



UiO : **Institutt for pedagogikk**
Det utdanningsvitenskapelige fakultet

Utdanningsvitenskapelig forskning på AI: Intelligent Tutoring Systemer til ChatGPT

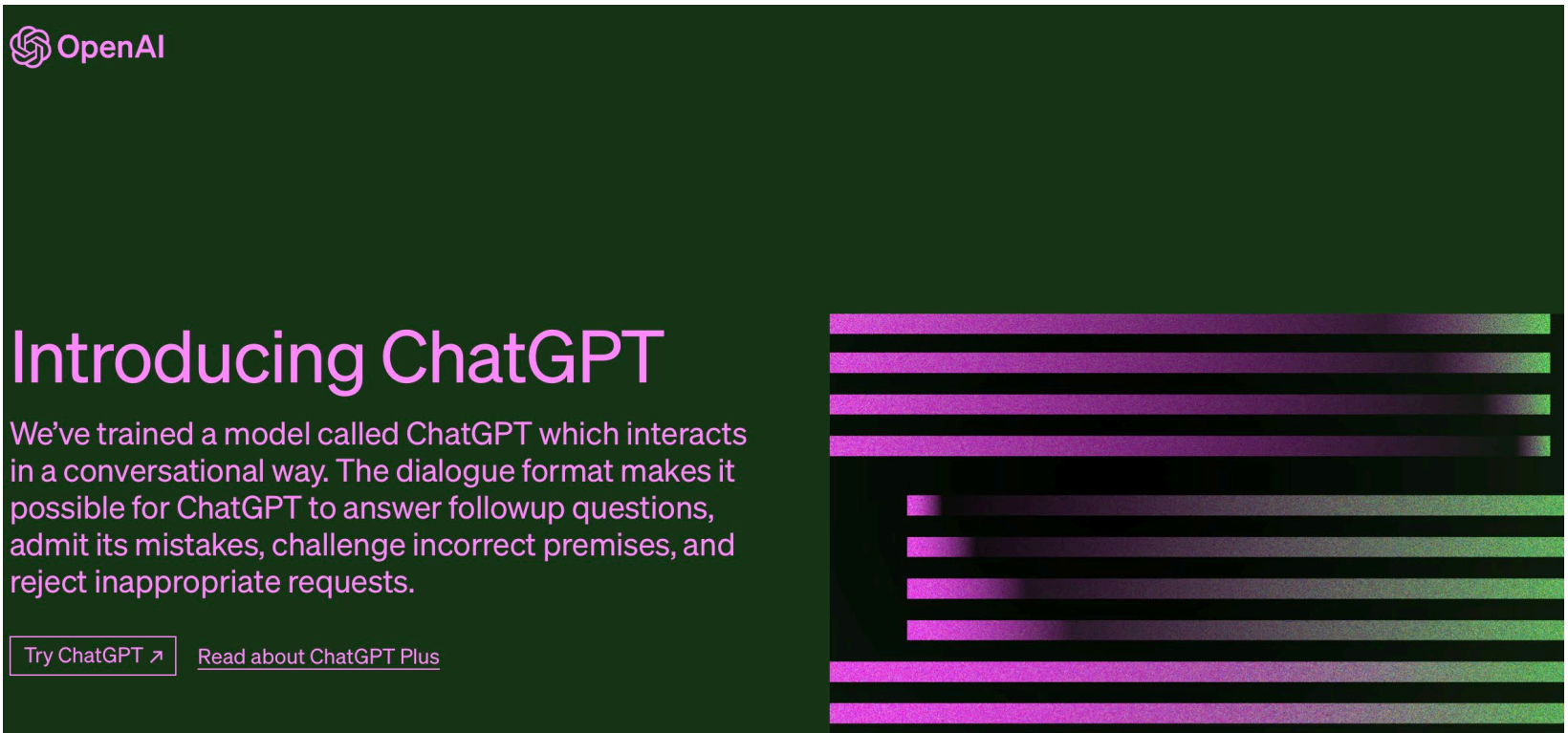
Anders Mørch
IPED/UiO



IDEA seminar om AI i fremtidens utdanning, 21. mars 2023

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How did we get here and where are we going?

A screenshot of the OpenAI website's introduction to ChatGPT. The page has a dark green background. In the top left corner is the OpenAI logo. The main heading is 'Introducing ChatGPT' in a light blue font. Below it is a paragraph of text describing the model's capabilities. At the bottom left are two buttons: 'Try ChatGPT' and 'Read about ChatGPT Plus'. On the right side of the image, there are several horizontal bars of varying lengths and colors, including shades of blue, purple, and green, which appear to be decorative or represent data points.

OpenAI

Introducing ChatGPT

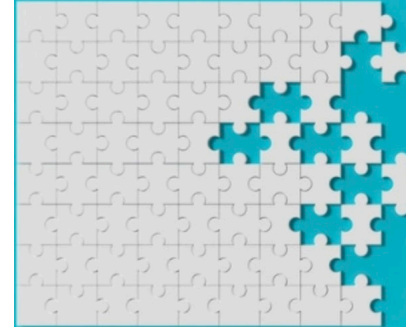
We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.

[Try ChatGPT ↗](#) [Read about ChatGPT Plus](#)

Co-pilot Microsoft 365, soon to come to a workstation near you!

- “With Copilot, you’re always in control. You decide what to keep, modify or discard. Now, you can be more creative in Word, more analytical in Excel, more expressive in PowerPoint, more productive in Outlook and more collaborative in Teams.”
- *What are implications of this for education and learning?*

The broad cultural context



- Three major revolutions in technology over long time have made the quality of human life better in terms of simplifying work and living
 - Agriculture (lasted milleniums, since 10,000 B.C.)
 - Industrialization (lasted decennials, since 1750)
 - Personal computer (lasts decades, since 1975)
- Personal computer revolution
 - Hardware, software, and Internet
 - AI is software (e.g. algorithms) and hardware (e.g. robots)

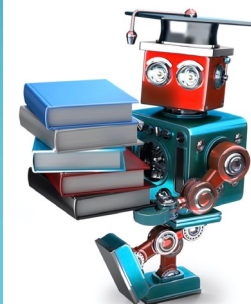
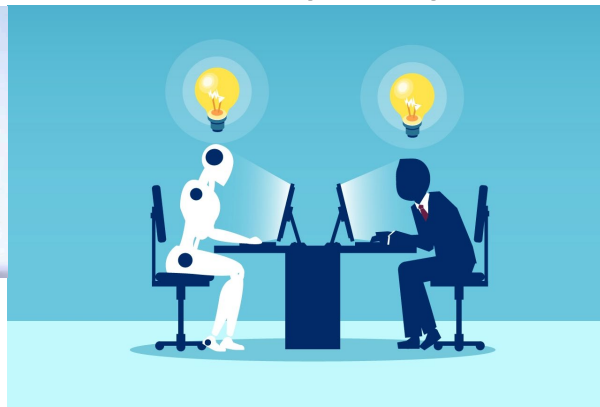
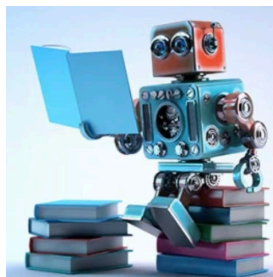


AI in education: Brief overview of intelligent tutoring systems (ITS)

- *AI in education has a long history (50 years), called ITS*
- Intelligent Tutoring Systems can automatically adapt to the learners needs by giving each user different learning goals, tasks and content for solving a problem or an assignment; they work best in well-defined domains like school subjects
- These systems have a task model and modify a student model
- The adoption of AI systems in educational settings has been slow and reported results are mixed (+ learn faster, adaptive)
- *The main challenge is to find the right balance of human and machine agency in complex educational systems (e.g., Luckin et al., 2022)*

Balancing human and machine agency

- Constructivist learning theories tell us that humans learn by actively constructing their knowledge, first together with teacher/parent and peers (Vygotsky) and later by oneself (Piaget)
- When AI systems automate intellectual tasks, they will simplify work for professionals, but they may be a disservice for students by depriving their agency

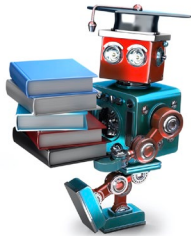
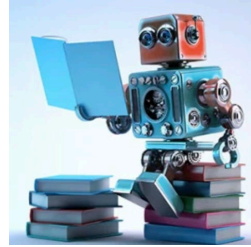


Research on human-centered AI (HCAI)

- Human-centred AI or just IA (Intelligence augmentation) reverses roles of actors in “strong AI”
- The human is the more active partner and the computer (AI) serves in an assistive role
- Research on EssayCritic (Mørch et al., 2017) and chatbot scenarios (Andersen, Mørch & Litherland, 2022) are examples
- *Goal of EssayCritic*: writing w/automated feedback
- *Goal of chatbot*: helping teacher in technical domains

Strong AI vs. human-centered AI

- *Strong AI*: Computer does the major part of intellectual activity; student provides feedback
- *Human-centered AI*: Human does the major part of intellectual activity; computer provides feedback
- In terms of writing an essay (ex. from EssayCritic):
 - Should the computer write the first version of the text and the student modify it, or should the student write the first version of the text and the computer provides feedback?
- If ChatGPT had a predefined (max) word length of its output, adapted for feedback, it would approach HCAI



Technology change in education was slow



- University class, Bologna (1350s) , URL:
https://no.wikipedia.org/wiki/Fil:Laurentius_de_Voltolina_001.jpg

The future of education w/AI?

- AI is going to give admin and faculty more support, extending their reach and expanding their time
- *Admin*: AI will simplify their task by automatically updating information in complex info systems, Inspera, EPN, etc.
- *Faculty*: AI will save time, helping them plan lectures, tasks, and do assessments
- *Students*: They need to learn about AI; AI tools can help them *outside* classrooms

References

- Andersen, R., Mørch, A.I., & Litherland, K.T. (2022). Collaborative learning with block-based programming: Investigating human-centered artificial intelligence in education, *Behaviour & Information Technology*, 41(9), 1830-1847.
- Luckin, R., Cukurova, M., Kent, C., & du Boulay, B. (2022). Empowering educators to be AI-ready. *Computers and Education: Artificial Intelligence*, 3, 100076.
- Mørch, A.I., Engeness, I., Cheng, V.C., Cheung, W.K., & Wong, K C. (2017). EssayCritic: Writing to Learn with a Knowledge-Based Design Critiquing System. *Educational Technology & Society*, 20 (2), 216–226.