

FaSMEd: The Digital Assessment Environment

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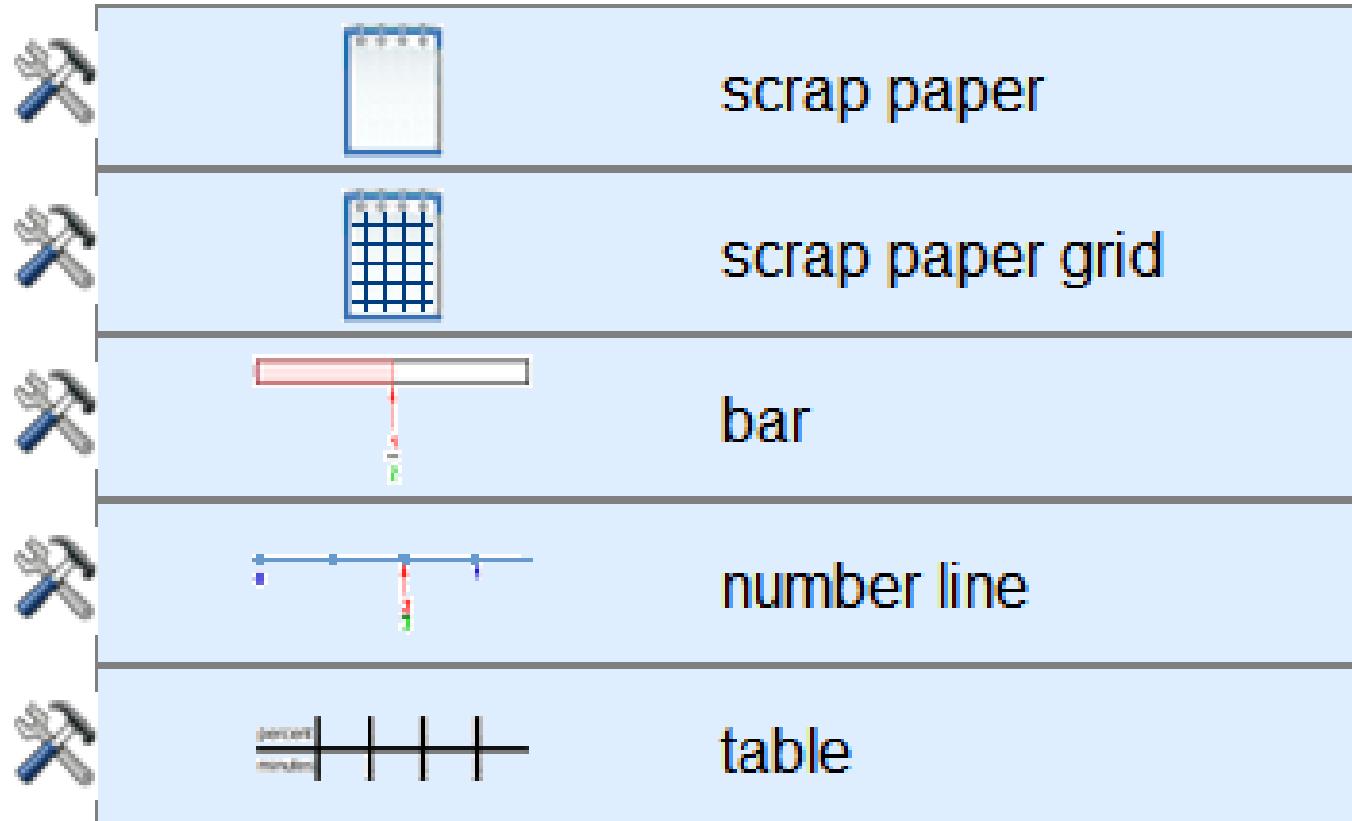


- **Introduction**
 - What is FaSMEd?
 - What is assessment?
- **Working in the DAE**
 - The Digital Assessment Environment (DAE)
 - Get to work
 - Assessment in the DAE
- **Outcomes of a DAE experiment**
 - Methodology
 - Results
 - Concluding remarks

- *Formative assessment in Science and Mathematics Education (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?
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- 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



Get to work!



<INTERLUDE IN DAE>

Assessment in the DAE: Overview of the whole group

Overzicht Logs

refresh

	log answers				log scores				log errors				log attempts count				log attempts				log data				deel-scores					
Le	1	1.1	1.2	1.3	1.4	2	2.1	2.2	2.3	2.4	3	3.1	3.2	3.3	3.4	4	4.1	4.2	4.3	4.4	5	5.1	5.2	5.3	5.4	6	6.1	6.2	6.3	6.4
antw. 1	KII	Klr	Str	Tab	antw.2	KII	Klr	Str	Tab	antw.3	KII	Klr	Str	Tab	antw.4	KII	Klr	Str	Tab	antw.5	KII	Klr	Str	Tab	antw.6	KII	Klr	Str	Tab	
Anr	72	Ja									105					30					32					Ja	150			Ja
Ma	96				56						140					30					31	Ja				Ja	150			
Lot	48				56	Ja					105					30					32	Ja					150			
Jip	48				56						105					30					32						160			
Ric	48				56						105					30					32						150			
Tel	48	Ja			56						105	Ja	Ja			30	Ja	Ja	Ja	Ja	32		Ja				150			
De	48				14						105					30					32						150			
Ma	48				56						105					30					32						150			
No	45				46	Ja					105					30					30						150			
Mil	48				56						105					30					32						150			
Lar	48				14						Ja	105				30					Ja	32					150			
Jer	48				Ja	84					105					20					Ja	30					50			
Ch	48				56	Ja					105					30					32						150			
Lia	46				66						105					4					31						150			
No	48				56						105					30					32						150			
Roi	48	Ja			14	Ja		Ja			105					30					Ja	40	Ja	Ja	Ja	150	Ja		Ja	
Nyr	48				56						105					30					32						150			Ja
Val	48				14						140					30					72						50	Ja		
Lau	48	Ja			56						105					30	Ja				32						160			
Lur	48				56						140					30	Ja				32						150			
Anr	3				56						105					30		Ja			31						150			
Alb	48				14						105					30					32	Ja					150			

Opslaan

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

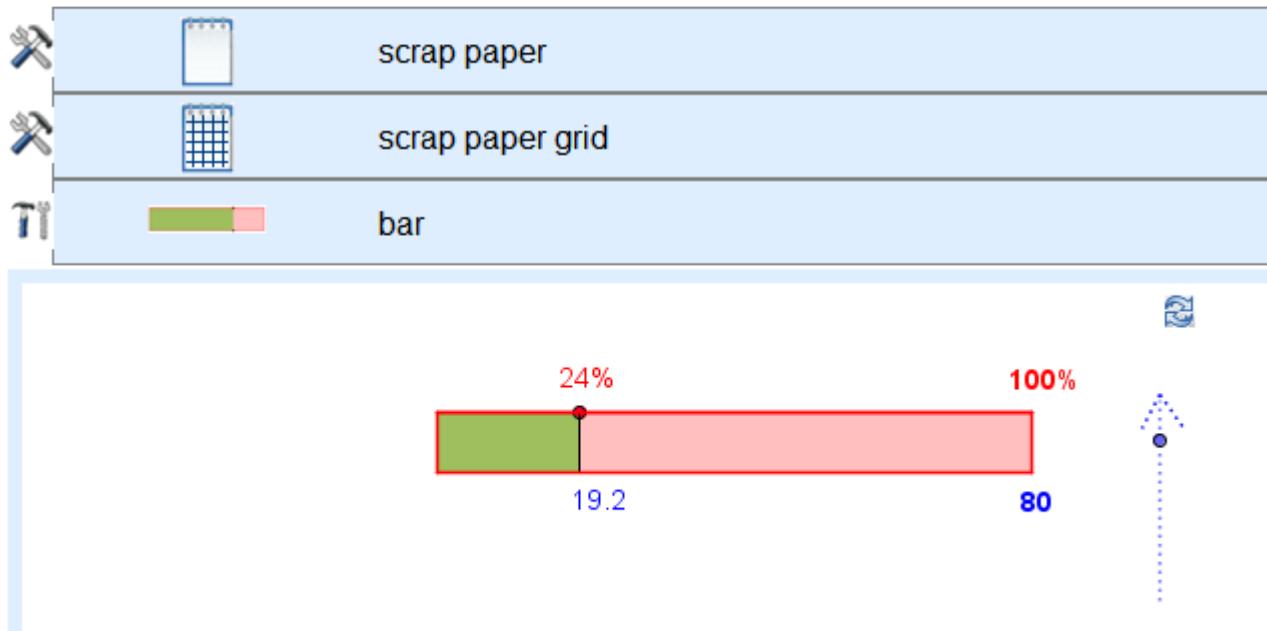
Point of interest	Examples of questions that can be answered
Class as a whole	<ul style="list-style-type: none">• Does my class make use of the auxiliary tools, or are problems generally solved mentally?• How do my students use the auxiliary tools?• Which proportion of problems is solved correctly by 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

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