

# How can digital systems help with differentiation in education?



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← Pick a reward and exercise:  
Next time you will get 4 new exercises.

$8 + X = 25$

Level: ★★★★

Reward: 1 ●

$X - 1 = -14$

Level: ★★★★

Reward: 2 ●●

$12 + X = 5$

Level: ★★★★

Reward: 1 ●

$-8 + X = -24$

Level: ★★★★

Reward: 2 ●●

Leerplangeboden

Week	Program
Week 1	...
Week 2	...
Week 3	...
Week 4	...
Week 5	...
Week 6	...
Week 7	...

Wat is de hoofdstad van de staat Florida?

Answer: Tallahassee

Quality of distractors: ● Good

Similarity scores

- Miami
- New York
- Los Angeles
- Limburg
- Noorwegen
- Zuidpool

### How is your new level determined?

Wiski estimates your level and the difficulty of exercises. Both change when solving exercises. Your level remained similar after solving the exercise series. Then, it increased even further because of your feedback.

Expert ●

Proficient ●

Competent ●

Advanced beginner ●

Novice ●

Solve more exercises on this topic | Return to exercise page

Question: Wat is de hoofdstad van de staat Florida?

Answer: Tallahassee

Quality of distractors: ● Good

Similarity scores

- Miami
- New York
- Los Angeles
- Limburg
- Noorwegen
- Zuidpool

Your mastery of skills in these exercises ↑ Sort

Exercise 1

Exercise 2

Exercise 3

Exercise 4

Solving this exercise will change your mastery as follows in the:

worst case | usual case | best case

Handle exercises like  $x = 3$  👑

Handle exercises like  $2x = 3$  👑

Handle exercises like  $2x + 4 = 3$  👑

Start

### Solve a recommended exercise of the same chapter

Recommended

- Exercise 37
- Exercise 26
- Exercise 21

Why this exercise? Wiski thinks your current level aligns with that of the exercise!

Wiski expects you will need 1 or 2 attempts to solve exercise 21, based on your results and those of your fellow students.

Solve exercise 21

... or pick your next exercise yourself

Go to the exercise overview

🤖 ● Novice I believe this is your level now for the following subject: Coordinates in space.

What difficulty level would you like for the next exercise series?

Very easy | Easy | **Novice** | Difficult | Very difficult

If you finish all exercises correctly, your level will increase:

Expert ●

Proficient ●

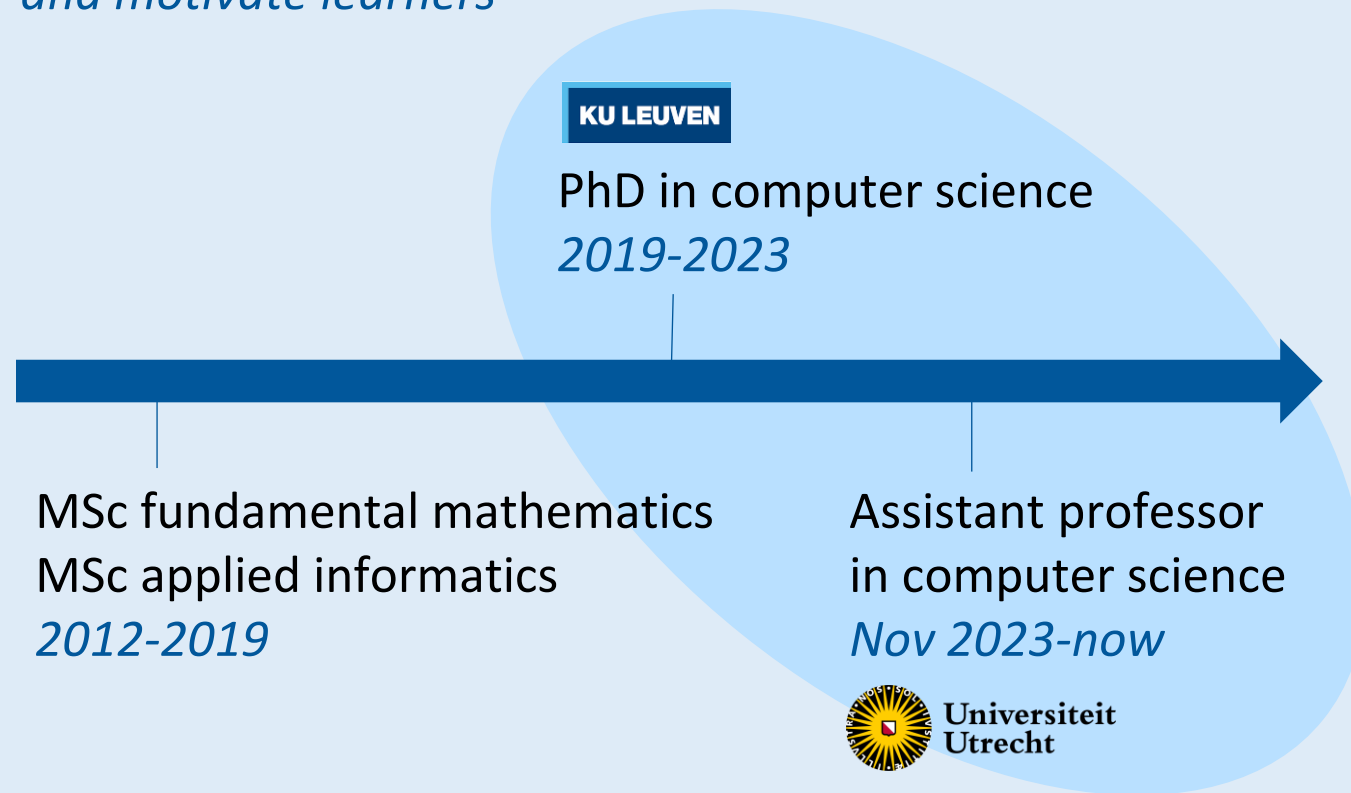
Competent ● Your level after completion

Advanced beginner ●

Novice ● Your level now

# My (professional) life in 1 slide

*Explainable and controllable AI systems to personalise education and motivate learners*



**Jeroen Ooge**  
jeroenooge.be

# How can digital systems help with **differentiation** in education?

WTF is dit?

← Pick a reward and exercise:  
Next time you will get 4 new exercises

$8 + X = 25$ Level: <span style="color: green;">●●●</span> Reward: 1 ●	$X - 1 = -14$ Level: <span style="color: green;">●●●</span> Reward: 2 ●●
$12 + X = 5$ Level: <span style="color: green;">●●●</span> Reward: 1 ●	$-8 + X = -24$ Level: <span style="color: green;">●●●</span> Reward: 2 ●●

Level: ●●●

Number of solved exercises: 10

Exercise 1: ●●●

Exercise 2: ●●●

Exercise 3: ●●●

Exercise 4: ●●●

### How is your new level determined?

Wiski estimates your level and the difficulty of exercises. Both change when solving exercises. Your level remained similar after solving the exercise series. Then, it increased even further because of your feedback.

Expert	●
Proficient	●
Competent	●
Advanced beginner	●
Novice	●

Solve more exercises on this topic | Return to exercise page

Question: Wat is de hoofdstad van de staat Florida?

Difficulty level: ●●●

Options: Miami, New York, Los Angeles, Limburg, Noorwegen, Zuidpool

Your mastery of skills in these exercises: Sort

Exercise 1	<span style="width: 80%;"></span>
Exercise 2	<span style="width: 60%;"></span>
Exercise 3	<span style="width: 40%;"></span>
Exercise 4	<span style="width: 20%;"></span>

Solving this exercise will change your mastery as follows in the:

Worst case | **Usual case** | Best case

Handle exercises like  $x = 3$  ●

Handle exercises like  $2x = 3$  ●

Handle exercises like  $2x + 4 = 3$  ●

Start

### Solve a recommended exercise of the same chapter

Recommended: Exercise 27, Exercise 28, Exercise 21

Why this exercise? Wiski thinks your current level might well fit that of the exercise! Wiski expects you will need 1 or 3 attempts to solve exercise 21, based on your results and those of your fellow students.

Solve exercise 21

... or pick your next exercise yourself

Go to the exercise overview

Novice | I believe this is your level now for the following subject: Coördinaten in space

What difficulty level would you like for the next exercise series?

Very easy | Easy | **Intermediate** | Difficult | Very difficult

If you finish all exercises correctly, your level will increase:

Expert | Proficient | Competent | **Advanced beginner** | Novice

Your level after completion: ●●●

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# The non-differentiated (usual?) way



# What teachers might expect



*teacher*



*learning content*



*one-size-fits-all approach works for everyone*

# Reality



*teacher*

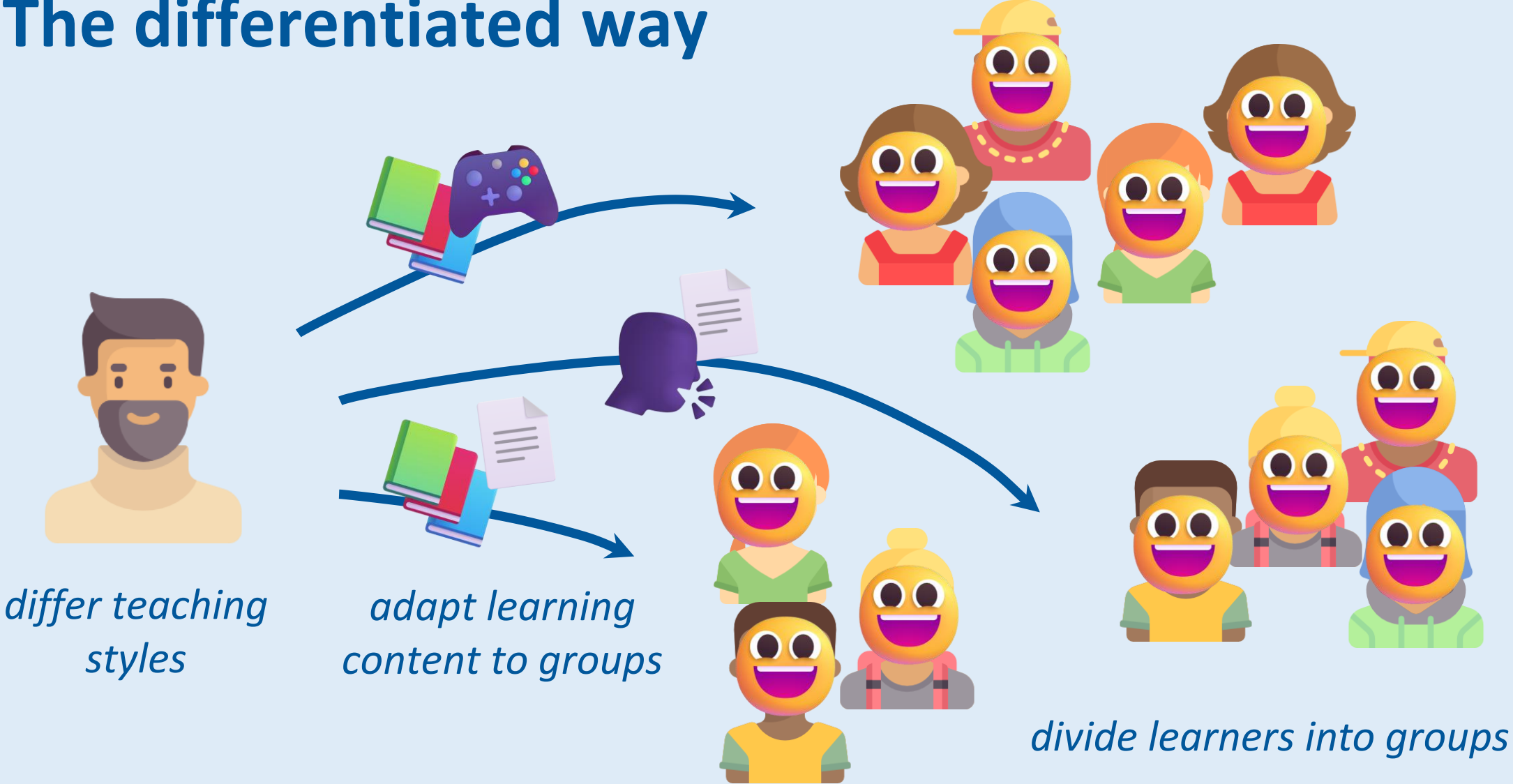


*learning content*



*effectiveness depends on abilities, interests, background...*

# The differentiated way



# What is differentiation (formally)?

“dividing students into groups or classes based on their assessed abilities and aptitudes ... is assumed to increase the teacher’s opportunities to adapt the teaching to the students”



differentiate  
teachers

differentiate  
content

differentiate  
students

# What is differentiation (formally)?

Differentiation as individualisation

Differentiation as adaptation to specific groups

Differentiation as adaptations within diverse classrooms

Differentiation in a system perspective

# What is differentiation (formally)?

## Differentiation as individualisation

= “adapt the curriculum, tasks, and teaching to students’ individual abilities”

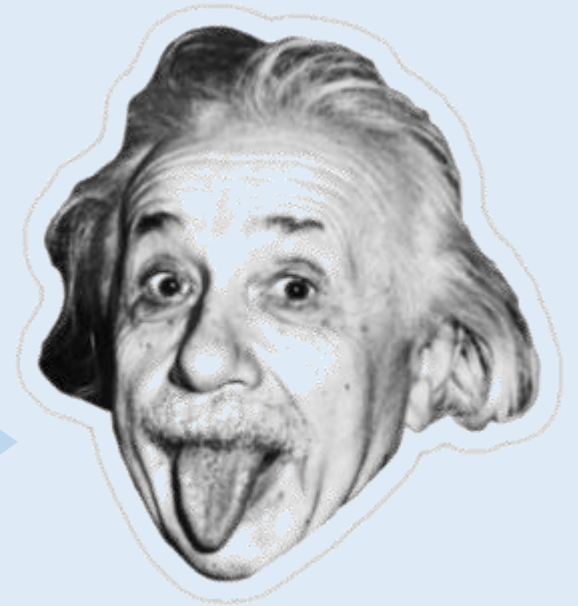
= personalisation

Differentiation as adaptation to sp

Differentiation as adaptations with

Differentiation in a system perspec

“enable all students to meet high standards and ... provide optimal conditions for learning and progress”



# How can digital systems help with differentiation\* in education?

\*in the sense of individualisation/personalisation

Make learning experiences more  
**1** adaptive, **2** transparent, and **3** motivating



## How can digital systems help with differentiation?

1

Adaptation

2

Transparency

3

Motivation

## How can digital systems help with differentiation?



*About fake whiskey, Elo ratings,  
and spying dashboards*



**Goed gewerkt!**

**Maak een aangeraden oefening van hetzelfde hoofdstuk**

**Aangeraden**

- Oefening 32
- Oefening 42
- Oefening 3

Waarom deze oefening? Wiski denkt dat jouw huidige niveau past bij dat van deze oefening!  
Wiski verwacht dat je 1 of 2 pogingen nodig gaat hebben om oefening 32 juist te maken, gebaseerd op de resultaten van jou en je medeleerlingen.

Aantal pogingen medeleerlingen nodig hadden om oefening 32 juist op te lossen

Maak oefening 32

... of kies zelf je volgende oefening

Naar het oefeningenoverzicht

**WISKI** Oefenen Helpen Oefeningen overzicht

Selecteer een Badge om te tonen aan jouw klasgenoten

1/5  
2/5  
2/5  
1/5

**gevorderde beginner** Volgens mij is dit nu je level voor het onderwerp Hoofdbewerkingen

Welke moeilijkheidsgraad wil je voor de volgende oefeningreeks?

Heer makkelijk Makkelijk Gewoon Moeilijk Heer moeilijk

Als je alle oefeningen in de reeks juist oplost, dan stijgt je level:

- Expert
- Bedreven
- Competent
- Gevorderde beginner
- Beginner

Start de reeks

Op volgende van: Hoog naar laag

Nummer	Verwachte moeilijkheidsgraad voor jou
Oefening 43	Makkelijk
Oefening 42	Makkelijk
Oefening 41	Makkelijk
Oefening 40	Moeilijk
Oefening 39	Makkelijk
Oefening 38	Makkelijk
Oefening 37	Makkelijk
Oefening 36	Makkelijk
Oefening 35	Makkelijk
Oefening 34	Makkelijk

**WISKI**

Schakel hier technieken in die jou motiveren om Wiski te gebruiken. Schakel de andere uit.

**Punten**

Verdien punten voor juist opgeloste oefeningen en verlies punten voor fout opgeloste oefeningen. Jij en anderen zien je puntentotaal op je profiel.

**Puntenklassering**

Vergelijk je puntentotaal met dat van anderen op een klasseringpagina. Er zijn twee klasseringen: 'deze week' en 'aller tijden'.

**Oefeningenklassering**

Vergelijk je aantal juist opgeloste oefeningen met dat van anderen op een klasseringpagina. Er zijn twee klasseringen: 'deze week' en 'aller tijden'.

Day streak

**How good do you think you are at mathematics?**

There is no right or wrong answer. Wiski uses your answer to find suitable exercises for you.

- Expert: mathematics holds no secrets for you.
- Proficient: you score better than average on mathematics.
- Competent: you score average on mathematics.
- Advanced beginner: basic exercises are not a problem for you.
- Novice: you often have a hard time understanding mathematics.

Submit

Hoofdbewerkingen

Gefeliciteerd Pri(s)ma resultaat!

Maak een oefening correct om een challenge voor jezelf te stellen

Volgzaam

# WISKI

personalised maths practice with AI

**WISKI** Oefenen

Kies het onderwerp waarover je wilt oefenen. Er start dan een reeks met 3 oefeningen over dat onderwerp.

**Natuurlijke getallen**

Hoofdbewerkingen  
Volgde van bewerkingen

**Gehele getallen**

Volgde van bewerkingen  
Eigenschappen van de hoofdbewerkingen  
Eerstegraadsvergelijkingen  
Rekenen met lettervormen  
Machten

**Basisbegrippen meetkunde**

Coördinaten in de ruimte  
Hoeken  
Omrek en oppervlakte van vlakke figuren

**WISKI** Oefenen Helpen Oefeningen overzicht

**Badge Vooruitgang**

0 10 20 1772 Badges

**Challenge Badges**

0 0 1

**Badge Overzicht**

Delen van oplossingen (2/4)

Medestudenten helpen (1/2)

Hang in behouden badges

Reeds behaalde badges

0/5  
2/5  
0/5

**How is your new level determined?**

Wiski estimates your level and the difficulty of exercises. Both change when solving exercises. Your level remained similar after solving the exercise series. Then, it increased even further because of your feedback.

Before series After series

Expert

Proficient

Competent

Advanced beginner

Novice

Volgorde van bewerkingen



$6 \cdot (-12) + 36 \cdot 2 = \dots$  Bereken en tik de juiste oplossing aan.

- 0
- 144
- 72
- 144



**Correct**

Top-zl

Overslaan

Volgende



expert

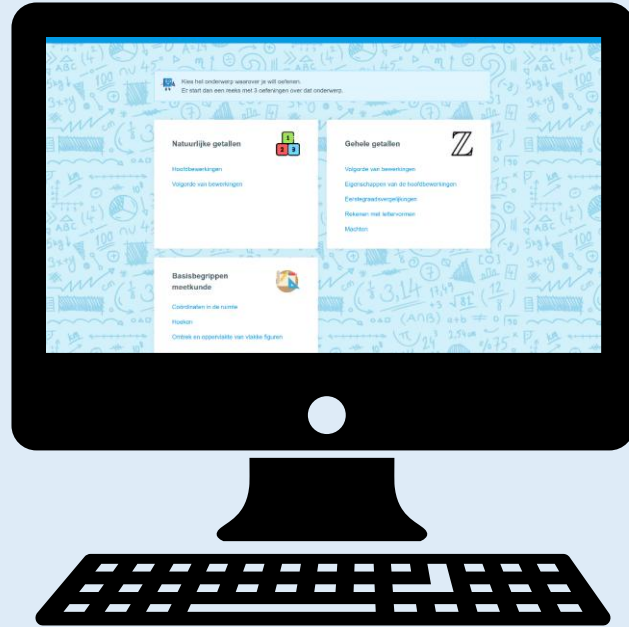


competent

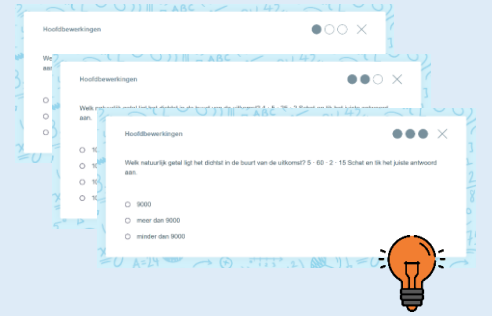
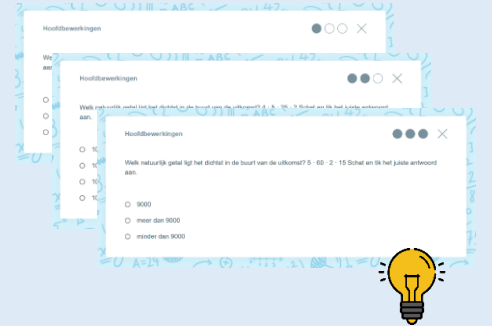


beginner

$$\sqrt{x} + \int dx + \pi$$



Recommender system



# Estimating mastery and difficulty with Elo ratings

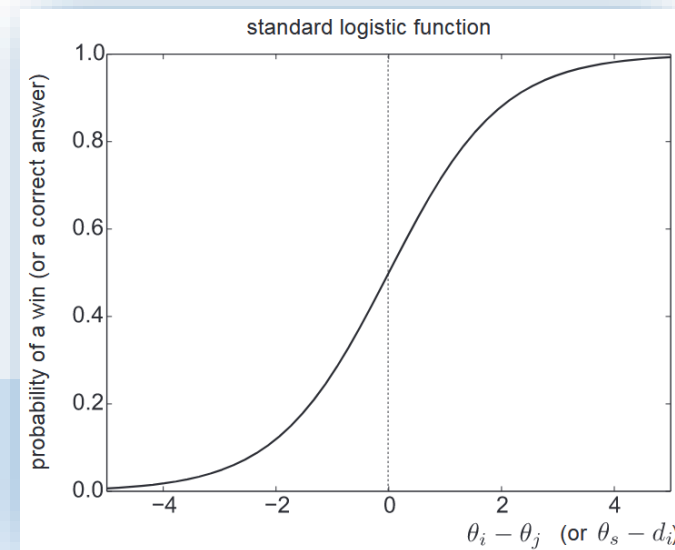
## 2.2. The Elo rating system in an educational setting

To apply the Elo rating system in the context of educational systems, we interpret a student's answer to an item as a match between the student and the item. In this context it is natural to slightly change the notation while keeping the basic principle the same. We denote **skill of a student  $s$  as  $\theta_s$** , **difficulty of an item  $i$  as  $d_i$** , and the correctness of an answer of a student  $s$  on an item  $i$  as  $\text{correct}_{si} \in \{0,1\}$ . The probability of a correct answer is given by the logistic function with respect to the difference between skill and difficulty (Fig. 1 left):

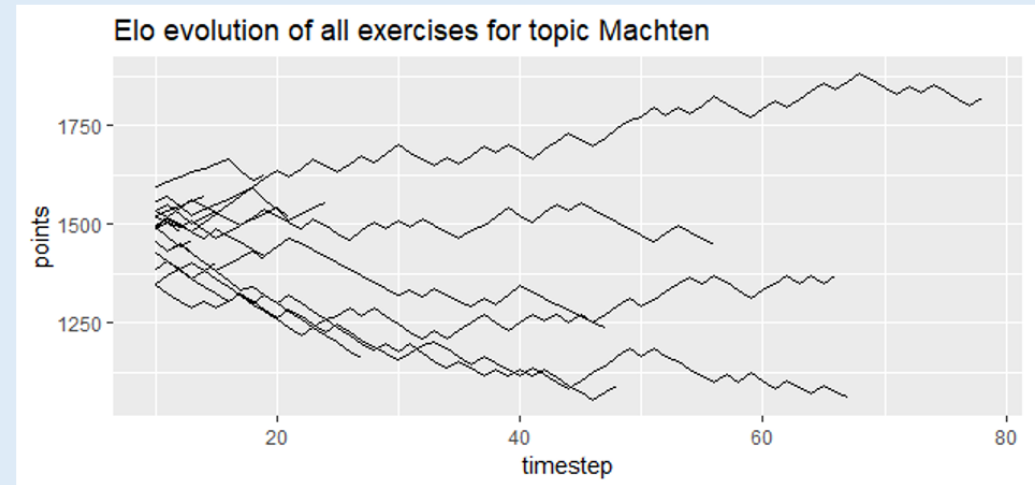
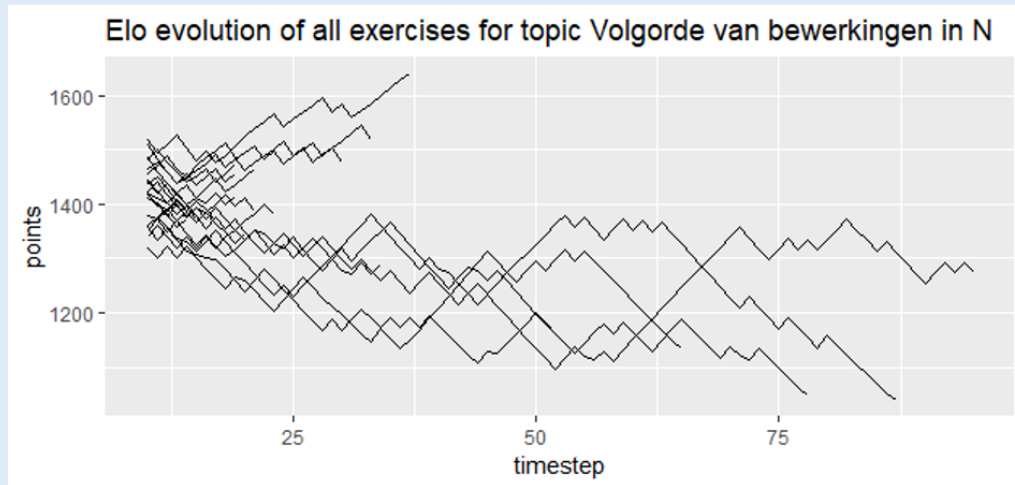
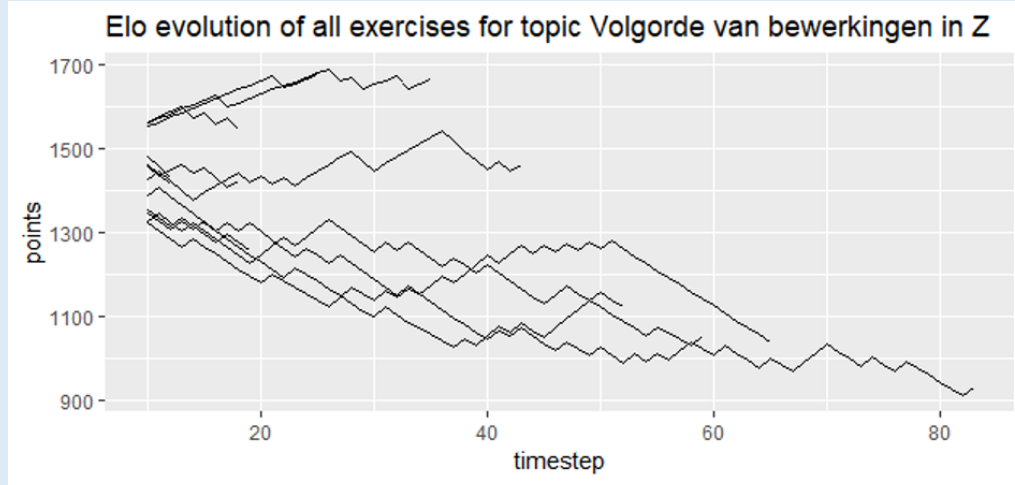
$$P(\text{correct}_{si} = 1) = 1 / (1 + e^{-(\theta_s - d_i)})$$

The skill and difficulty estimates are updated as follows:

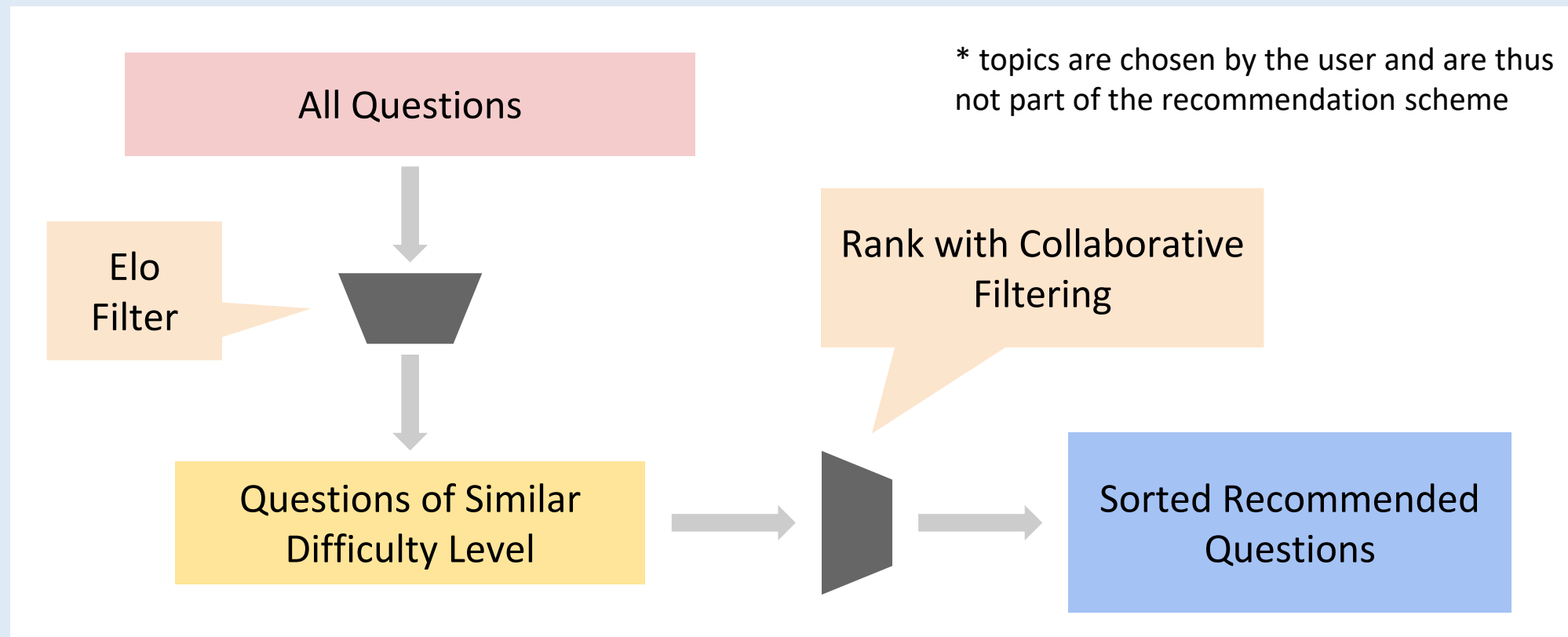
$$\begin{aligned}\theta_s &:= \theta_s + K \cdot (\text{correct}_{si} - P(\text{correct}_{si} = 1)) \\ d_i &:= d_i + K \cdot (P(\text{correct}_{si} = 1) - \text{correct}_{si})\end{aligned}$$



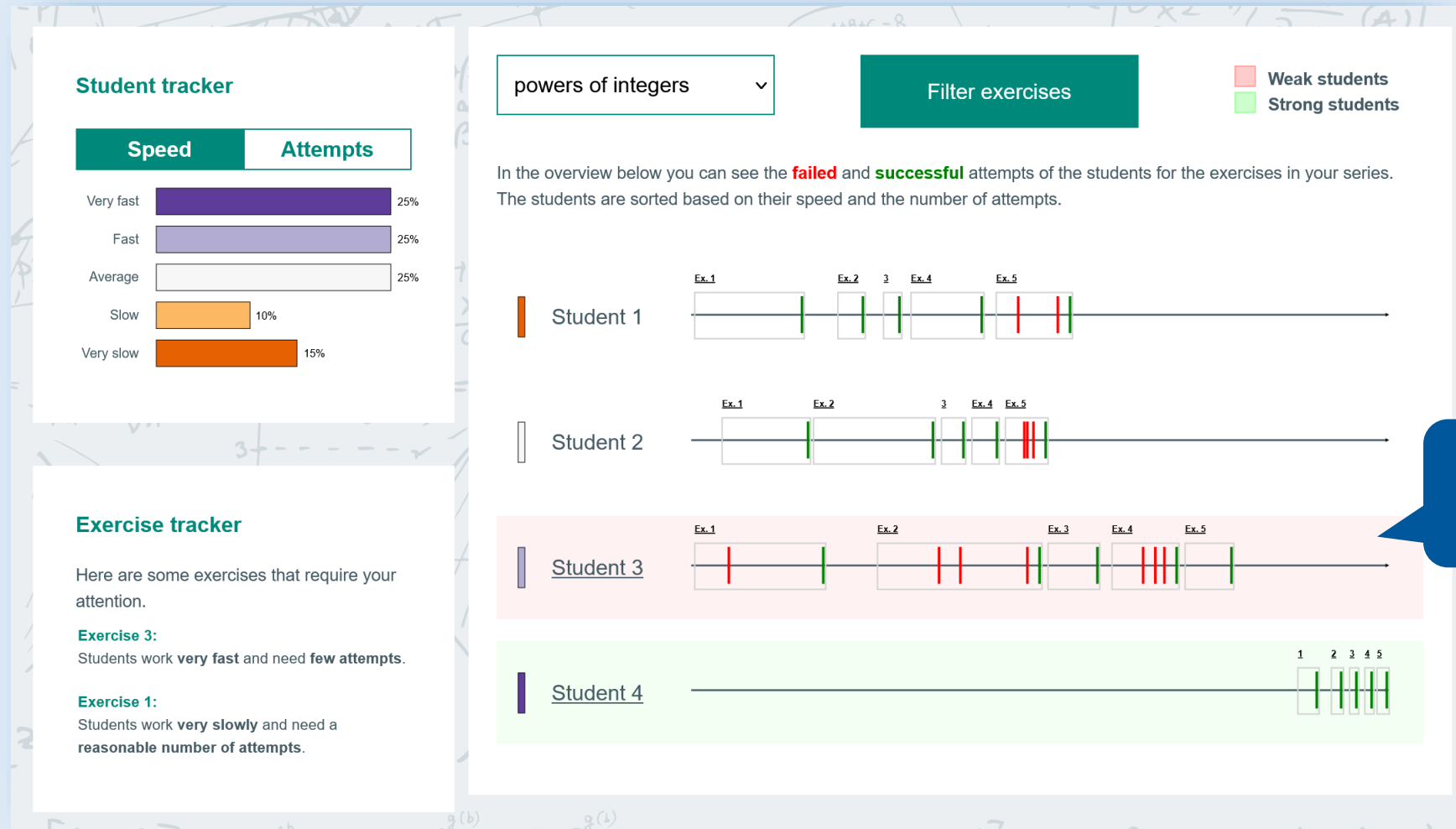
# Elo ratings going crazy



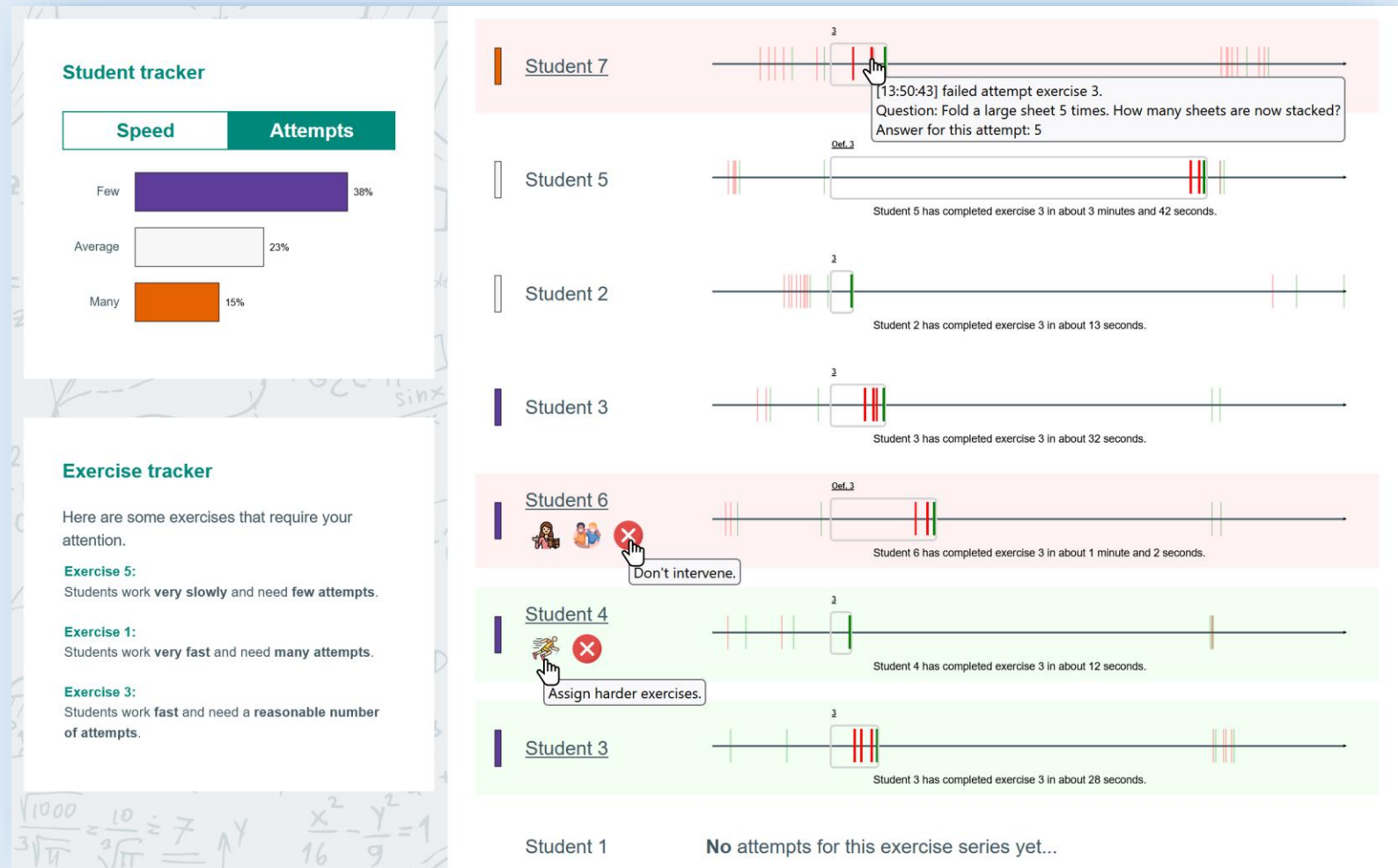
# Recommending with Elo and collaborative filtering



# Monitoring dashboard for teachers



# Monitoring dashboard for teachers





TIME FOR

QUESTIONS



How can digital systems differentiate  
with **adaptation** in universities?



## How can digital systems help with differentiation?

1

Adaptation

*About fake whiskey, Elo ratings,  
and spying dashboards*

2

Transparency

3

Motivation



## How can digital systems help with differentiation?

1

Adaptation

2

Transparency

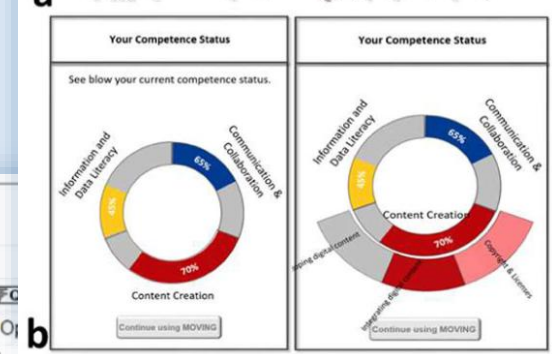
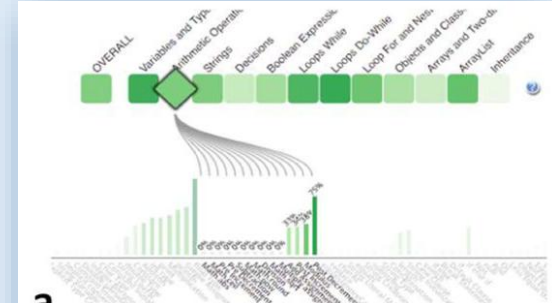
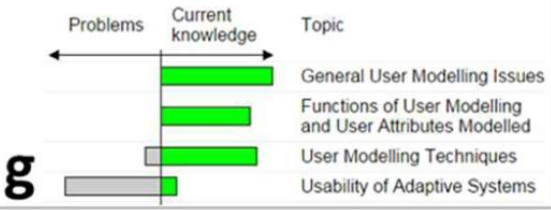
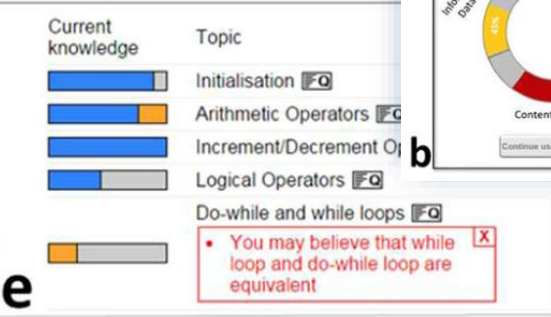
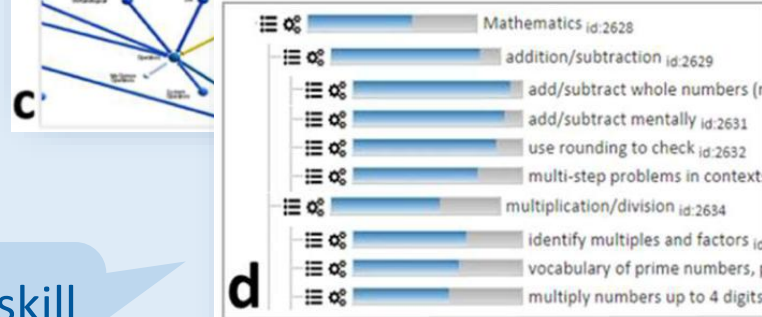
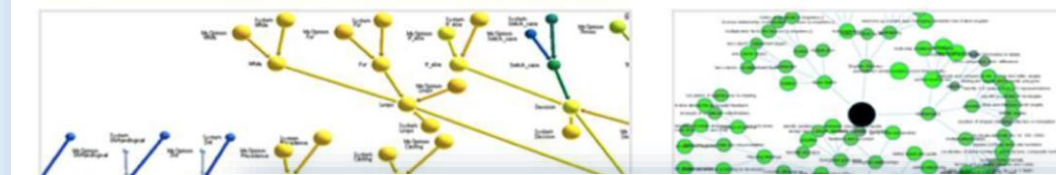
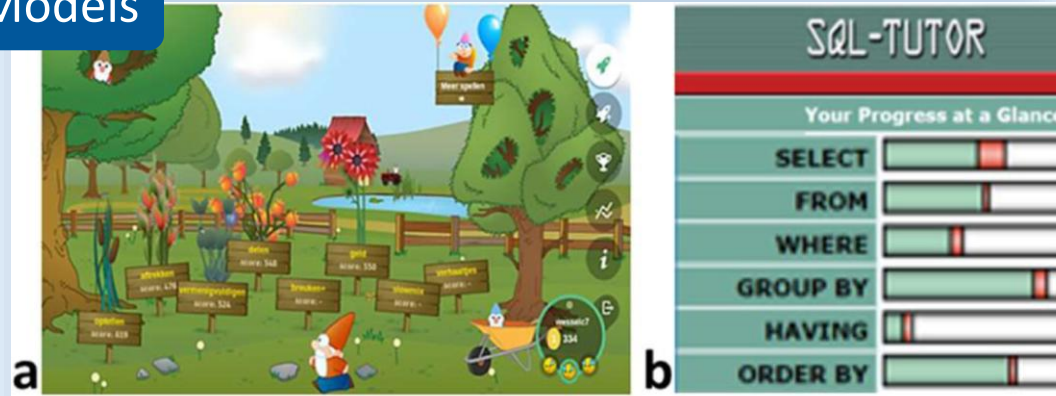
3

Motivation

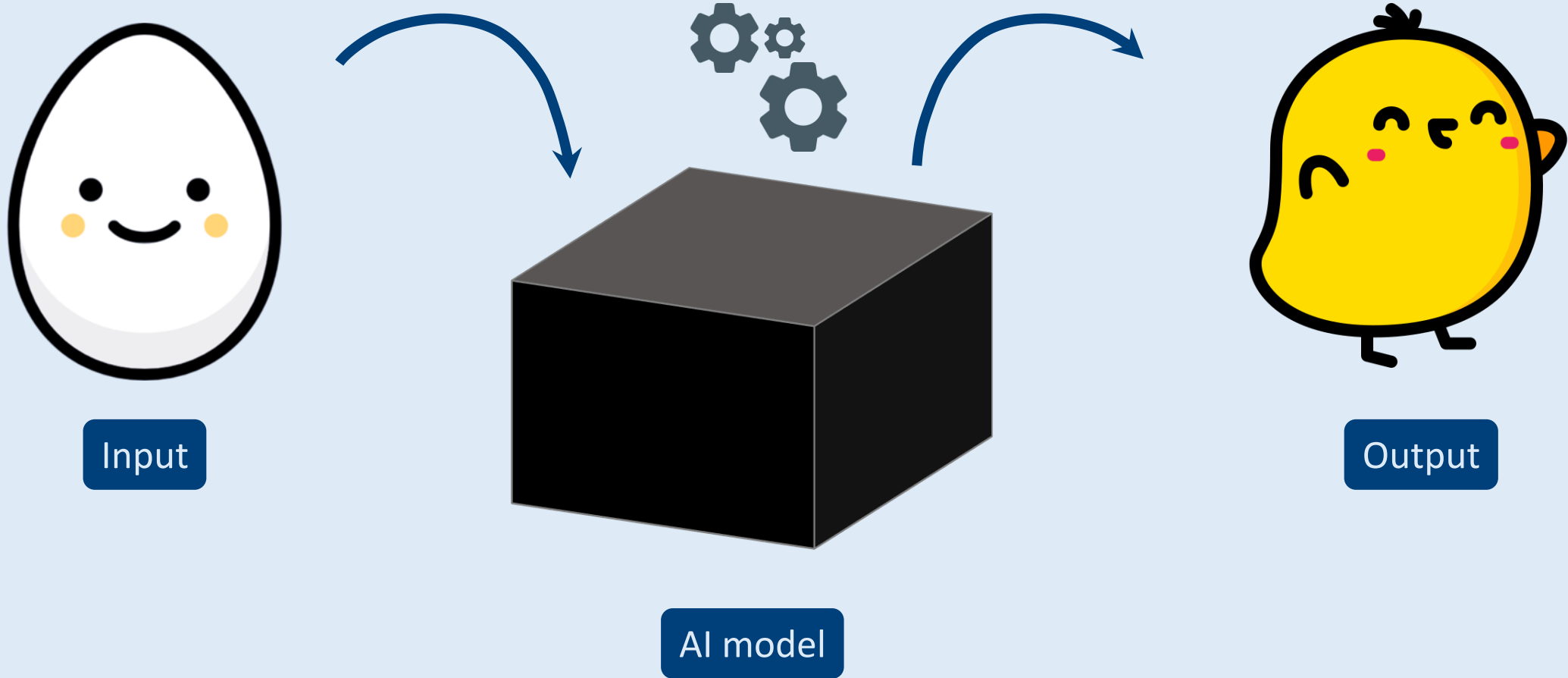
*About seeing what you master  
and explaining AI decisions*



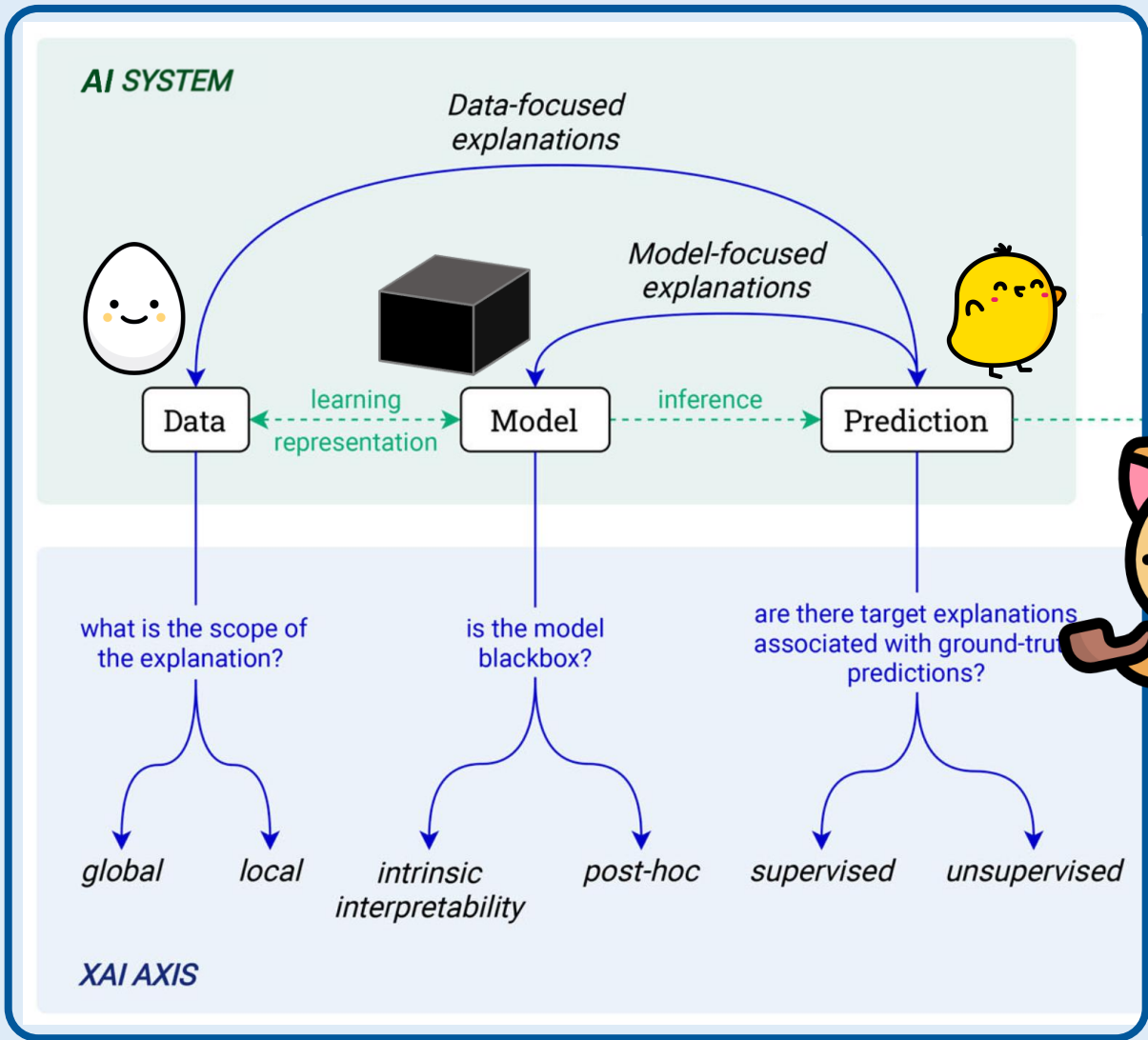
# Open Learner Models



Algorithmic skill estimation



# Algorithmic Explainability



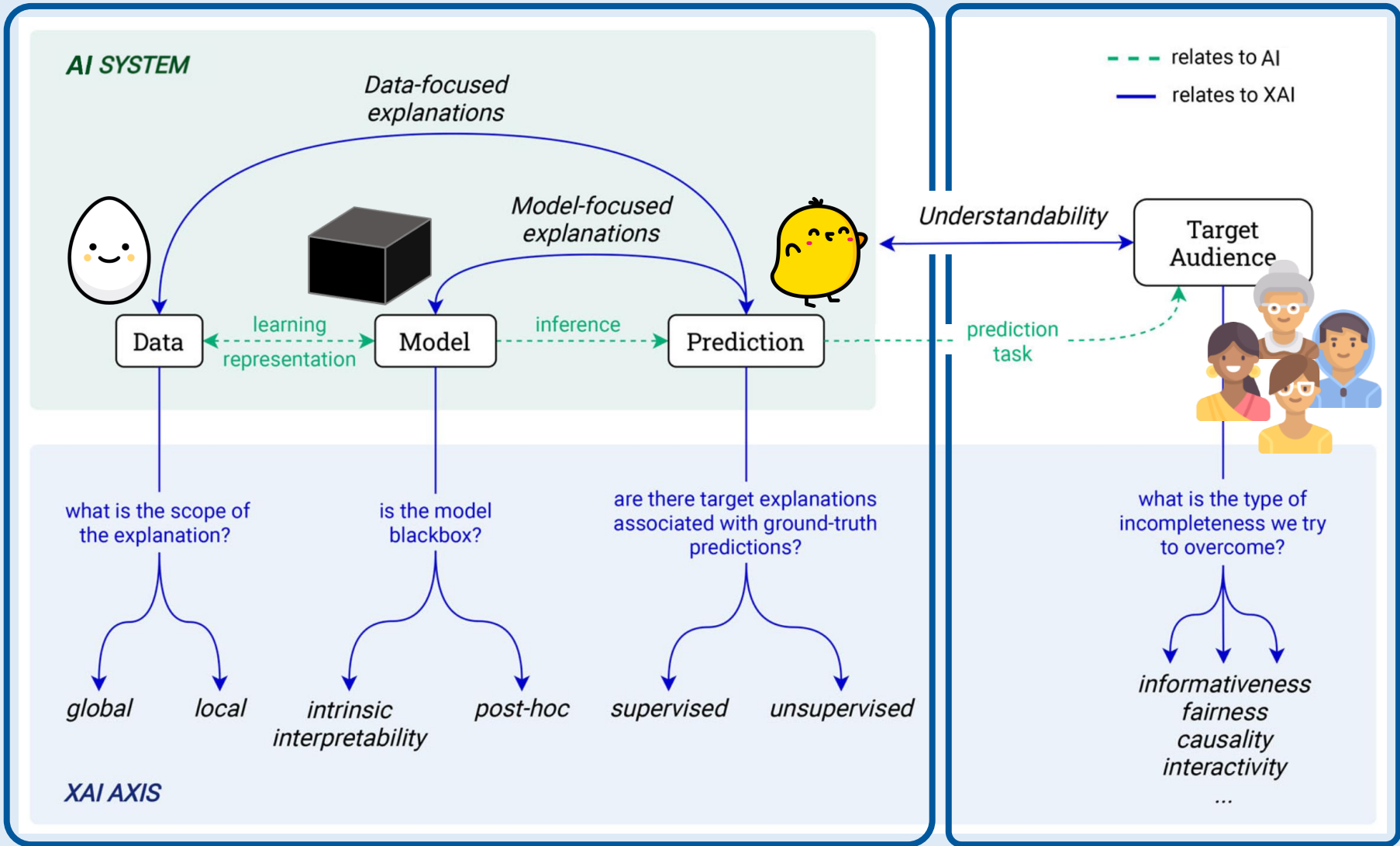
Which explanation do we use?

Who is the audience?

What is their context?

# Algorithmic Explainability

# Human-Centred Explainability





## Human-Centred Explainability

**Design** explanations for a specific audience and **evaluate** how they affect behaviour (e.g., trust, understanding, motivation, learning)

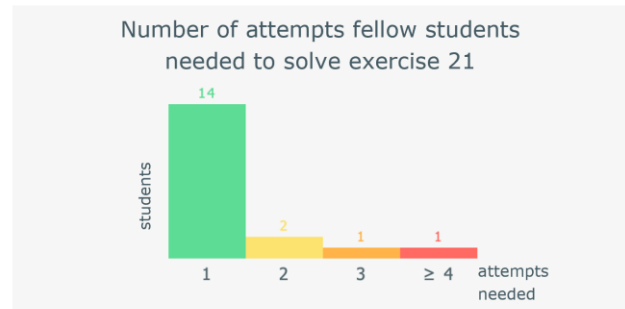
## Solve a recommended exercise of the same chapter

### Recommended

-  Exercise 37
-  Exercise 26
-  Exercise 21

**Why this exercise?** Wiski thinks your current level aligns with that of the exercise!

Wiski expects you will need **1 or 2 attempts** to solve exercise 21, based on your results and those of your fellow students.



Solve exercise 21

... or pick your next exercise yourself

Go to the exercise overview

Textual explanation

Visual explanation

Justify *why* a specific exercise was recommended by the algorithm

Goed gewerkt!

**Maak een aangeraden oefening van hetzelfde hoofdstuk**

Aangeraden

- Oefening 4
- Oefening 11
- Oefening 7

**Waarom deze oefening?** Wiski denkt dat jouw huidig niveau past bij dat van deze oefening!

Wiski verwacht dat je **1 of 2 pogingen** nodig gaat hebben om oefening 4 juist te maken, gebaseerd op de resultaten van jou en je medeleerlingen.



Maak oefening 4

... of kies zelf je volgende oefening

Naar het oefeningenoverzicht

Justify *why* a specific exercise was recommended by the algorithm

# Designing explanations requires iterating

Hoe kiezen wij de aangeraden oefening voor jou?

Step 1/3  
Wij zoeken naar studenten die gelijkaardige resultaten behalen als jou.  
Met gelijkaardige resultaten bedoelen we dat deze studenten dezelfde oefeningen juist of fout hadden als jou.

Step 2/3  
Wij bekijken dan hoe zij presteerden op de oefeningen die jij nog niet gemaakt hebt.

Step 3/3  
Op basis van deze informatie kiezen wij de nuttigste oefening uit voor jou.

Verwachte slaagkans voor jou: Oef 1: 100%, Oef 3: 33%, Oef 5: 66%.  
Aangeraden: Oefening 5.

VORIGE PAGINA | IK SNAP HET

Tutorial for full transparency  
9 think-aloud studies

Oefening 5 voltooid! Jij had 1 poging nodig.

De volgende oefeningen zijn aangeraden voor jou!

Aangeraden: Oefening 25. Waarom? 57% van je medestudenten met gelijkaardige prestaties hadden deze vraag vóór de eerste poging juist!

Hoeveel pogingen hebben gelijkaardige studenten nodig? Oef 25: 1 (100%), 2 (40%), 3 (20%), 4 (10%), 5 (10%).

Uitdaging Nodig? Oefening 19. Hoeveel pogingen hebben gelijkaardige studenten nodig? Oef 19: 1 (20%), 2 (40%), 3 (20%), 4 (10%), 5 (10%).

1/3 aangeraden oefeningen

Ik kies zelf mijn volgende oefening | Terug naar Oefeningenoverzicht

Single-screen explanation  
7 think-aloud studies

Solve a recommended exercise of the same chapter

Recommended: Exercise 37, Exercise 26, Exercise 21.

Why this exercise? Wiski thinks your current level aligns with that of the exercise!  
Wiski expects you will need 1 or 2 attempts to solve exercise 21, based on your results and those of your fellow students.

Number of attempts fellow students needed to solve exercise 21: 1 (14), 2 (2), 3 (1), 4 (1).

Solve exercise 21

... or pick your next exercise yourself  
Go to the exercise overview

Final explanation interface  
4 think-aloud studies

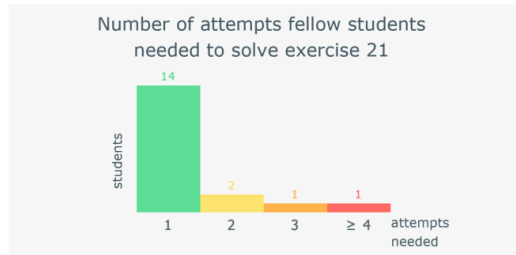
## Solve a recommended exercise of the same chapter

### Recommended

- Exercise 37
- Exercise 26
- Exercise 21

**Why this exercise?** Wiski thinks your current level aligns with that of the exercise!

Wiski expects you will need **1 or 2 attempts** to solve exercise 21, based on your results and those of your fellow students.



Solve exercise 21

... or pick your next exercise yourself

Go to the exercise overview

Real explanation

## How was trust in the platform affected?

## Solve a recommended exercise of the same chapter

### Recommended

- Exercise 37
- Exercise 26
- Exercise 21

### Why this exercise?

Exercise 21 is recommended because Wiski's algorithm computed it this way



Solve exercise 21

... or pick your next exercise yourself

Go to the exercise overview

Placebo explanation

## Solve a recommended exercise of the same chapter

### Recommended

- Exercise 37
- Exercise 26
- Exercise 21

### Wiski recommends this next exercise



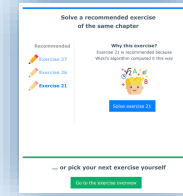
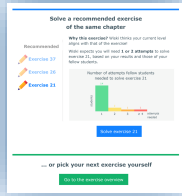
Solve exercise 21

... or pick your next exercise yourself

Go to the exercise overview

No explanation

# How was trust in the platform affected?



## Real vs no explanation

## Placebo vs no explanation

trust increased

trust increased

trust unchanged

trust unchanged

trust decreased

trust decreased

## Solve a recommended exercise of the same chapter

### Recommended

 Exercise 37

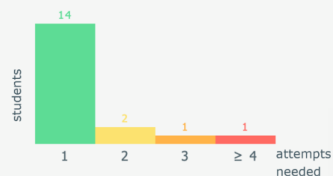
 Exercise 26

 Exercise 21

**Why this exercise?** Wiski thinks your current level aligns with that of the exercise!

Wiski expects you will need **1 or 2 attempts** to solve exercise 21, based on your results and those of your fellow students.

Number of attempts fellow students needed to solve exercise 21



Solve exercise 21

**Visual explanations can increase initial trust** but may not be the most important factor for building it

## Solve a recommended exercise of the same chapter

### Recommended

 Exercise 37

 Exercise 26

 Exercise 21

### Why this exercise?

Exercise 21 is recommended because Wiski's algorithm computed it this way



Solve exercise 21

... or pick your next exercise yourself

[Go to the exercise overview](#)

## Solve a recommended exercise of the same chapter

### Recommended

 Exercise 37

 Exercise 26

 Exercise 21

### Wiski recommends this next exercise



Solve exercise 21

... or pick your next exercise yourself

[Go to the exercise overview](#)

# What-if explanations

## Best Case



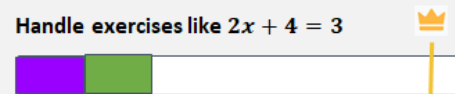
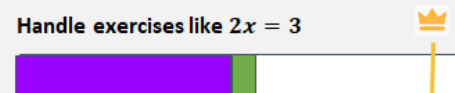
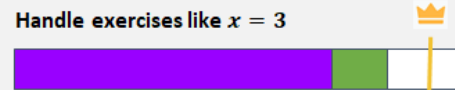
Based on your mastery levels, I selected an exercise about these skills:

Show your mastery changes in the

worst case

usual case

best case



Start

## Usual Case



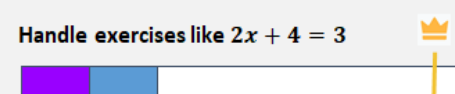
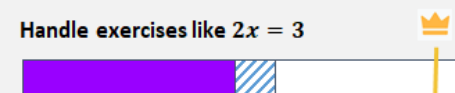
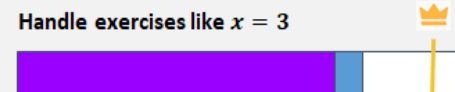
Based on your mastery levels, I selected an exercise about these skills:

Show your mastery changes in the

worst case

usual case

best case



Start

## Worst Case



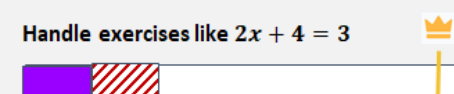
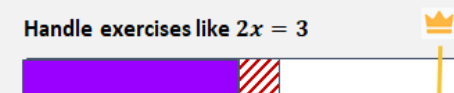
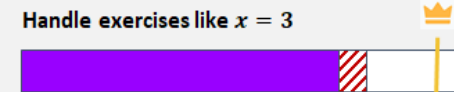
Based on your mastery levels, I selected an exercise about these skills:

Show your mastery changes in the

worst case

usual case


best case



Start

# Sharing control with recommender systems

### Full AI Control



Based on your mastery levels, I selected an exercise about these skills:

Show your mastery changes in the

worst case usual case best case


Handle exercises like  $x = 3$

Handle exercises like  $2x = 3$

Handle exercises like  $2x + 4 = 3$

Start

### Shared Control



Select the skill(s) you want to practice next

Handle exercises like  $2x = 3$

Handle exercises like  $x = 3$


Handle exercises like  $2x + 4 = 3$

I found an exercise. The bars show how your mastery would change in the

worst case usual case best case

Start

### Full Learner Control



Select the exercise you want to solve next

Your mastery of skills in these exercises

Exercise 1

Exercise 2

Exercise 3

Exercise 4

Solving this exercise will change your mastery as follows in the:

worst case usual case best case

Handle exercises like  $x = 3$

Handle exercises like  $2x = 3$

Handle exercises like  $2x + 4 = 3$

Start



TIME FOR

QUESTIONS



How can digital systems differentiate with **transparency** in universities?



## How can digital systems help with differentiation?

1

Adaptation

2

Transparency

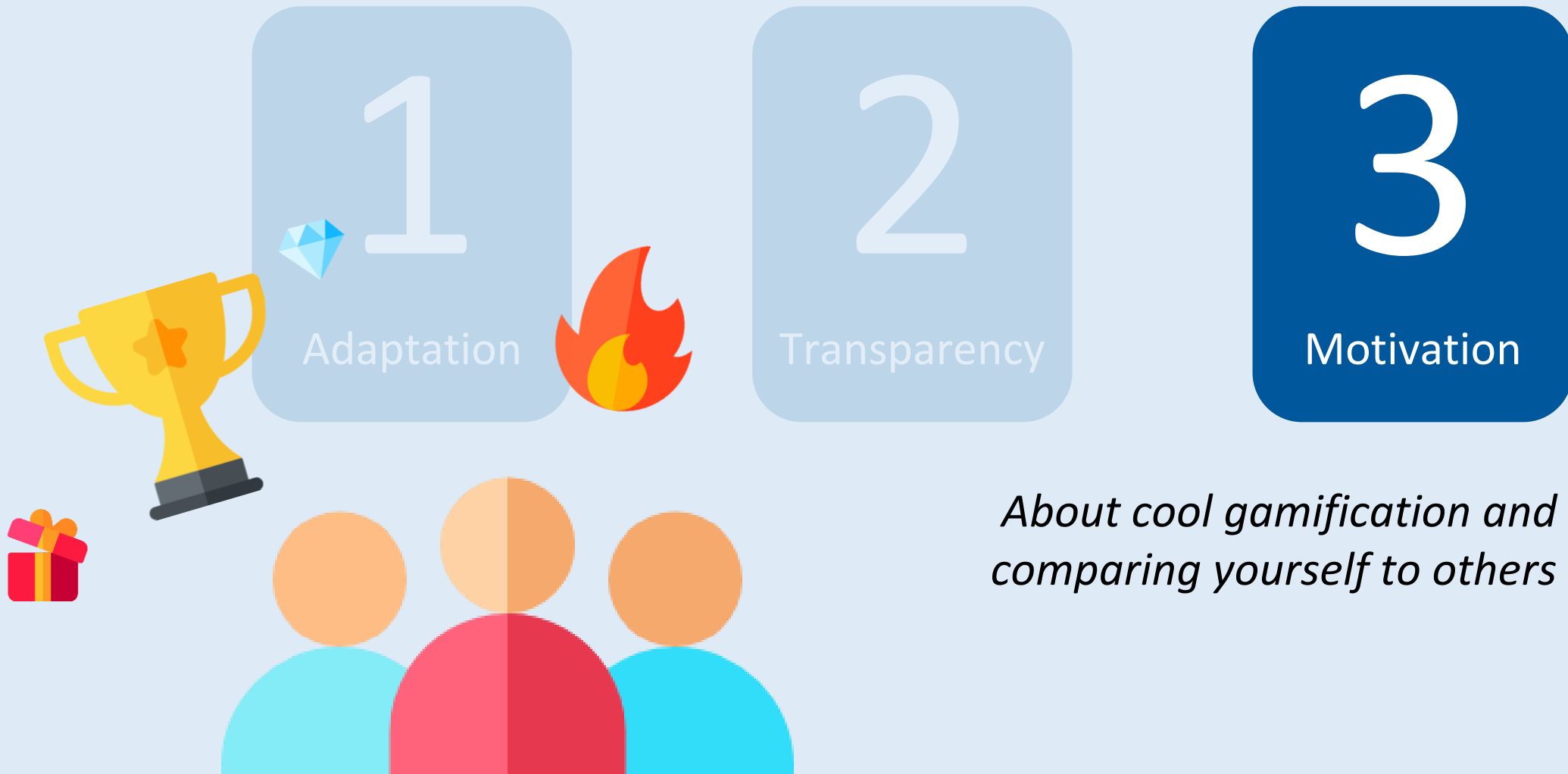
3

Motivation

*About seeing what you master  
and explaining AI decisions*



## How can digital systems help with differentiation?









# Gamification should be personalised

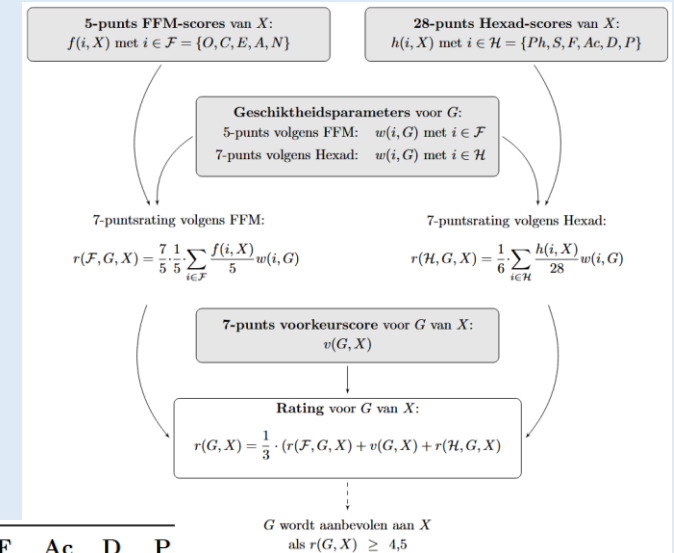


# Gamification needs to be personalised



Hexad gamification user types

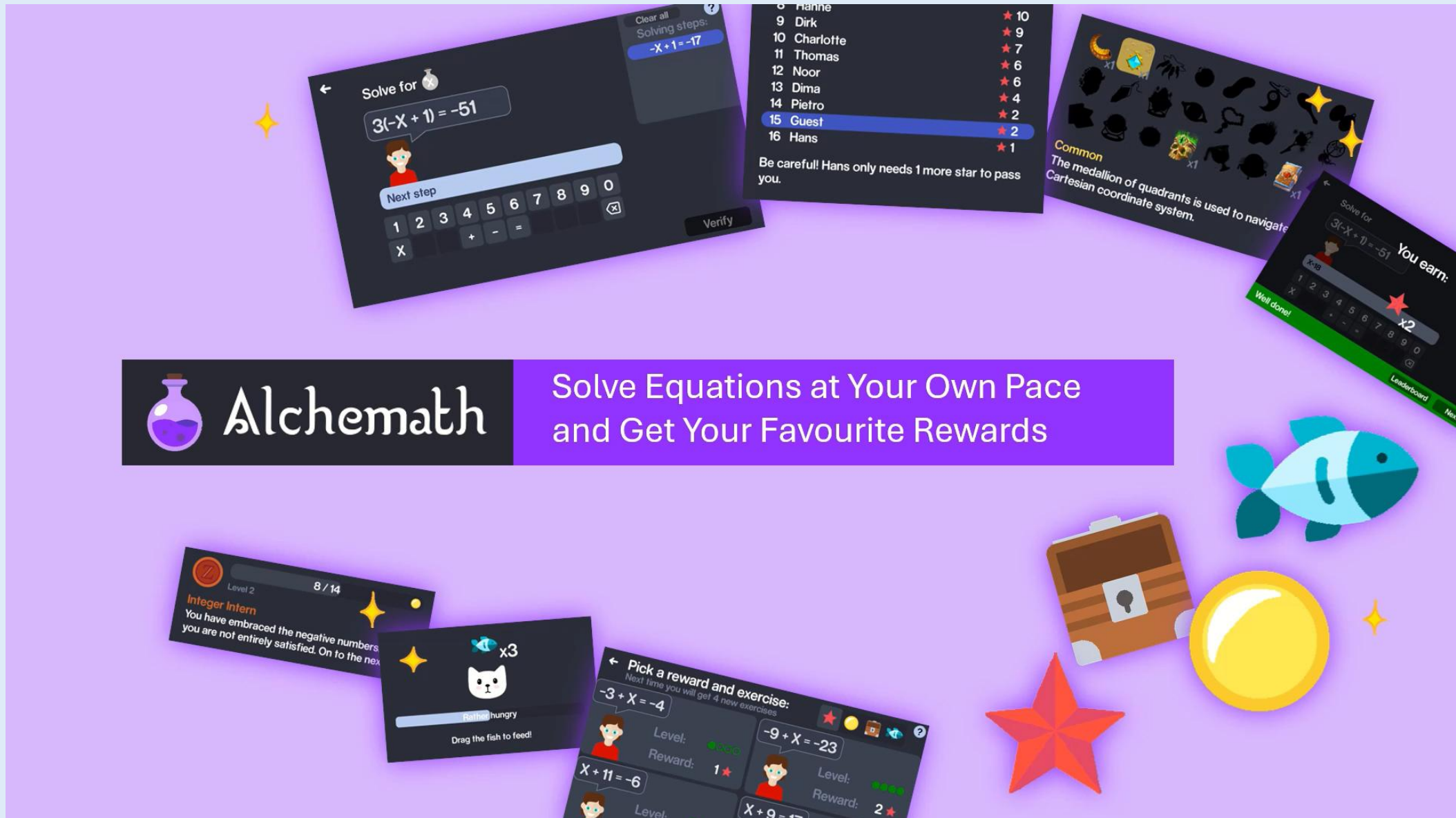
Adapt gamification based on personality, Hexad profile, and preferences



	O	C	E	A	N	Ph	S	F	Ac	D	P
Punten	5a	3	4c	3	4c	4	6e	5b	5b	5e	7a
Puntenklassement	3	4c	5a	4c	3	4	7a	5b	6a	6b	6a
Oefeningeklassement	3	4c	5a	4c	3	4	7a	5b	6a	6b	6a
Day streak	3	4c	3	3	5c	5a	5b	5b	5c	4	6b
Helpen	3	4c	4a	5c	3	7a	6a	5b	6a	5b	6b
Verrassingen	4c	4c	4c	3	5c	5a	5b	7a	7a	5a	7a
Uitdagingen	4c	4c	3	4c	2c	5b	4	7b	7a	5a	6a
Motiverende feedback	5a	3	4d	3	3	4	4	5b	4	5b	5b





Maximilian Altmeyer, Gustavo F. Tondello, Antonio Krüger, and Lennart E. Nacke. 2020. HexArcade: Predicting Hexad User Types By Using Gameful Applications. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '20)*, 219–230. <https://doi.org/10.1145/3410404.3414232>

Jeroen Ooge. 2019. Het personaliseren van motivationele strategieën en gamificationstechnieken m.b.v. recommendersystemen. Master's thesis, KU Leuven. <https://jeroenooge.be/research/masters-thesis-personalising-motivational-strategies-and-gamification-techniques>



← Pick a reward and exercise:  
Next time you will get 4 new exercises

★ ● 📦 🐟 ?

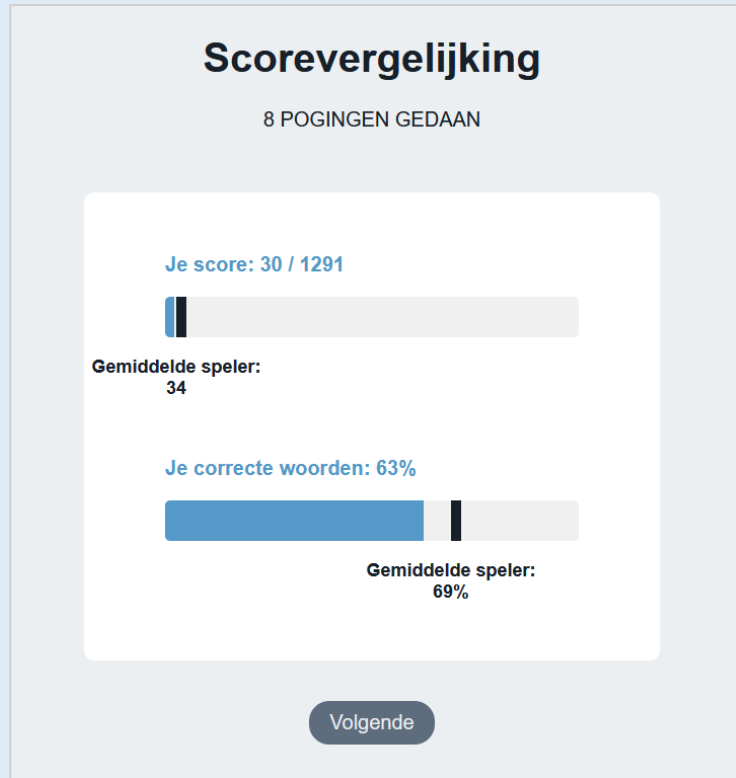
$8 + X = 25$  Level: ●○○○ Reward: 1 ●	$X - 1 = -14$  Level: ●●●● Reward: 2 ●
$12 + X = 5$  Level: ●●○○ Reward: 1 ●	$-8 + X = -24$  Level: ●●●○ Reward: 2 ●

Difficulty for the learner

Reward for a correct answer



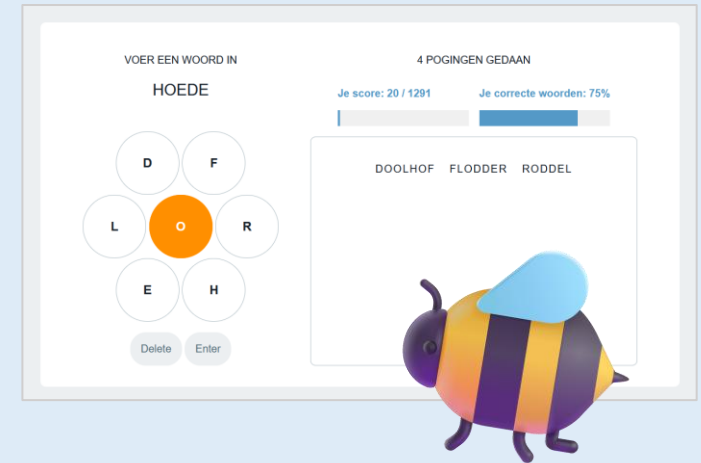
# Social comparison impacts emotions/motivation



*seeing yourself below  
average = 😞*



*seeing yourself  
above average = 😊*



People have many reasons to compare themselves



TIME FOR

QUESTIONS



How can digital systems differentiate  
to **motivate** in universities?



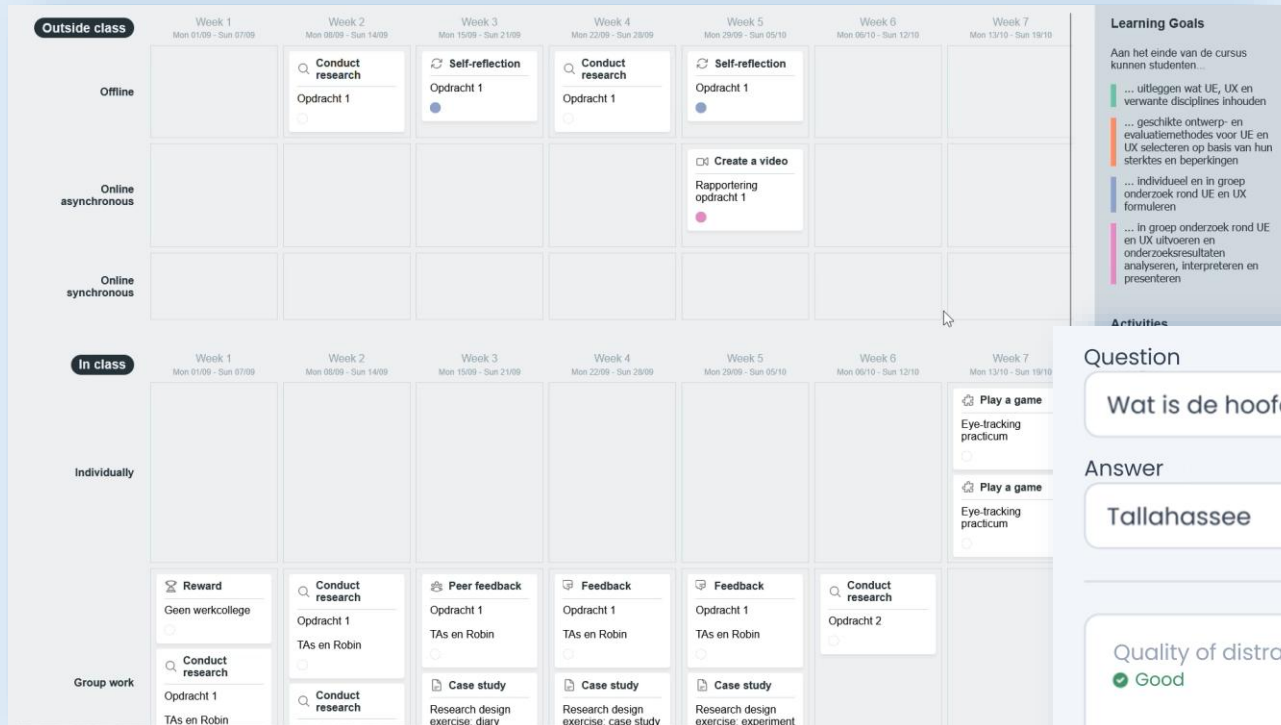
# How can digital systems help with differentiation\* in education?

\*in the sense of individualisation/personalisation

Make learning experiences more  
**1** adaptive, **2** transparent, and **3** motivating



# I did much more research...



Help teachers plan blended learning

Question

Wat is de hoofdstad van de staat Florida?

Answer

Tallahassee

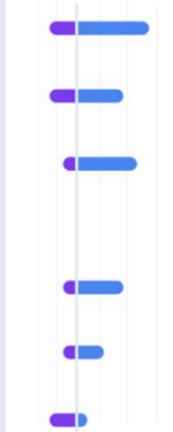
Quality of distractors

Good



Similarity scores

Distractor Questions



Distractors

- Miami
- New York
- Los Angeles
- ...
- Limburg
- Noorwegen
- Zuidpool

Help teachers create new content with AI

Check out [jeroenooge.be](https://jeroenooge.be) and reach out for projects together!



### How to Design Educational AI Systems With Transparency and Control

6 Examples of Experiments in Real Learning Contexts

- Steer mastery level and see the impact visualised**
  - Seeing the impact of control can increase initial trust, but having control alone may not
- Iterative human-centred design with stakeholders involved**
  - Ensure utility and usability, and collect valuable qualitative feedback
- Visualise time and performance data used for student outlier detection**
  - Data-centric explanations allow teachers to calibrate their trust and perceived accuracy
- Choose difficulty of recommendations and get real-time what-if explanations**
  - Explanations can encourage to try harder exercises, motivation, or performance
- Choose among recommendations with difficulty labels and nudges**
  - Reward-based nudging can be effective without harming performance or self-reported competence
- Visualise similarity scores for proposed distractors and change model parameters**
  - The utility of explanations and control can depend on model performance

**Jeroen Ooge**  
jeroenooge.com  
Llenguatge University

Poster at BBG 4.21

Jeroen Ooge

About Research Outreach

## Research

I have published research papers about explainable artificial intelligence, visual analytics, and gamification at international conferences and in scientific journals. Filter on your favourite topics with the buttons below.

All Explainable AI Gamification Visual Analytics

### Gamification

#### AIED 2024: "Nudging Adolescents Towards Recommended Maths Exercises With Gametful Rewards"

This paper for the AIED 2024 conference is an outcome of the master's thesis by Joran De Braekeleer, which I guided and Katrien Verbert supervised. We studied how gamification can be used to nudge adolescents towards recommended exercises on a mobile app for practising math equations.

Explainable AI Visual Analytics

#### PhD thesis: "Explaining Artificial Intelligence With Tailored Interactive Visualisations"

My PhD thesis focuses on human-centred explainable AI and presents 5 studies on how explainability can be achieved through visual analytics.