From **conventional schoolbooks** to **completely digital lessons:** How can digitalization be embedded in a classroom in a **meaningful way**?

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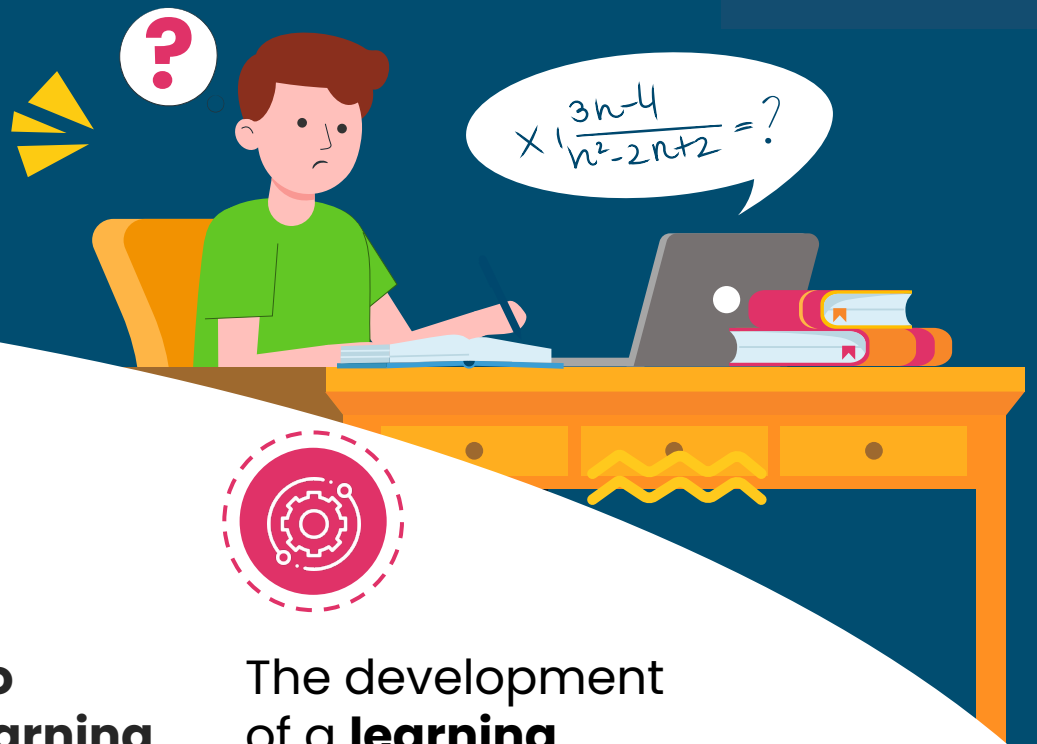
Today's challenges in the classroom



Very **heterogeneous classrooms** make teaching and learning more difficult.

It would be desirable to give each pupil **individual homework**, but this is not possible due to **time constraints**.

There are **no adaptive learning paths** that are tailored to the specific strengths and weaknesses of the individual student

The development of a **learning platform for STEM** is complex due to the special nature of the relevant features.

Are MOOCs the solution for these problems?

> **Massive Open Online Courses** (MOOCs) offer **high-quality education** from **top universities** and **experts**, allowing people worldwide to **learn** at their **own pace**. They have proven to be highly efficient in a university setting.

Ebner, M., Schön, S., & Braun, C. (01 2020). More Than a MOOC—Seven Learning and Teaching Scenarios to Use MOOCs in Higher Education and Beyond. doi:10.1007/978-981-15-0618-5_5

And in schools?

“

MOOC platforms usually **perform well** when looking at **learner-system interactivity** and **learner-content interactivity**.

However, they lack when it comes to learner-learner and learner-instructor interactions.

”

Gamage, D., Perera, I., & Fernando, S. (2020). MOOCs lack interactivity and collaborativeness: evaluating MOOC platforms. *Int. J. Eng. Pedagog.*, *10*(2), 94–111.

The **research question** is therefore: How can **MOOCs be conceptually well integrated** into **schools?**

Use Case 1: As a teacher, I want to send my students to a specific position of the MOOC.

- students shall be **provided with jump marks** that signal to them that **special attention** is required at this point or that specific material is now available
- if teacher wants to **discuss a specific topic,** the student shall not have to navigate to the specific page but **gets this notification directly inside the MOOC**
- important: **granularity of this approach**, as otherwise the student still needs to scroll to the specific element

Add custom element

Which kind of element do you want to add?

Freetext

Video (e.g. YouTube)

Own example

Custom element

Absatz

MAKE ELEMENT AVAILABLE ONLY FOR ME

MAKE ELEMENT AVAILABLE FOR MY STUDENTS

Use Case 2: As a teacher, I want to add own content to the MOOC. Also, I want to modify existing content.

same done with today's schoolbooks

- **hide certain elements** of the MOOC if **they prefer alternative explanations** (hidden elements won't be visible to students but marked with a symbol indicating their availability, maintaining the integrity of the original content)

- add **own elements to the MOOC**: they should have the freedom to **add their own content to the MOOC**. These additions should be **clearly distinguished** from the original content, for instance, by being **labeled as teacher-created elements**

And much more...

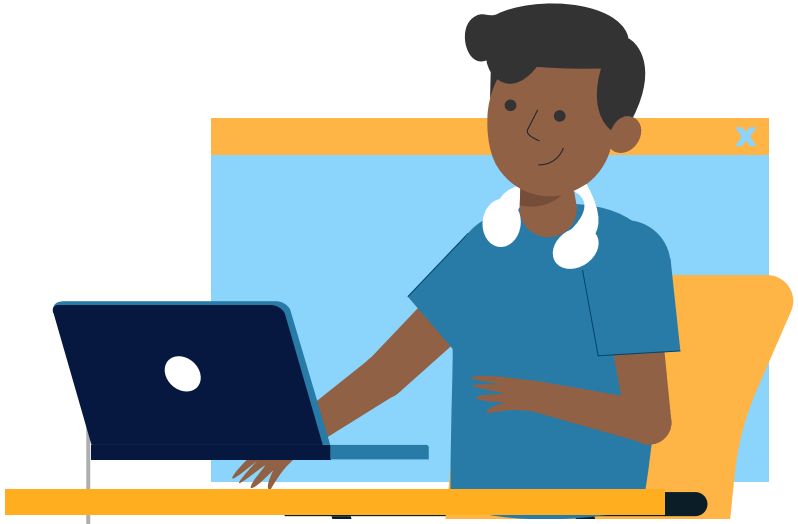
Use Case 3: When students solve exercises inside the MOOC, I wish to get immediate feedback

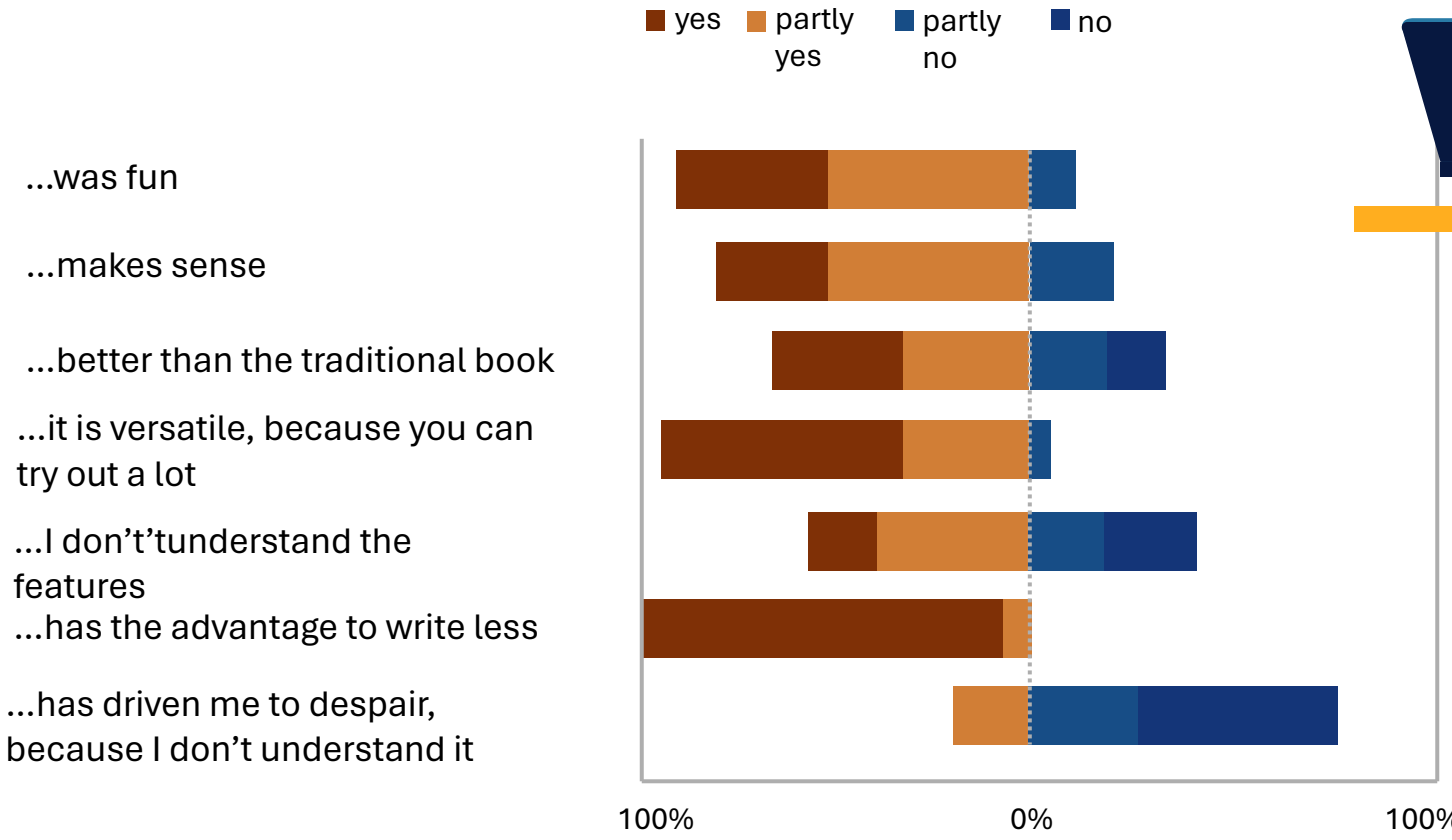
Use Case 4: As a teacher, I want to select specific examples from a MOOC, which I then give as homework to my students

Use Case 5: Own notes: Students and teachers can add their own notes to each chapter

...etc.

...working with digital schoolbooks





n=21

study currently being conducted!

Can ChatGPT do that?

Use Case 6: Question formats

Die Anzahl der Überraschungen, die du erhältst, folgt einer binomialen Verteilung mit den Parametern n=10 und p=1/7, wobei n die Anzahl der Versuche (Anzahl der Überraschungseier) und p die Wahrscheinlichkeit ist, bei jedem Versuch eine Überraschung zu erhalten.

Die Wahrscheinlichkeit, mindestens eine Überraschung zu erhalten, ist gleich der Wahrscheinlichkeit, dass du keine Null Überraschungen bekommst. Diese Wahrscheinlichkeit kann mit der folgenden Formel berechnet werden:

$$P(X \geq 1) = 1 - P(X = 0)$$

wobei X die Anzahl der erhaltenen Überraschungen ist.

It all seems plausible, doesn't it?

Die Wahrscheinlichkeit, dass du in einem Ei keine Überraschung bekommst, ist 6/7. Daher ist die Wahrscheinlichkeit, in 10 Eiern keine Überraschung zu erhalten:

$(6/7)^{10} \approx 0.2824$

Daher ist die Wahrscheinlichkeit, mindestens eine Überraschung zu erhalten:

$P(X \geq 1) = 1 - P(X = 0) = 1 - (6/7)^{10} \approx 0.7176$

Das bedeutet, dass du eine Wahrscheinlichkeit von etwa 71,76% hast, mindestens eine Überraschung in den 10 gekauften Überraschungseiern zu erhalten.

„ChatGPT's **mathematical abilities** are significantly below those of an average **mathematics graduate student**. Our results show that ChatGPT often understands the question but **fails to provide correct solutions**. Hence, if your goal is to use it to pass a university exam, you **would be better off copying from your average peer**!"

Frieder, Simon et al. (2023). Mathematical Capabilities of ChatGPT. Cornell University.

In a school context, this means...

1. automatic generation of relevant tasks
2. evaluating student solutions on a calculation step basis
3. tailored and appropriate feedback

Take-home messages

- **MOOCs** have to **be adapted** to be **effectively used** in class setting
- **students** like this concept
- **varied question formats** with **tailored feedback** is essential