards, left) and via digital student respons systems (SRS, Kahoot (right))

Theoretical approach to some aspects of the differences between analog and digital technology

Motivating learning environment (cf. Pietz & Turner 1999)	Task / Operation	Analog technology	Digital technology	Development of digital competence (cf. Ferrari, 2013)
Challenging Collaboration	Initial activities (test, survey, brainstorm, develop ideas)	Blackboard, small Whiteboards, paper	Computer with projector and screen or whiteboard	Information Communication Problem-solving
Curiosity	Data collection	Paper, pen, graph stories; or sneeze bottles with coloured water and big paper sheets	Computers or data loggers with sensors	Content creation Problem solving
Choice Control	Data processing	Big paper sheets	Spreadsheets	Content creation Problem solving
Collaboration	Sharing / Response	Blackboard / Whiteboard	Computer	Communication
Collaboration	Presentations (sharing)	Blackboard, small Whiteboards, paper, posters	Computer with projector and screen or whiteboard	Communication

Q-sort showing student engagement in the use of technologies

Some important findings from the case studies:
The analog and digital technology supplemented each other, enhancing student understanding
The immediate feedback from the digital systems was appreciated by both teachers and students
The digital technology was helpful regardless of students achievement level