Hochschule Bremen
City University of Applied Sciences

Students and AI: Usage, Needs, and Consequences for Higher Education

Do, 04.06.2026 – Dr.in Anna Kaim (Campus 2031/Writing Lab)

Agenda

- Overview research field
- Central findings
- Possible consequences for higher education
- Discussion

Overview research field

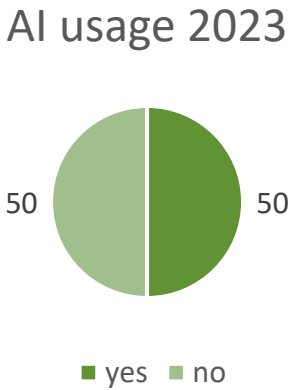
2022-today

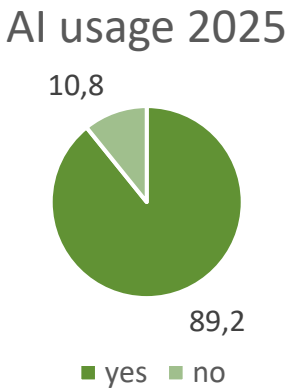
- Various studies on AI usage among students
- Many localised/regional studies at inidividual universities
- Due to different questionnaires in the individual studies, meta studies are only limited useful
  - Extensive meta study: Bosse et al (2026)
- Central studies for this talk:
  - Hoffmann et al (2026): quantitative & qualitative study, Germany-wide, 2023/2025, n > 4.000
  - Von Garrel/Meyer (2025): quantitative, Germany-wide longitudal study, 2023/2025, n > 4.900
  - Rapp et al (2025): focus on thesises, 2024, n > 800
- BUT: the studies aren‘t representative regarding their sample

Central findings

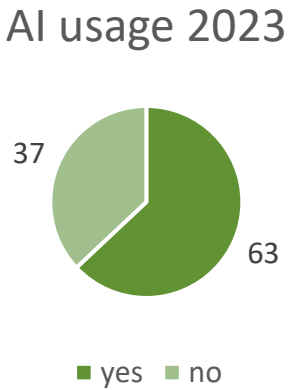
AI usage

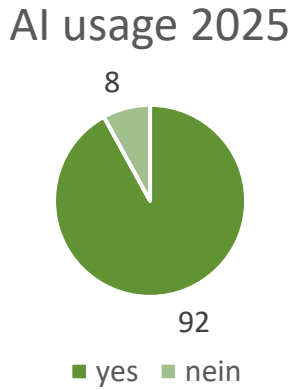
The number of students who do not use AI at all is continually dropping





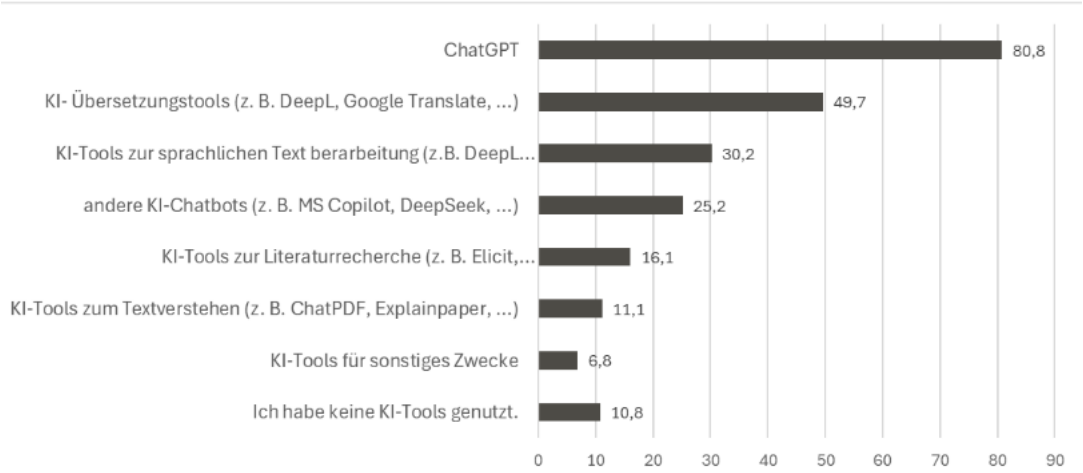
Source: Hoffmann et al (2026)





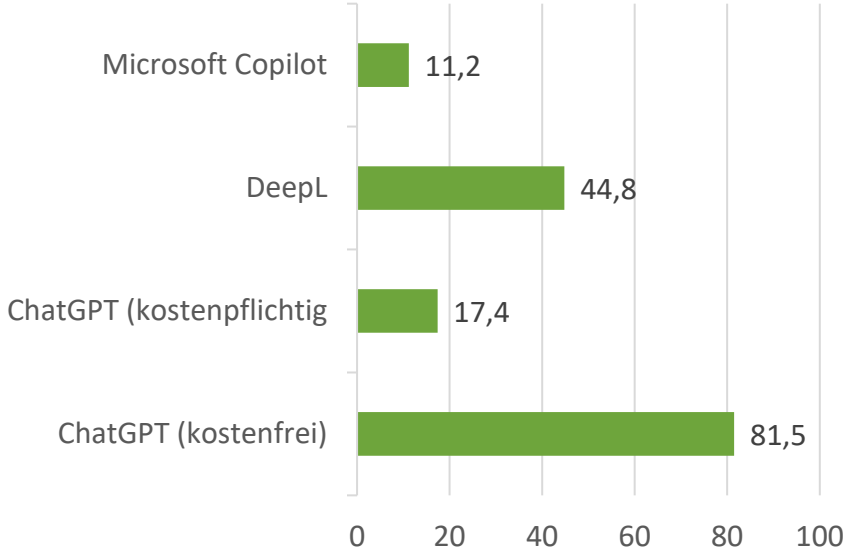
Source: van Garrel/Meyer (2025)

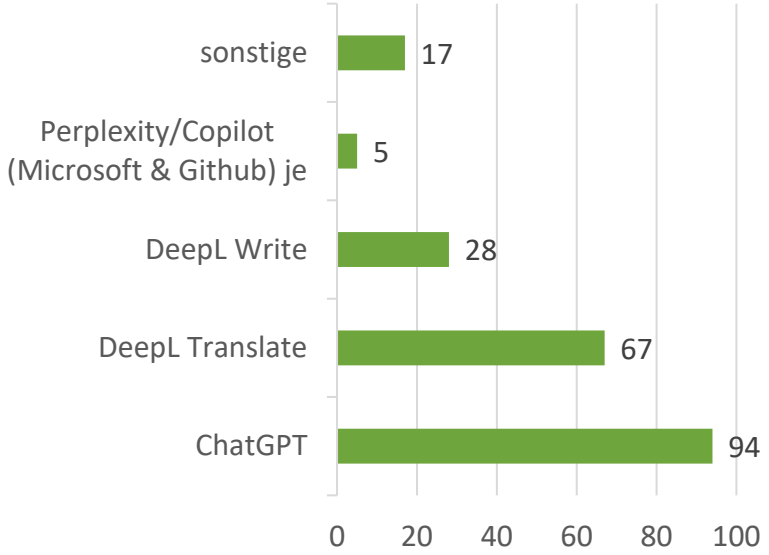
Most used AI tools (Hoffmann et al, 2026)



- Ca. 20% of students use ONLY ChatGPT
- Ca. 50% of students use ChatGPT in combination with translation tools
- Only a handful of students use other AI tools without also using ChatGPT

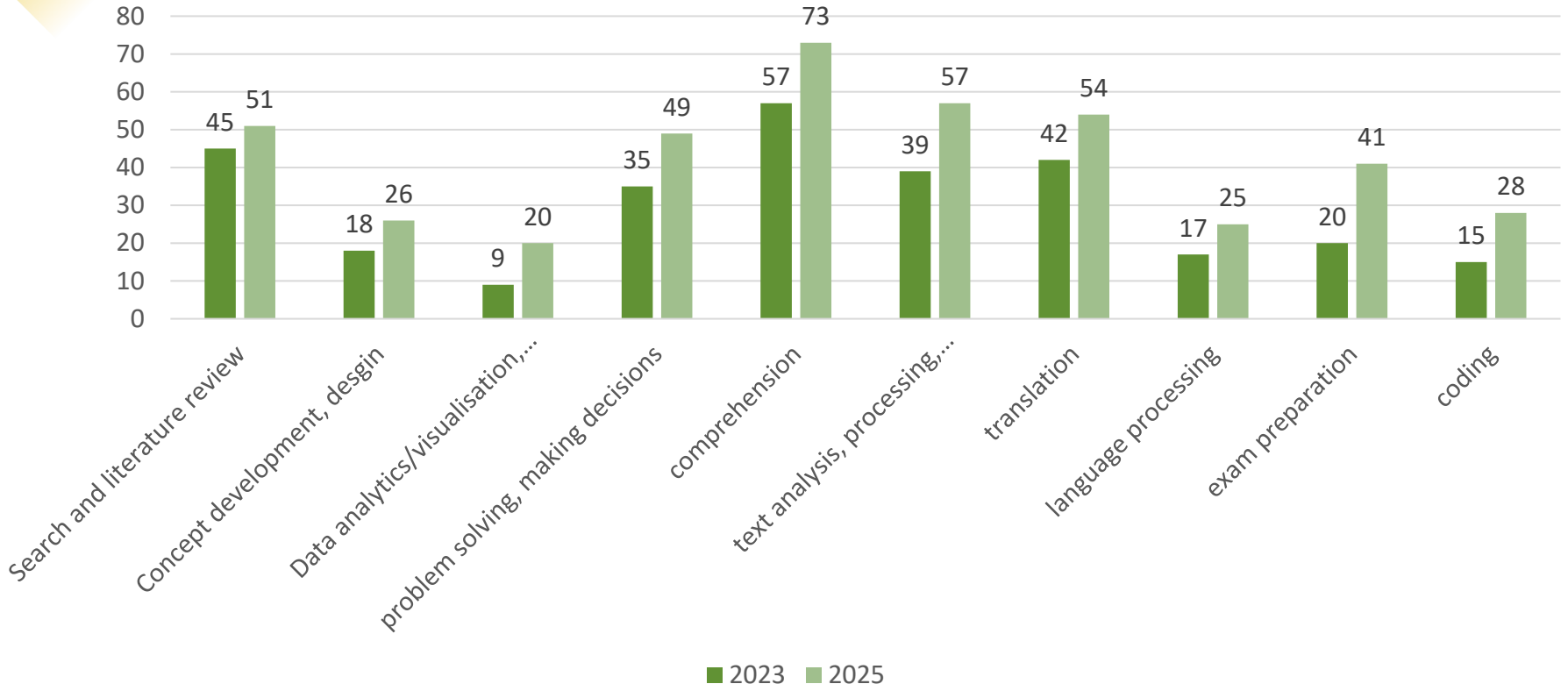
Most used AI tools : (von Garrel/Mayer, 2025) & (Rapp et. al. 2025)



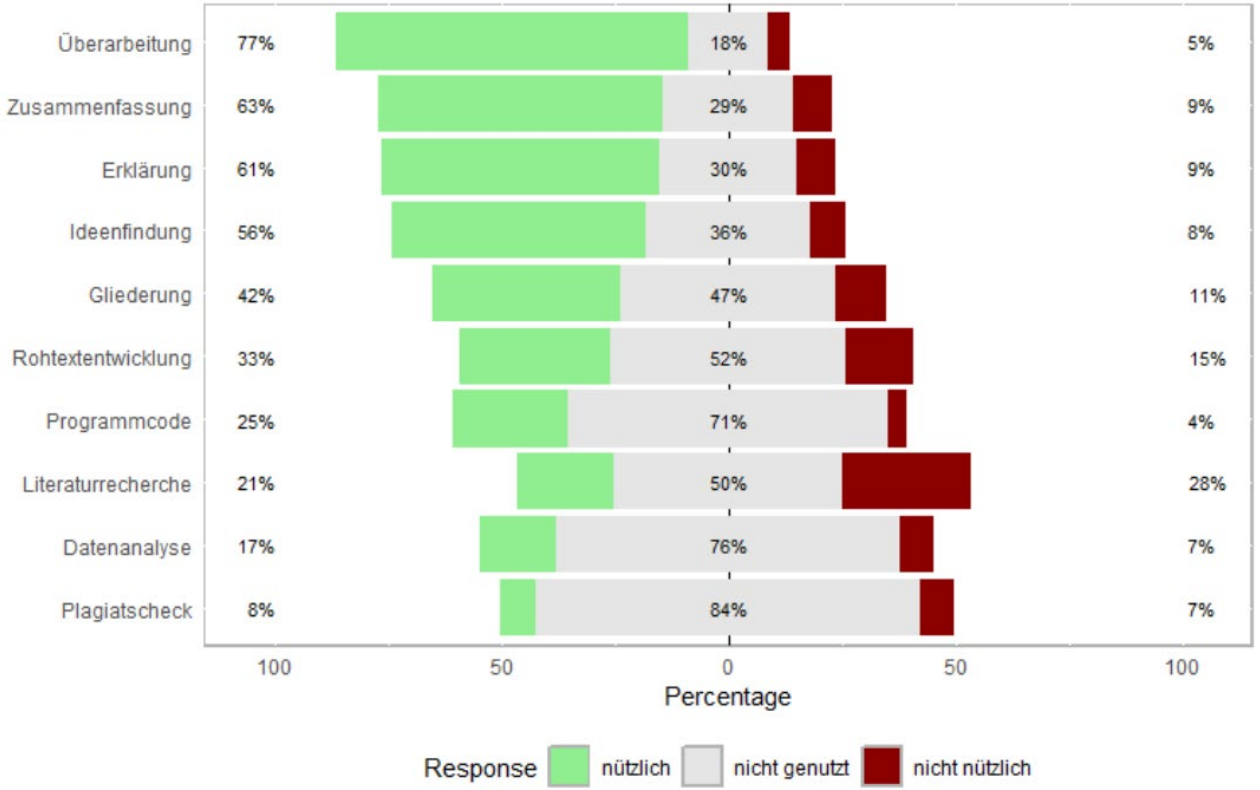


- All other tools don‘t reach 10%

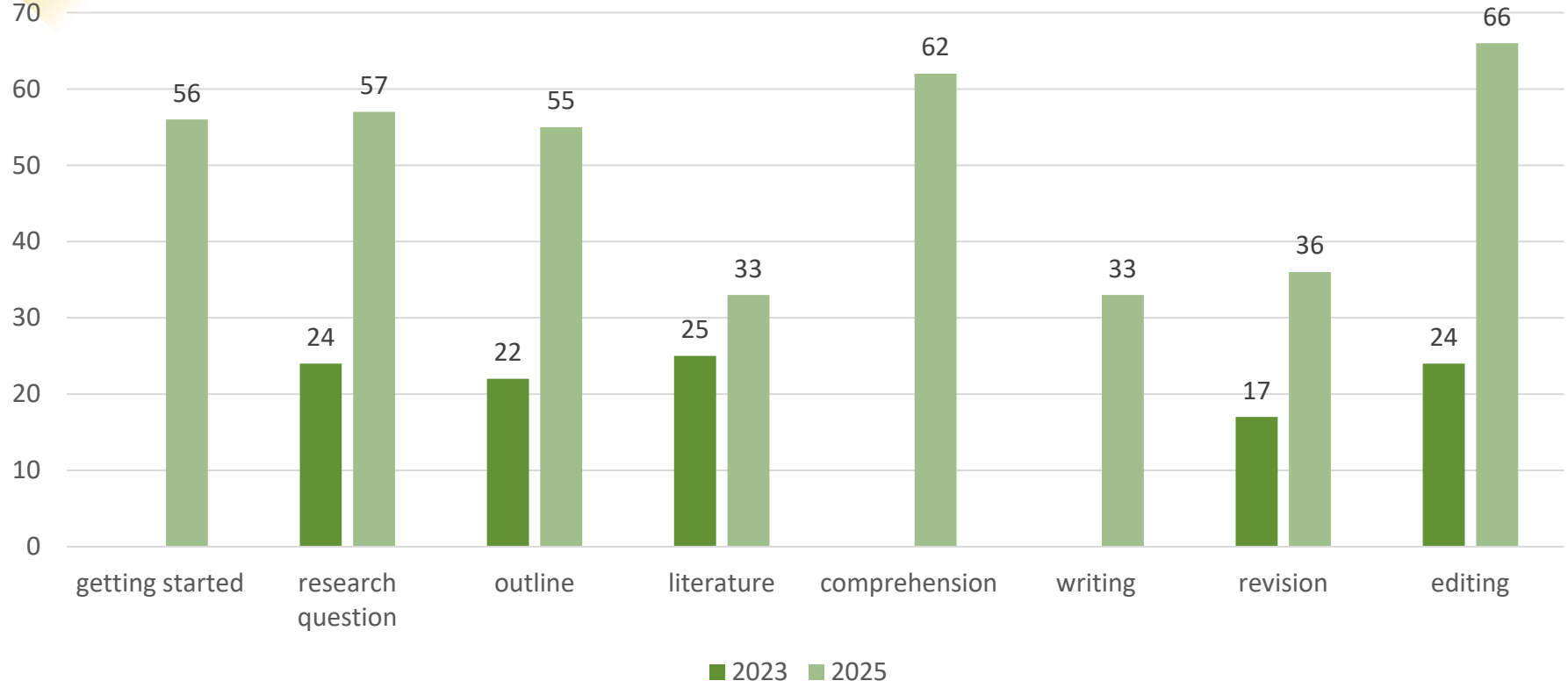
Purpose of AI usage (von Garrel/Mayer 2025)



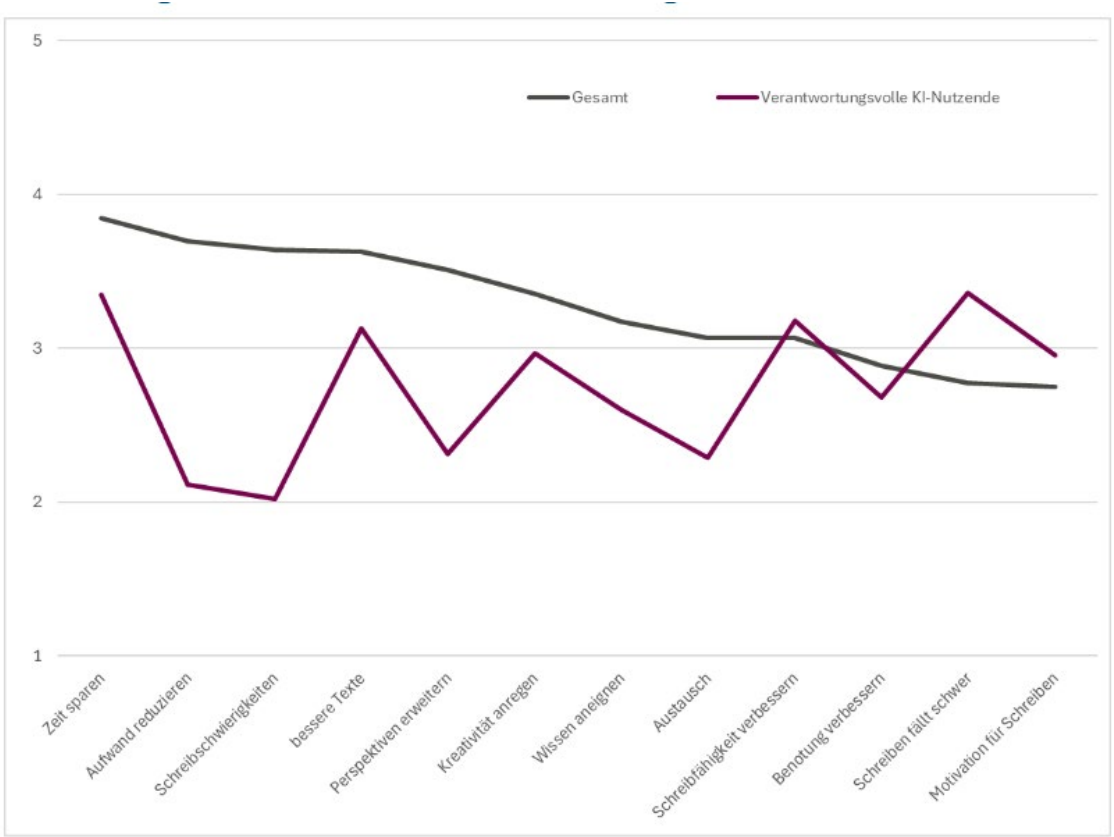
Helpfulness of AI usage (Rapp et. al. 2025)



Purpose of AI use in writing (Hoffmann et. al. 2026/Hoffman et. al. 2024)



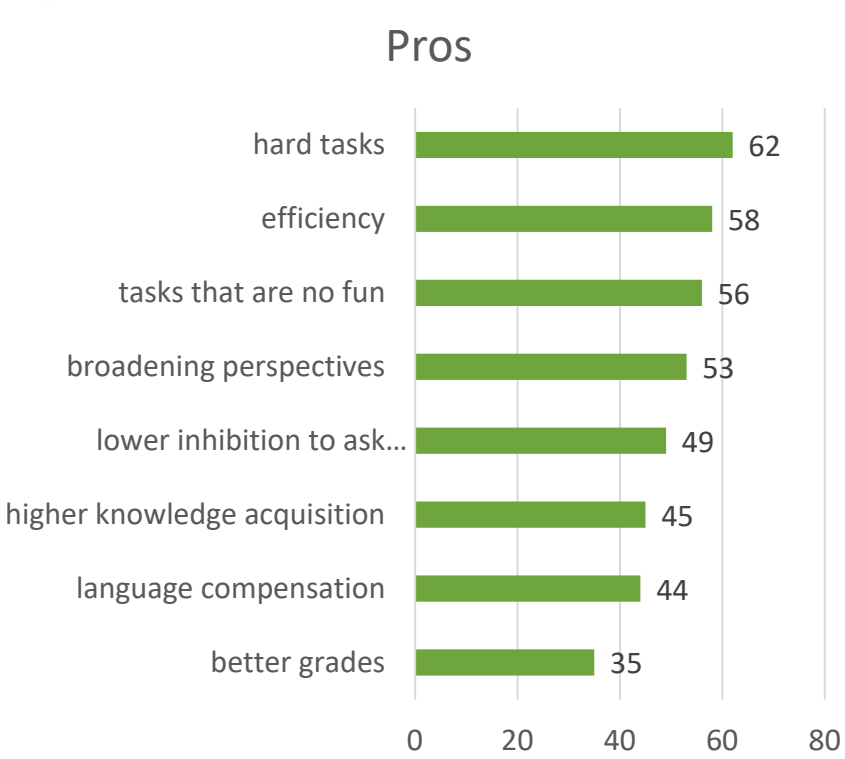
Reasons for AI usage (Hoffmann et. al. 2026)

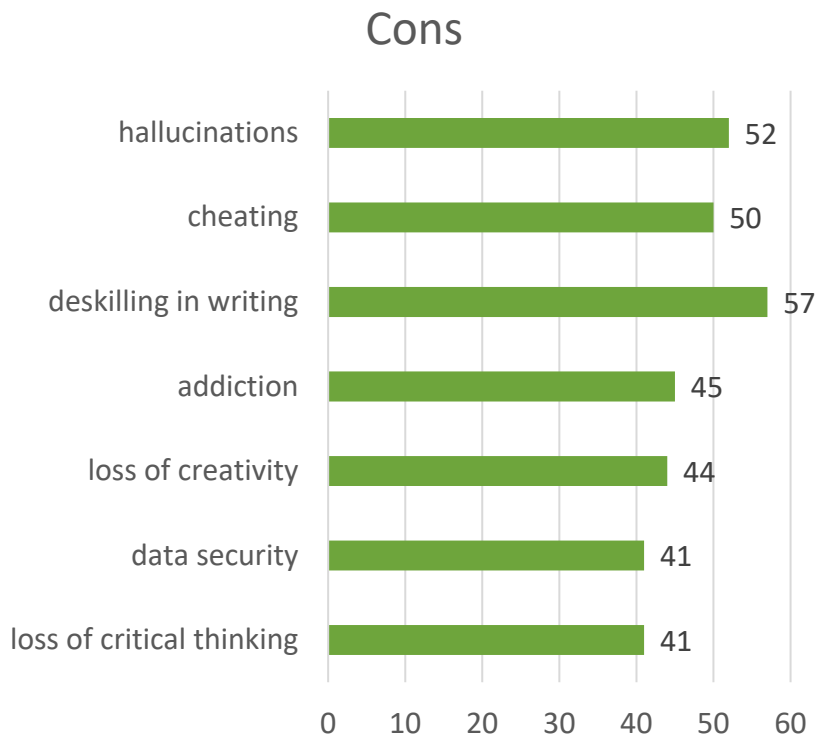


Central findings

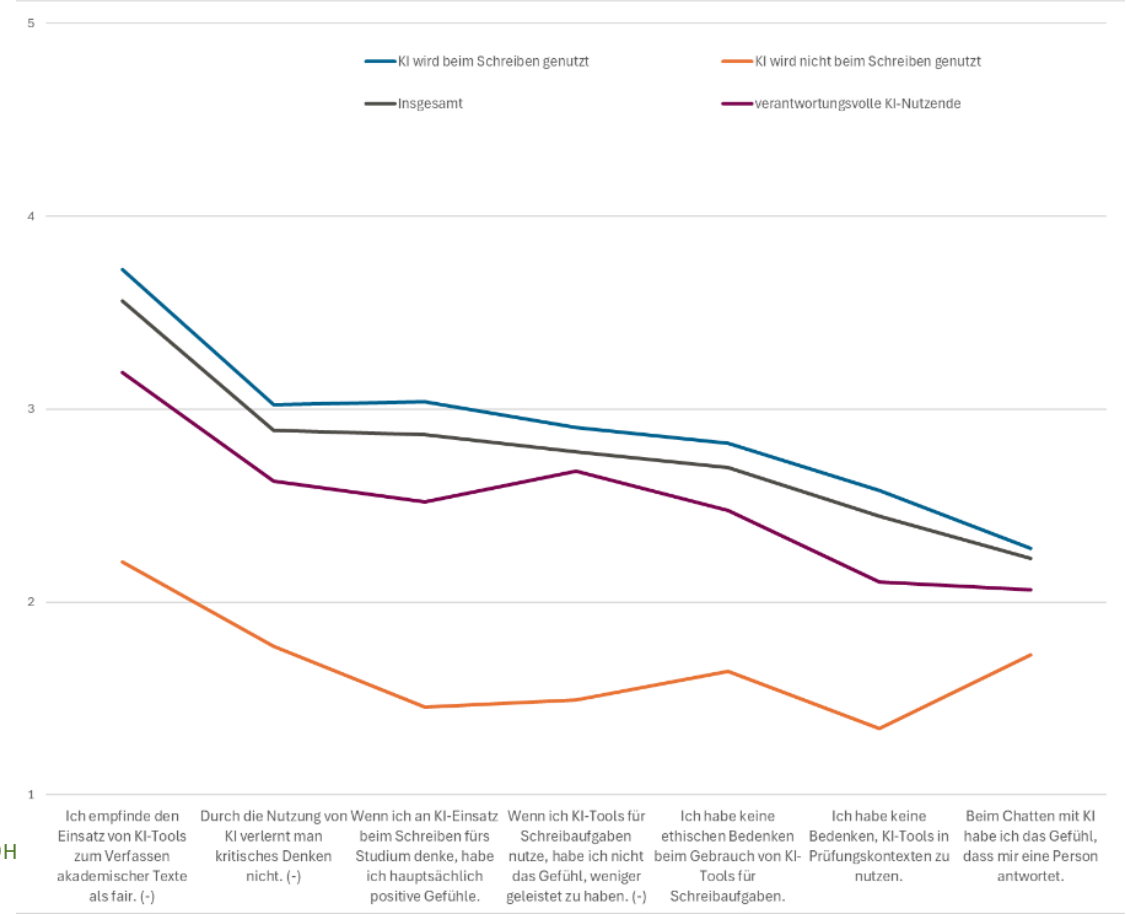
Attitudes towards AI

Attitudes about the pros and cons of AI usage (Marczuk et. al. 2025)

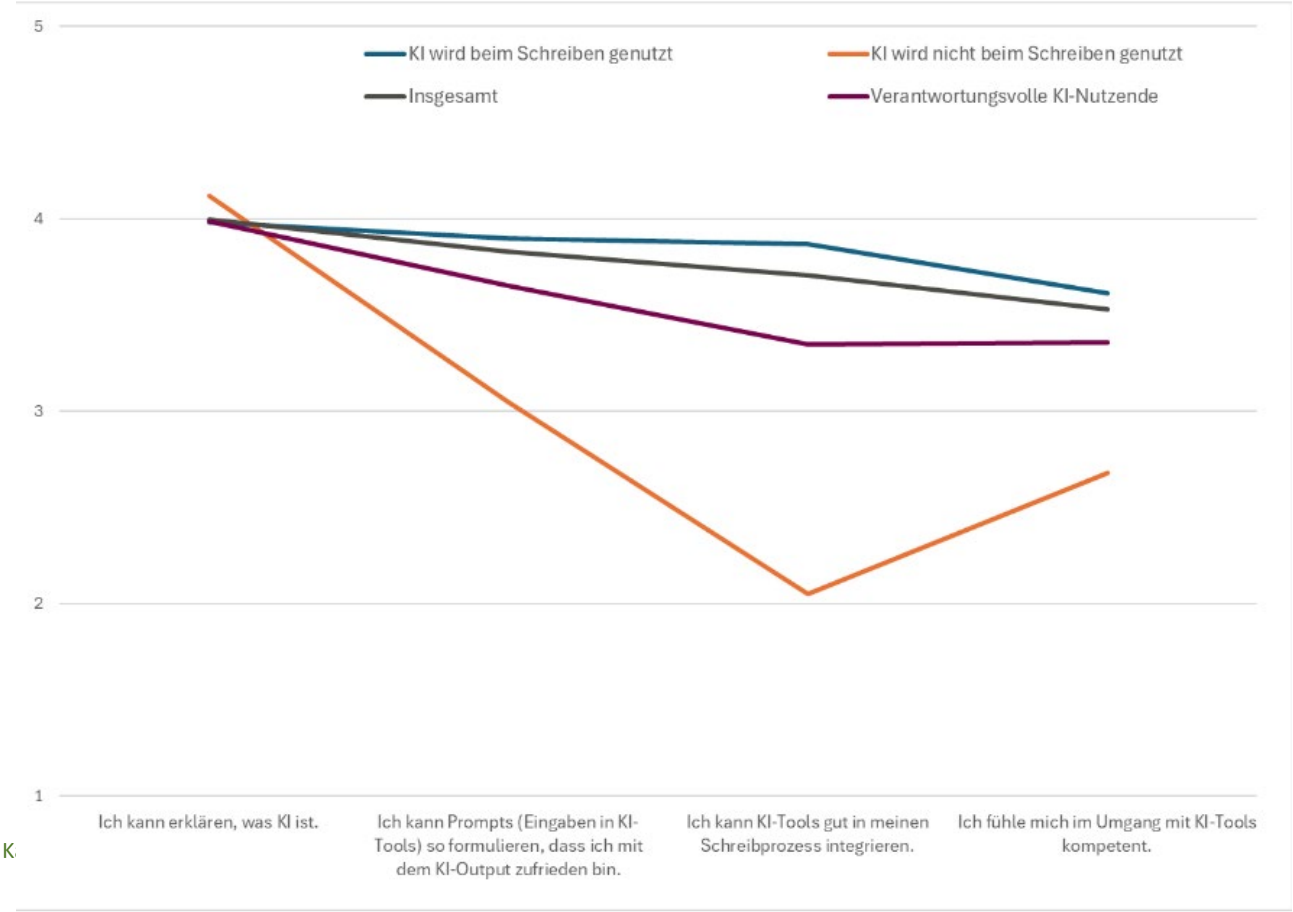




Self-assessment AI usage for writing tasks (Hoffmann et. al. 2026)



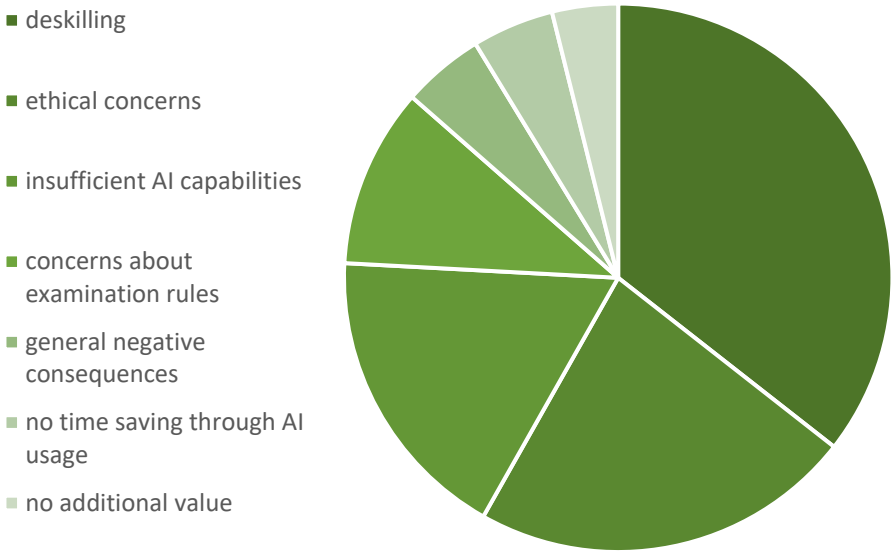
Self-assessment AI literacy (Hoffmann et. al. 2026)

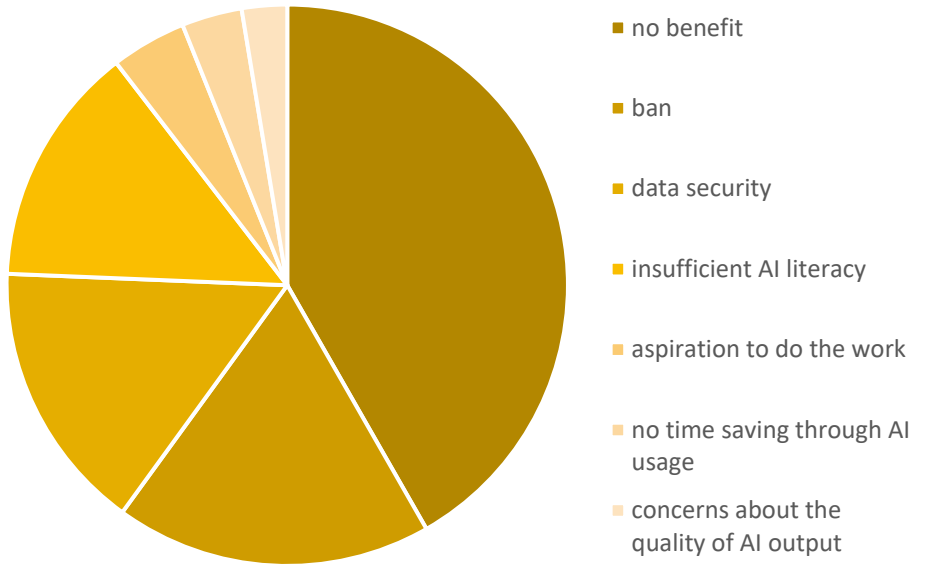


Interdependency between writing competence and AI usage (Hoffmann et. al. 2025)

- Students who estimate their own writing competences as high show lower AI usage during their writing process
- The more students feel responsible for their own texts, the less they use AI
- Quantitative and qualitative findings show that efficiency is the number one reason and effect students report regarding AI usage
- The effects of AI usage on motivation and affect are ambivalent: some students feel more motivated through their AI usage while others report less motivation and doubts about the meaningfulness of academic learning and writing → potential existential crisis
- AI usage is a substitute for human interaction for many students
- AI tools become the basis for knowledge acquisition

Reasons for not using AI (Hoffmann et. al. 2026) & (Rapp et al. 2025)





What do students want regarding AI use in their studies?

- Clarity over the expectations of lecturers
- Thematisation of ethical concerns
- Information on judicial aspects
- More opportunities to learn about AI
- Integration into their courses
- exchange
- Financial, didactic, technical, organisational and ideational support through universities
- Practical tips
- Clear rules for labelling AI use
- Access to more AI tools
- Pros and cons on different tools

Consequences of AI use on learning

Research on consequences of AI use

- Various studies and interventions on the topic
- Many have been put together quickly and aren‘t methodically sound
- → ambivalent and non-reliable results
- E. g. a meta analysis (Wang/Fan 2026) has been retracted in May 2026 because of methodological flaws
- A good overview on methodical errors in educational reaearch: Bauer et. a. 2025: Looking Beyond the Hype: Understanding the Effects of AI on Learning

Bastani, H. u. a. (2024) „Generative AI Can Harm Learning“

- Data collection in 2023/24
- High school in Turkey, focus on math classes
- Students n =1.000
- Experimental design:
  - 3 phases: teacher explains the mathematical problem; students work on practice exercises in three groups (GPT Base, GPT Tutor, no GPT); final exam
- Students with access to GPT show 127% (GPT tutor) and 48% (GPT Base) better results in their practice exercises than students without access to a GPT
- During the final exam, students with access to GPT base show 17% worse results than students without access to GPT; students with access to GPT Tutor show the same results as students without access to a GPT
- → performance can improve, but learning might be inhibited through the use of AI
- GPT Tutor: a specially trained chatbot that has access to at least one correct solution to the practice problems as well as information on how to give feedback when errors occur; the chatbot is further trained to only give hints, and no solutions

Kestin et. al. (2025): AI tutoring outperforms in-class active learning

- Data collection in 2023
- Undergrad physics at Harvard
- student n = 194
- Randomized controlled experiment
  - 2 groups; 2 learning units over the span of 2 weeks; group 1 has access to a AI tutor, group 2 studies with a teacher in class
  - After one week, the two groups change settings
  - Students take a pre and post test after each learning unit
- Knowledge acquisition has doubled for students with access to an AI tutor
- Motivation and effort have also increased in the group with access to an AI tutor
- The AI tutor is a specifically trained bot which has been trained on best practices to concepts like active learning, cognitive load and growth mindset, and has been supplied with a step by step instruction
- → the training of the specialiased tutor is the most time consuming part of the study

Kosmyna et. a. (2025, preprint) Your Brain on ChatGPT

- Experimental study
- n = 54, n= 18 for the fourth session
- Participants from MIT, Wellesley, Harvard, Tufts, Northeastern
- Focus: brain activity while writing essays
- 3 groups:
  - LLM Group: had only access to ChatGPT-4o as a ressource
  - Search Enginge Group: had access to the internet, except LLMs
  - Brain-only Group: didn‘t have access to either LLMs or the internet
- In the first three sessions, participants wrote an essay about three different topics
- In session 4, the LLM and brain-only groups switched conditions, and wrote an essay on a topic they had already covered in a prior session
- Brain-only: writing without assistence activates a broad range of brain networks → holistic cognitive work load
- The three grooups generally show different brain acitivity: brain-only participants show more bottom-up activity, meaning they process less external information and generate more internally
- While the brain-onlys participants had higher executive control over the writing process, the LLLm participants executed more monitoring activities
- When the LLM group didn‘t have access to an LLM anymore, they were still engaged, but they avoided processes with a high concentration (self-driven idea organisation, reasoning), meaning their results were sufficient and less unique

Yuxian (2025) Bridging the knowledge-skill gap

- With-in subjects experimental design
- Physics students, China
- N = 80
- 2x2 factorial design: LLM use and Critical Thinking
  - 4 exercises in 4 weeks
  - Order of exercises: Baseline, LLM-Only, CT-Only, Combined LLM & CT
  - 30 minutes time to gather information, 500 words on a learning note, 20 minute test
- The use of LLMs increases declarative knowledge acquisition
- Exercises about critical thinking increase procedural knowledge acquisition and hinder declarative knowledge acquisition
- → the combination of LLM usage and exercises on critical thinking increases both declarative and procedural knowledge acquisition

Potential consequences for higher education

How can we promote the meaning behind learning and science in times of GenAI?

How can we curb the use of AI tools so that they don‘t hinder learning?

How meaningful is science in these times?

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Thank you!

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