

## 2015: an overview of FaSMEd @ DUE

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### Who we worked with and what we did (Maths)

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10 teachers, 4 secondary schools

Evaluation of first pen&paper version of tool (Dez14 – Apr15):

- 3 single student interviews (grade 8, 13-15 years)
- 4 partner student interviews (grade 8, 13-15 years)
- Expert review with 23 colleagues at DUE

Re-Design: second pen&paper version

Implementation of Technology:

- Sept14-May15: JACK & TI-Nspire Prototypes
- Mar15: collaboration with Steve Arnold
- Aug15: first test with 16 students (grade 10, 16-18 years)
- Dez15: TI-Nspire version finalized

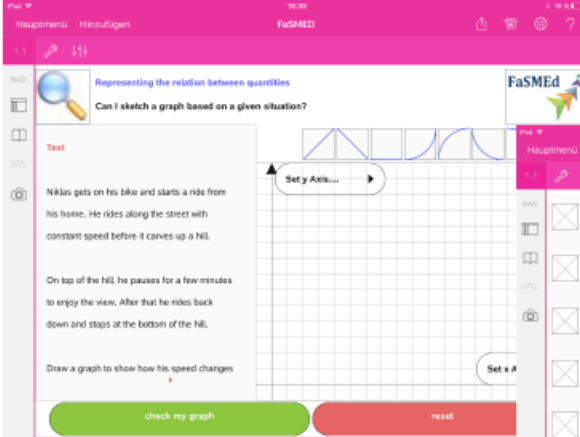
Case Study:

- 28 students (grade 10, 16-18 years)
- 2 single student interviews

# Formative assessment and technology (Maths)


## Digital tool for formative self-assessment (TI-Nspire Navigator)

Test



The screenshot shows the FaSMED app interface. On the left, a text box describes a scenario: "Niklas gets on his bike and starts a ride from his home. He rides along the street with constant speed before it curves up a hill. On top of the hill, he pauses for a few minutes to enjoy the view. After that he rides back down and stops at the bottom of the hill. Draw a graph to show how his speed changes". To the right of the text is a coordinate grid with a blue line graph showing speed over time. The graph starts at the origin, increases linearly, then levels off, then decreases linearly, and finally levels off again. The x-axis is labeled 'Time' and the y-axis is labeled 'Speed'.

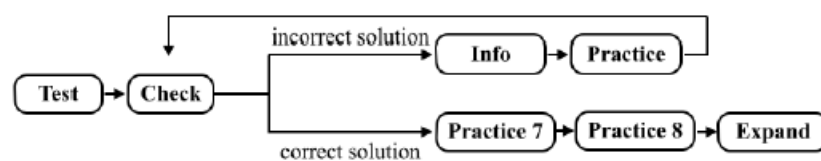
Check



The screenshot shows the FaSMED app interface for the 'Check' phase. It features a list of reflection questions on the left, each with a checkbox and a lightbulb icon. The questions are: "I realized that the graph reaches the value of zero three times.", "I realized when the graph is increasing, decreasing, or remains constant.", "I realized that the graph is not always increasing and decreasing with the same speed, my speed increases faster when riding downhill.", "I realized that the graph has a different shape than the other with the hill at the end.", "I realized that there is only one value of speed related to any time in my graph and not vice versa.", "I realized that time is the independent variable, recorded on the x-axis, and that the speed is the dependent variable recorded on the y-axis." To the right of the questions is a coordinate grid with a blue line graph showing speed over time. The graph starts at the origin, increases linearly, then levels off, then decreases linearly, and finally levels off again. The x-axis is labeled 'Time' and the y-axis is labeled 'Speed'.

# Formative assessment and technology (Maths)

Structure:



## Case study 1: Can I sketch a graph based on a given situation?

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School context:

- approximately 600 students aged 10-18 (grades 5-10)
- Realschule (lower secondary school, most likely no high achievers)
- urban area, mixed ethnicity

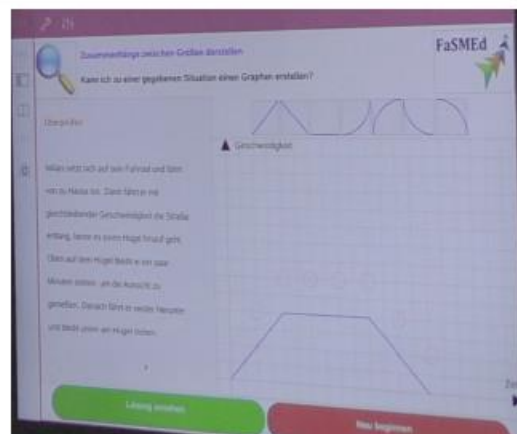
Class:

- 28 students (25 present, 14f/11m)
- grade 10 (16-18 years)
- mixed abilities (few revisiting grade 10, but no special needs students)

## Reconstruction of FA processes – S2

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Student's solution to the Test-task:



First Check-point: „I realized that the graph reaches the value of zero three times.“

S2 doesn't mark off the Check-point (identifies a mistake)

## Reconstruction of FA processes – S2

S2 continues with Info 1:

Reflecting her mistake:

*„I did not do it like this, I did it so that Niklas rides along the street (points to the first increasing part of the graph) and then here (points to the first segment of the graph that remains constant) he rides along the hill and then he stops, but I did not do it with the second zero, when Niklas stands on top of the hill then he has no speed anymore.“*



## Reconstruction of FA processes – S2

Practice 1: Story of girl walking home from school.

Students have to decide for all 8 parts whether the graph for this story reaches the value of zero.

- S2:
- tests her learning process by working on the task
  - solves it correctly
  - checks her answer by comparing her solution to the sample solution
  - marks off the first Check-point in the Check-list

## Case study 2: Science Case

School context:

- Gesamtschule (comprehensive school), founded 2013
- 450 students
- 40 teachers

Used material:

- Self-developed material for science experiment „Who has the juiciest apple?“

Context:

- surface-volume-relationship
- evaporation protection
- experiment
- use of technology (ipad)



## Who we worked with and what we did (Science)

### Material development:

- Feedback process of materials via phone and mail with teachers

### Work with interested teachers:

- Introduction Workshop at DUE (10 participating teachers)

### Case Study Implementation:

- Preliminary meeting at case study school (2 teachers)
- Case Study & Student interview
- Teacher interview

## Formative assessment and technology (Science)

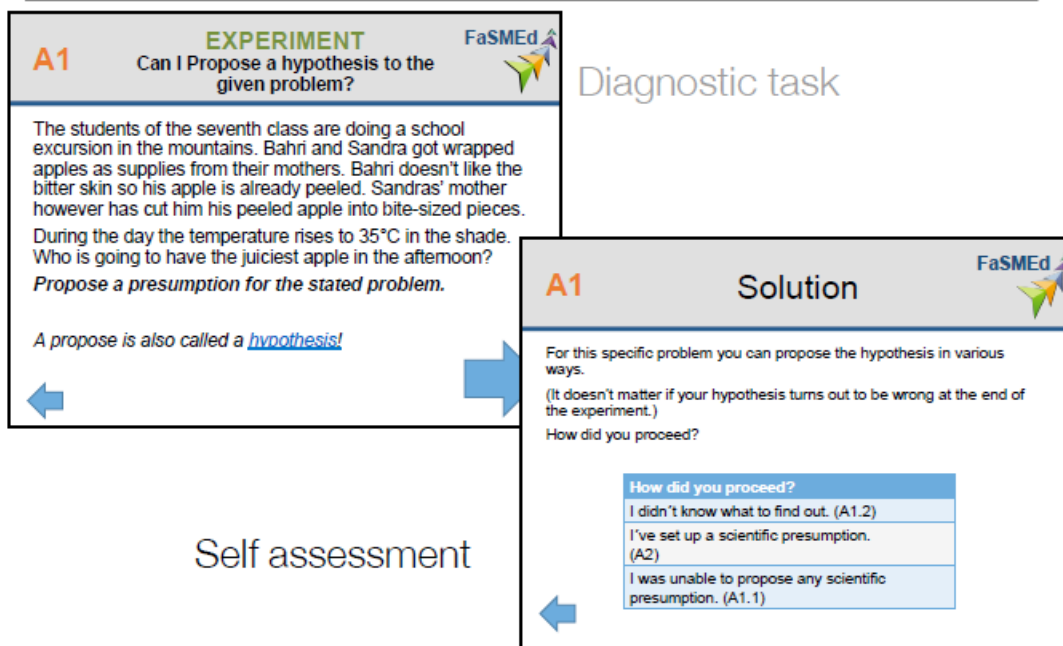
16 tablet mobile computers (iPad) to take to school

Powerpoint version of  
Pen & Paper version:

- Interactive
- Simplify links
- Illustrations
- Further definitions



## Formative assessment and technology (Science)




Self assessment



# Formative assessment and technology (Science)

## Self assessment

**A1** **Solution** 


For this specific problem you can propose the hypothesis in various ways.  
(It doesn't matter if your hypothesis turns out to be wrong at the end of the experiment.)  
How did you proceed?

How did you proceed?


I didn't know what to find out. (A1.2)

I've set up a scientific presumption. (A2)

I was unable to propose any scientific presumption. (A1.1)




## Good to know

**A1.2** **GTK** 

Imagine you are getting a cut apple from your mother to school. Unfortunately you forgot to eat it so you find the apple after a week in your schoolbag. The apple pieces are now already shriveled and collapsed. So they also became lighter. This process has already begun on the first day. Sometimes it's difficult to discover these differences in the first few minutes.

By using a balance you can determine the weight repeatedly. Please note that the balance must be set correctly.

## Diagnostic Task

**A2** **EXPERIMENT** 

What are the experimental approaches?



After your first scientific presumption you may now design your experiment.

For your first preparations you need two experimental approaches:

- If X is present, then something happens.
- If X is not present, then something different happens.

As a scientist you're now planning an experimental approaches, in which this factor X is present, and another approach, where the factor is missing. Afterwards the different results after your experiment will show you the effect of this factor.

Which one is your chosen variable in this experiment?



## Implementation



# Implementation

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## **In general:**

- Positive feedback regarding concept, implementation, interaction and support
- Motivation throughout independence, technology and experiments



## **Teacher:**

- Would like to have more self-diagnostic assessment materials
- Relieving because of structured lesson plan and material

## **Student:**

- Appreciated possibility to get individual answers (GTK, definitions) based on the specific experiment
- Emphasized independence of work