

AI Custom Chatbots Cut Cognitive Load but Show No Clear Learning Gain — A University of Cologne Physics-Education RCT

AI in Education · Good practice · Germany

Quality score: 27/100

Evidence strength: Cautionary / limited

Summary

A randomized study at the University of Cologne found AI-generated custom chatbot explanations in physics lessons significantly cut cognitive load and raised interest and self-efficacy, but found no clear advantage in objective learning outcomes over standard textbook material.

Key dimensions

Dimension	Score
Evidence of learning impact	1/3
Equity & inclusion	1/3
Transparency, ethics & data protection	1/3
Teacher capability & pedagogy	0/3
Scalability & sustainability	1/3

Evaluated by C-NAPSE

Data sources

[C-NAPSE web research](#) — accessed 2026-08-25

[University of Cologne, Faculty of Mathematics and Natural Sciences](#) — accessed 2026-08-25

[Physical Review Physics Education Research](#) — accessed 2026-08-25

[University of Cologne repository copy](#) — accessed 2026-08-25

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