



Challenges and Opportunities for Education Systems in the AI Revolution

International Conference on Artificial Intelligence in Education 2026

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AI a magic power – or an amazing accelerator and amplifier?

Foster equity

Amplify inequality

Personalise and accelerate learning

Outsource thinking

Empower teachers as designers of innovative learning environments

Make teachers slaves of scripted lesson plans

Nuance human perspectives

Amplify bias

Connect people

Create echo-chambers

AI is ethically neutral...

...but is in the hands of teachers who are not neutral



AI in education

- GenAI tools are AI systems that:
 - ◆ **create new outputs** (e.g., text, code, audio, images, video),
 - ◆ often in response to prompts,
 - ◆ based on their **training data**
- GenAI is **widely accessible** and used **outside institutional control** by students, teachers and researchers
- 2 types of GenAI: **general-purpose** and **educational**

General-Purpose

Translation software
Speech to text, Text to speech
(essential for assistive technologies)

Educational

Intelligent tutoring systems
Early warning systems

Large-language models (LLMs), not mostly designed to support student's learning
e.g. ChatGPT, CoPilot, Gemini, etc.

LLMs developed for education purposes
e.g. Khanmigo, Socratic Playground, etc.

Non-generative
(Predictive)

Generative

Part 1: Use of GenAI in education

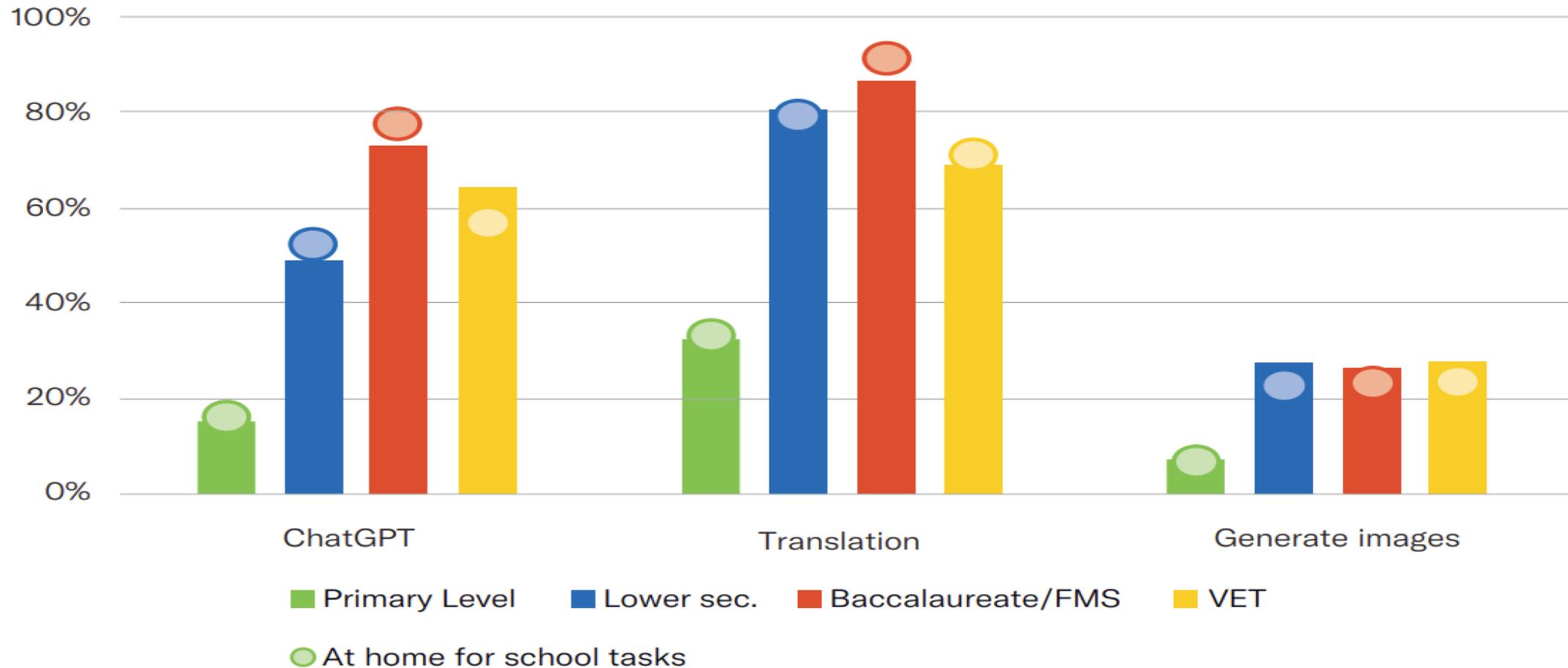




Students' uptake of AI increases with educational level (and age)

Use of different AI types in class and at home, by educational level

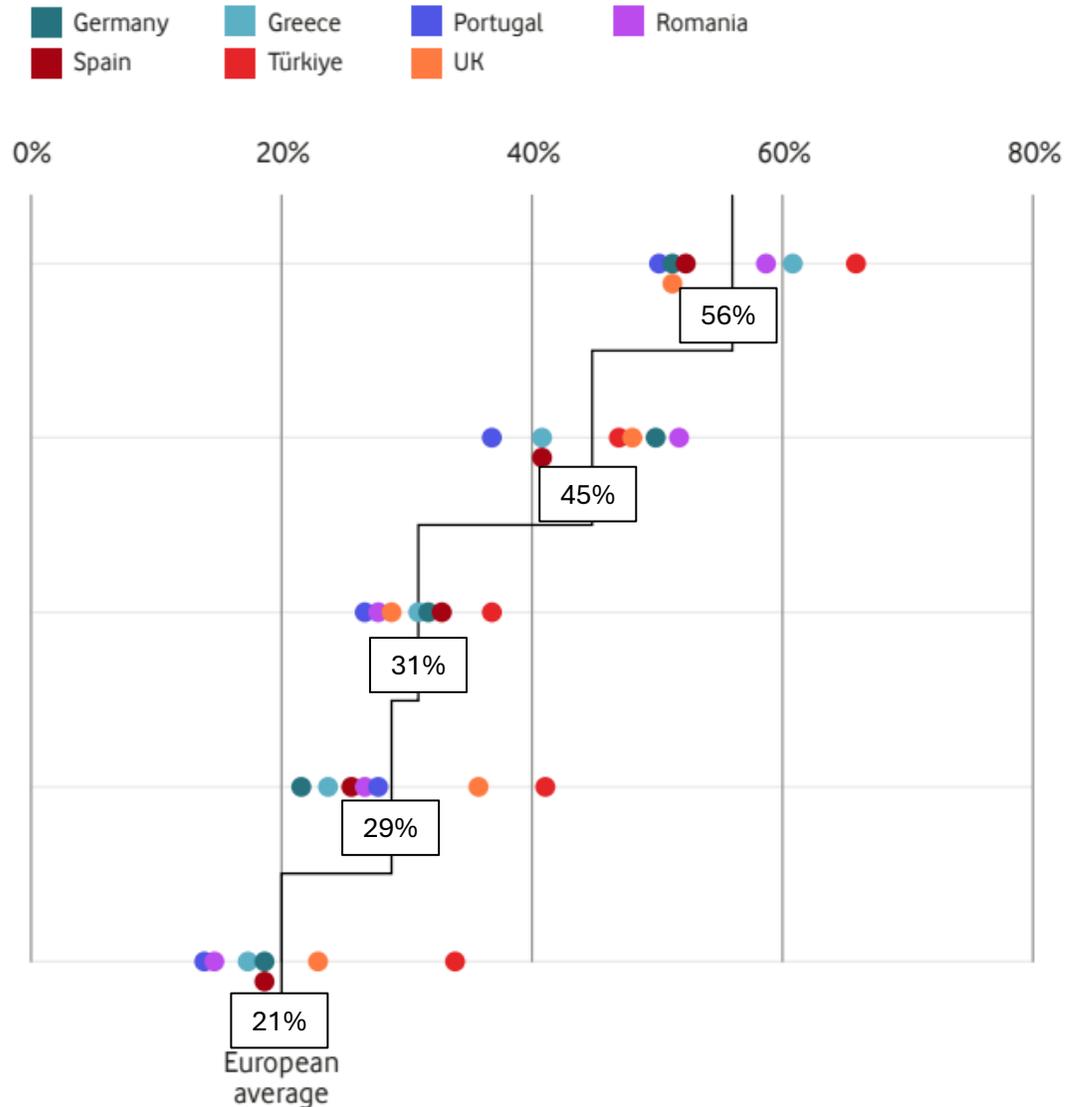
Statistically representative survey of 8-18-year-olds in Switzerland, 2024





On their own students use GenAI as an augmented search engine more than as an interactive tool

“What do you currently use AI applications for when learning **outside of school** and **not being instructed** by your teachers?”



From consultation...

... to interactivity

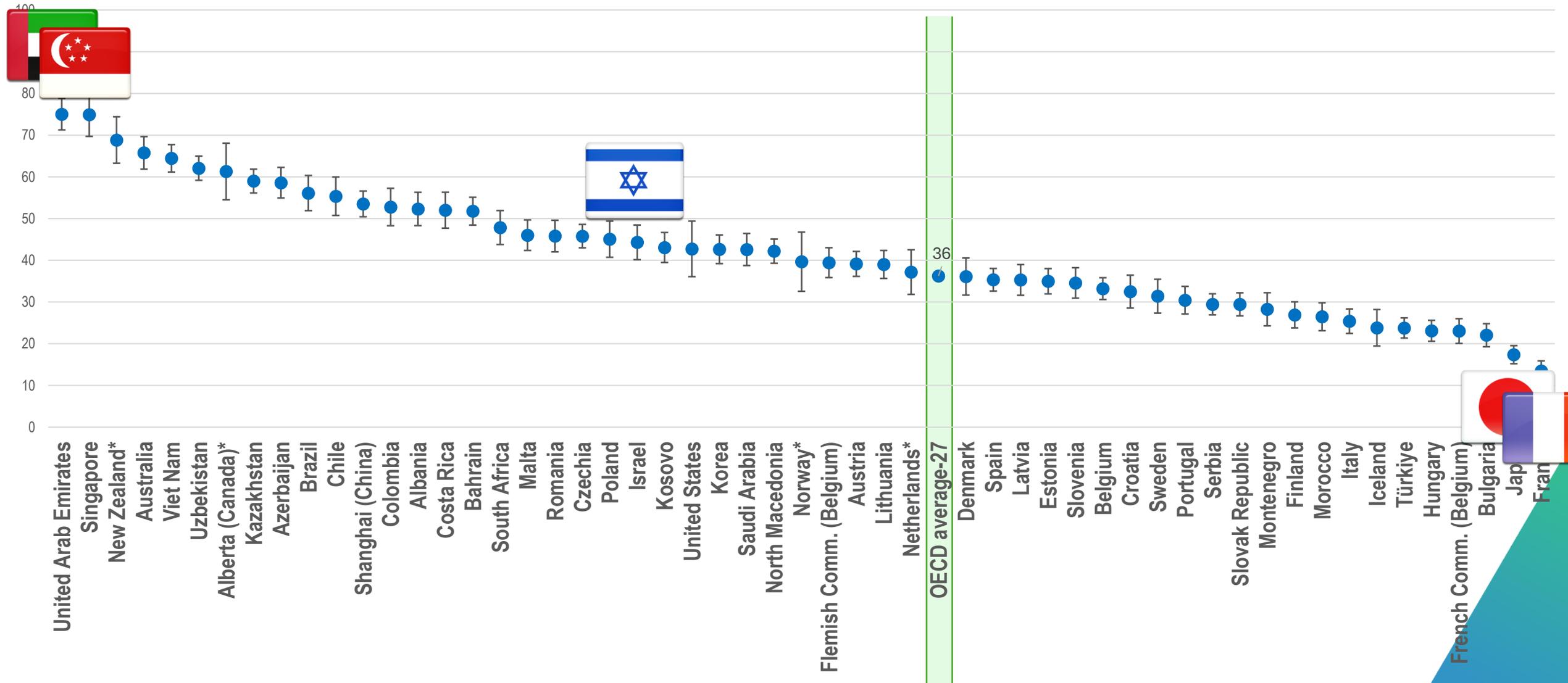
And teachers too





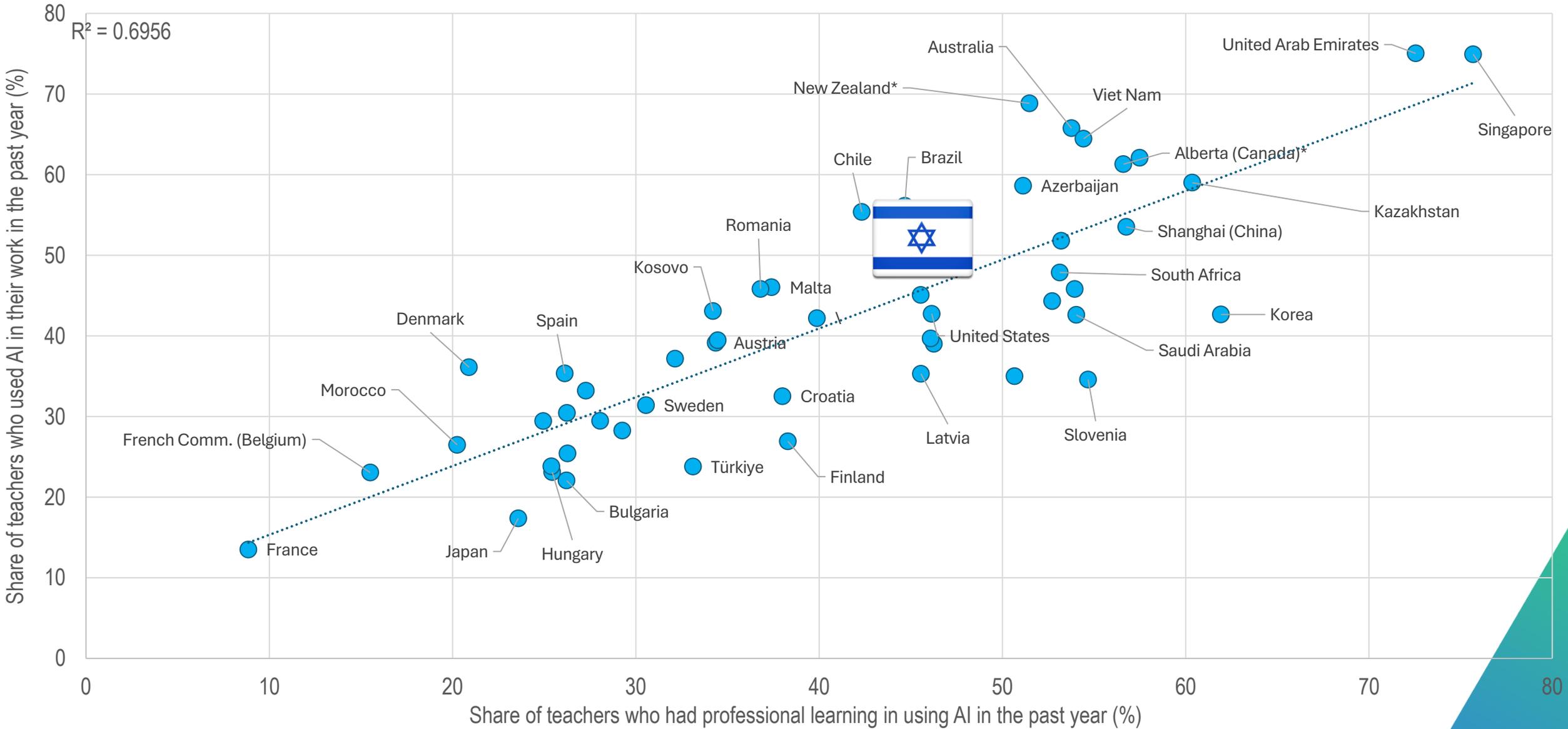
And what about teachers?

Share of lower secondary teachers who used AI in their teaching in the last year





Teachers who **learn more** about AI **use more** AI (TALIS)



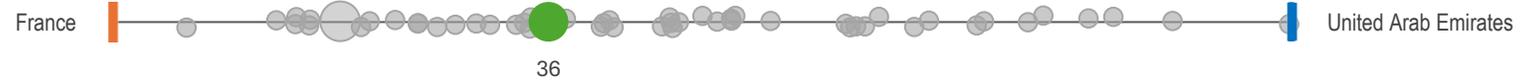


Teachers views on AI (TALIS 2024)

Share of lower secondary teachers who agree with the following statements

● OECD average ● Education systems | Lowest value | Highest value

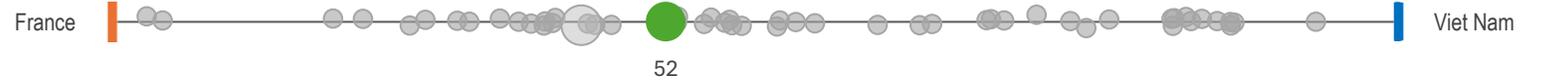
Teachers who report having used AI



Teachers who agree that AI helps to write or to improve lesson plans



Teachers who agree that AI enables adaption of learning materials for students



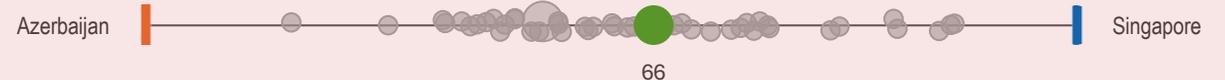
Teachers who agree that AI helps to automate administrative tasks



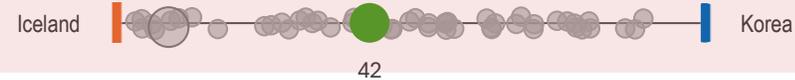
Teachers who agree that AI enables students to misrepresent work as their own



Teachers who agree that AI makes incorrect or inappropriate recommendations



Teachers who agree that AI amplifies biases to reinforce misconceptions



0 10 20 30 40 50 60 70 80 90 100

Part 2: When does generative AI enhance learning?





**Does better performance
with general-purpose tools
automatically lead to learning?**



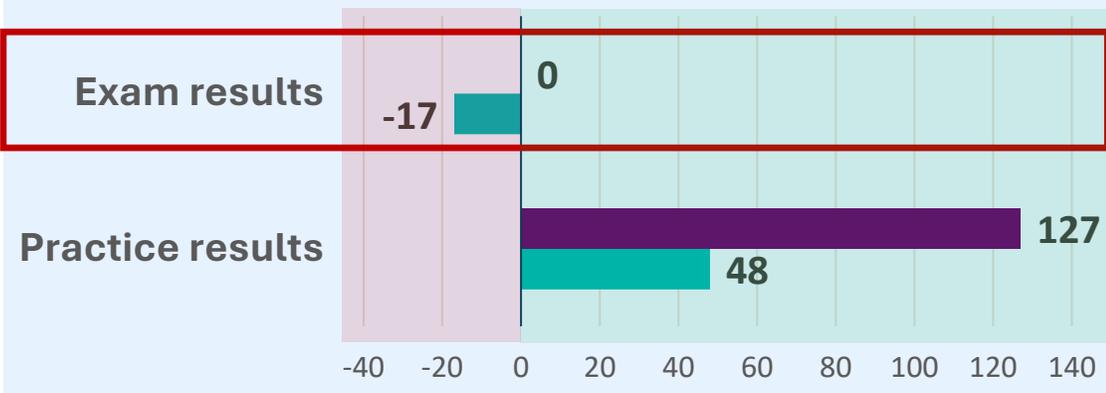
Using **general-purpose** GenAI tools does not automatically lead to learning - and sometimes even deters **understanding**

Selected international evidence from the DEO 2026

Türkiye (GPT-based tutors)

- Access to GPT-4 improved student performance in maths
- When access was removed, students who had used **standard GPT-4** performed 17% worse than those who never had access.

■ GPT tutor ■ GPT base





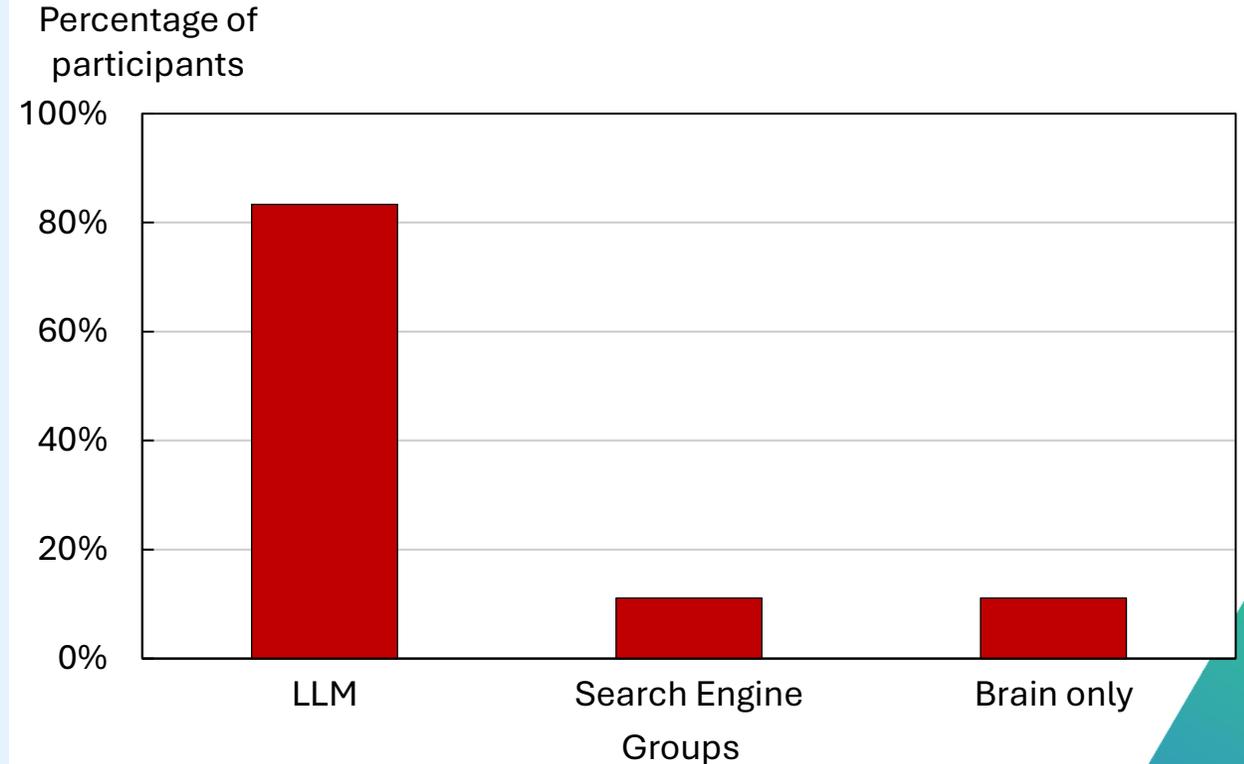
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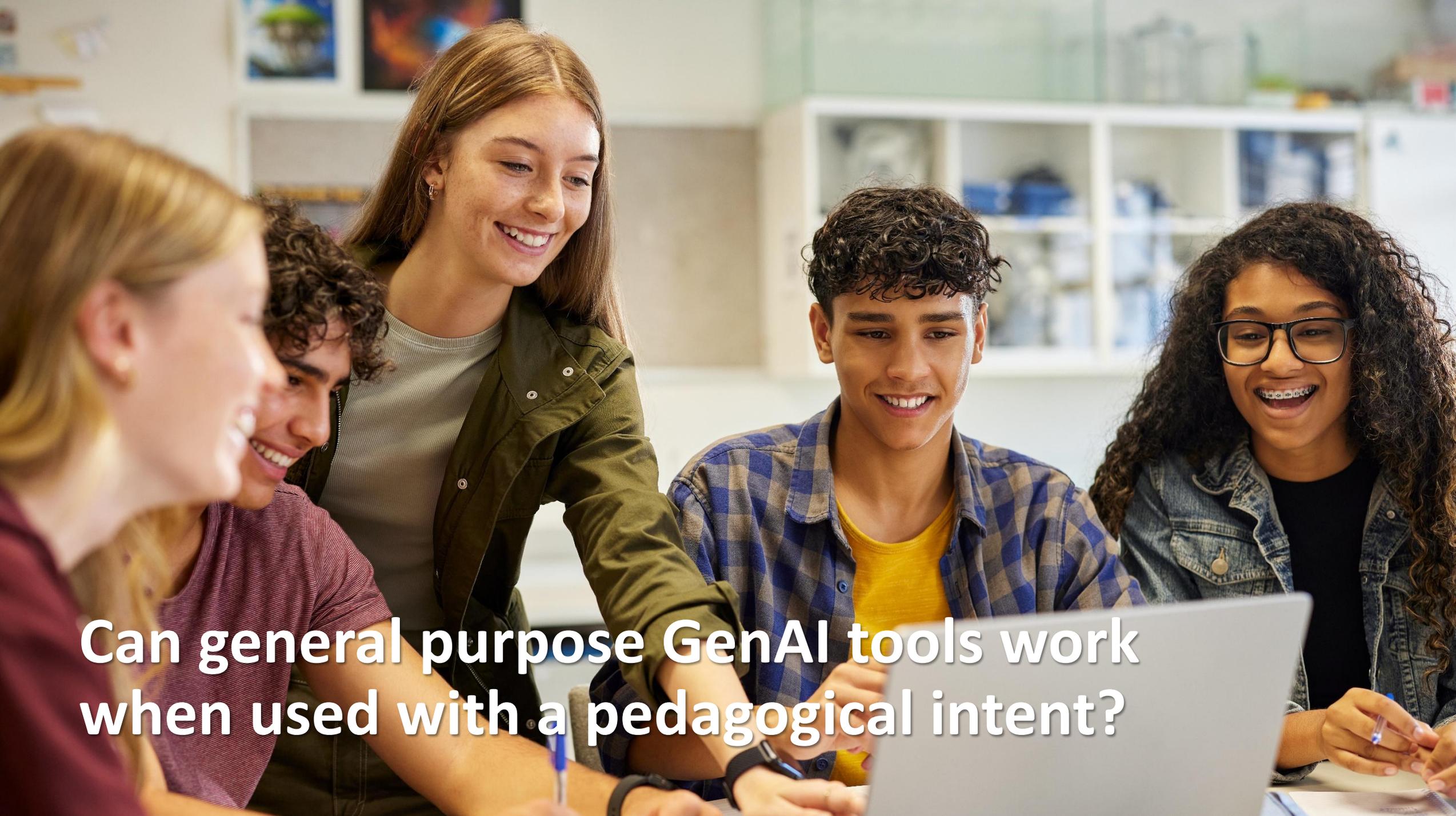
Selected international evidence from the DEO 2026

USA (ChatGPT-assisted essay writing)

- Using LLM (standard ChatGPT):
 - Reduced students' brain engagement and cognitive activity
 - Led to lower self-reported ownership and recall
- Switching from LLM to independent writing further decreased engagement
- While LLMs enhance convenience and one-off performance, they may carry long-term “cognitive debts” and learning costs.

Percentage of students who could **NOT** quote something from their written essay





Can general purpose GenAI tools work when used with a pedagogical intent?



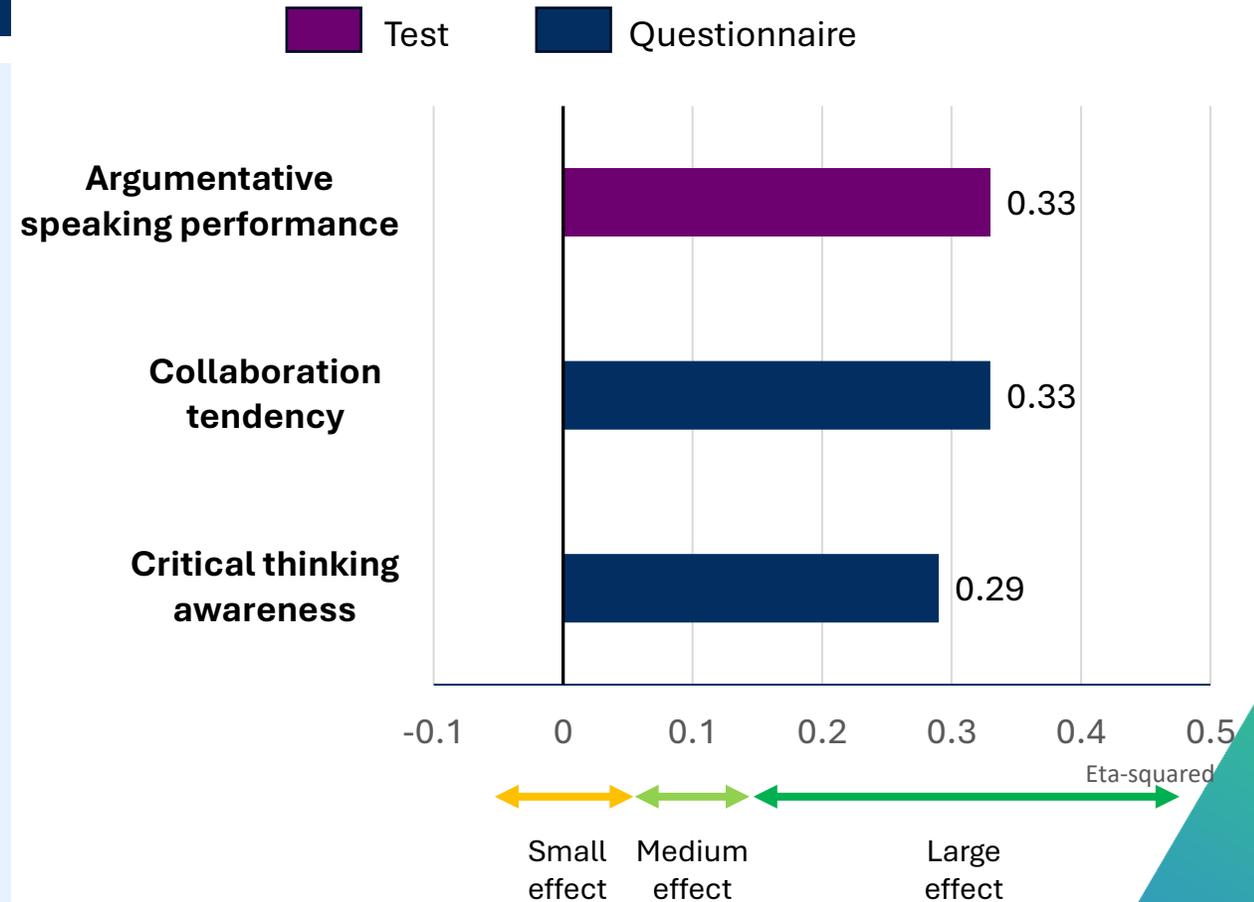
Pedagogical use of GenAI in a collaborative learning pedagogy

Selected international evidence from the DEO 2026

Indonesia (GPT-supported collaborative learning)

Course: English as a Foreign Language

- ▶ 5 weeks of collaborative learning with GenAI significantly enhanced students:
 - Argumentative speaking skills (pre-post **tests without GenAI**)
 - Critical thinking awareness and collaboration tendency (pre-post questionnaires)
 - Better results for students with high- and mid-proficiency levels in English
 - Dependent on prompt quality





Use of GenAI as a help to start creative writing (on one's own)

Selected international evidence from the DEO 2026

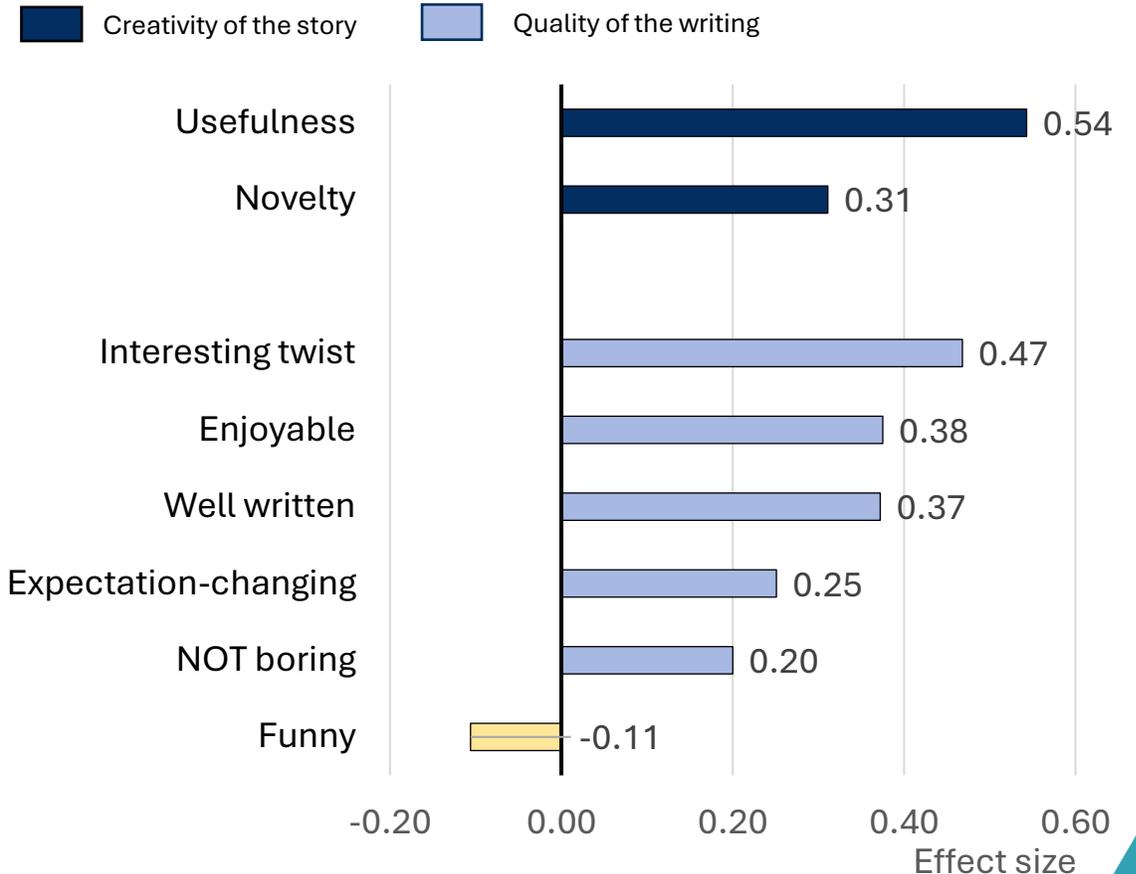
United Kingdom (Suggestions for creative writing)

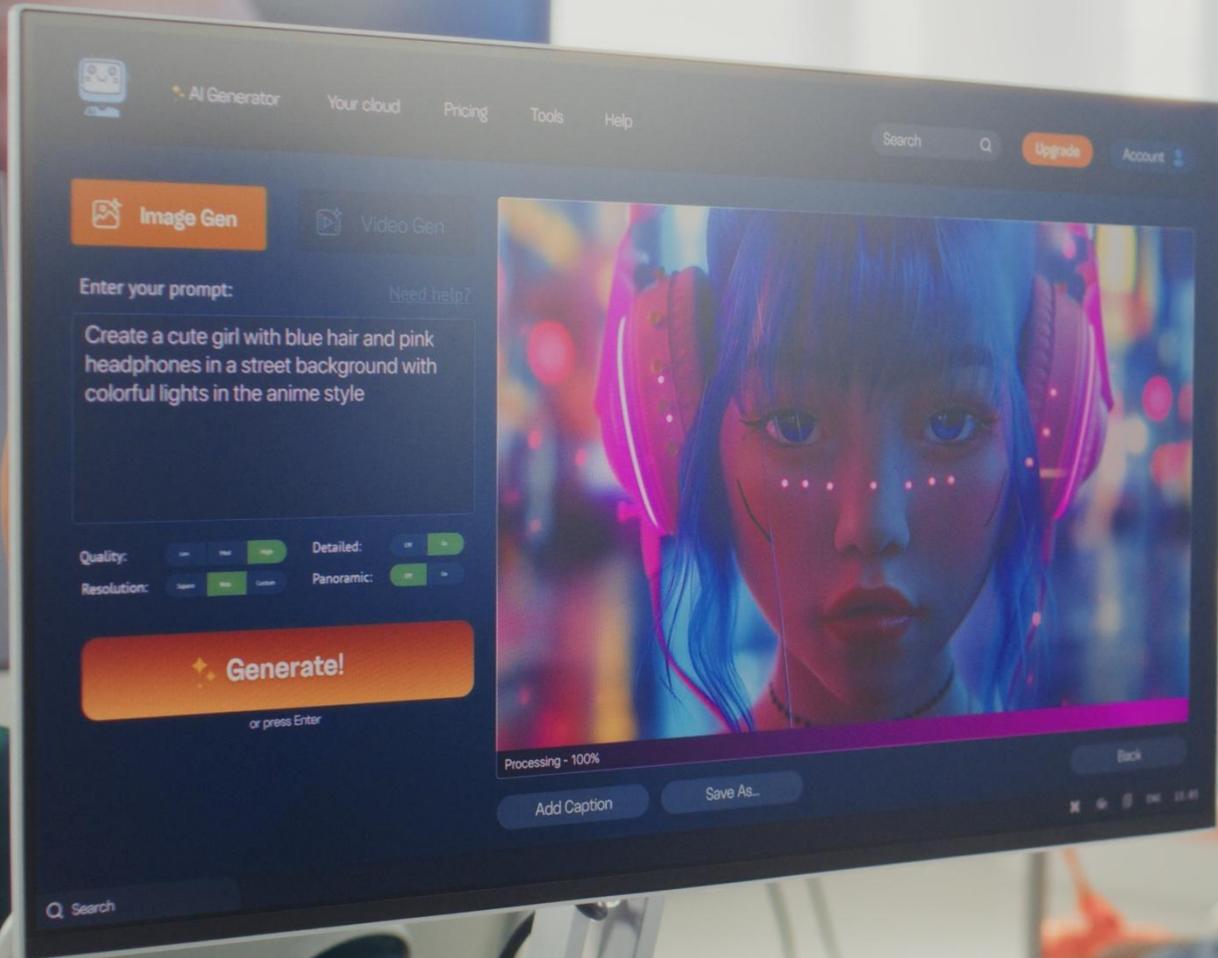
Access to 5 generative AI ideas leads to human-written stories evaluated as:

- More creative (especially among less creative writers)
- Better written
- More enjoyable

- BUT less collective variety than in the pool of non-AI assisted stories

Effect on human creative writing when receiving ideas from GenAI



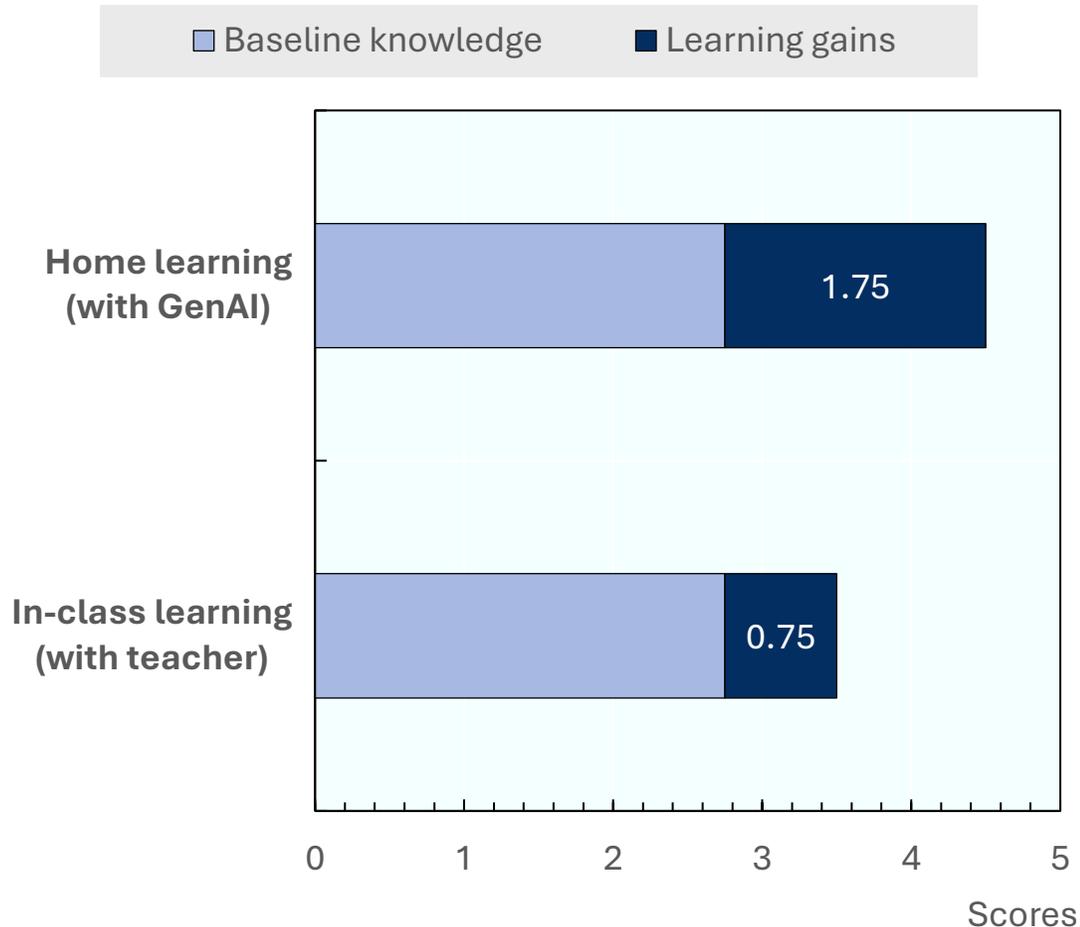


The advantage of **educational** GenAI tools?



A GenAI tool fostering “active learning” pedagogy outperformed the same “in-class” pedagogy

Selected international evidence from the DEO 2026



United States (Active learning)

RCT – Undergraduate physics course

The same pedagogy (active learning) tested in two different settings: **at home with a custom-made GenAI** versus **in-class with a teacher**.

Results:

- Students learnt more and in less time when using the GenAI tutor
- They also felt more **engaged** and **motivated**

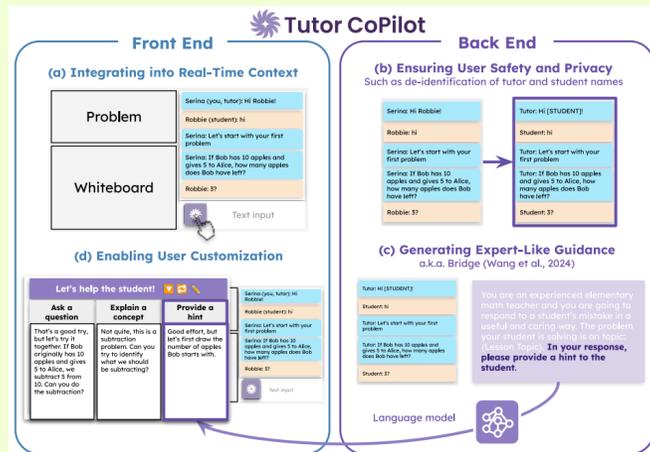


Educational GenAI shows promise to raise quality and equity in tutoring (and perhaps teaching)

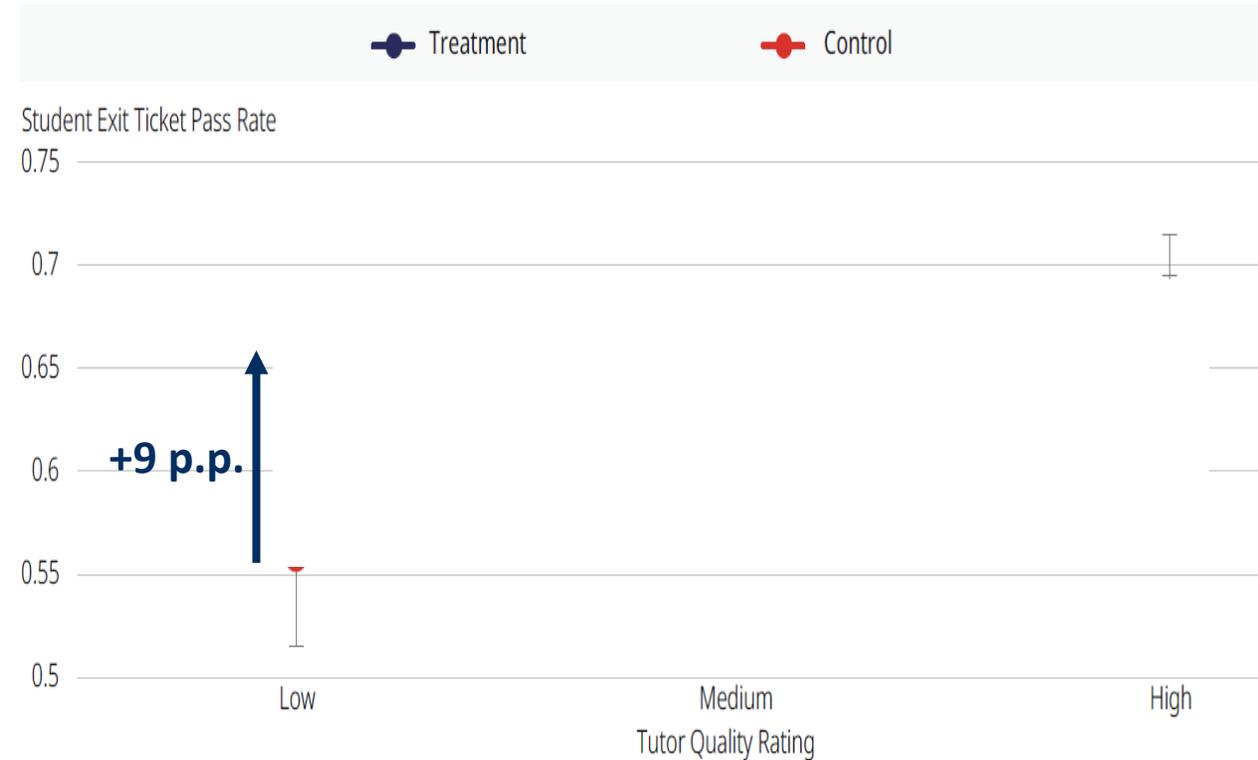
Selected international evidence from the DEO 2026

USA (Human-AI approach support to tutors)

- Tutor CoPilot improved student learning outcomes, raising topic mastery by **4 percentage points** overall and **9 points** for students tutored by lower-rated tutors.
- Similar results for less experienced tutors



RCT shows effectiveness, particularly for « lower quality » (and less experienced) tutors

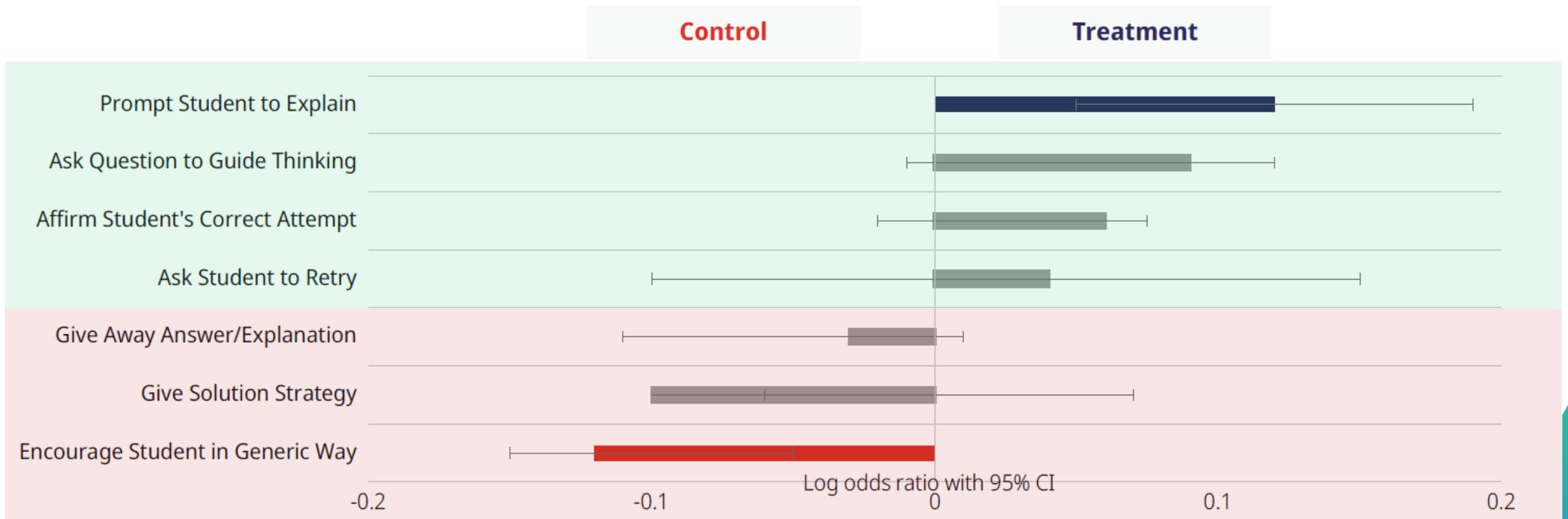




Educational GenAI shows promise to raise quality and equity in teaching (and tutoring)

Selected international evidence from the DEO 2026

How come? GenAI-assisted tutors used more active and effective teaching strategies.





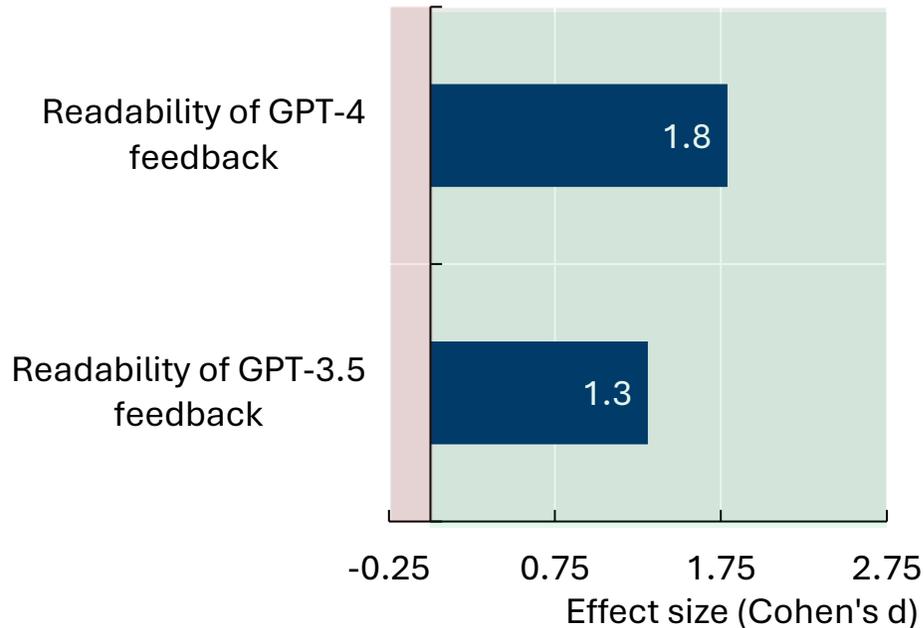
GenAI and the power of feedback



AI and the power of feedback - readability

Selected international evidence from the DEO 2026

Comparing **GenAI's feedback readability** to humans'



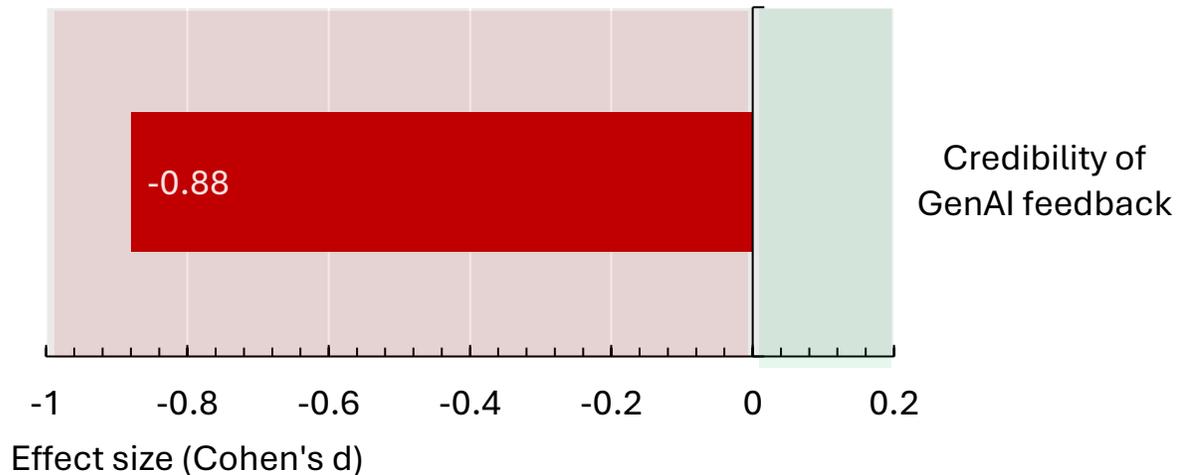
Review of evidence

- GenAI can scale timely and individualised formative feedback.
- Evidence shows that **AI-generated feedback** can match or exceed human feedback in quality, readability, structure...
- And can lead to similar learning gains for students.



AI and the power of feedback - credibility

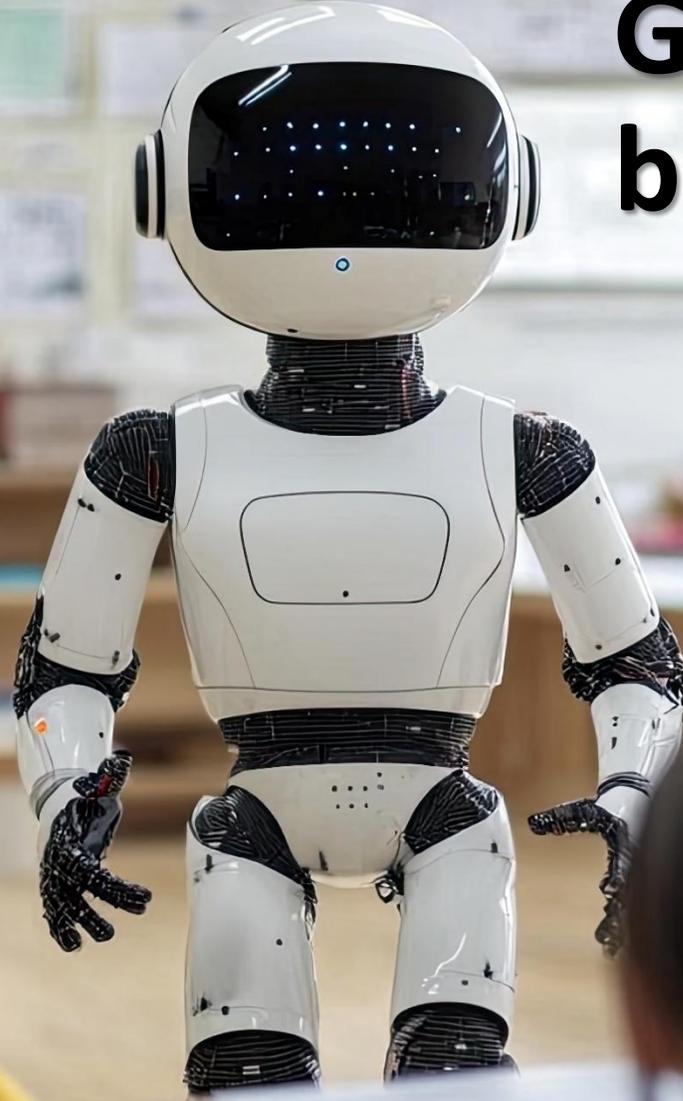
Selected international evidence from the DEO 2026



Review of evidence

- Whatever its quality, feedback is only effective if taken seriously and acted upon
- And students still tend to perceive GenAI feedback **less credible** and meaningful than humans', which decreases their motivation and engagement
- Comparable quality of feedback does not imply pedagogical interchangeability
- Thus, **hybrid AI-teacher** models are most promising

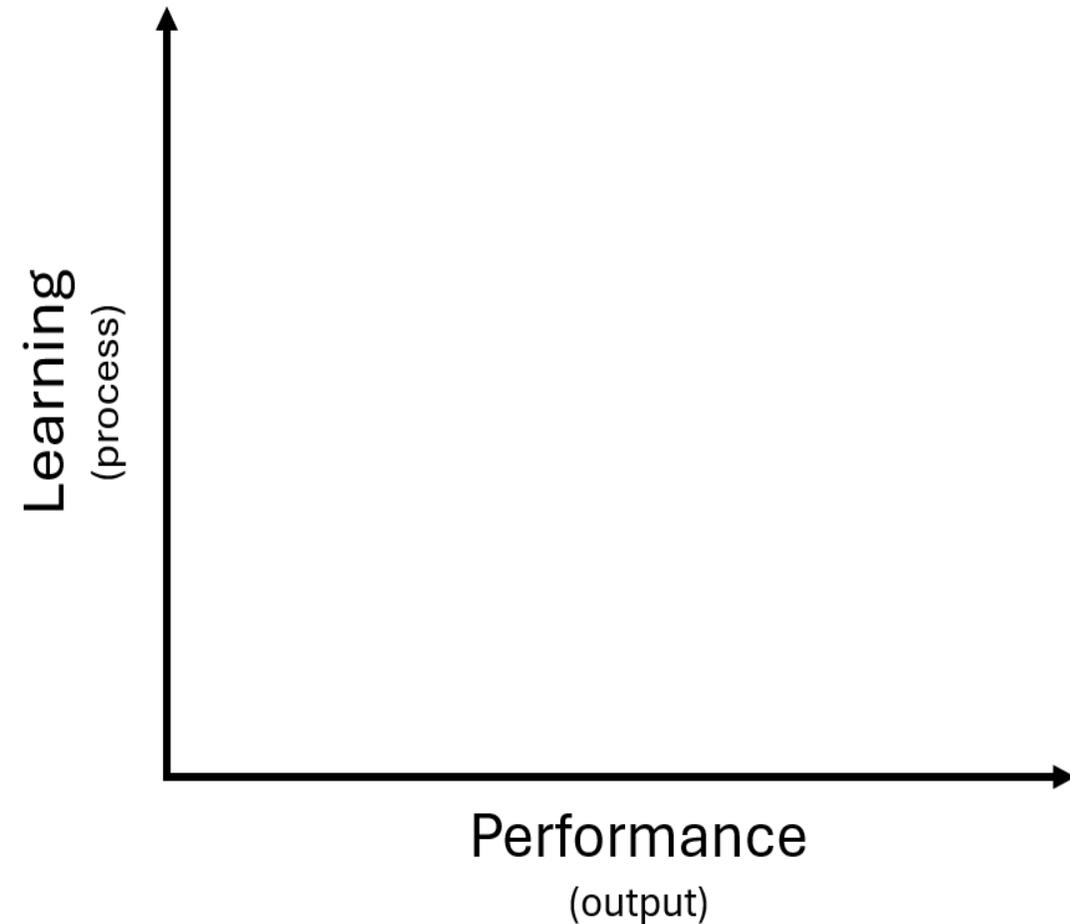
**Getting the
balance right**





What does it take to learn with GenAI?

Either integrating GenAI into learning.... or embedding learning into GenAI



- Use **general-purpose** GenAI tools as part of traditional pedagogies in ways that support learning, under teacher guidance
- Redesign current pedagogies so that the availability of **general-purpose** tools does not affect learning outcomes
- Pay attention to learning processes and not just outputs and emphasise process-based assessment
- Develop **educational** GenAI tools align with pedagogical knowledge and educational research
- **Emerging evidence: learning gains are more likely with educational GenAI than general-purpose chatbots**

**Part 3:
Towards educational generative AI**





What does GenAI bring to traditional educational AI tools?



Opportunities and challenges for GenAI pedagogical agents

Selected international evidence from the DEO 2026

Opportunities

- Conversational approach (flexibility)
- Easily adaptable to multiple subjects
- Capable of questioning, scaffolding, turn-taking techniques, providing feedback...
- Personalisation to the specific challenges of an individual learner

Challenges

- Occasional errors (hallucinations) – some techniques help but it remains a problem
- Balancing support/scaffold and dependence (over-reliance by student)
- Making it engaging for students to learn



Example of a GenAI tutor shifting its scaffolding approach

The Socratic Playground - Example from the DEO 2026

You are a new policy analyst at a foundation tasked with reviewing proposals for renewable energy subsidies. [...] Write an argumentative essay that outlines the pros and cons.

GenAI Tutor: Hello, it's great to see you. [...] Let's start by outlining two reasons to **support** subsidies for renewable energy.

Student B: I think it should.

GenAI Tutor: Great opinion! What's one reason why you support subsidies?

Student B: I have no idea how this should be justified.

GenAI Tutor: No worries at all! Let's work on this together. One reason might be related to climate change – do you want to expand on that or think of another reason?

After being in questioning mode, the GenAI tutors shifts its pedagogical strategy and provides a first answer to start the discussion

How can GenAI best support teachers while preserving their agency?





GenAI tools can support teachers in different ways

Some ways to think about Human-AI teaming and the design of AI tools for education

Replacement

- › GenAI accomplishes a task or subtask for the teacher
- › Productivity gain: more time for other tasks
- › Risk of skill atrophy?
- › Important loss to human teaching relationship?

Complementarity

- › GenAI amplifies the teacher's capabilities while the teacher remains actively involved
- › Productivity gain: tasks are done better
- › Conducive to professional learning?

Augmentation

- › Human-GenAI team outperforms what either the human or the GenAI could have performed alone
- › Productivity gain: tasks are done better
- › Conducive to professional learning

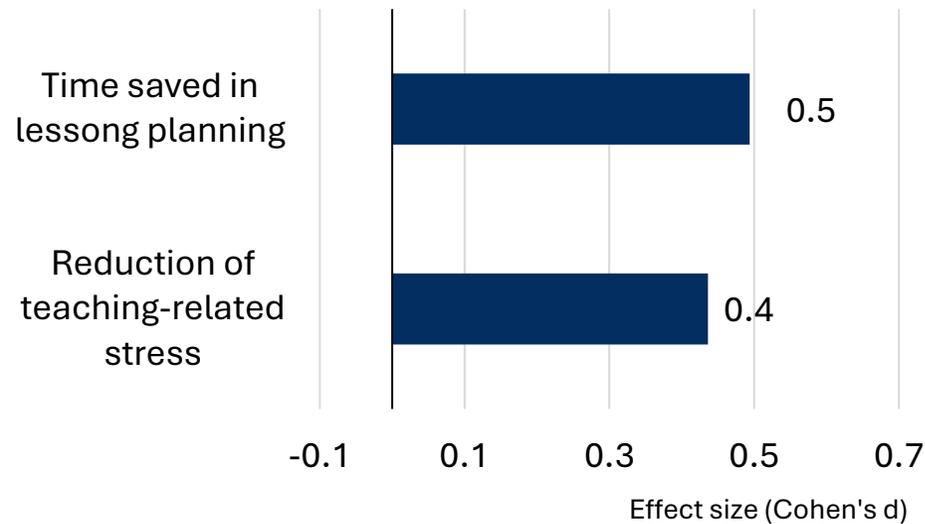


GenAI as a productivity boost for teachers

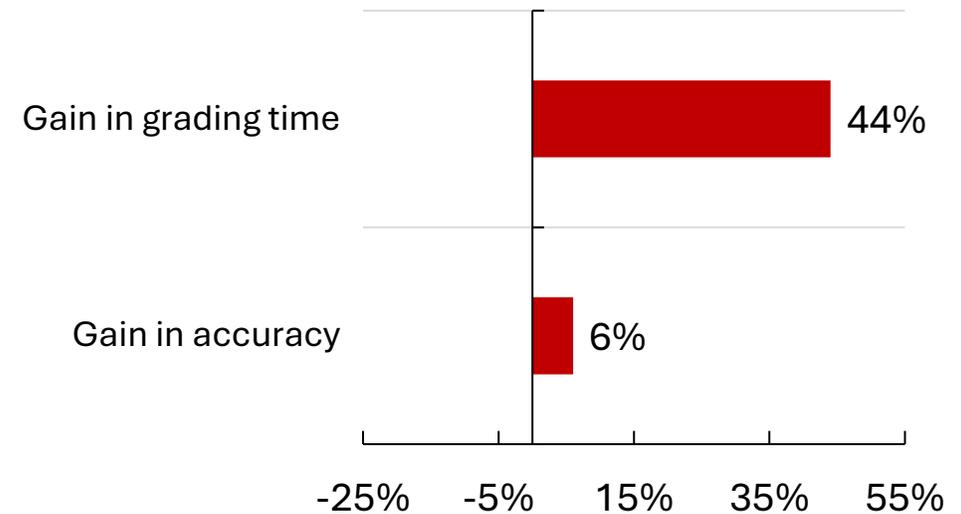
Selected international evidence from the DEO 2026

Comparing **GenAI** and humans in...

... preparing lessons



... grading a coding assignment



Though it also comes with risks to mitigate for teachers: cognitive offloading, loss of social interactions with students, halt to professional development, reduced agency and autonomy



Example of educational GenAI as **teaching assistant** respecting teacher (and teacher assistant) autonomy

Selected international evidence from the DEO 2026

JeepyTA (LLM-based Teaching Assistant at Penn U)

AI TA supports human TAs to provide **logistics information** and **formative feedback** to students, to **answer questions** on course reading, to moderate student fora, etc.

Instructors can set the tool to review answers with flexibility (topics, type of activity, etc.) before they reach students

Results:

- **Halved** median **response time** to students (available 24/7)
- Feedback **raised** the share of students writing **quality essays** from 64% to 95%
- Tool rated as **comparable** to human TAs in **clarity, accuracy,** and **professionalism**... but **weaker** in **motivation** and **developmental guidance**

The screenshot shows a forum thread. The first post is from a student (profile 'A') asking a question about grading criteria for creative assignments. The second post is a reply from 'JeepyTA' explaining the grading criteria and offering advice on how to earn maximum points.

A 19 days ago

I am wondering if we're supposed to post 4 times for each creative assignment, or what's the grading criteria for this? I only posted once for each CA and got 1/4. Is there any way that I can make up for it?

Thank you!

↳ JeepyTA replied to this.

JeepyTA 19 days ago

Hey there **A**!

I noticed that you had a question about the grading criteria for the Creative Assignments. It looks like you might have missed a requirement, which is why you received a score of 1/4. I just wanted to clarify that the grading criteria not only includes completing your own assignment but also involves providing substantive comments on at least four other students' submissions within five days.

Unfortunately, there's no way to make up for the missed posts in this case. However, don't worry! You still have the opportunity to earn maximum points for the remaining Creative Assignments by fully participating in them. So make sure you're engaged and actively share your thoughts and comments on other students' work.

Part 4: GenAI for system and institutional management





GenAI (and its underlying techniques) can also improve the effectiveness of systems and institutions

Selected international evidence from the DEO 2026

Streamlining backend workflows

- Credit mobility and transfer prediction across institutional boundaries (HE and LLL)
- Structure the classification, tagging, and reuse of learning content and curricular components
- Support academic advisors to provide personalised course and major recommendations to students

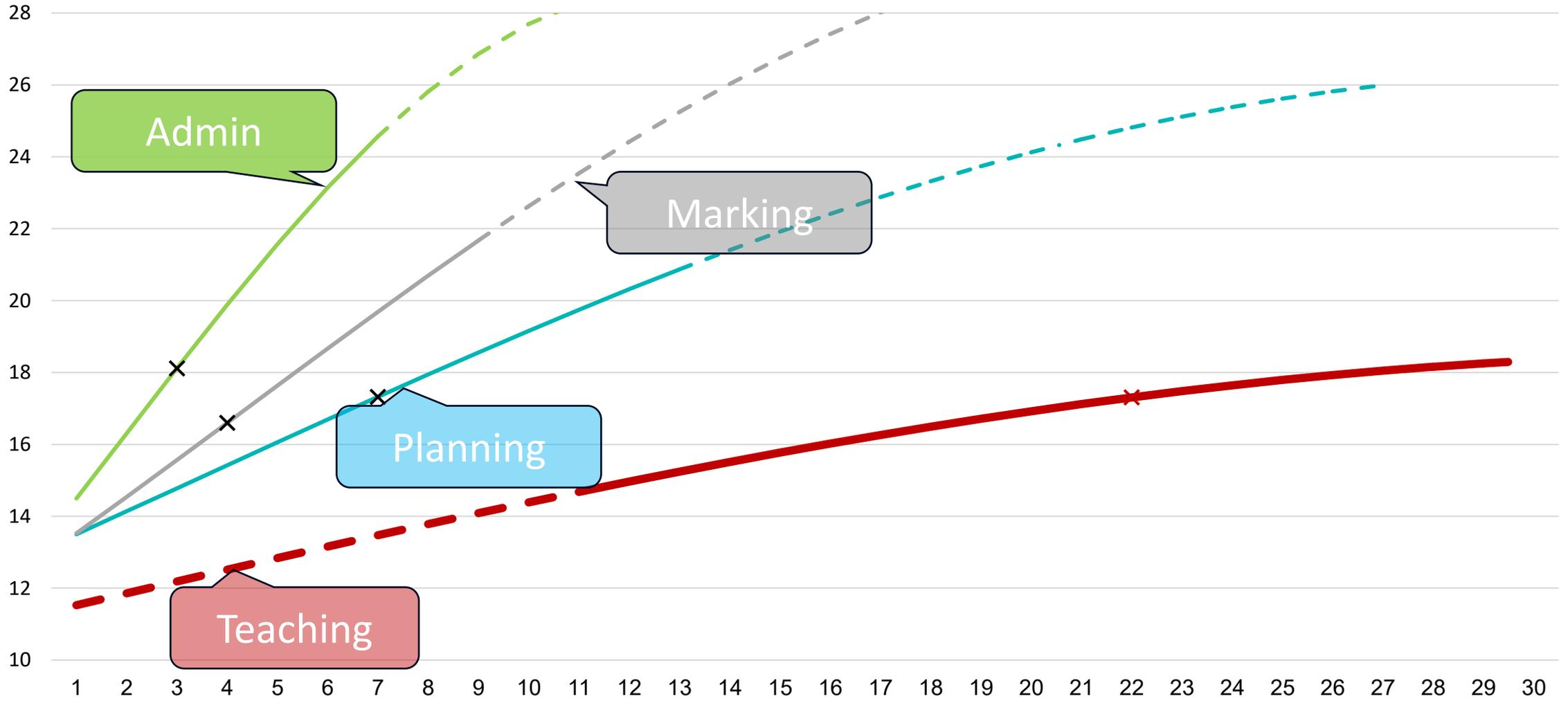
Improving scientific/educational research

- Specialised research GenAI tools for almost all stages of the research process
- Access and process large quantities and new types of data: unstructured data (text, images, etc.)
- Production of privacy-preserving synthetic datasets
- Connect distant areas of knowledge



The drivers of teachers' stress

Teachers experiencing stress in their work "a lot" (Estimated %)



Hours spent during the most recent week doing a specific task (task intensity)

Take-aways



Harnessing GenAI for education while mitigating risks for learning

Human-Centred Teaching, Learning and Assessment with GenAI

1

- **Doing a task with GenAI isn't the same as learning from it**

2

- **As machines get smarter, human skills matter more.**

3

- **Students must learn to think** (without GenAI) **before they learn to prompt.**

4

- **GenAI works best when teachers design the task.**

5

- **No GenAI lesson plan replaces professional judgment.**

6

- **Algorithms may suggest; teachers must decide. Teachers should not outsource assessment to AI.**



Better understanding how GenAI can be educational Investing in GenAI Research and Development for Education

7

- EdTech should build GenAI for classrooms, not just consumer markets.

8

- If it isn't tested for safety, bias, and impact, it isn't ready for schools.

9

- The strongest GenAI will be co-designed with teachers and learners.

10

- We need global yardsticks—and serious research—to measure what GenAI actually changes in learning.

11

- Universities should train GenAI builders, not just GenAI users



Adapting previous guidelines and guardrails to GenAI

Shaping an Enabling Policy Environment for Trustworthy GenAI

12

- **Black-box AI has no place in education.**

13

- **AI safety and standards demand global cooperation.**

14

- **Responsible GenAI use requires continuous guidance.**

15

- **Every AI decision must be open to human challenge.**



Adding GenAI tools to countries' digital education infrastructure

Supporting an Effective GenAI Infrastructure for all

16

- **No devices, no connectivity—no AI learning.**

17

- **GenAI belongs alongside other digital resources and textbooks as a core learning tool.**

18

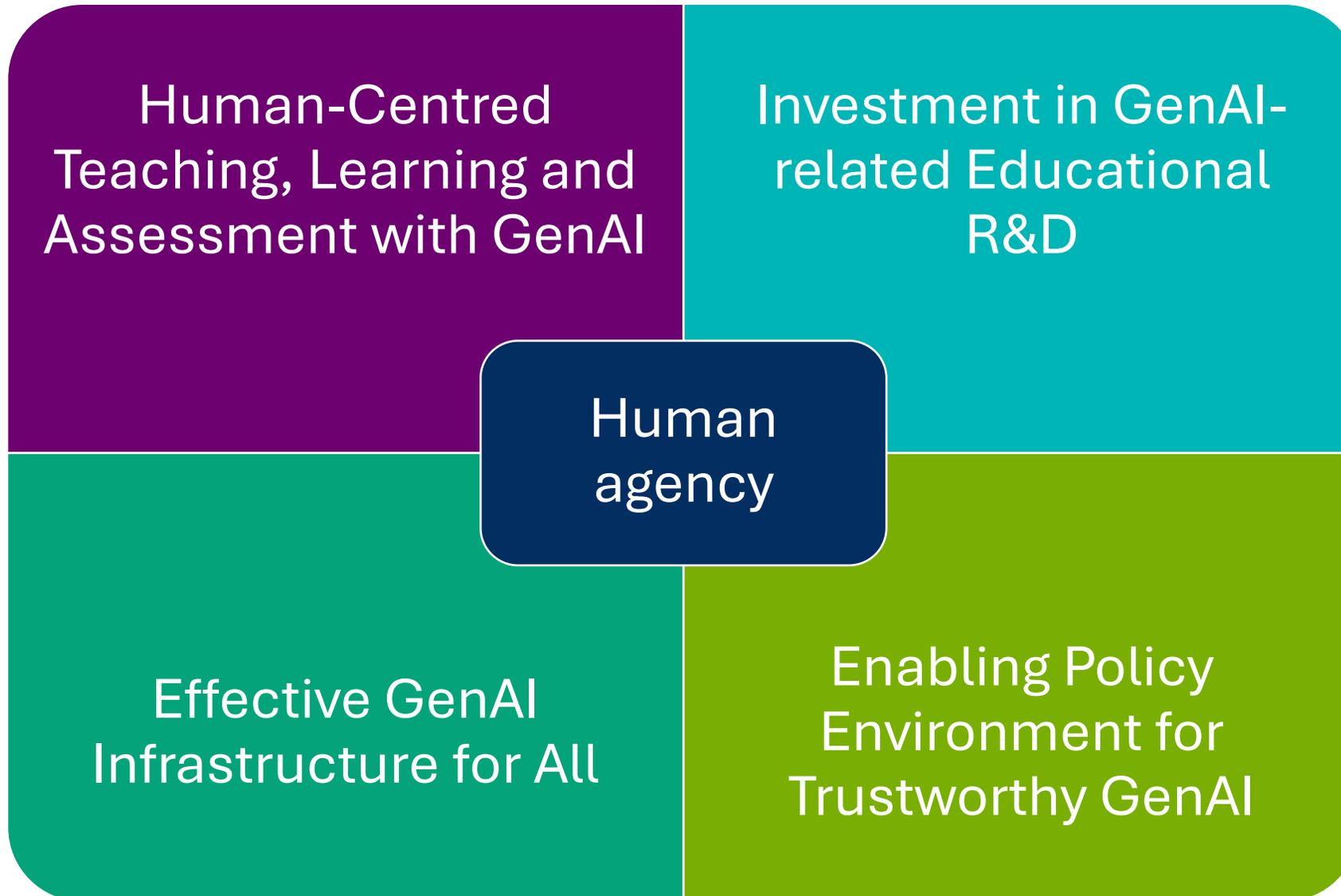
- **Teachers need ongoing AI literacy, not one-off training.**

19

- **GenAI should empower teachers, not watch them.**



Human agency remains at the core





Read the OECD Digital Education Outlook



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