

AI, Teaching and Learning

Colin de la Higuera, 25th September 2024

1. The context

A. Turing publishes
'Computing
Machinery and
Intelligence'

A. Samuel develops
a machine learning
programme for
playing chess

1950

1959

1956

J. McCarthy coined the
term 'artificial intelligence'
at the Dartmouth
Conference

1973

The Lighthill Report severely
criticises the progress of AI,
leading to a reduction in
funding in the UK. AI
experiences its first 'winter'.

1996

Deep Blue (IBM) beats Kasparov, the world chess champion

2011

Watson (IBM) wins the JEOPARDY game show

Google buys DeepMind, a company
specialising in deep learning

2014

2016

2022

ChatGPT is available free online

DeepMind's AlphaGo
beats Go champion Lee
Sedol

Inspired by
https://www.unige.ch/numerique/files/8317/2587/9842/Rapport_IA_Generatives_-_UNIGE_-_SEPTEMBRE_2024_15.556_x_22_cm.pdf



Chaire Unesco RELIA 2024



 https://chaireunescorelia.univ-nantes.fr/@Chaire_RELIA

Remember. A genAI simply **predicts** the next word in the sentence

- There is no understanding, no logic
 - There is no quality check
-
- But it works!

2. AI and education

Students get to grips with it

- Selma El Barbati studies the habits of students at Nantes University (<https://chaireunescorelia.univ-nantes.fr/2024/02/26/chatgpt-et-les-etudiant%c2%b7es-de-nantes-universite/>, February 2024)
- In the UK, 67% of secondary school students (sample=1000) have used it, and for 68% it has helped them improve their grades (<https://www.cryptopolitan.com/67-percent-uk-students-use-ai-tools/>, June 2023).
- In the USA, 85% of -3+3s (sample>3000) who use a tutor and ChatGPT think that ChatGPT is more effective (<https://www.intelligent.com/new-survey-finds-students-are-replacing-human-tutors-with-chatgpt/>, October 2023)

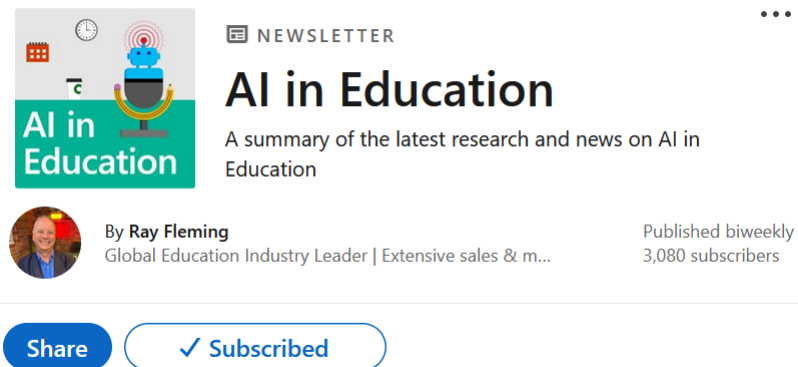
3. Some recent AIEd research results

Why is research appearing now (only)?

- Nov 2022-July 2023: acceleration, instability
- Since then, nothing spectacular has happened. It has become possible to set up research protocols
- An avalanche of articles, conferences, blogs... We're starting to be able to build filters...

Sources

- François Bocquet
- Charlotte Barot of the CNIL
- Consensus (Prompt: "**Can you suggest some recent papers about Ai in education?**")
- <https://www.linkedin.com/newsletters/ai-in-education-7143109038984077312/>



NEWSLETTER

AI in Education

A summary of the latest research and news on AI in Education

By **Ray Fleming**
Global Education Industry Leader | Extensive sales & m...

Published biweekly
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Can we use AI for grading?

Can Large Language Models Make the Grade?

Owen Henkel from [University of Oxford](#), *Libby Hills* at [Jacobs Foundation](#), *Adam Boxer* at [Carousel Learning](#) and *Zachary Levonian* at [Digital Harbor Foundation](#)

- Use of GPT-4 to mark history and science papers (short answers).
- GPT-4 in few-shot training
- Based on 1700 responses
- Kappa score of 0.70 (between humans 0.75)
- <https://dl.acm.org/doi/10.1145/3657604.3664693>

Large Language Model as an Assignment Evaluator: Insights, Feedback, and Challenges in a 1000+ Student Course

- <https://arxiv.org/abs/2407.05216>
- A game of ping pong between the AI that assesses and the students
- Students learn how to thwart an AI assessment

PlagBench: Exploring the Duality of Large Language Models in Plagiarism Generation and Detection

[Jooyoung Lee](#), [TOSHINI AGRAWAL](#), [Uchendu Uchendu](#), Thai Le, [Jinghui Chen](#) & Dr Dongwon Lee

- PlagBench, database of 46,000 instances of synthetic plagiarism (verbatim, paraphrased, summary) by GPT-3.5, GPT-4, and Llama2.
- The question is: does an IAGen detect better than a traditional detector? Answer: yes
- But the question of false positives is not addressed. And in their experiment, the originals must be known to the detector.
- <https://arxiv.org/abs/2406.16288>

Can teachers know when an AI is being used?

A real-world test of artificial intelligence infiltration of a university examinations system: A "Turing Test" case study

• Peter Scarfe, Kelly Watcham, Alasdair Clarke, Etienne Roesch

- 33 dissertations written by an AI (without human correction) at the University of Reading (UK)
- 1 single "alert"
- Average score above that of the students.

<https://www.theguardian.com/education/article/2024/jun/26/researchers-fool-university-markers-with-ai-generated-exam-papers>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0305354>

And...

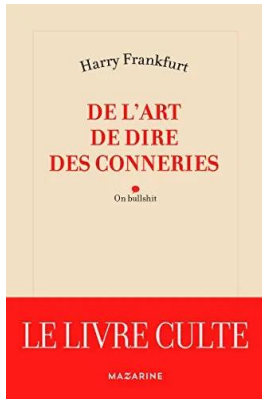
The Prompt Report: A Systematic Survey of Prompting Techniques

[Sander Schulhoff](#), [Michael Ilie](#), [Nishant Balepur](#), [Konstantine Kahadze](#), [Amanda Liu](#), [Chenglei Si](#), [Yinheng Li](#), [Aayush Gupta](#), [HyoJung Han](#), [Sevien Schulhoff](#), [Pranav Sandeep Dulepet](#), [Saurav Vidyadhara](#), [Dayeon Ki](#), [Sweta Agrawal](#), [Chau Pham](#), [Gerson Kroiz](#), [Feileen Li](#), [Hudson Tao](#), [Ashay Srivastava](#), [Hevander Da Costa](#), [Saloni Gupta](#), [Megan L. Rogers](#), [Inna Goncarencu](#), [Giuseppe Sarli](#), [Igor Galynker](#), [Denis Peskoff](#), [Marine Carpuat](#), [Jules White](#), [Shyamal Anadkat](#), [Alexander Hoyle](#), [Philip Resnik](#)

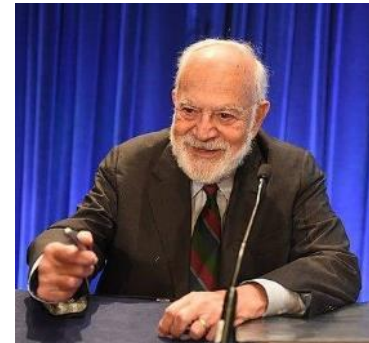
- 58 text prompter techniques and 40 multimodal techniques, plus lots of vocabulary
- 76 pages
- Numerous examples
- <https://arxiv.org/abs/2406.06608>

"ChatGPT is Bullshit", [Michael Townsen Hicks](#), [Joe Slater](#) and James Humphries

- According to Harry Frankfurt, "Bullshit" is content produced with no interest (concern) in the truth. So there is no intention to lie.
- The terms **errors** and **hallucinations** are therefore not correct.



Harry Frankfurt: the art of talking Bullshit



Generative AI Can Harm Learning

[Hamsa Bastani](#), [Osbert Bastani](#), [Alp Süngü](#), [Haosen Ge, Ph.D.](#) [Özge Kabakcı](#) and [Rei Mariman](#)

- Approximately 1000 students
- 3 revision scenarios: without AI, with GPT Base (GPT-4), with GPT Tutor
- Revision phase: +48% for GPT Base, +127% for GPT Tutor
- Restitution phase (without AI): **-17%** for GPT Base
- https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4895486

4. The AI4T project



- Artificial Intelligence for Teachers
- Erasmus+ Key Action 3
- 2021-2024

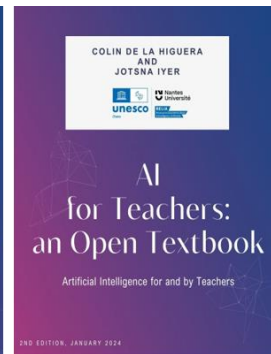
AI4T
AI FOR TEACHERS

- O1 An initiation to AI
- O2 What tools for the teacher?
- O3 What about the rest of AI?
- **O4 Will we learn differently?**
- O5 Human-centric aspects and ethics





Published on 18/1/2024
<https://www.ai4t.eu/textbook>



Exciting times

- The textbook is currently being translated into Telugu, Chinese, Greek, Arabic, Gaelic, Polish, Spanish and Xhosa
- The textbook is about AI but is also being translated with the help of AI

Why train...

...teachers?

Because the students are using AI

Because using AI helps to improve one's practices

Because it is essential to use AI safely

...students?

Because they will be needing AI during their studies and after these

Because using generative AI efficiently doesn't come for free

5. The harder questions

5.1. What can open education do for us in this context?

Why link AI and OE

- Because open approaches are faster for fast moving issues
- Because Educational Resources are going to be generated by AI
- Because we need open educators to keep “the human in the loop”






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Some worries and opportunities

- An AI that ‘helps itself’ to OERs and does not refer to the sources
- Confusion over copyright
- But also an opportunity (or not): people will prefer to choose a course written by a human being rather than by an algorithm
- This also raises the question of licenses. The license should be used to reassure the reader, not (just) to protect ourselves





UNOE

UNITWIN Network Open Education

-  A global network of 16 partners worldwide
-  Experts in open education
-  UNOE is built around existing UNESCO Chairs in open education.



UNOE main goals

-  Strengthen international coordination to achieve SDG 4: Education for all
-  Focus on: community building, research, education, software
-  Foster knowledge sharing and skills development in the digital age
-  Ensure inclusive and equitable quality education



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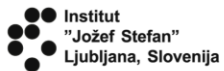


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5.2. Grading, revisited



Should we expect more?

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A starting point

- “I don’t want to give a high grade to a student who doesn’t deserve it...
- ...because they have used ChatGPT»



"Study-in-Place" by Ian Aberle is licensed under CC BY-NC 2.0.

Some food for thought

- With the advent of spellers our expectancy (as teachers) increases
- So there is the question for the student: should they use an GenAI?
- What should the teacher say?
- What should the institution say?

- A specific difficulty with PhDs

There could be 4 options

- Expect the same and change nothing
- Expect the same and forbid the use of AI
- Expect the same and ask that AI is only used in specific settings (see Lidija's Australian example)
- Expect more

This is about open education!

- The first 2 solutions are not open
- The third one is, but is likely to fail (IMHO) unless a dialogue with the students takes place
- The fourth one is open, and needs dialogue with the teachers and means

New (september 2024)

- This is what I say to my 550 first year students
- 1. Not using AI is just as wrong as using it too much
- 2. I prefer that you don't use it in the classroom. Unless I have an adapted teaching scenario
- 3. I am not here to tell you what you do at home, but you should know that using ChaitGPT to do your homework is probably going to result in you getting lower marks
- 4. Since AI is a tool, you remain ultimately responsible of what you produce

5.3. Sustainable education



Class, B., & De la Higuera, C. (2024). From Disposable Education to Acting in the World as a Human in the Time of AI. *Journal of Ethics in Higher Education*, (4), 231-244.

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Sustainable education?

- If we ask ChatGPT : « Sustainable education, aka education to sustainability, is... »
- We mean sustainable/**durable** as opposed to **ephemeral**
- An education which will allow us, in the future, to **mobilize our knowledge**

Yet: our education is not sustainable

- Textbooks we have to give back at the end of the course
- Courses which vanish from the LMS as soon as we have obtained our exam
- Pupils who seem to have forgotten what was taught last year

Who is to blame?

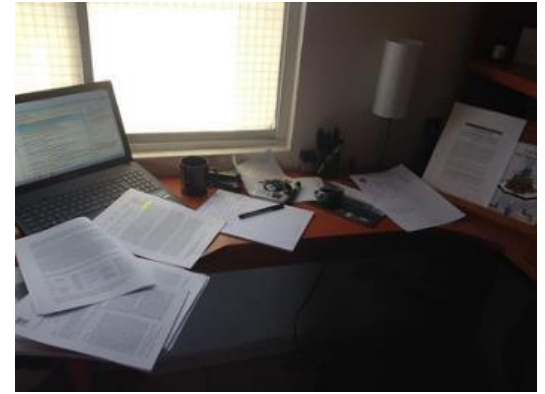
- Expensive textbooks (paid by the parents or by our taxes)
- Exam oriented pathways
- Progress of technology



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AI, critical thinking and trust

- Using generative AI works when we understand the question (the prompt) and the answer.
- Which requires knowledge
- The digital barrier is in fact a cultural barrier



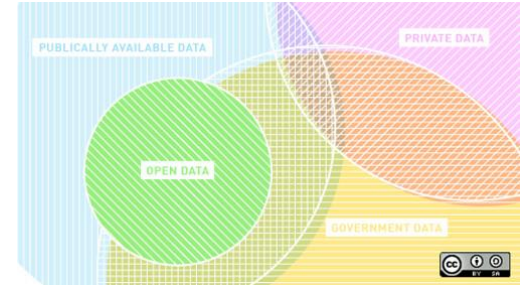
"[Handwritten notes in academic research](#)" by [Raul P](#) is licensed under [CC BY-NC-ND 2.0](#).

How does a Machine Learning algorithm work?

- We have data and we choose what we want to learn (functions, for example)
- We ask ourselves how we are going to check the quality of the solution. Often by measuring errors.
- We can now **usefully** replace the **learning** problem with an **optimisation** problem: find the function f which minimises $\text{error}(f)$
- The standard technique is to use the partial derivatives of the error function and solve in 0.

5.4. Why learn?

Why (bother to) learn?



The question is non rhetorical

« Mobilizing one's knowledge » means something different since

November 2022

In order for the teachers to find the purpose of learning, they need to align their teaching with this question

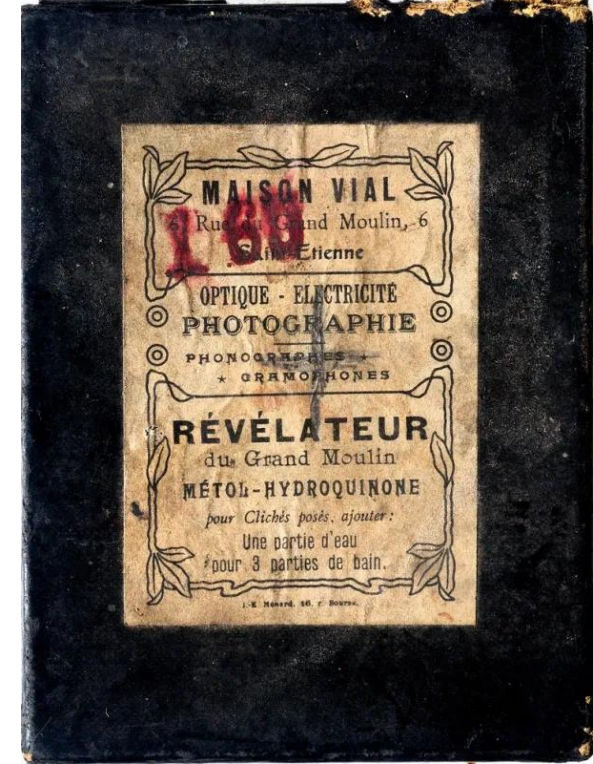
21st century skills ^e

- **Conversation** with a generative AI is not a conversation with a generative AI
 - One of the two parties cannot change its mind (does it have a mind?)
 - Asymmetry in the relationship
- You have to know how to **ask questions**:
 - Know the subject about which you are asking questions
 - "put yourself in the AI's shoes"
 - *Theory of mind, empathy?*
- It's essentially a question of **critical thinking**

6. Conclusion

~~Conclusion~~: AI is a developer

- AI has allowed us to see the bias in our data (and in our society)
- AI has allowed us to understand the flaws in grading homework
- AI is showing how ephemeral education has become
- AI is also showing how stupid it is to have research based on production



"[Maison Vial, révélateur du Grand Moulin \(St-Etienne, France\)](#)" by [Cletus Awreetus](#) is licensed under [CC BY-NC 2.0](#).

Keep in mind

- AI is going to change education
- Teachers have to work harder to be part of the conversation and the decision making