

UDE cases:

Digital tools for formative  
self- and peer assessment

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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

# Digital tool for formative self-assessment:

***„Can I sketch a graph based on a given situation?“***

*Test*

**Test**

Can I sketch a graph based on a given situation?

For the following situation, sketch a graph to show how the speed changes as a function of the time.

Niklas gets on his bike and starts a ride from his home. He rides along the street with constant speed before it carves up a hill. On top of the hill, he pauses for a

Set y-axis... Set x-axis...

view solution reset

*Check*

**Check**

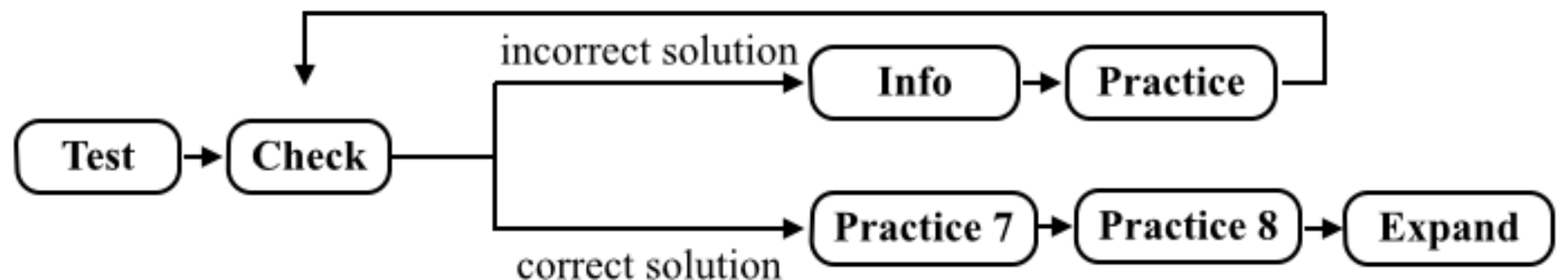
There are many right answers to the test task. What is important is ...

Sample solution ▶ Your solution ▼

Set y-axis...

back submit reset

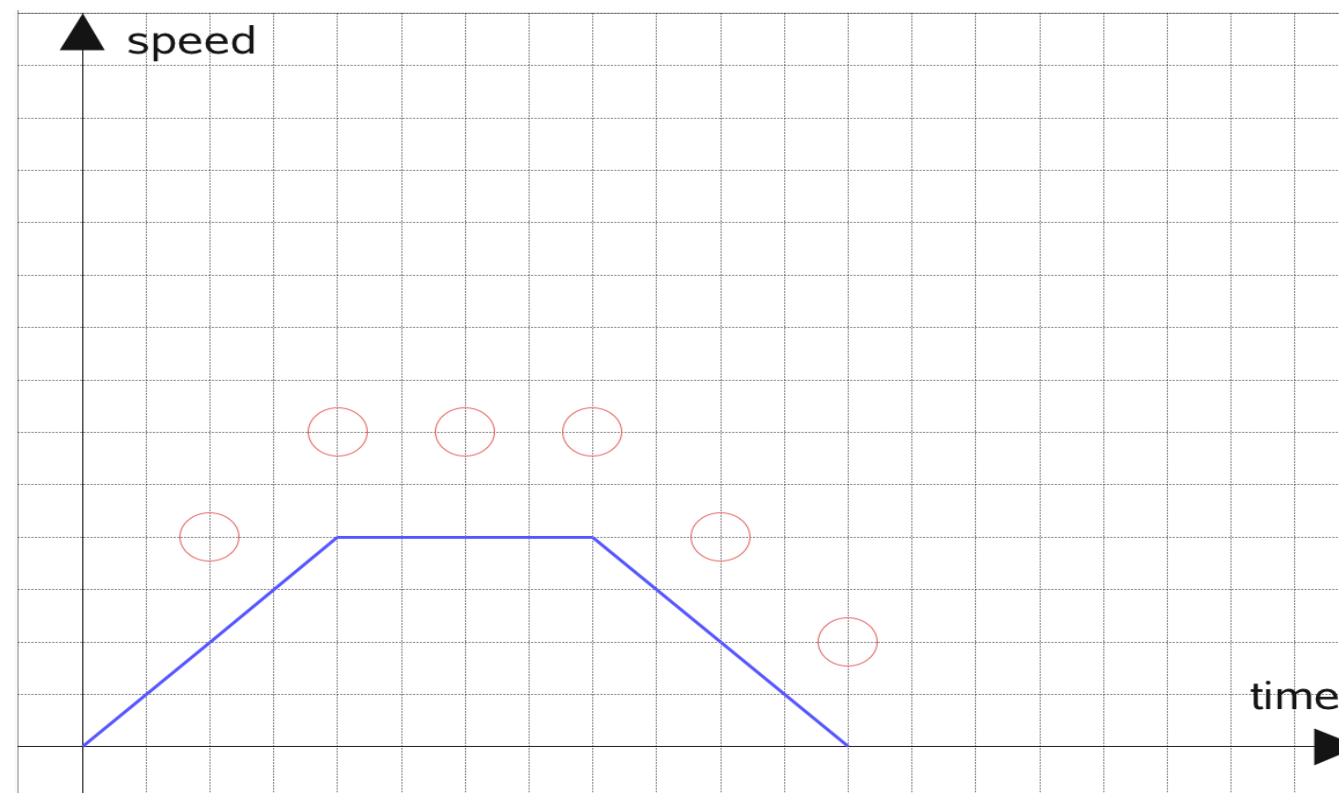
Structure:



# Reconstruction of formative assessment processes:

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Student's (grade 10, age 16) solution to the *Test*-task:



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

S does not mark off the Check-point (identifies a mistake)

# Reconstruction of formative assessment processes:

S continues with Info 1 and reflects 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 formative assessment processes:

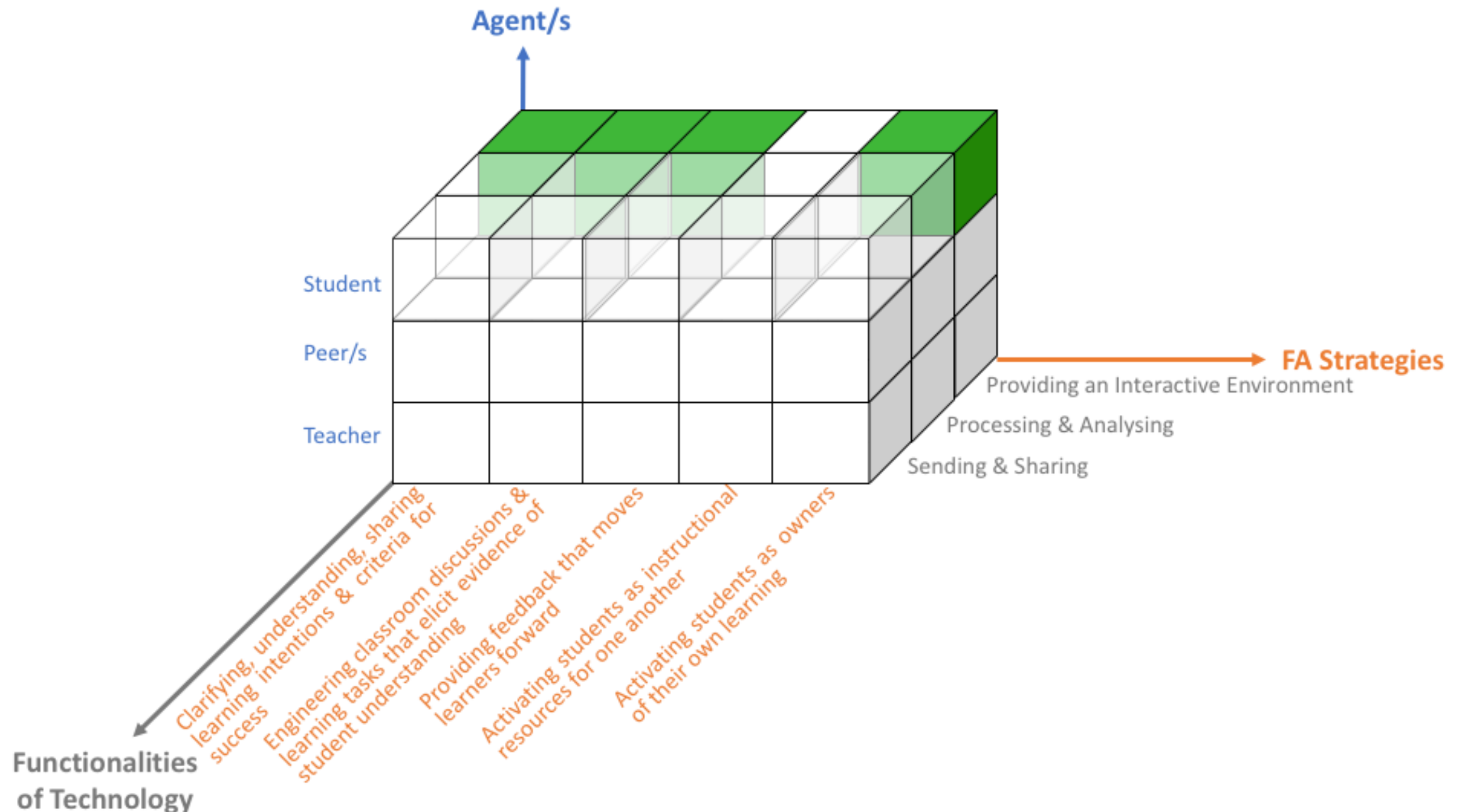
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## The student:

- understands criteria for success,  
(marking off check-points)
- elicits evidence of own understanding.  
(work on tasks, identification of mistake, comparison of own solution to sample solution)
- formulates a self-feedback,  
(reflection on own solution)
- is activated as the owner of her learning  
(challenge to reflect own work, decisions on which steps to take next)

# Reconstruction of formative assessment processes:

## Characterisation of the formative assessment process:





# Science Case

## School context:

- Gesamtschule (comprehensive school)
- grade 7 (12-14 years)

## Scientific context:

### ***“Who has the juiciest apple?”***

- surface-to-volume ratio
- evaporation protection
- experiment

AB 1

FaSMEd

### Who has the juiciest apple?

The students of the seventh class are doing a school excursion in the mountains. Bahri and Sandra got wrapped apples as supplies from their mothers. Bahri doesn't like the bitter skin so his apple is already peeled. Sandra's mother however has cut him his peeled apple into bite-sized pieces.

During the day the temperature rises to 35°C in the shade. Who is going to have the juiciest apple in the afternoon?

**Task:**  
Formulate a hypothesis for the stated problem. Afterwards plan an experiment that verifies your hypothesis. Also name what you have to observe and note during the experiment.

The following **materials** are available:  
2 apples, knives, cutting boards, stop-watches, 1 scale, 2 petri dishes, 1 hair dryer (or a drying cabinet)

Write down your results in a trial protocol (including setup, procedure, monitoring and interpretation) and display them in an appropriate diagram of your choice. You may note especially the significance of the size of the apple surface.

**Accomplish your goal:**  
**Additional help and instructions can be found on the „Good to know“ cards:**

First pay attention to the headlines on the front of the cards displaying the individual task steps. The back of the cards show appropriate help and instructions that explain and illustrate associated knowledge. Use the cards only if you are stuck or unsure about how to continue.





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

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## **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

# Digital tool for formative self- and peer assessment:

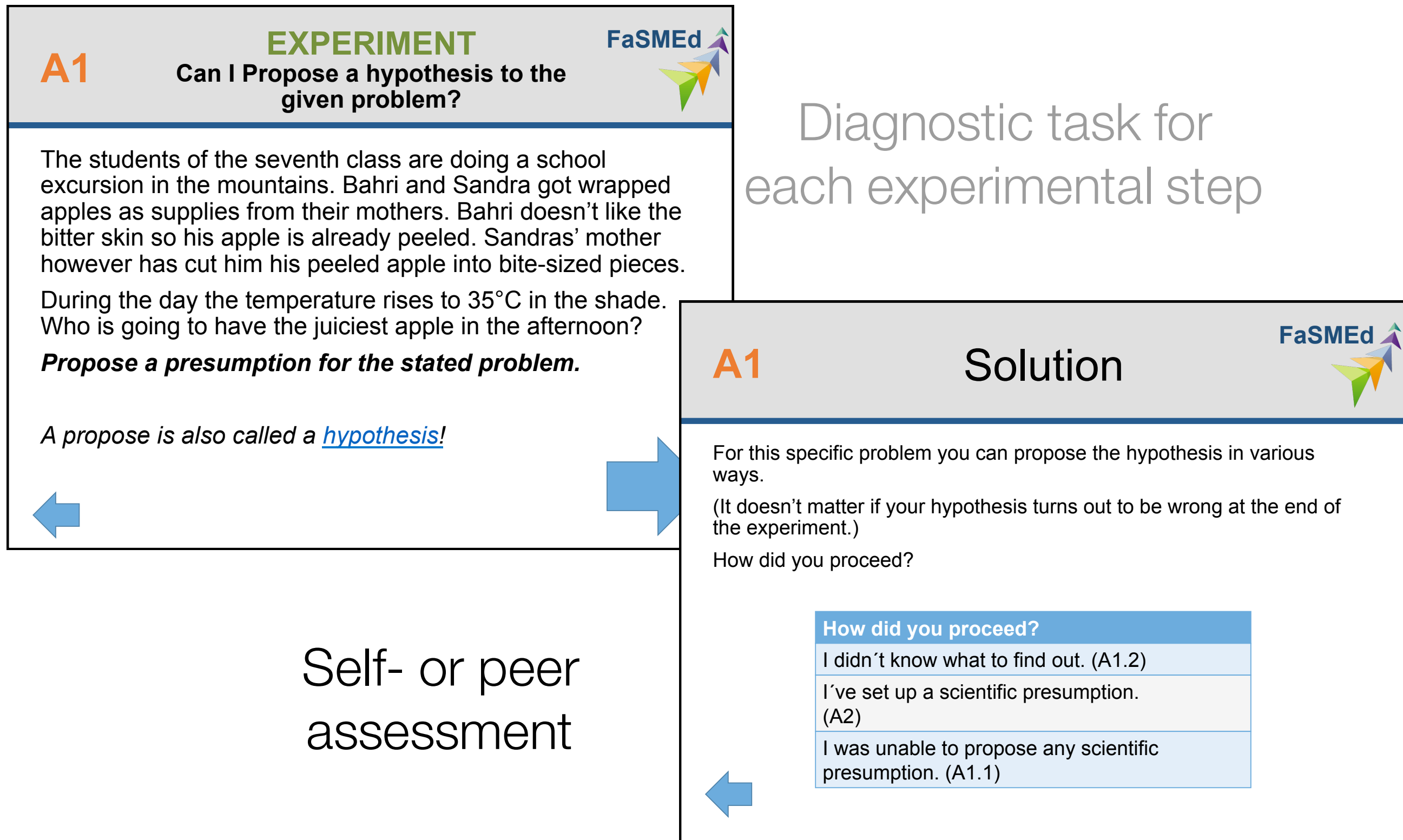
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PowerPoint  
presentation:

- Interactive
- Simplifies hyperlink structure
- Illustrations
- Further definitions




# Digital tool for formative self- and peer assessment:




# Digital tool for formative self- and peer assessment:

## Self- or peer 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?

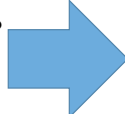

After your first scientific presumption you may now design your experiment.

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

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## **In general:**

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

## **Teacher:**

- Would like to have more self-diagnostic assessment materials
- Reduced work load due to structured lesson plan and material

## **Student:**

- Appreciated possibility to follow their Own learning path
- Emphasized independence of work

