

AuthOMath :

Towards a didactic concept for  
designing digital interactive tasks with  
automatic answer based feedback



Guido Pinkernell ◦ Pädagogische Hochschule Heidelberg  
ICTMT Athens ◦ June 2023

## Authoring Online Material with Multimodal, Dynamic and Interactive Applets and Automated Feedback for Learning Math



# AuthOMath

University of Education Heidelberg : Guido Pinkernell  
University of Cantabria Santander : Jose Manuel Diego Mantecon  
University of Edinburgh : Chris Sangwin  
Johann-Kepler-Universität Linz : Zsolt Lavica  
Geogebra GmbH (associated)



# AuthOMath

## AuTo

- a moodle based authoring tool for randomized interactive and dynamic multimodal mathematical tasks with automatic adaptive feedback

which basically means to

extend STACK to facilitate the implementation of GeoGebra applets into task and feedback

## DiCo

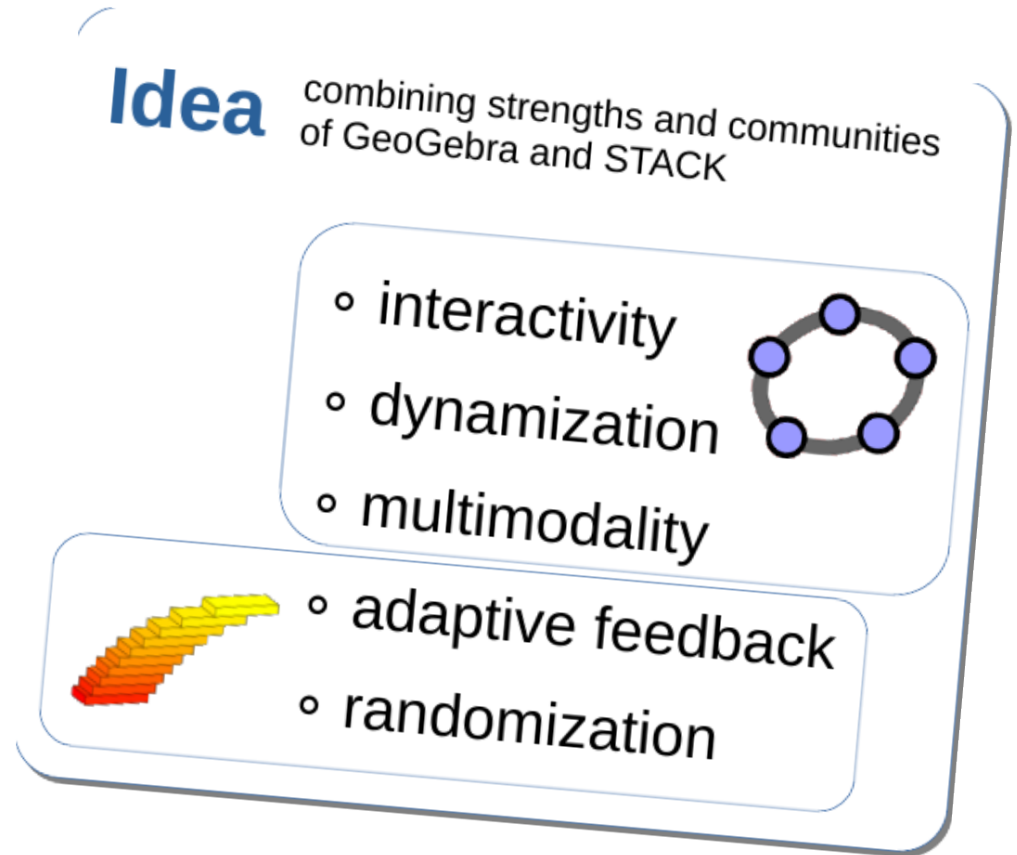
- a didactical concept for designing online based interactive learning material for use in mathematics teacher education



# towards a didactic concept

...in teacher education:

technical advances  
resulting from combining  
GeoGebra and STACK  
initiate  
didactic reflection



# towards a didactic concept

## 1. how to address the learning object

## 2. how to address learners

## 3. how to use media

- mathematical analysis:

“do research on how to address the object of learning such that it supports mastery and understanding”

focus on:

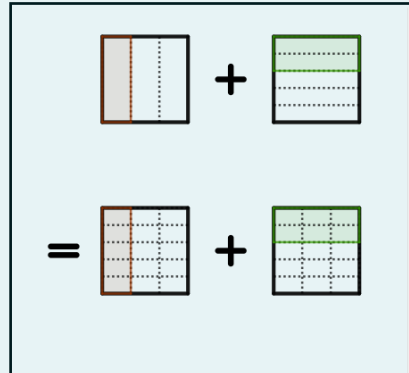
- relevant definitions and terminology
- mathematically valid explanatory models (aka basic ideas, “Grundvorstellungen”)
- specific representations, strategies, and applications

# towards a didactic concept

1. how to address the learning object
2. how to address learners
3. how to use media

This picture explains how two fractions are added.

Translate into maths:



$$\square + \square$$

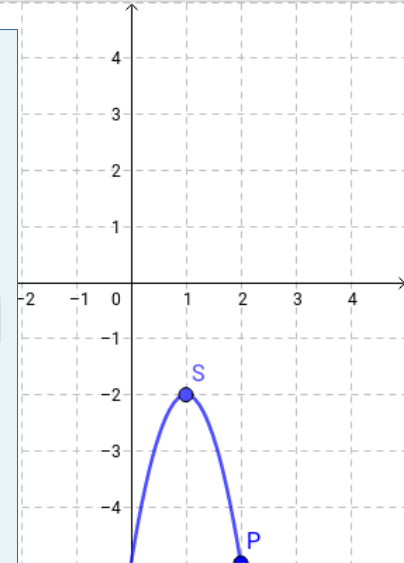
$$= \square + \square$$

$$= \square$$

Give a quadratic expression which has exactly the two roots  $-3$  und  $-1$ .

$$f(x) = \square (x-3)*(x-1)$$

Move the points S und P, such that the graph fits with  $f(x) = -3 \cdot (x+1)^2 - 2$ .



*"Multiply the difference of 2 and x with 4 and you get 8."*

Translate into an equation:

$$\square 2-x*4 = 8$$

# towards a didactic concept

1. how to address the learning object
- 2. how to address learners**
3. how to use media

- didactic perspective:

“do research on how learners actually do access the object of learning (correctly or wrongly)”

focus on

- as novices or experts in the topic, as low or high achievers in general
- individual conceptions, misconceptions, systematic errors
- range of possible solving strategies



# towards a didactic concept

1. how to address the learning object
2. **how to address learners**
3. how to use media

Give a quadratic expression  
which has exactly the two roots  $-3$  und  $-1$  .

$$f(x) = (x-3)*(x-1)$$

**NEARLY correct, but not quite!**

You seem to know what to do.  
Just check your answer again...

# towards a didactic concept

1. how to address the learning object
2. how to address learners
- 3. how to use media**

- media perspective:

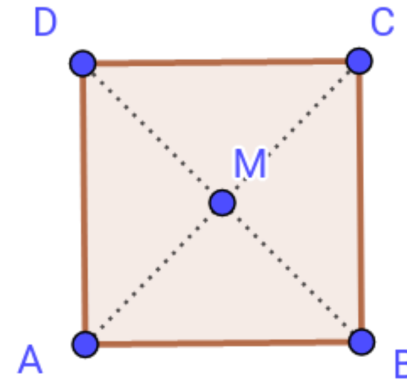
“now decide on the use and structure of textual and pictorial elements of task and feedback area”

focus on

- how to use language
- how to use static, dynamic, interactive elements
- how to structure task and feedback

# towards a didactic concept

1. how to address the learning object
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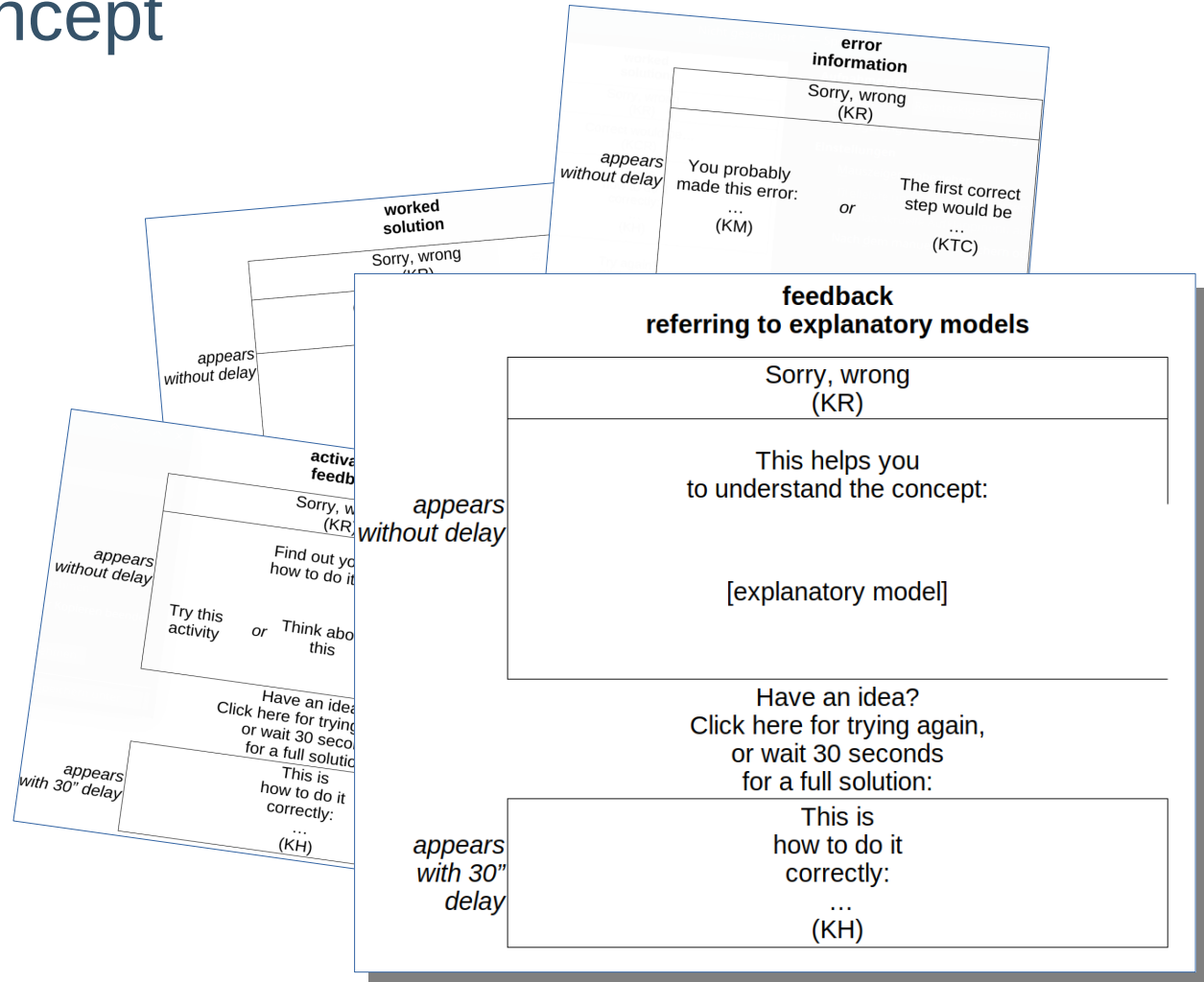


This is not a square.

Move points  
to explore the range of appearances,  
and then decide  
what this quadrangle really is.

# towards a didactic concept

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# open questions

1. clarify relation between  
the product of digital task design and  
the process of digital task design
2. clarify the objective of task design activity in teacher education  
as creating a product or  
as doing didactic reflection for creating a product
3. how to adapt the didactic concept  
presently structured into 3 perspectives on activity planning  
to real life processes of task design

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