



FaSMEd: The Digital Assessment Environment

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- Introduction
 - What is FaSMEd?
 - What is assessment?
- Working in the DAE
 - The Digital Assessment Environment (DAE)
 - Get to work
 - Assessment in the DAE
- Outcomes of a DAE experiment
 - Methodology
 - Results
 - Concluding remarks



- *Formative **a**ssessment in **S**cience and **M**athematics **E**ducation (FaSMEd)*
- An international research project with many international partners
- We focus on **formative** assessment in mathematics education, using a for this purpose designed digital environment
- Aims to research the **use of technology** in formative assessment classroom practices in ways that allow teachers to respond to the emerging needs of low achieving learners in mathematics and science.






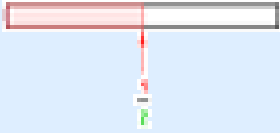

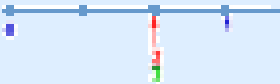

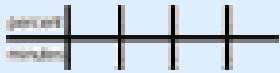


- First: why do we assess students?
.....
.....
.....
- Summative
- Formative
- An assessment practice can be defined as formative “to the extent that evidence about student achievement is elicited, interpreted, and used [...] to make decisions about the next steps in instruction” (Black & Wiliam, 2009)



- Embedded in the DME
- For formative assessment
- Students complete the assessments on computer
- Their work is saved
- Not only answers, but also use of optional auxiliary tools is visible
- Overviews of whole group
- Approach of an individual student

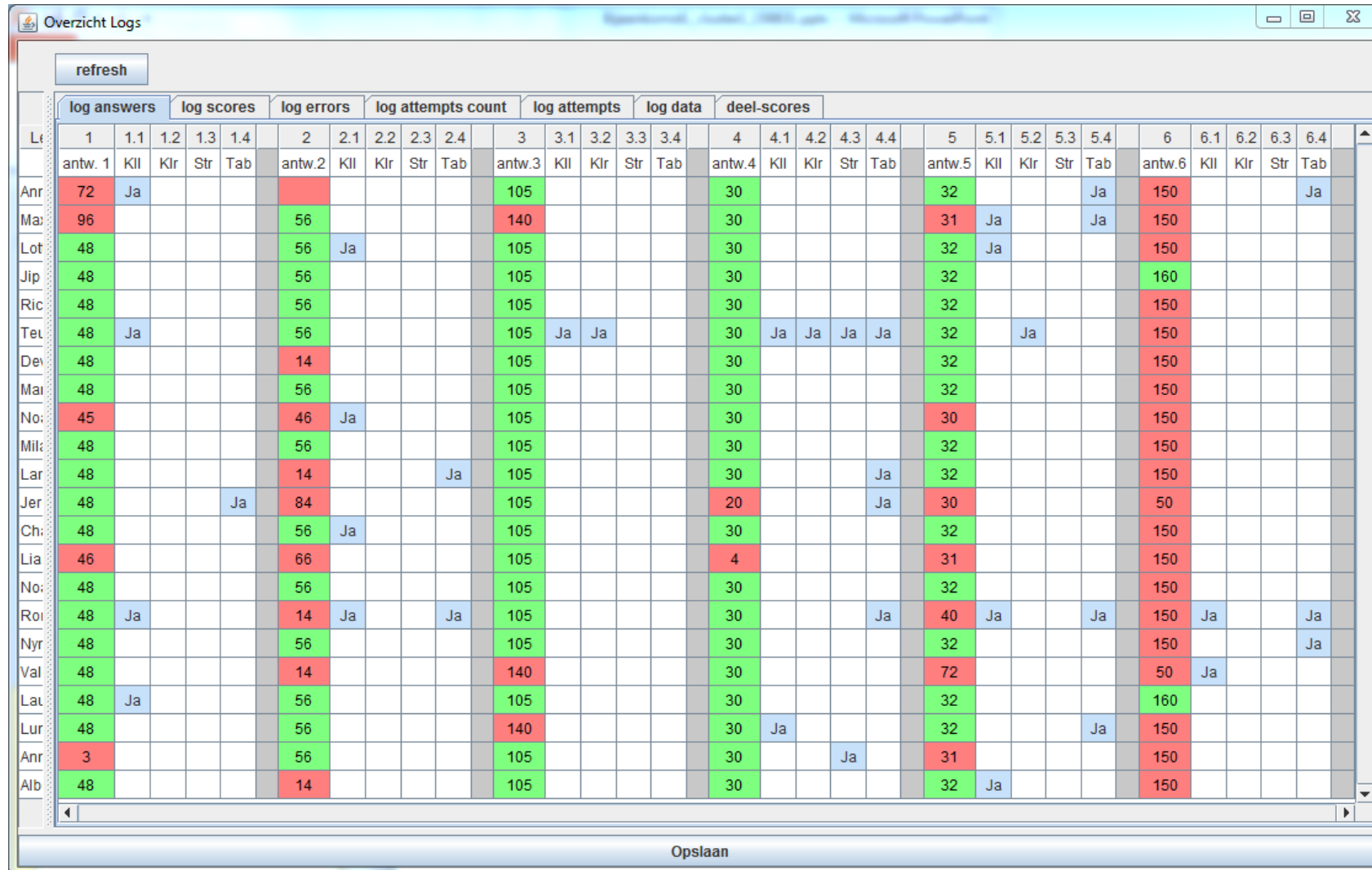


		scrap paper
		scrap paper grid
		bar
		number line
		table



<INTERLUDE IN DAE>

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How do you think the output of the auxiliary tools will help you determine the next steps in instruction?



Point of interest	Examples of questions that can be answered
Class as a whole	<ul style="list-style-type: none">• Does my class make use of the auxiliary tools, or are problems generally solved mentally?• How do my students use the auxiliary tools?• Which proportion of problems is solved correctly by my class when the calculation is done mentally, and which proportion is solved correctly when students use an auxiliary tool?
Individual students	<ul style="list-style-type: none">• Which students perform below or above average in terms of accuracy?• Which students used a certain auxiliary tool more or less often than the rest of the class in certain domains?
Mathematics textbook	<ul style="list-style-type: none">• Do the core competencies come up for discussion in my mathematics textbook?• Which auxiliary tools come up for discussion in my mathematics textbook?

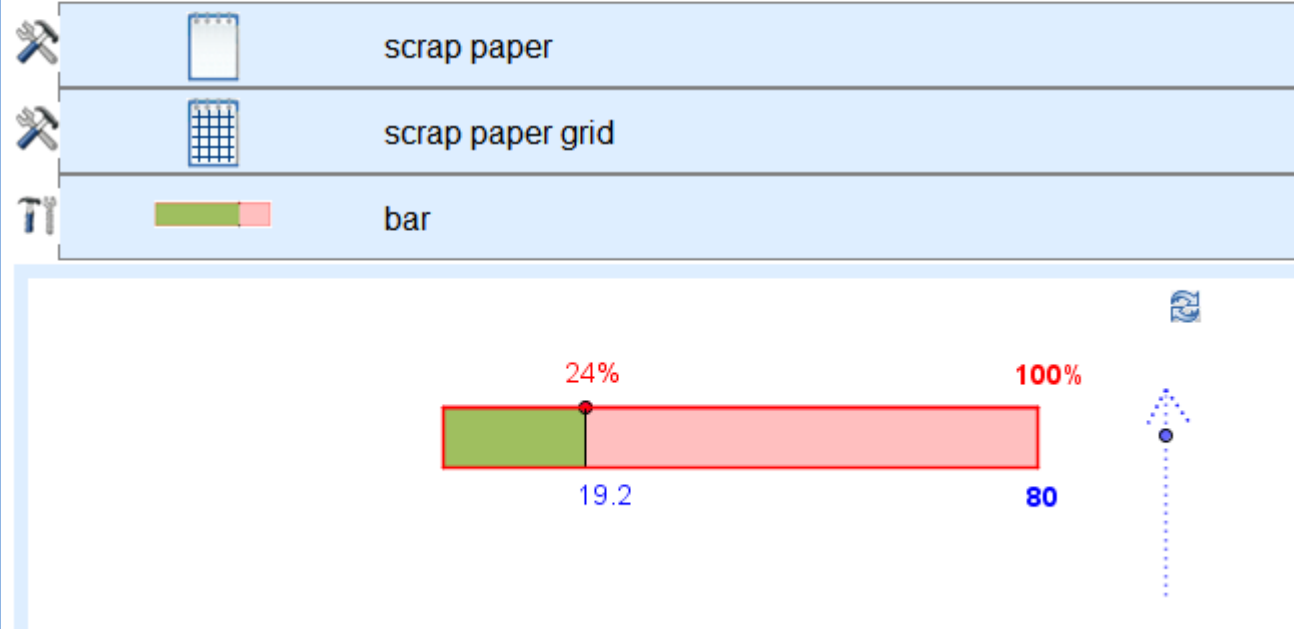


Problem 4

Caren plays a computer game. Her score is 24 out of 80 points.

What percent is her score?

Answer: 19.2 ✗ %





- Percents
- Fractions
- The metric system
- Graphs

For each domain, two tests:
Test A and Test B
Every test has 6 or 7 problems



- Related to reference levels 1 F and 1 S
- B problems slightly more difficult than A problems
- Test A for all students
- Test B to be used at own discretion
- Students can use auxiliary tools with every problem



- Overview of core competencies and core problems for percents and fractions
- Brief didactical information about percents and fractions
- Explanation how to use the DAE

Assessment in the DAE: Core competencies

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Percents

Core competency	Test A	Test B
Calculating a percent of a number	Problem 1. When the battery is fully charged, it lasts for 120 hours. Now it is just 40% full. How many hours will it last?..... hours	Problem 1. When the battery is fully charged, it lasts for 120 hours. Now it is just 75% full. How many hours will it last?..... hours
Calculating the result of a percentual decrease	Problem 2. A cell phone costs 70 dollar. You get a discount of 20%. What do you have to pay now?..... euros	Problem 2. A shirt costs 40 euros. You get a 15% discount. How much will you have to pay?..... euros
Calculating the result of a percentual increase	Problem 3. A chocolate bar weighs 70 gram. You get 50% extra. How much does the bar weigh now? grams	Problem 3. A package contains 80 biscuits. You get 30% extra. How many biscuits are in the package now? biscuits
Describing part of a whole with a percent	Problem 4. Caren plays a computer game. Her score is 24 out of 80 points. What percent is her score?..... %	Problem 4. There are 160 students in grade 5 and 6. Of these students 144 have their own computers. What percent is that? %
Calculating a number when a percent of that number is known	Problem 5. In 24 minutes, the battery is charged for 75%. What will be the total charging time?..... minutes	Problem 5. In 32 minutes, the battery is charged for 80%. What will be the total charging time?..... minutes
Calculating the original number of a collection after a known percentual increase or decrease has taken place	Problem 6. This year, a school has 200 students. That is 25% more than last year. How many students were there last year?..... students	Problem 6. This year, 220 students participated in the evening march. That is 10% more than last year. How many students participated last year? students



Performed in autumn 2015 and spring 2016

Aim:

To see whether teachers could use the DAE in a meaningful way

Research questions

- How does the DAE facilitate the formative assessment carried out by the teachers?
- Does using the DAE have an effect on the students' mathematics performance?



Participants

Teachers & students from 26 6th grade classes within 22 primary schools

Measures

Teachers

Questionnaires concerning use of the DAE

- What did the teacher learn?
- How did the teacher use the new information?

Students

Pre-test: Cito Mathematics tests End grade 5

Post-test: Cito Mathematics tests Mid Grade 6



3 meetings

- Meeting 1: Introduction to FA; modules percentages and fractions.
After Meeting 1: work with modules.
- Meeting 2: Evaluation percentages and fractions, introduction metric system and graphs.
After Meeting 2: work with modules.
- Meeting 3: Evaluation metric system and graphs, general evaluation and future use of DAE.



- Based on available data mid-February
- Questionnaires Use of the DAE: Percentages and Fractions
 - 20 teachers/classes, 18 schools
 - What did teachers learn?
 - What did teachers do with this?
- Cito data
 - 10 schools, 218 students
 - Do students progress in ability score?

Results: What did teachers learn?



What was learned from the DAE	Frequency of response	
A. Nothing was learned	0	0%
B. Only existing knowledge about student performance	4	10%
C. One of three things: what students could or could not do, how students approached something, and which problems were difficult.	10	25%
D. Two of three things: what students could or could not do, how students approached something, and which problems were difficult.	18	45%
E. All of three things: what students could or could not do, how students approached something, and which problems were difficult.	8	20%
Total	40	100%



- *“Because of this test I got a better picture of the skills of the students regarding percentages, and I was surprised about the scores of some students. I also saw that the auxiliary tools are used frequently, which puts me in a positive mood. Of the students who obtained a score of 0%, none used the auxiliary tools. This is something I can work with.”*



- Most teachers intended to use the information or had already done so:
 - 11 wanted to use information of both modules
 - 6 wanted to use the information of one module
 - 6 had already started
- Specificity and quality of reports varied considerably.



- *“As duo-colleagues we need to discuss this. As mentioned before, this is a weak group in terms of mathematics. Concentration and sloppiness play a large part in this. 1. The auxiliary tools are used too little. First, I would like to oblige a number of students to always use scrap paper, even if it is only to offload memory. I tell students this on an individual basis, but apparently this is not enough. 2. With 3 to 4 students we really need to get back to the foundations of fractions [Names]. The fourth student is very poor at mathematics in any case. With percentages, she did not give a single correct answer either [Name].”*



- Cito end grade 5 and Cito middle grade 6 mathematics
- Significant progress between pre- and posttest, $t(228) = -6.15, p < .001$.
- No significant difference with national average, $t(228) = -1.82, p = .07$.



- DAE: rich source of information about students
- Teachers made diverse plans
- No visible difference on Cito
 - No better education than without DAE?
 - More specific measures needed?



- Further data analysis
 - Missing data
 - Metric system and graphs
 - Content of DAE
- Further development of DAE
- Dissemination