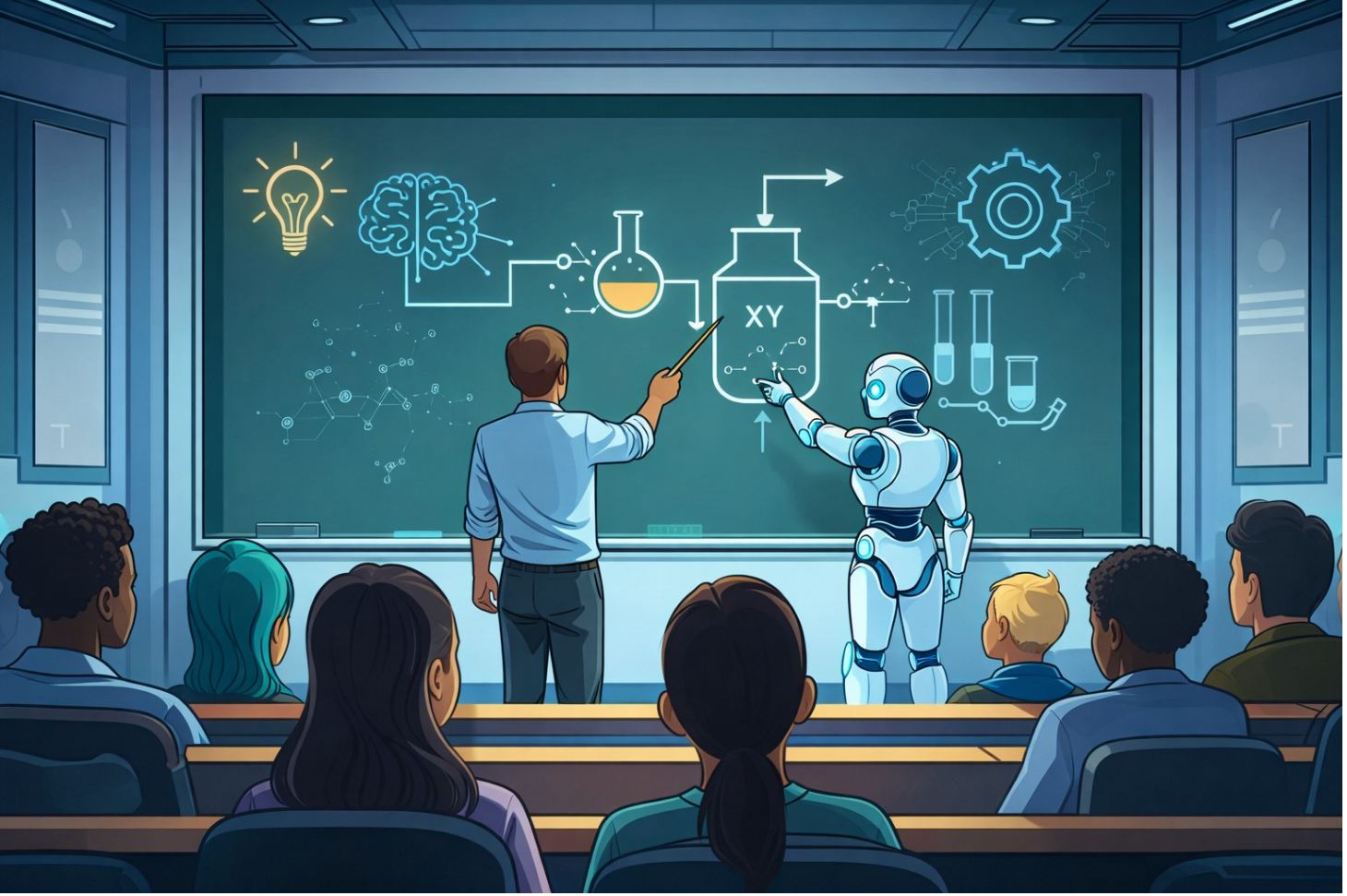

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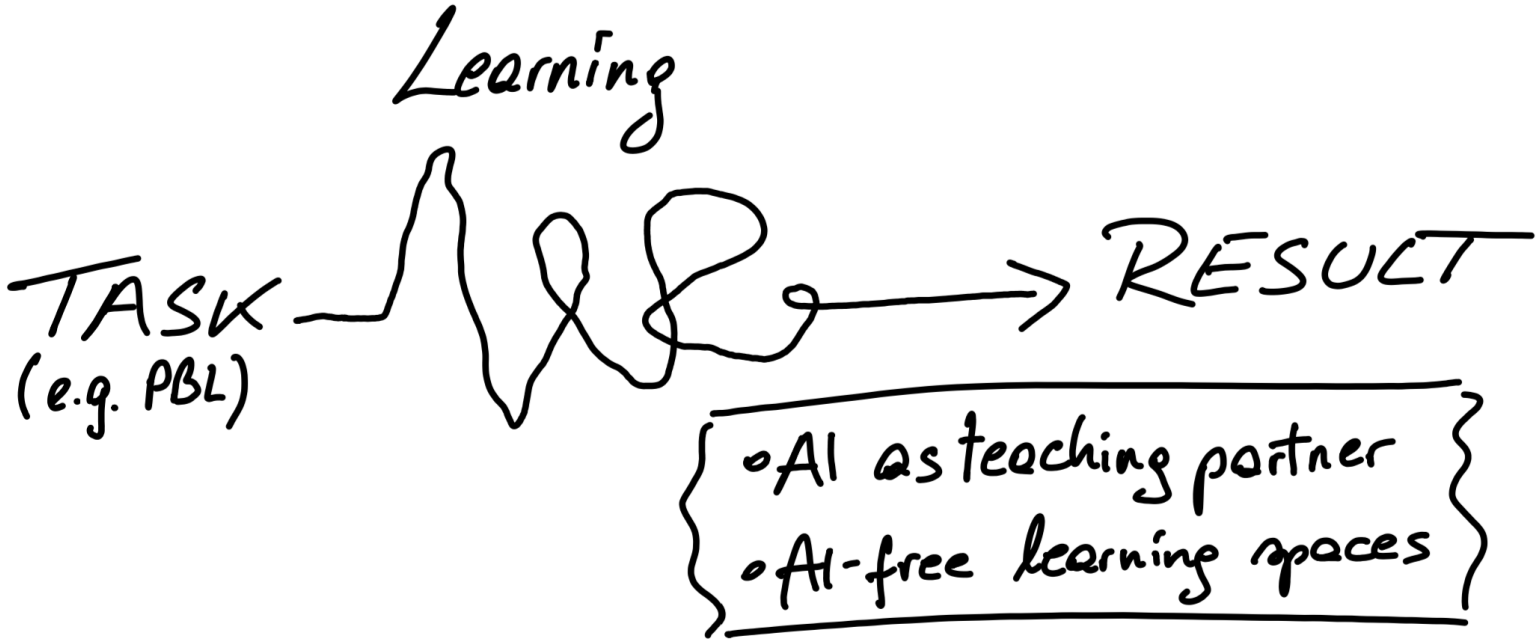
From Tool to Teaching Partner

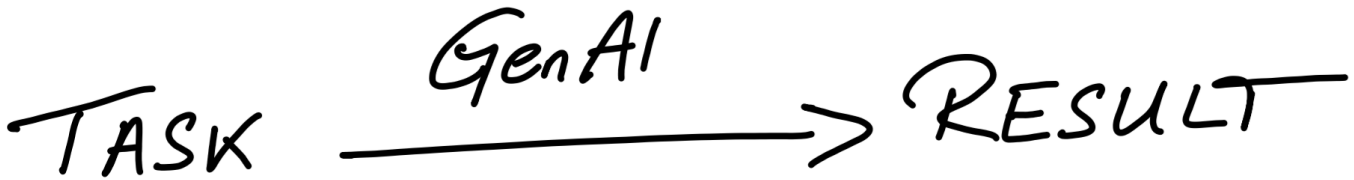
Integrating Generative AI into Engineering Education

What worries you most when students use generative AI?

Wordcloud!

Where does learning actually happen?





Two learning options

Option 1

AI as teaching partner

Integrated
AI is allowed and often required

Visible
Usage is documented, not hidden

Reflected
Outputs are evaluted and critiqued

Option 2

AI-free learning spaces

Protected space
Consciously offline for deep thinking

Analog methods
Whiteboards, discussions, in-person

Focus
Thinking without digital assistance

Core requirements

- Role clarity → **Rules for Tools**
- Transparency → **Modeling**
- Reflection → **e.g. Process documentation, discussions**

Moment of reflection: Which of these elements might deserve more attention in your teaching practice?

Three scenarios

- Scenario 1: Project based learning meets AI
- Scenario 2: In-class activities
- Scenario 3: e-tivities (asynchronous & online for part-time degree)

Scenario 1: Project based learning meets AI

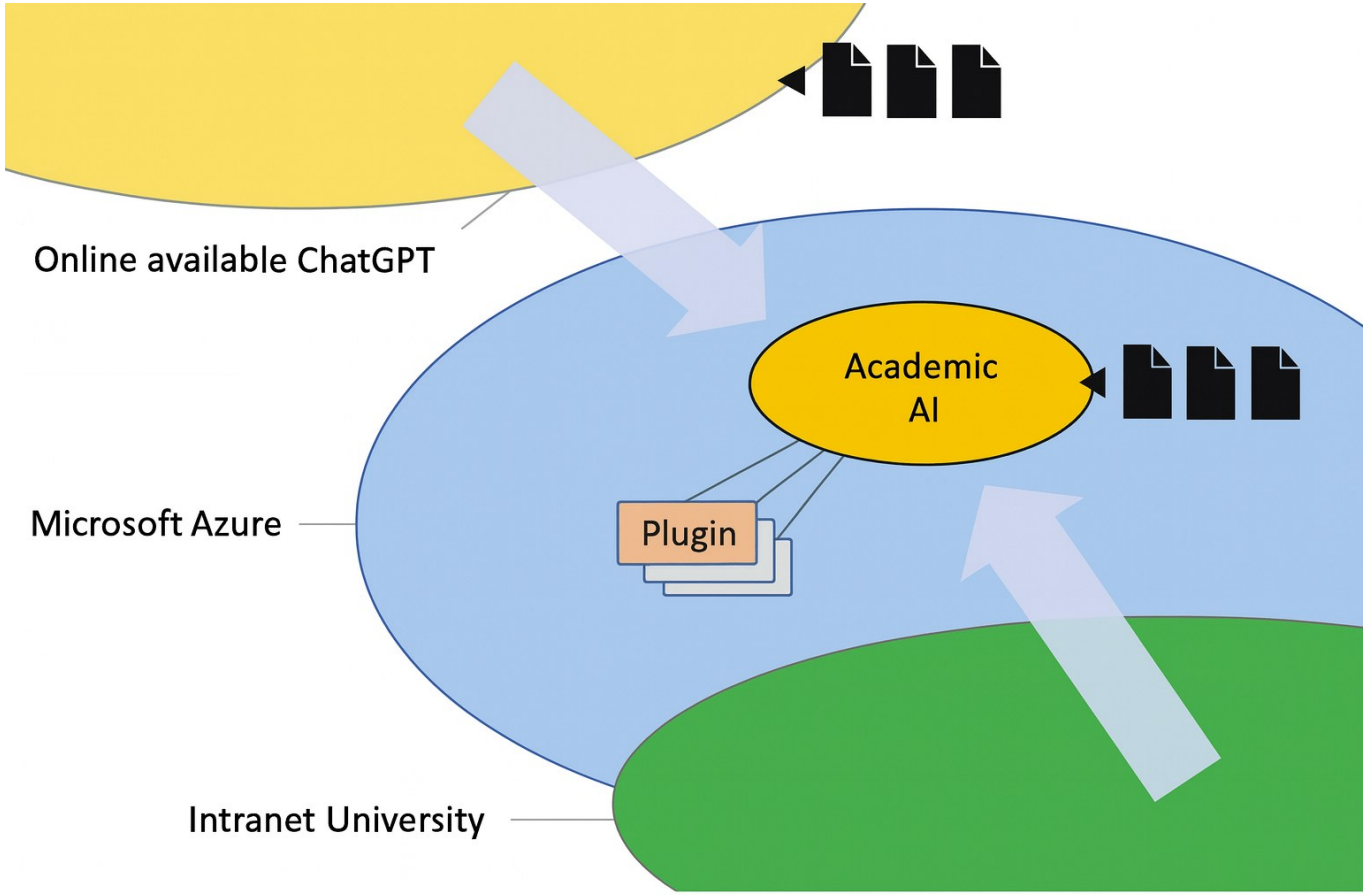
- Bachelor students in the 6th semester
- Topic: Waste water treatment
- PBL scenario: Students are the environmental officer of a given company. In this role they need to develop a waste water treatment route for a given waste water.
- AI use is mandatory but must be documented in process documentation

Mandatory AI use is only possible if the students have access to a „safe“ LLM/GenAI Chatbot → no personal information required

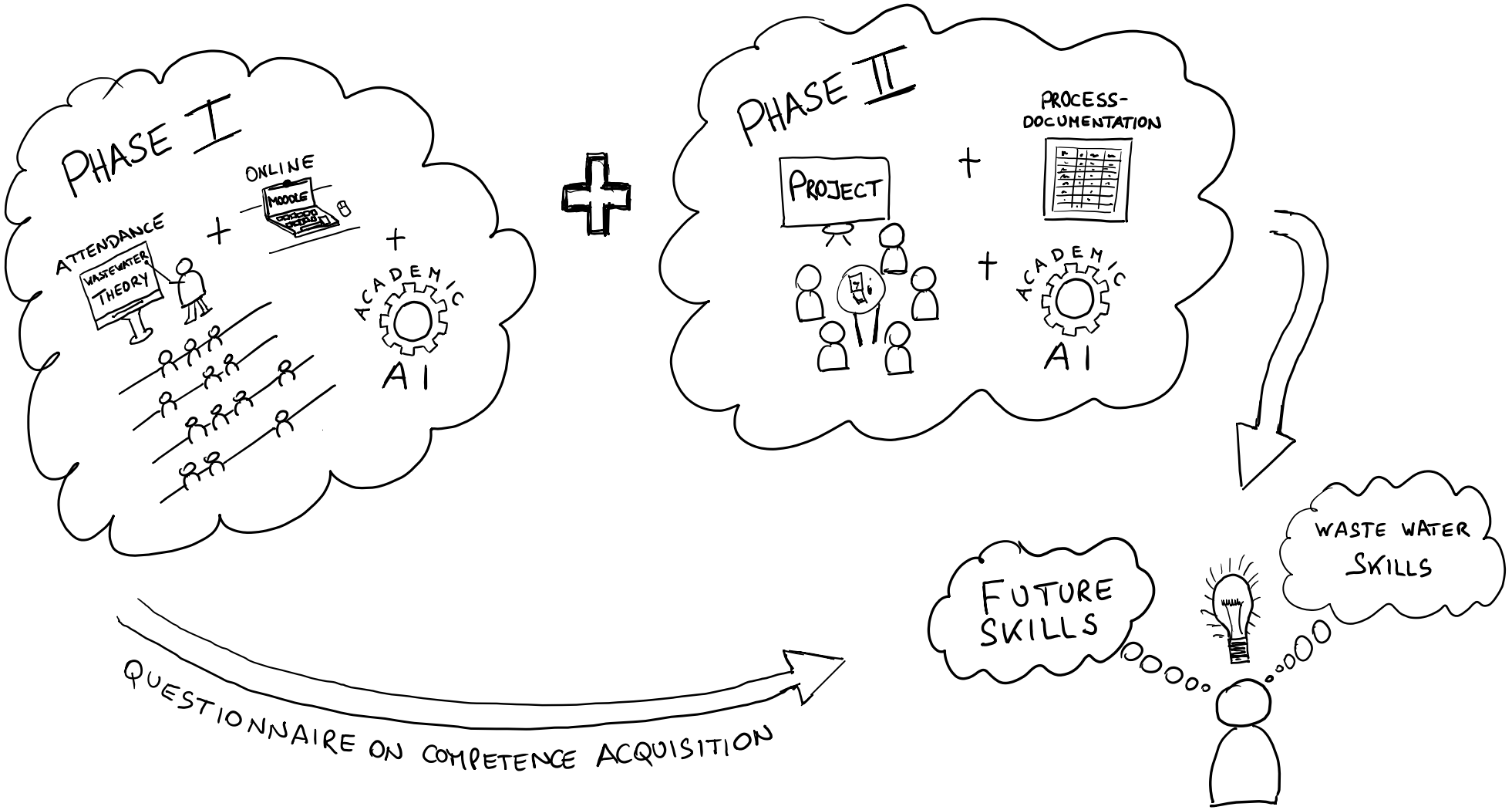
Austria → Academic AI

Scenario 1: Academic AI = „safe“ ChatGPT

Academic AI is a secure cloud platform that allows universities to use ChatGPT safely within Microsoft Azure



Scenario 1: Project based learning meets AI



Scenario 1: Process Documentation of AI usage*

The template for process documentation enabled students to systematically reflect on and validate their application of generative AI.

Process Documentation – AI Application Project Wastewater Treatment

… what I did …	… why I did it …	… what result it led to …	… how I validated the result.

(At least 10 steps must be documented.)

* Based on Hanke (2024; hanke-teachertraining.de) "Developing Authentic Assessments in a World with Generative AI Tools" – extended with a focus on result validation.

Scenario 2: In-Class Activities

- Bachelor and Master students
- Focus on reflective AI use
- In-class workflow

  Students work on a discipline-specific task using AI
  Findings and experiences are collected in a shared Padlet
  Results are discussed and critically reflected on together in class

AI makes students expose their thinking – and that is exactly what we need in engineering education.

Image generated using ChatGPT 5.2; 26/1/27

Scenario 2: In-Class Activities

01 AI as Explainer

Students ask AI to explain a subject-specific concept for a defined target audience, then critically evaluate the explanation and improve it using their own expertise.

02 AI as Learning Buddy

Students use AI as a learning companion to test their understanding, identify misconceptions and knowledge gaps, and reflect on the feedback received.

03 AI as Peer-Feedback Tool

Students receive AI-generated feedback on their work and compare it with human peer feedback, discussing strengths, limitations, and differences between both perspectives.

Scenario 3: e-tivities*

- Master students in a part-time degree
- Focus on reflective AI use
- Online and asynchronous workflow

Image generated using ChatGPT 5.2; 26/1/27

Students work individually on a discipline-specific task in moodle forum or glossar
AI is used as a learning partner to compare, question, or extend their own thinking
AI use and learning processes are documented transparently
Contributions are shared and discussed asynchronously in the forum
Learning is consolidated through peer feedback and reflection

Explicit integration of AI as a learning partner reduces shortcut behavior and fosters AI literacy in asynchronous learning.

*https://www.gillysalmon.com/e-tivities.html

Scenario 3: e-tivities*

01 Human vs AI

Students create two answers to a discipline-specific question: one written by themselves and one generated by AI. They post only one of the two answers in the forum. Peers analyze the text, argue whether it was written by a human or AI, and justify their judgment based on disciplinary and linguistic criteria. (Resolution after deadline)

02 AI-supported Glossary

Students create a glossary entry based on their own explanation and an AI-generated definition. Both versions are compared, validated, and refined through peer discussion.

03 AI as Sparring Partner

Students use AI to challenge or extend their own reasoning. They reflect on how AI was used (tool and prompt), what output was generated, how it was evaluated and validated, and which parts are based on their own experience or observation.

*https://www.gillysalmon.com/e-tivities.html

Impact and insights

Teacher perspective

- Strong heterogeneity in students' AI competencies
- AI literacy currently requires explicit teaching
- Reflection improves AI use
- Learning designs can enable reflection, but cannot guarantee it

Student feedback

- Clear rules and official permission to use AI are highly appreciated
- Reflective, discipline-specific AI use is highly valued
- Without explicit reflection tasks, critical AI use would not occur
- Student report improved judgment of *when* and *how* AI use is appropriate
- Confidence in evaluating and integrating AI outputs has increased

Not everything worked perfectly – but learning and AI use became much more visible.

Sharing teaching designs openly OER

www. beyondlearning.at

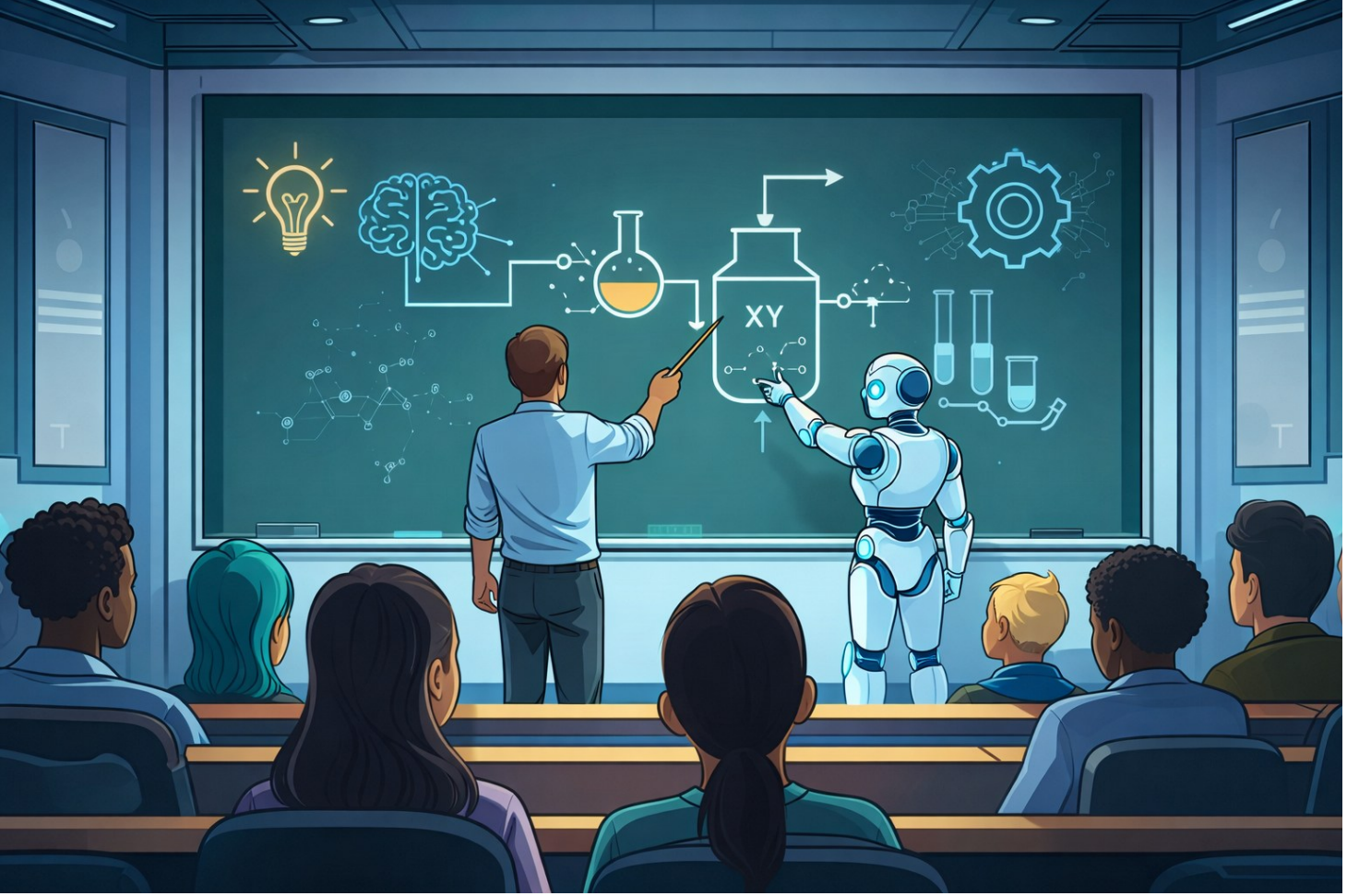
All scenarios shown today are available on the platform.

Not as recipes, but as adaptable designs.

Open Educational Resources – OER

Which of these ideas could you imagine trying in your own teaching context?

„One thing I take with me…“



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The real challenge is not AI entering the classroom–
it is designing learning so that thinking cannot be avoided.