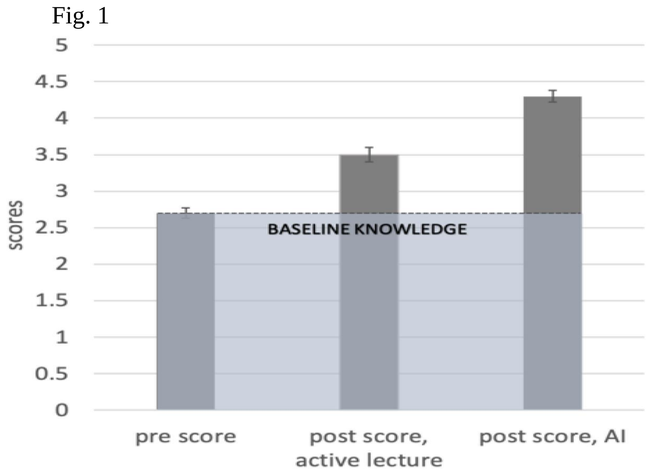
Immediate, Adaptive Assistance: Can AI Tutoring Enhance Active Learning? *- And what it means for teaching economics*

Fig. 1



INTRODUCTION

- University-level economics is taught through a combination of lectures and exercise classes designed to solve problem sets and conduct data analysis using **active learning, facilitated by teaching assistants (TAs).**

- This project explores whether the latest generative **artificial intelligence (AI) tools should be actively integrated into exercise classes** at the UCPH Department of Economics—and, if so, how to do it effectively

- Recent feedback from TAs indicates that **most students already use AI tools** to complete problem sets, but often in ways that do not support meaningful learning

METHODS

1. This study involved a **literature review of 2023-2024 papers** using a snowballing approach from social media, Google Scholar, and AI tools. Here I discuss two papers on related subjects that use **randomization**.

2. In a classroom setting, I introduced a more challenging question and encouraged students to seek AI assistance. Following this, a survey was distributed, though it suffered from a low response rate (see Fig. 2). **Respondents indicated that trial-and-error was the most rewarding approach**.

3. Key conclusions are drawn from a semi-structured **interview with two stakeholders at the Department of Economics**: a PhD student TA currently tutoring students in active learning environments and a Professor, who is also Head of Studies.

RESULTS IN RECENT LITERATURE

- Kestin et al. (2024)* found that **Harvard physics students using an AI tutor achieved over twice the learning gains of traditional active learning** students while spending less time on the material.
  - Fig. 1 compares pre- and post-test scores; Figs. 3 and 4 show time spent with the AI tutor and student engagement; Fig. 6 outlines the study design.

- In another randomized setup, Ma, Li, and Shin'ichi** reported that **integrating ChatGPT into a university Python course was well-received for quick responses, debugging, and concept explanation** (Fig. 5), but concerns about over-reliance were noted.

DISCUSSION

- Interview with PhD TA Magnus Eldrup and Prof. John Rand (Head of Studies):
  - Kestin et al. (2024) highlights potential but faces two limitations: a small sample size (with novelty effects) and AI tutors being similar to existing bots.
  - TAs could create tailored AI tutors for specific problem sets.
- **Rethinking assessments is essential**:
  i. Small, in-class handwritten tests
  ii. Higher expectations for tech-enabled exams
  iii. More courses combining oral and written exams.

Listen to AI generated podcast based on audio recording of interview:

CONCLUSION

- The availability of AI tutoring is ubiquitous and should **raise the bar** for both teaching, learning, and evaluations.
- However, a **variety of teaching methods and tests of learning are required**

Fig. 2

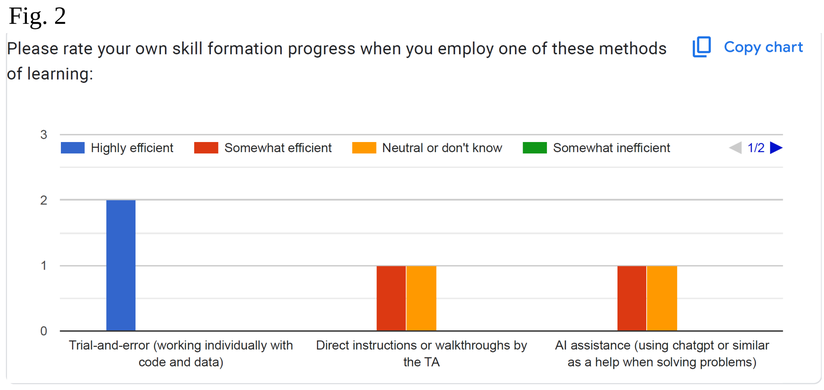


Fig 3

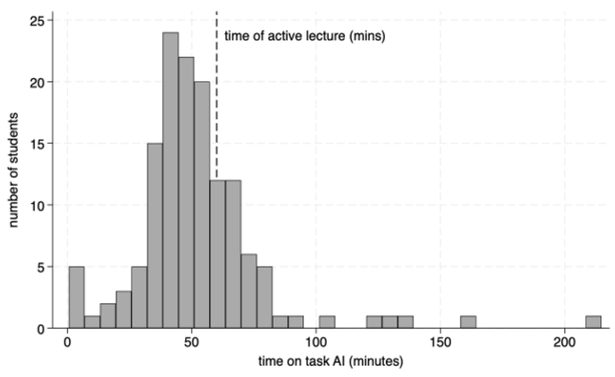


Fig 4

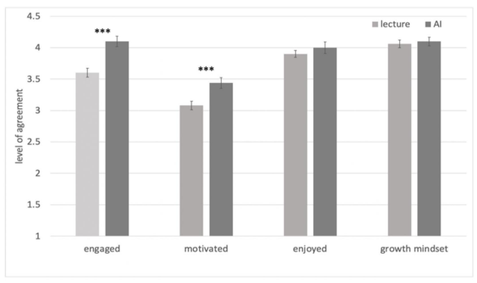


Fig 5

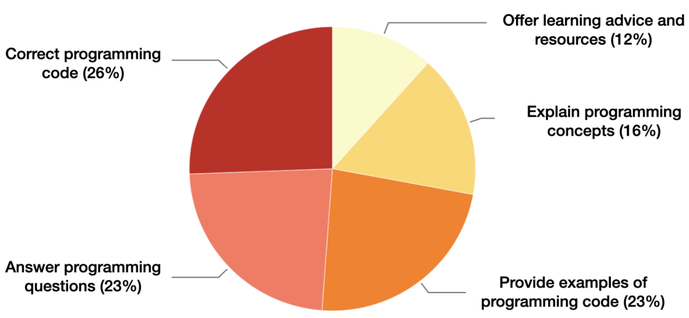


Fig 6

	Group 1	Group 2
Surface Tension Lesson	Pre-Test	
	AI Tutor	Active Classroom
	Post-Test & Affect Survey	
Fluid Flow Lesson	Pre-Test	
	Active Classroom	AI Tutor
	Post-Test & Affect Survey	

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