Aspects of feedback design in STACK

Guido Pinkernell

Heidelberg, Germany

www.pinkernell.online

1. adaptive feedback
2. feedback parameters
3. examples from the “Heidelberger MatheBrücke”
4. thinking further: activating feedback

adaptive feedback

- information about performance aiming at closing the gap between ”what is understood and what is aimed to be understood”
  (Sadler, 1989, Mory, 2004; Hattie & Timperley, 2007)
- when addressed to the learner,
  acceptable when perceived as “advice for action”,
  i.e. adapted to individual’s needs
  (Ras, Whitelock, & Kalz, 2016)
- adaption as
  - adjustment to an individual’s actual performance within an ongoing learning process
    (Leutner, 1992)
  - adjustment to an individual’s needs within a heterogeneous group

1. adaptive feedback
2. feedback parameters
3. examples from the “Heidelberger MatheBrücke”
4. thinking further: activating feedback

feedback parameters

- content
- modality
- load
- language
- timing

(Mory, 2004; Shute, 2008; Ras, Whitelock, & Kalz, 2016)

feedback parameters

- **content**
- modality
- load
- language
- timing

(Mory, 2004; Shute, 2008; Ras, Whitelock, & Kalz, 2016)

Content-Related Classification of Feedback Components

Category	Examples
Knowledge of performance (KP)	15 or 20 correct; 85% correct
Knowledge of result/response (KR)	Correct/incorrect
Knowledge of the correct results (KCR)	Description/indication of the correct response
Elaborated concepts	
Knowledge about task constraints (KTC)	Hints/explanations on type of task
	Hints/explanations on task-processing rules
	Hints/explanations on subtasks
	Hints/explanations on task requirements
Knowledge about concepts (KC)	Hints/explanations on technical terms
	Examples illustrating the concept
	Hints/explanations on the conceptual context
	Hints/explanations on concept attributes
	Attribute-isolation examples
Knowledge about mistakes (KM)	Number of mistakes
	Location of mistakes
	Hints/explanations on type of errors
	Hints/explanations on sources of errors
Knowledge about how to proceed (KH)	Bug-related hints for error correction
	Hints/explanations on task-specific strategies
	Hints/explanations on task-processing steps
	Guiding questions
	Worked-out examples
Knowledge about metacognition (KMC)	Hints/explanations on metacognitive strategies
	Metacognitive guiding questions

(Narciss, 2008)

feedback parameters

- **content**
- modality
- load
- language
- timing

(Mory, 2004; Shute, 2008; Ras, Whitelock, & Kalz, 2016)

for experts,
corrective or thought provoking feedback seems sufficient
(Chi, Siler, Jeong, Yamauchi & Hausmann, 2001; Quintana, Zhang & Krajcik, 2005; Johnson & Priest, 2005; Ras et al., 2016)

for novices,
scaffolding or worked out examples are needed
(Kirschner, Sweller & Clark, 2006; Renkl, 2002; Renkl & Atkinson, 2003)

feedback parameters

- content
- modality
- load
- language
- **timing**

(Mory, 2004; Shute, 2008; Ras, Whitelock, & Kalz, 2016)

immediate: as quickly
as the computer allows
delayed: up to several hours
or days
(Dempsey & Wager, 1988)
or after second try
(Richards, 1989)

feedback parameters

- content
- modality
- load
- language
- **timing**

(Mory, 2004; Shute, 2008; Ras, Whitelock, & Kalz, 2016)

for low achievers, prompt timing,
for high achievers, delayed timing
of feedback seems suitable
(Shute, 2008)

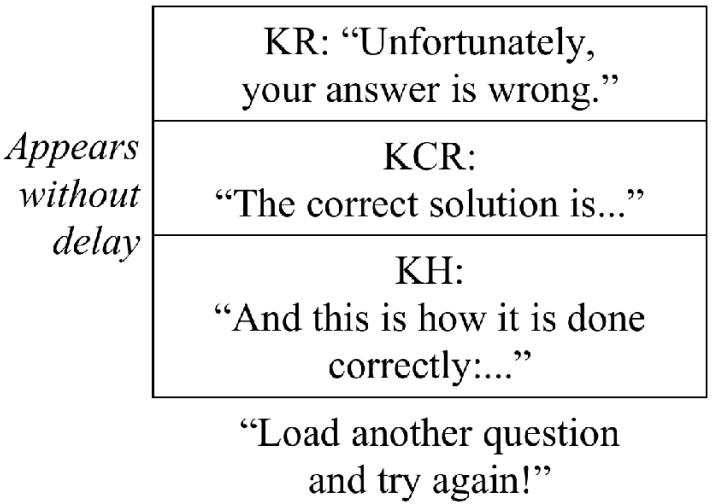
when testing declarative knowledge
feedback after second try more effective
(Richards, 1989)

“Give a moment to think it over…”
(Mory, 2008)

examples

- **worked-out example**
- thought provoking

(Gulden, 2019; Pinkernell et al., 2020)

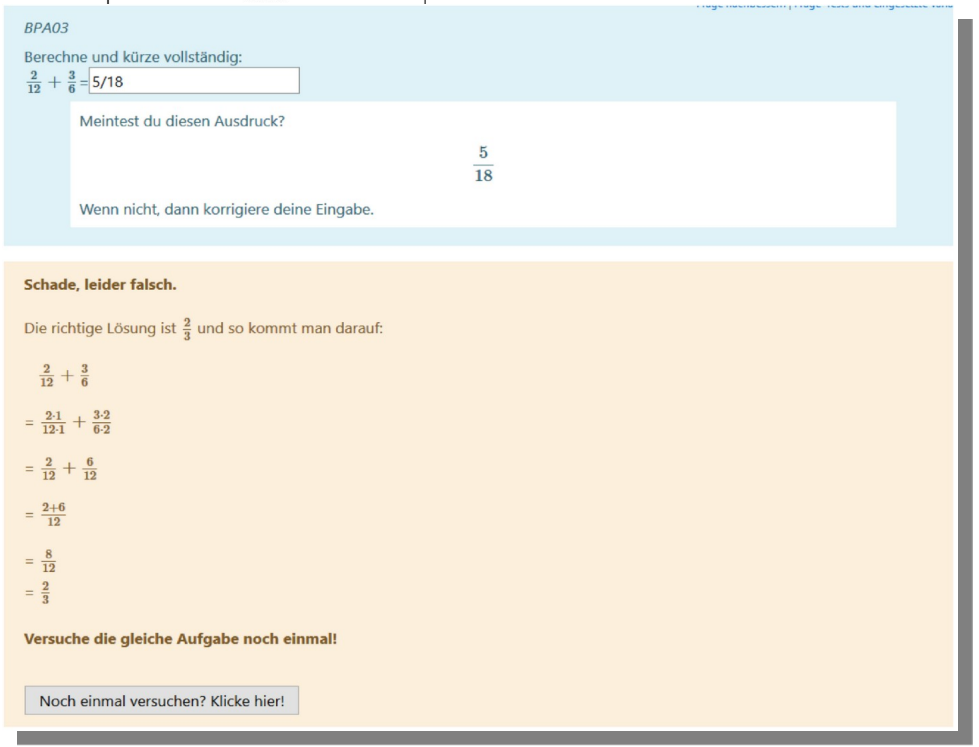


examples

- **worked-out example**
- thought provoking

(Gulden, 2019; Pinkernell et al., 2020)

	KR: “Unfortunately, your answer is wrong.”
Appears without delay	KCR: “The correct solution is...”
	KH:

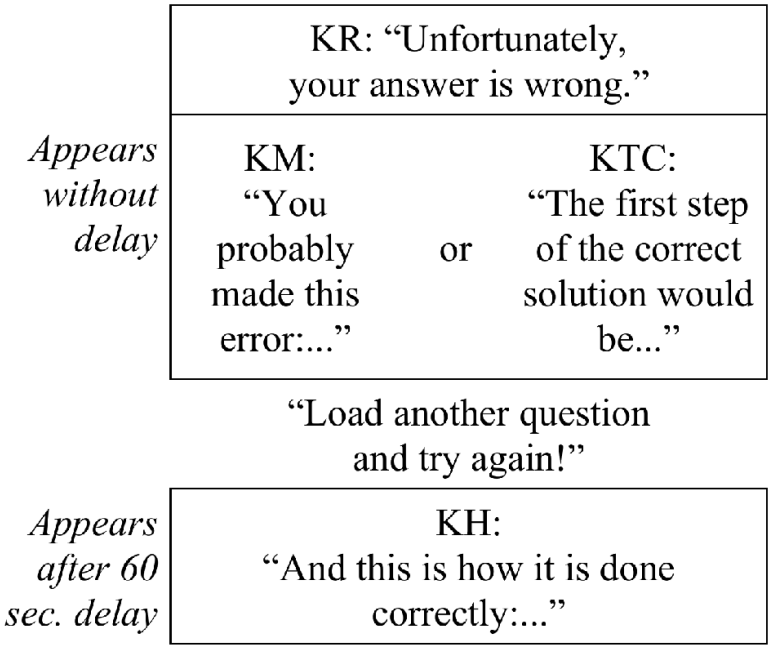


www.pinkernell.online

examples

- worked-out example
- **thought provoking**

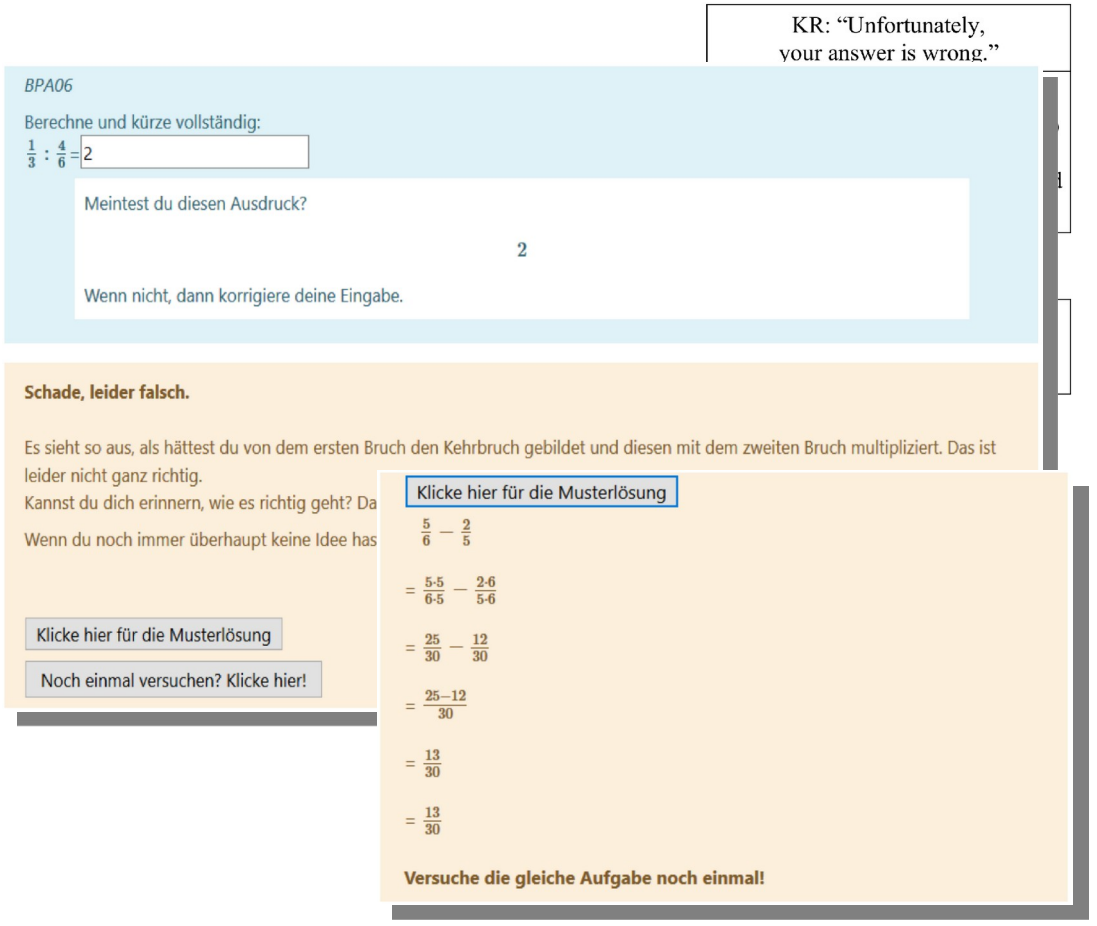
(Gulden, 2019; Pinkernell et al., 2020**)**



examples

- worked-out example
- **thought provoking**

(Gulden, 2019; Pinkernell et al., 2020**)**

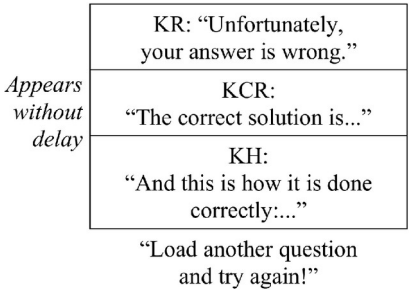


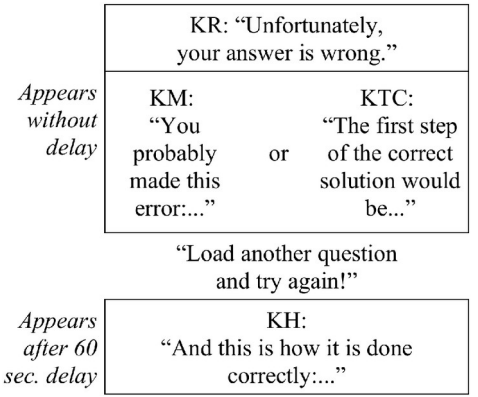
www.pinkernell.online

examples

- **worked-out example**
- **thought provoking**

(Gulden, 2019; Pinkernell et al., 2020**)**



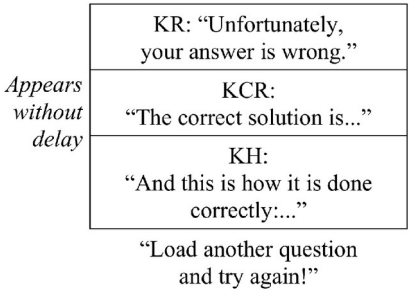


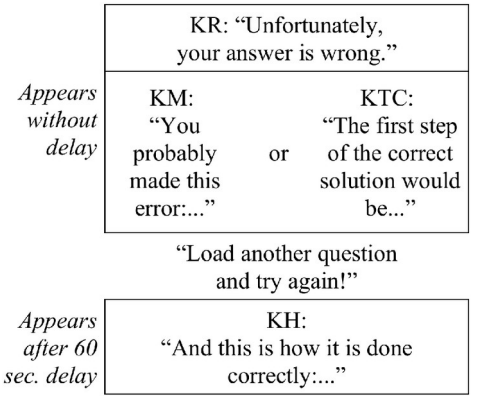
Which is more effective?
Error detection or worked out example?
Examining two types of feedback in the case of elementary arithmetic with fractions
(Gulden, 2019)

examples

- **worked-out example**
- **thought provoking**

(Gulden, 2019; Pinkernell et al., 2020**)**





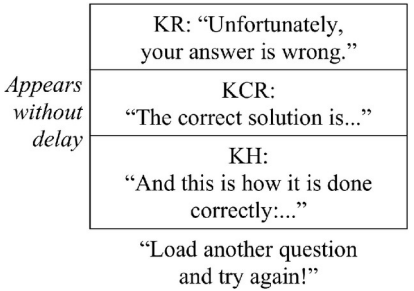
Information about error made possibly more effective on performance than worked out example – why?

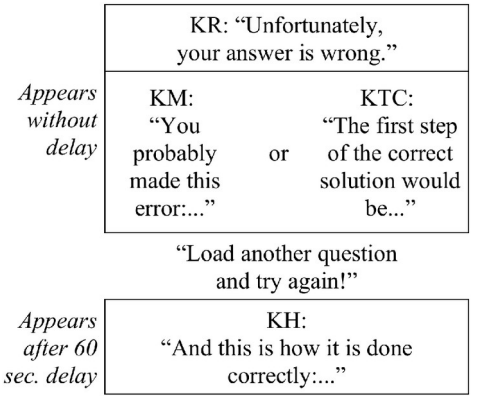
Pupils were not novices on subject, for which worked out examples would have been the prefered type of feedback...
(Kirschner, Sweller & Clark, 2006)

examples

- **worked-out example**
- **thought provoking**

(Gulden, 2019; Pinkernell et al., 2020**)**





Information about error made
possibly more effective on performance
than worked out example – why?

… i.e. worked out examples
did not contain information new to pupils or
could even interfere with individual's
preferred solving strategies
(Renkl & Atkinson, 2003)

1. adaptive feedback
2. feedback parameters
3. examples from the “Heidelberger MatheBrücke”
4. thinking further: activating feedback

feedback parameters + 1

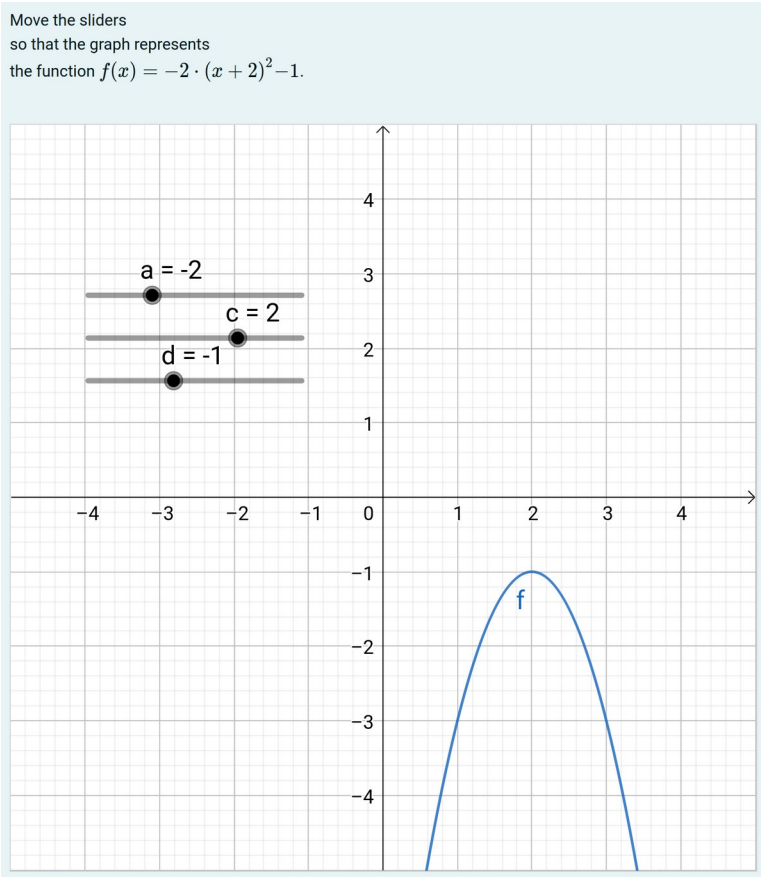
- content
- modality
- load
- language
- timing
- **activation**

idea

- turning receptive into active behaviour
- adding enactive to cognitive engagement

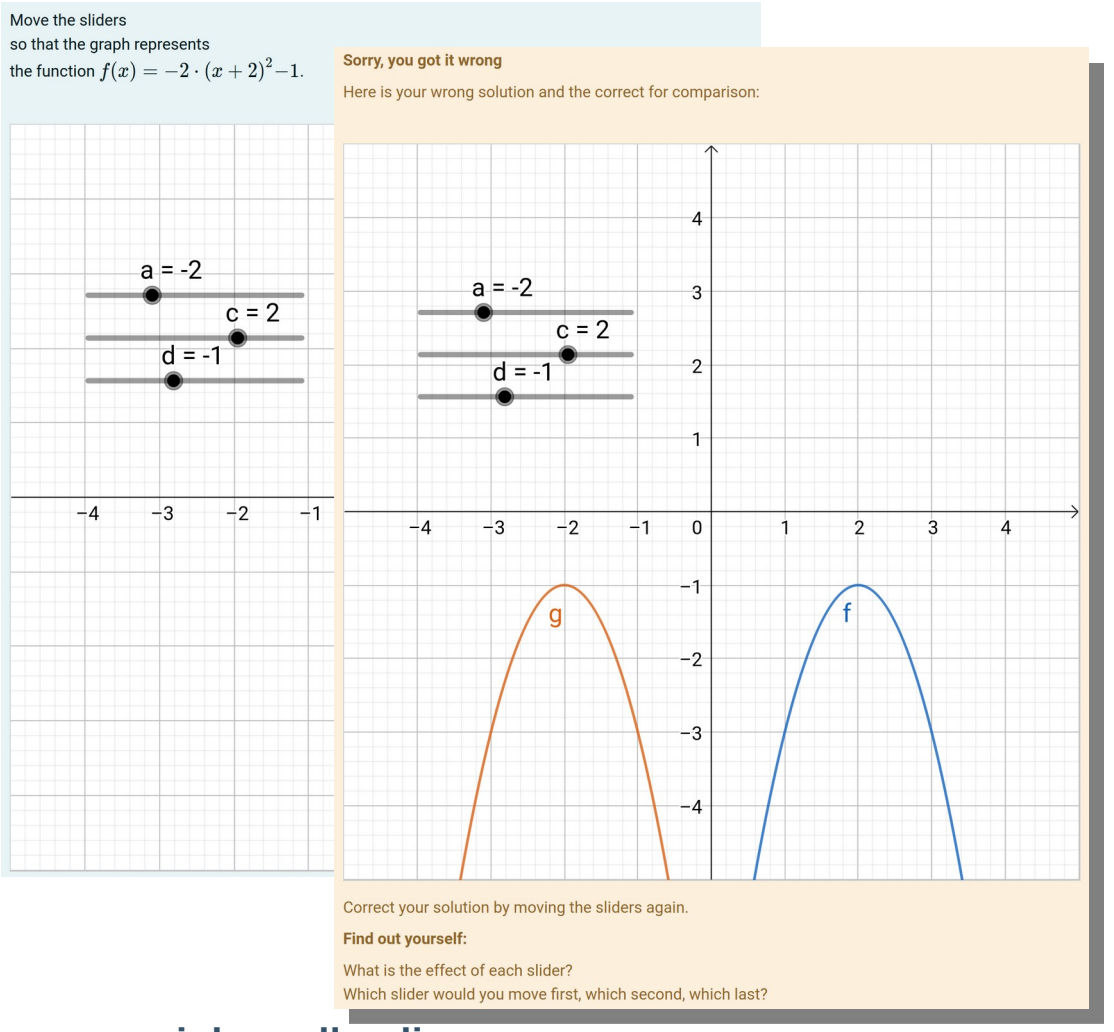
examples

- worked-out example
- thought provoking
- **activating**



examples

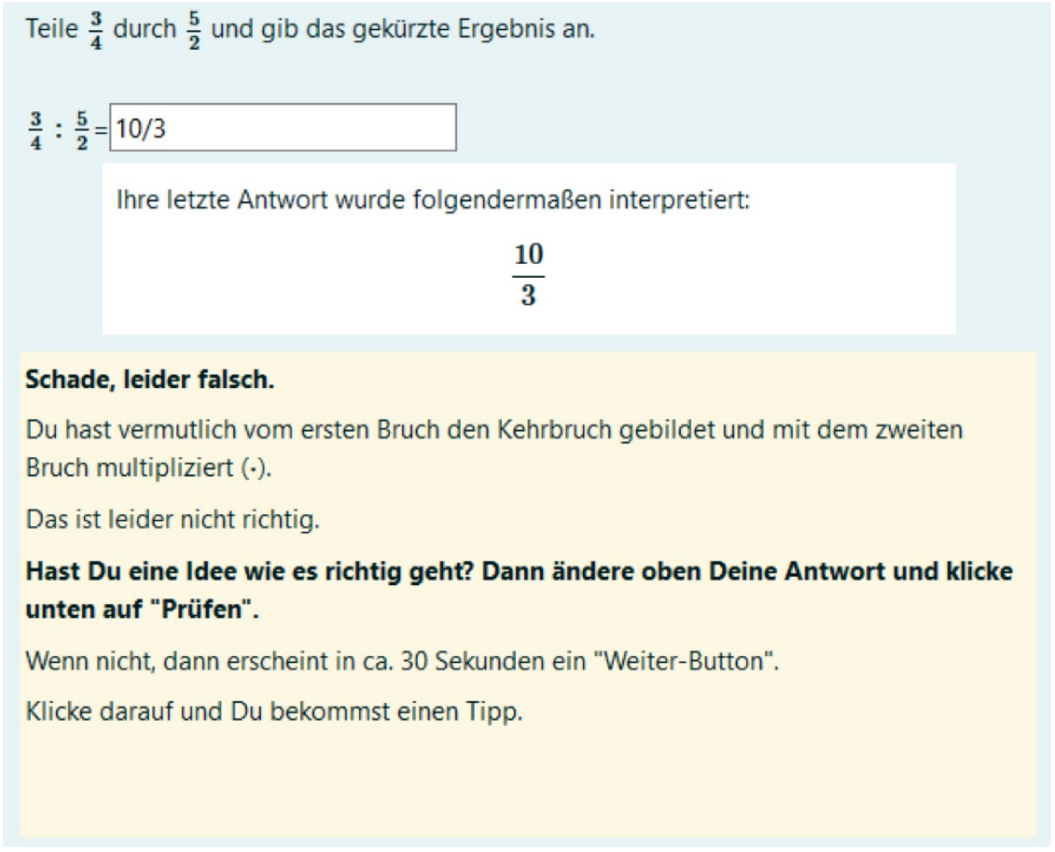
- worked-out example
- thought provoking
- **activating**



www.pinkernell.online

examples

- worked-out example
- thought provoking
- **activating**



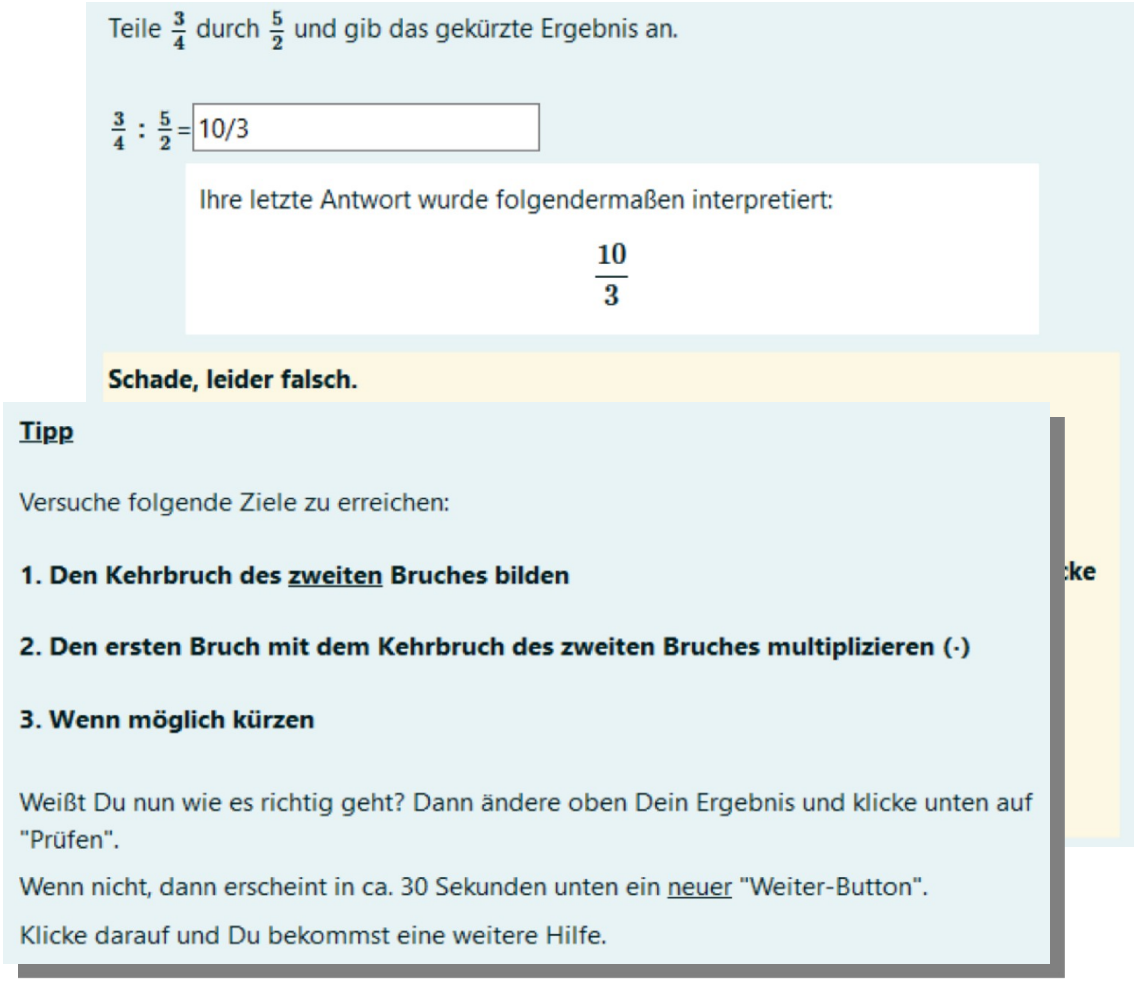
1. step
thought provoking
delay

www.pinkernell.online

Gulden, 2020

examples

- worked-out example
- thought provoking
- **activating**



1. step
thought provoking
delay

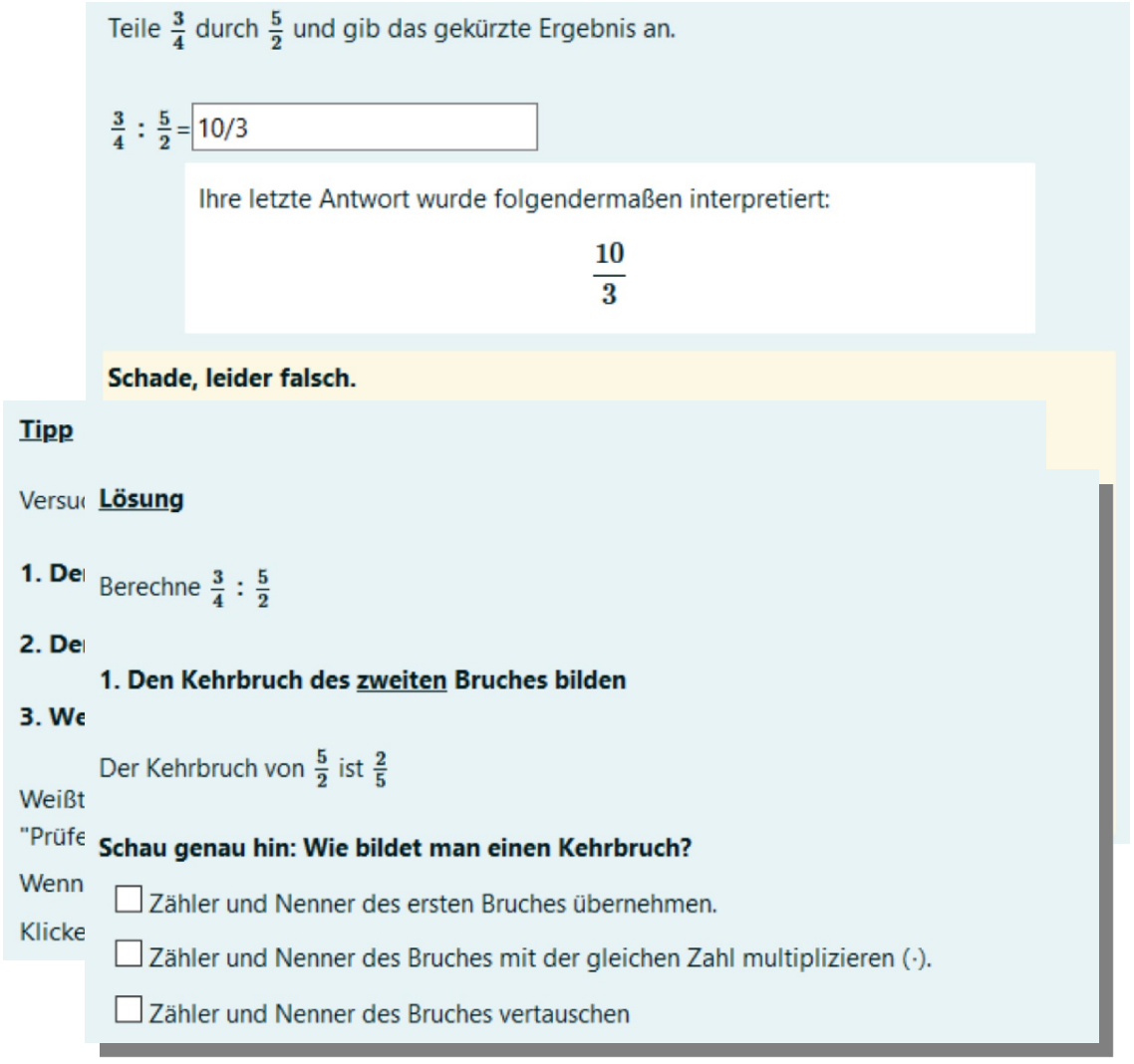
2. step
process information
delay

www.pinkernell.online

Gulden, 2020

examples

- worked-out example
- thought provoking
- **activating**



1. step
thought provoking
delay

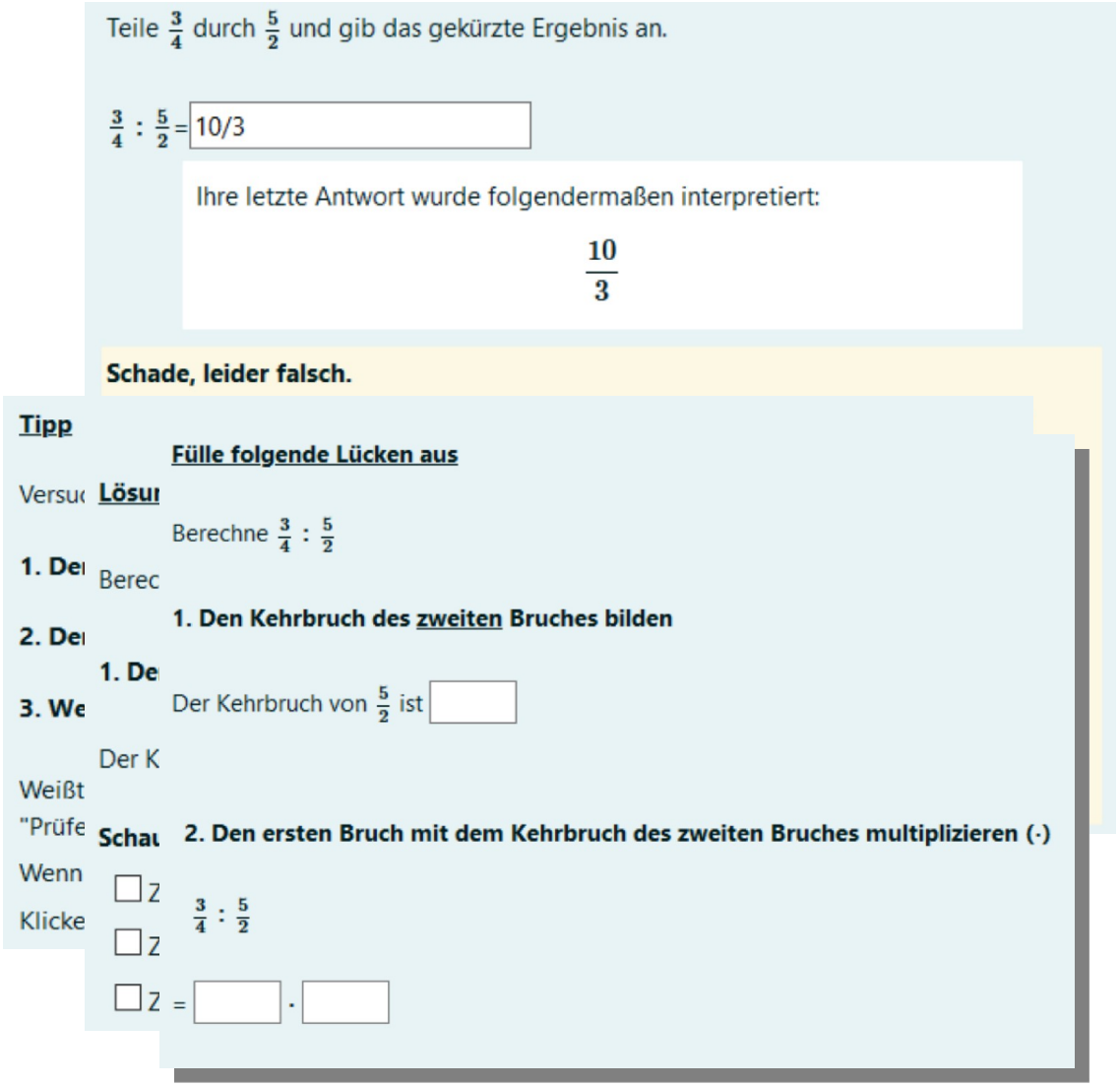
2. step
process information
delay

3. step a
prompts
or

Gulden, 2020

examples

- worked-out example
- thought provoking
- **activating**



1. step
thought provoking
delay

2. step
process information
delay

3. step a
prompts
or
step b
cloze worked-out example

Gulden, 2020

- content
- modality
- load
- language
- timing
- **activation**

idea

- turning receptive into active behaviour
- adding enactive to cognitive engagement

by means of

- interactive graphic applets
- cloze texts
- ...

feedback message

- “here is material
  to find out yourself
  how it is done correctly”

Thank you