

From ‘Generative AI Can Harm Learning’

(Bastani, Bastani, Sungu et al, University of Pennsylvania and Budapest British International School)

“The study took place at a large high school in Turkey during the Fall semester of the 2023-2024 academic year.

We conducted four 90-minute sessions for about fifty 9th, 10th, and 11th-grade classes, comprising nearly 1000 students. For each grade, our sessions collectively comprised about 15% of the math curriculum covered during the semester. Each session has three parts:

1. In the first part, teachers review a topic (e.g., combinatorics) previously covered in the course, and solve one or more examples on the board. This part is identical to a standard high school one-to-many (i.e., teacher-to-students) lecture.
2. The second part is an assisted practice period, where students solve a sequence of exercises designed by teachers to reinforce the covered concept. Our randomized intervention...” (the Chat GTP group and the non-Chat GTP group) “...only affects this second, self-study part.
3. The third part is an unassisted evaluation, where students take a closed-book, closed-laptop exam.

Importantly, each problem in the exam corresponded to a conceptually very similar practice problem from the previous part—this design was chosen to help students practice the key concepts needed to perform well on the exam.”

Findings:

“We find that GPT Base and GPT Tutor substantially increased student scores in the GPT-assisted practice sessions. These results imply that GPT Base and GPT Tutor would increase performance on the assisted practice sessions by 48% and 127%, respectively, on average relative to the control arm...” (ie. The students who just used textbooks).

“In stark contrast, in the subsequent unassisted exam, student performance in the GPT Base cohort degraded. GPT Base diminished the average control student’s performance on the unassisted exam by 17%.

These results demonstrate an inherent trade-off in access to generative AI tools: while these tools can substantially improve human performance when access is available, they can also degrade human learning (particularly when appropriate safeguards are absent), which may have a long term impact on human performance.”