FI US
University of Colorado Boulder

Realistic Mathematics Education Conference: Sept 18 - 20, 2015

The FaSMEd Digital Assessment Environment (DAE): an approach to assessment that helps teachers

Marja van den Heuvel-Panhuizen & Mieke Abels

Freudenthal Faculty of Social and Behavioural Sciences
Universiteit Utrecht
Freudenthal Faculty of Science

Overview

- What is the Digital Assessment Environment?
- How did we come to the DAE?
- Making acquaintance with the DAE
- Working yourself in the DAE as a student
- The teacher’s view in the DAE
- Discussion & questions

What is the **D**igital **A**ssessment **E**nvironment?

- A digital environment for **formative assessment** in primary mathematics education
- Aimed at giving teachers indications for further instruction
- Informs teachers about
  - correctness of answers
  - strategies and tool use
- Developed in the FaSMEd project

  by Marja van den Heuvel-Panhuizen
  Mieke Abels
  Ilona Friso-van den Bos

  based on Peter Boon's **DME**

FaSMEd

Formative assessment in Science and Mathematics Education

SEVENTH FRAMEWORK PROGRAMME

- 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

- FaSMEd partners
  - University of Newcastle Upon Tyne, UK - Coordinator
  - The University of Nottingham, UK
  - Ecole Normale Superieure De Lyon, France
  - Maynooth University, Ireland
  - University of Duisburg-Essen, Germany
  - University of Turin, Italy
  - Utrecht University, The Netherlands
  - African Institute for Mathematical Sciences, South Africa
  - University College Of Trondheim, Norway

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IMPULSE

Previous project on making assessment informative

IMPULSE project

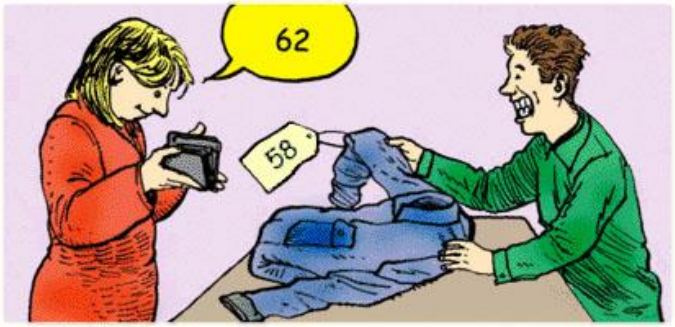
Marja van den Heuvel-Panhuizen
Marjolijn Peltenburg
Alexander Robitzsch

- Aimed at revealing the mathematics potential of special education students by using ICT-based dynamic assessment

- Students were offered test items with **optional auxiliary tools**, including
  - digital manipulatives
  - number line

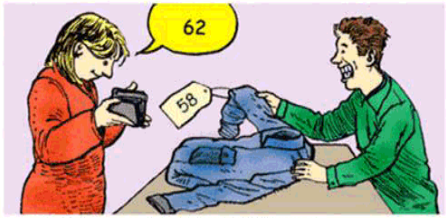
IMPULSE

Cito test



Michel's mother has 62 euro.
She buys a jacket of 58 euro.
How many euro is left?

Impulse test



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1 2 3 4 5 6 7 8 9 0

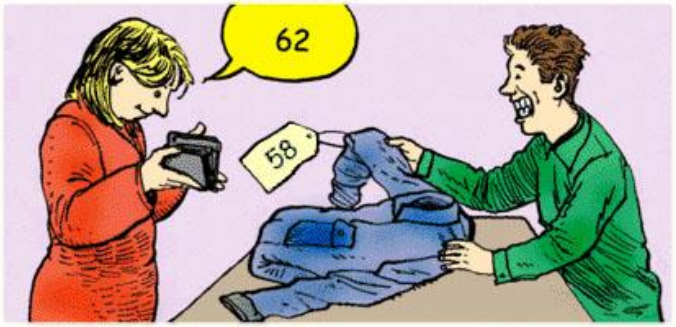
Answer:

100-board

next

IMPULSE

Cito test



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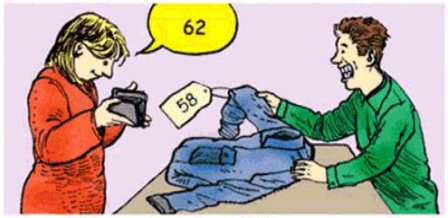

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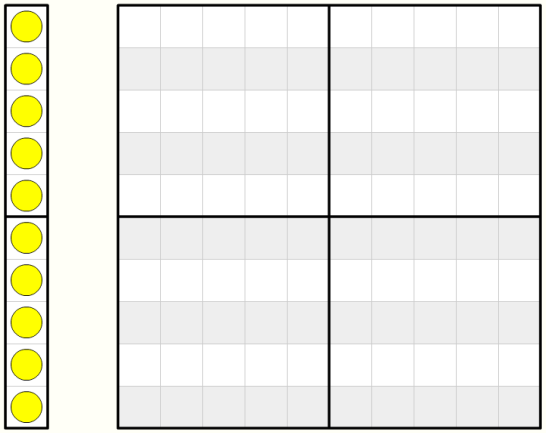
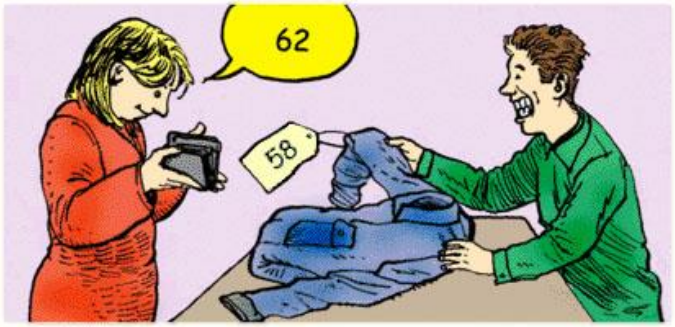


next

IMPULSE

Cito test



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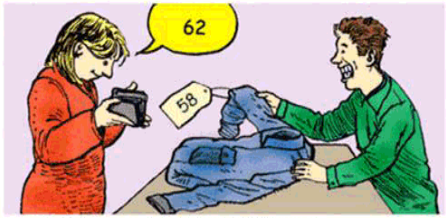

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IMPULSE

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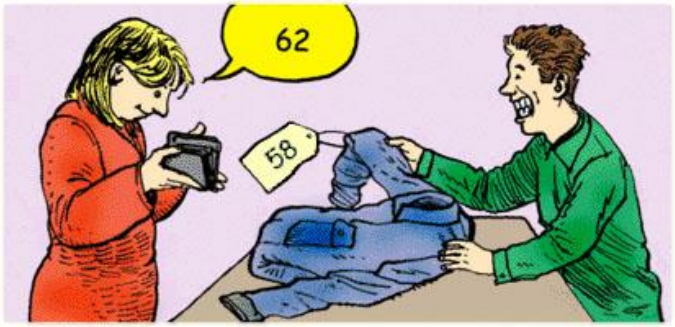

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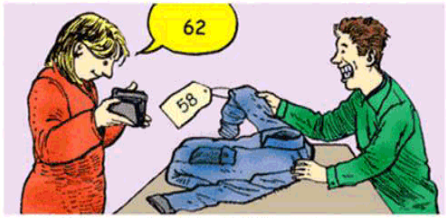

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number line

next

IMPULSE

Can an ICT-based dynamic assessment reveal the mathematics potential of SE students?

Research question

Is there a difference in percentage correct answers between standardized test items and ICT-based test items including auxiliary tools, including digital manipulative and number line?

Participants

Students in SE (grade 2 level; 8-12 years old)

- Manipulatives study (*n* = 37)
- Empty number line study (*n* = 43)

Instrument

7 subtraction items with crossing the ten in two versions:

- ICT-based IMPULSE test
- CITO LOVS End Grade 2

IMPULSE

Results:
Differences in proportions of correct answers

	% correct answer (7 items)		
	ICT version	Stand. version	
Digital manipulatives (*n*=37)	54	34	*t*(36)= 3.67, *p*<.01, *d*=.71
Digital empty number line (*n*=43)	55	36	*t*(42)=4.77, *p*<.01, *d*=.75

IMPULSE

Additional finding: Students' competence awareness

Manipulatives study	*Standardized version*	
	Incorrect answer	Correct answer
Tool use in *ICT version*	49%	21%

Number line study	*Standardized version*	
	Incorrect answer	Correct answer
Tool use in *ICT version*	60%	29%

IMPULSE

Conclusions

- ICT-based dynamic assessment with auxiliary tools
  - can reveal SE students' mathematics potential
  - provide teachers with indications for further instruction

- SE students can judge their mathematical competence quite well

Routledge
Taylor & Francis Group

Research Papers in Education
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ICT-based dynamic assessment to reveal special education students' potential in mathematics

Marjolijn Peltenburg[a]*, Marja van den Heuvel-Panhuizen[a] and Alexander Robitzsch[b]

[a]*Freudenthal Institute for Science and Mathematics Education, Utrecht University, Utrecht, The Netherlands;* [b]*Federal Institute for Education Research, Innovation and Development of the Austrian School System, Salzburg, Austria*

(*Received 15 March 2010; final version received 31 May 2010*)

This paper reports on a research project on information and communication technology (ICT)-based dynamic assessment. The project aims to reveal the mathematical potential of students in special education. The focus is on a topic that is generally recognised as rather difficult for weak students: subtraction up to 100 with crossing the ten. The students involved in the project were 8–12 years old. Their mathematical level was one to four years behind the level of their peer group. In special education, teachers often use standardised written mathematical understanding and computational iliary resources. In the research

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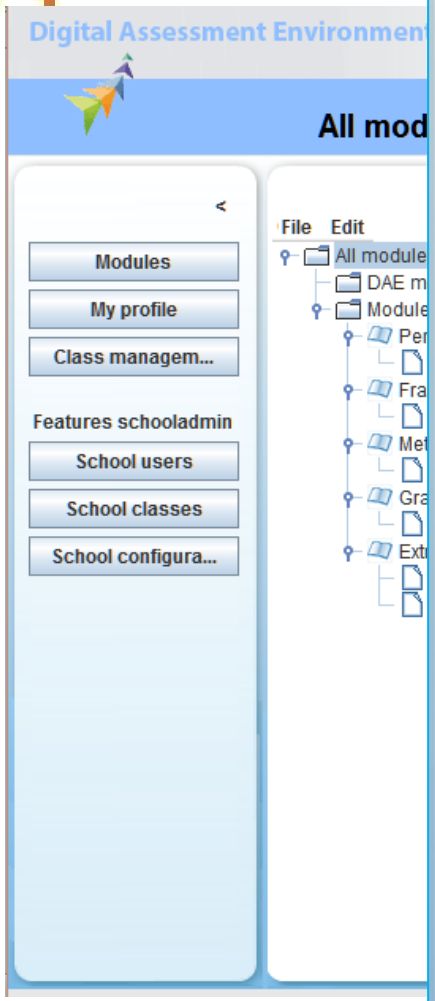
DAE


Digital Assessment Environment
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Features schooladmin
School users
School classes
School configura...
File Edit
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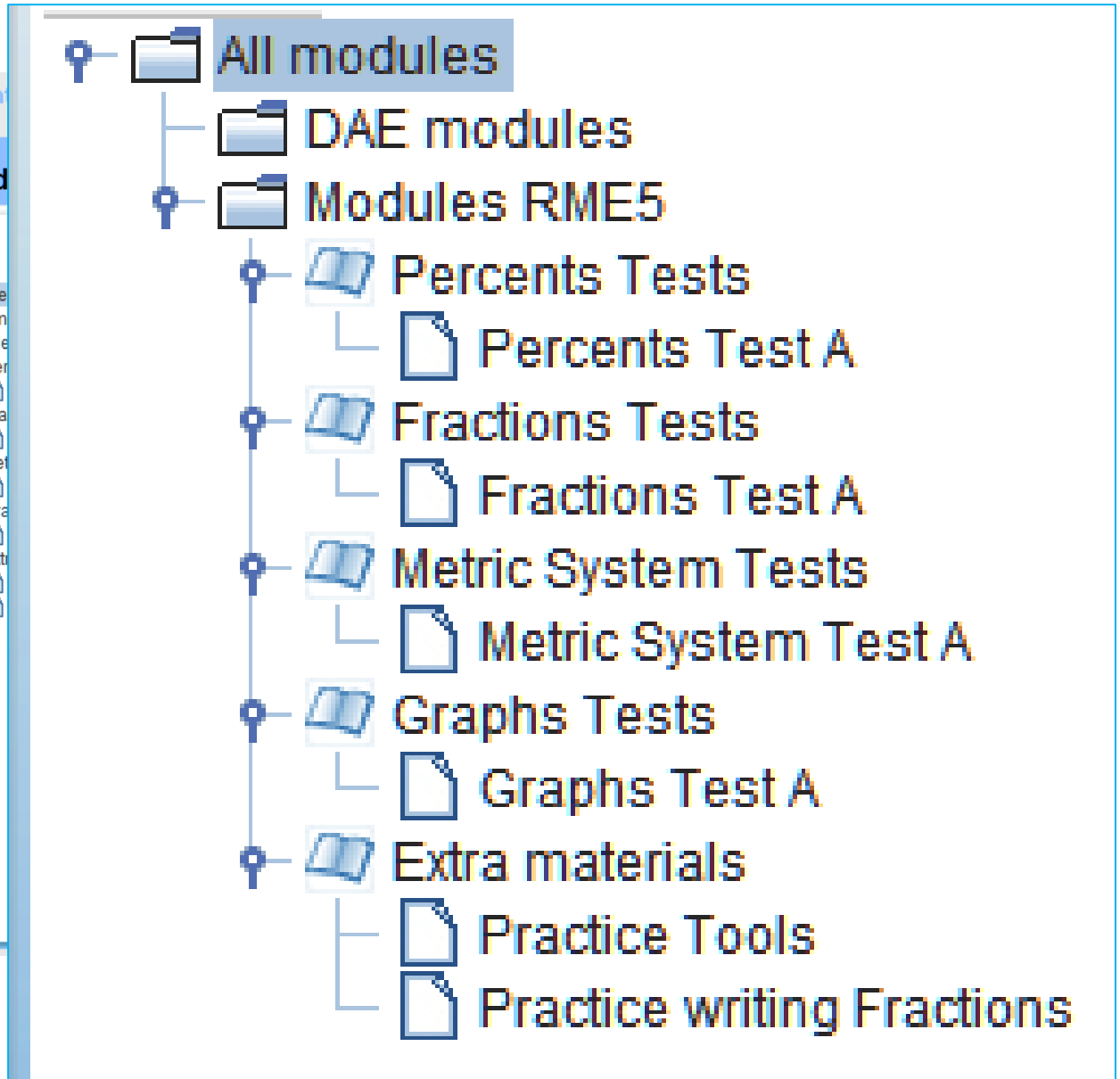

All modules
DAE modules
Modules RME5
Percents Tests
Percents Test A
Fractions Tests
Fractions Test A
Metric System Tests
Metric System Test A
Graphs Tests
Graphs Test A
Extra materials
Practice Tools
Practice writing Fractions

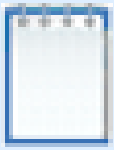
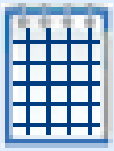
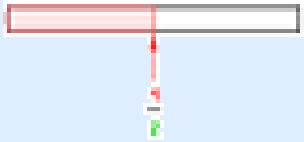
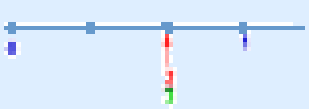
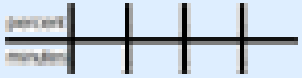
Current content DAE

- four domains
- two assessment modules for each
- assessment tasks based on NL reference standards for end primary school

Percents	Fractions
Metric system	Graphs

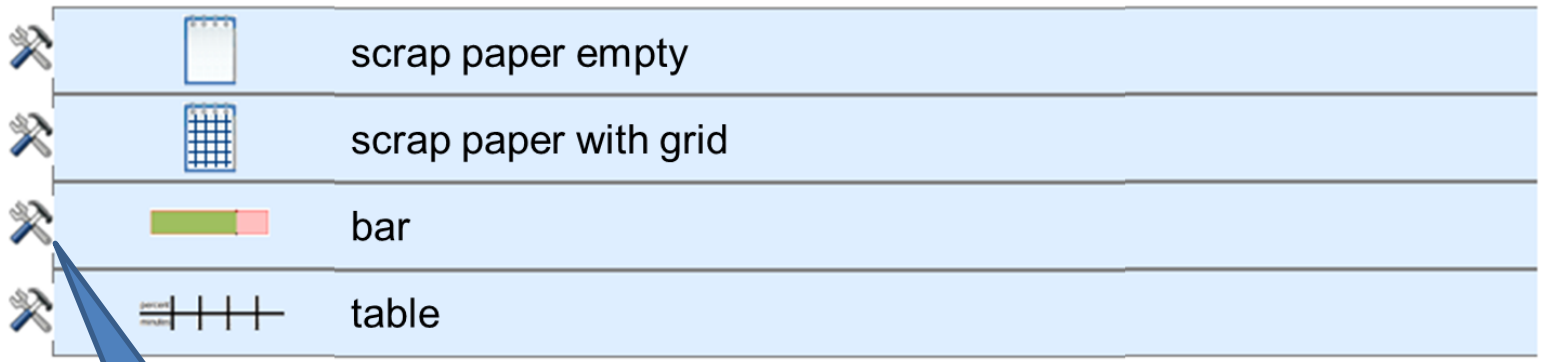
Core competency	Test A
Calculating a percent of a number	1. When the battery is fully charged, it lasts for 120 hours. Now it is just 40% full. How many hours will it last?..... hours
Calculating the result of a percentual decrease	2. A cell phone costs 70 dollar. You get a discount of 20%. What do you have to pay now?..... euros
Calculating the result of a percentual increase	3. A chocolate bar weighs 70 gram. You get 50% extra. How much does the bar weigh now? ..... grams
Describing part of a whole with a percent	4. Caren plays a computer game. Her score is 24 out of 80 points. What percent is her score?..... %
Calculating a number when a percent of that number is known	5. In 24 minutes, the battery is charged for 75%. 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	6. This year, a school has 200 students. That is 25% more than last year. How many students were there last year?..... students

Auxiliary tools

	scrap paper
	scrap paper grid
	hint
	bar
	number line
	table

Problem 1

When a battery is full, it will work 120 hours.
It is still charged for 40%.
For how many hours will this battery still work?
Answer: … hours



The tool icon is clicked

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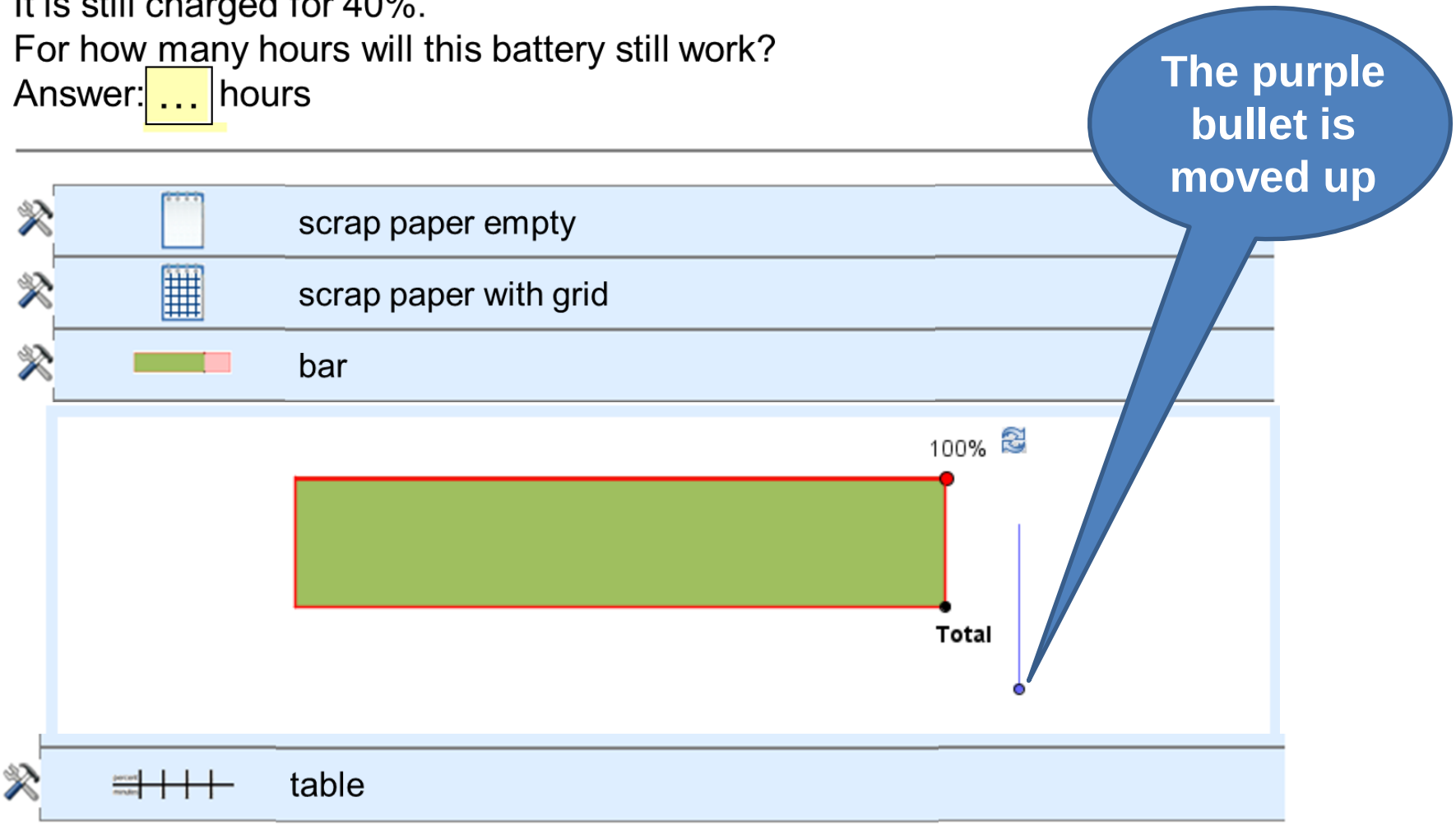

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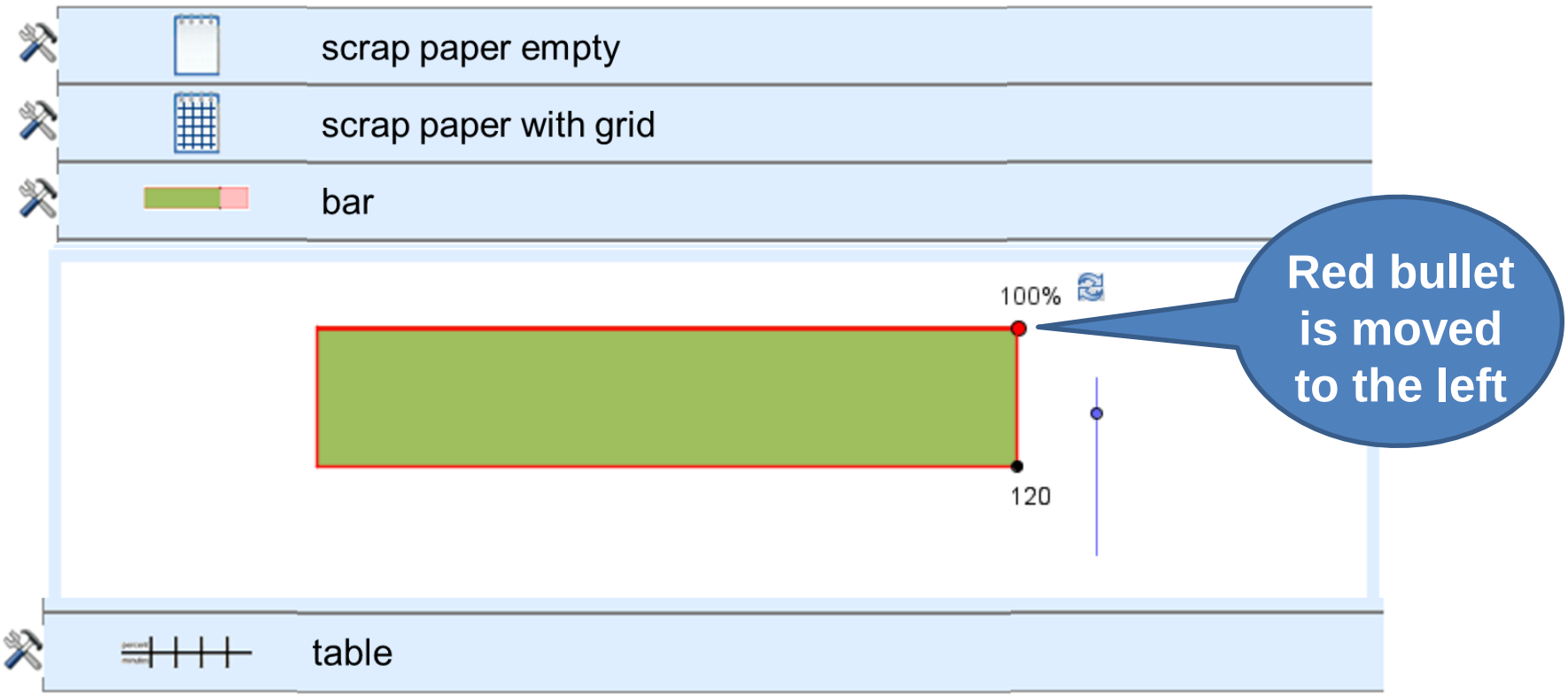

Problem 1

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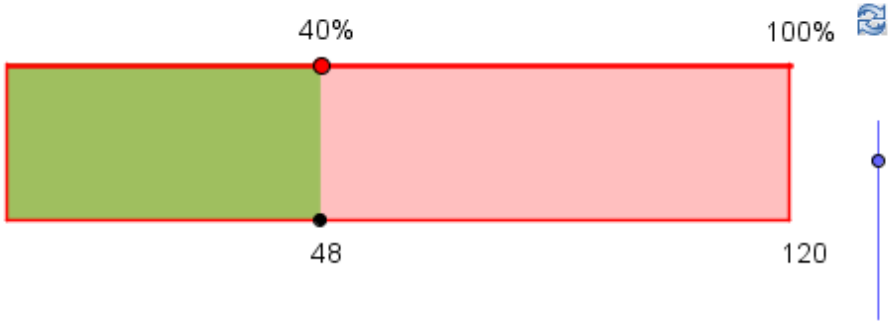
Answer: ... hours

The answer is filled in

scrap paper empty

scrap paper with grid

bar



table

Problem 1

When a battery is full, it will work 120 hours.
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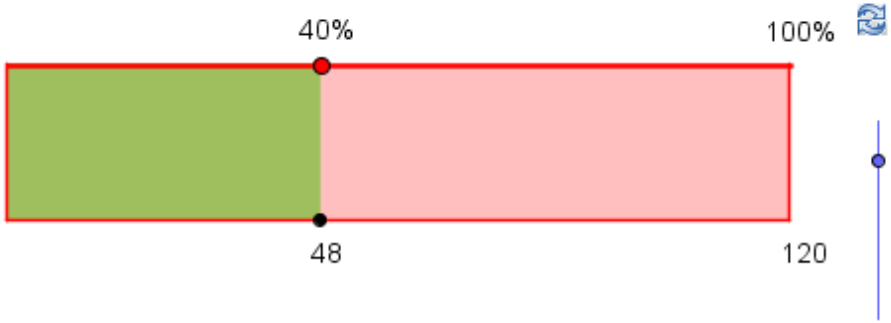
Answer: 48 hours

scrap paper empty

scrap paper with grid

bar



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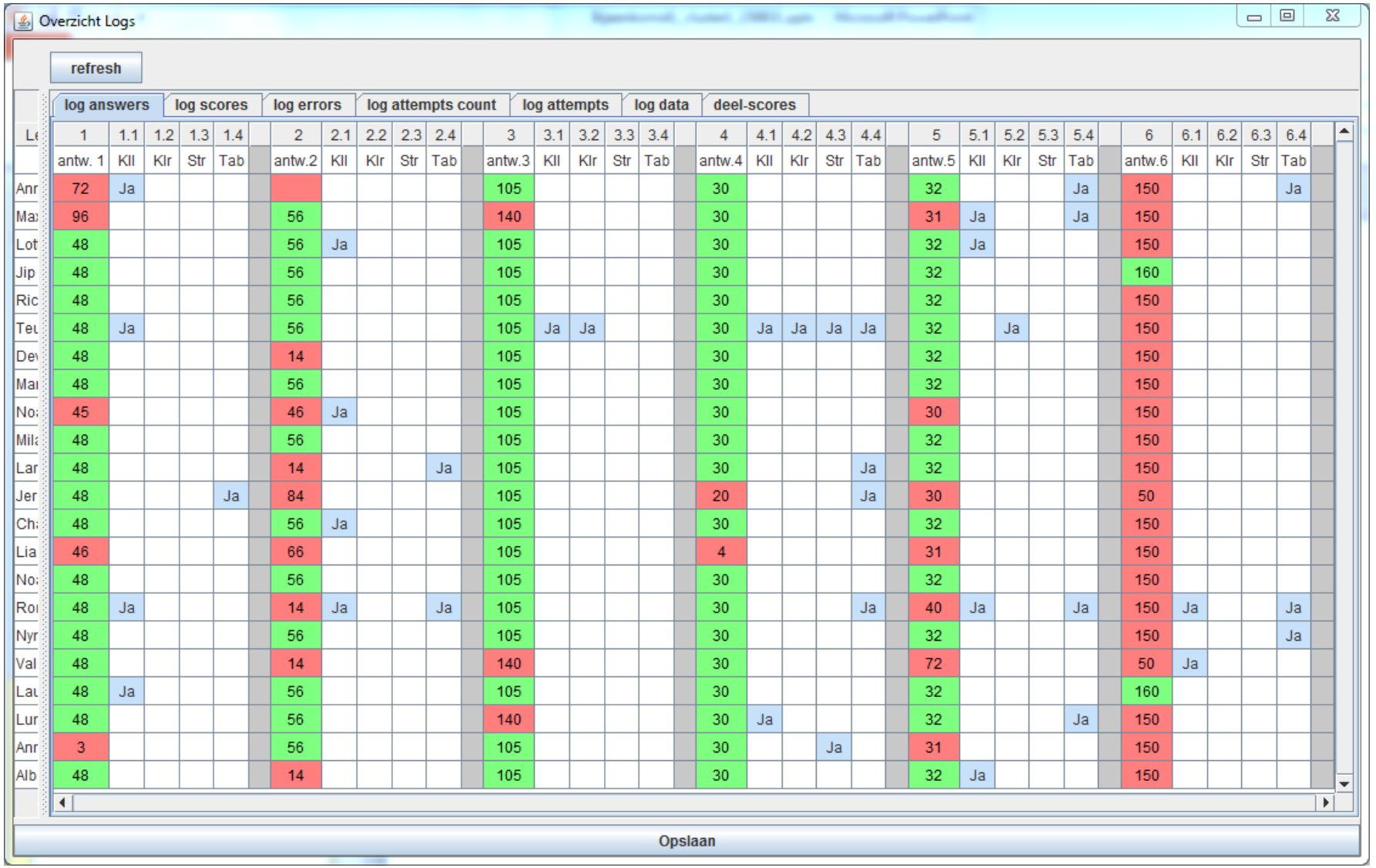
Overview of students work



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	antw. 1	Kll	Klr	Str	Tab		antw.2	Kll	Klr	Str	Tab		antw.3	Kll	Klr	Str	Tab		antw.4	Kll	Klr	Str	Tab		antw.5	Kll	Klr	Str	Tab		antw.6	Kll	Klr	Str	Tab
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