

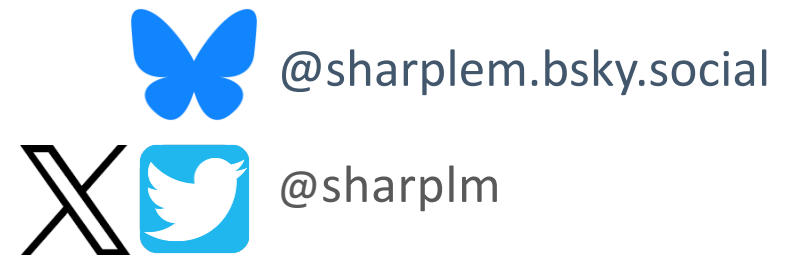
# Generative AI and Education

## Opportunities and Issues

Mike Sharples

Institute of Educational Technology  
The Open University

[www.mikesharples.org](http://www.mikesharples.org)

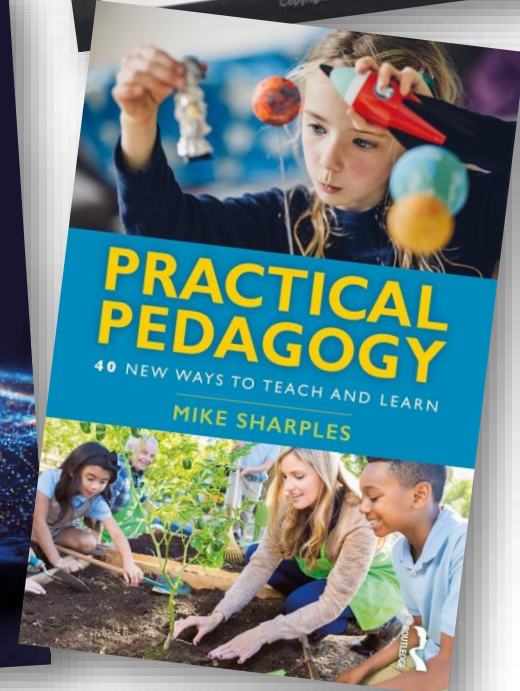
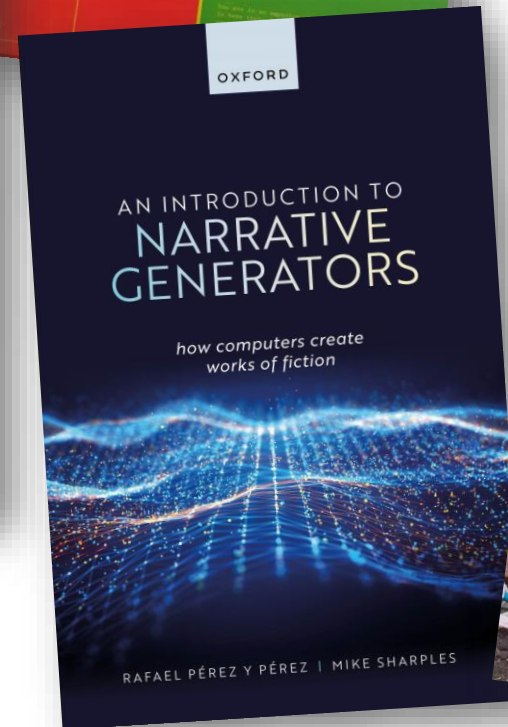
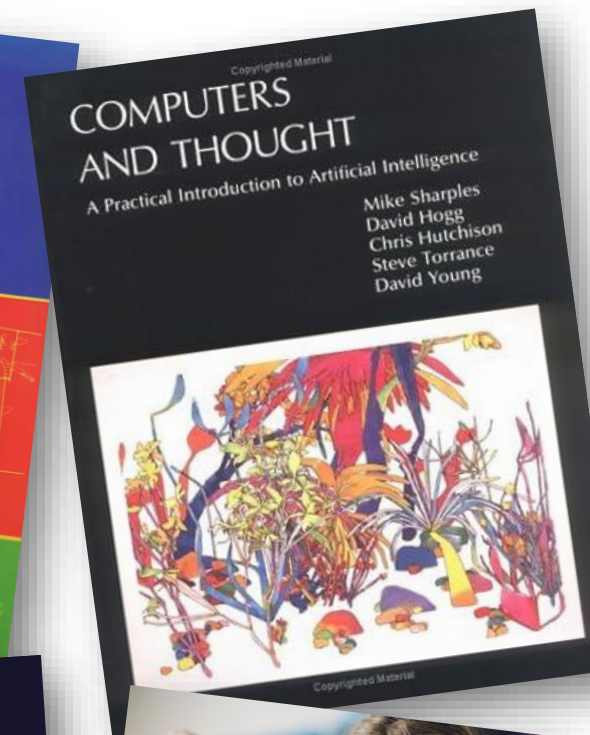
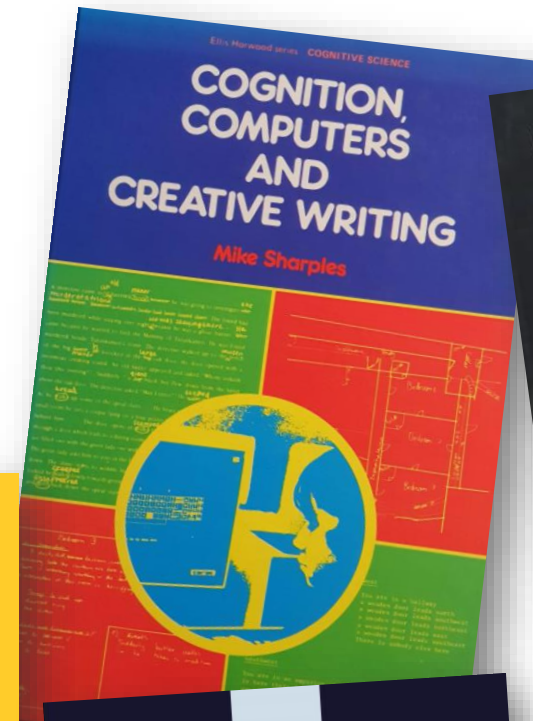
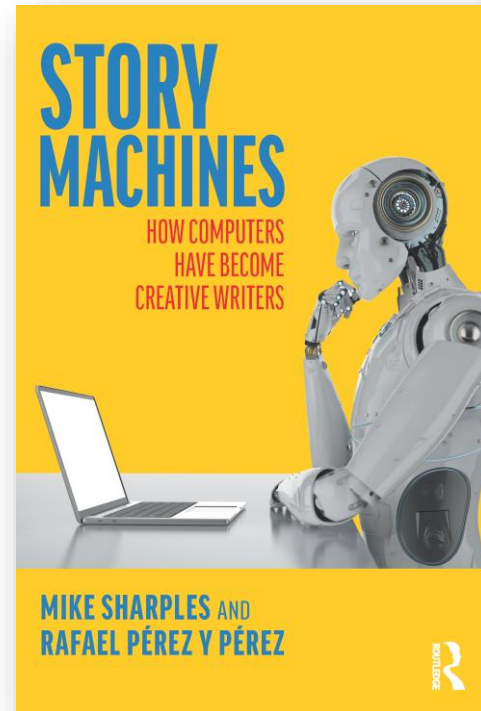


# My background in AI and education

PhD in generative AI and education from Edinburgh University Department of Artificial Intelligence, 1984

Research and innovation on educational technology

Now returned to generative AI - developing policy and practice



# What has changed?

From rule-based “symbolic” AI to “neural network” generative AI.

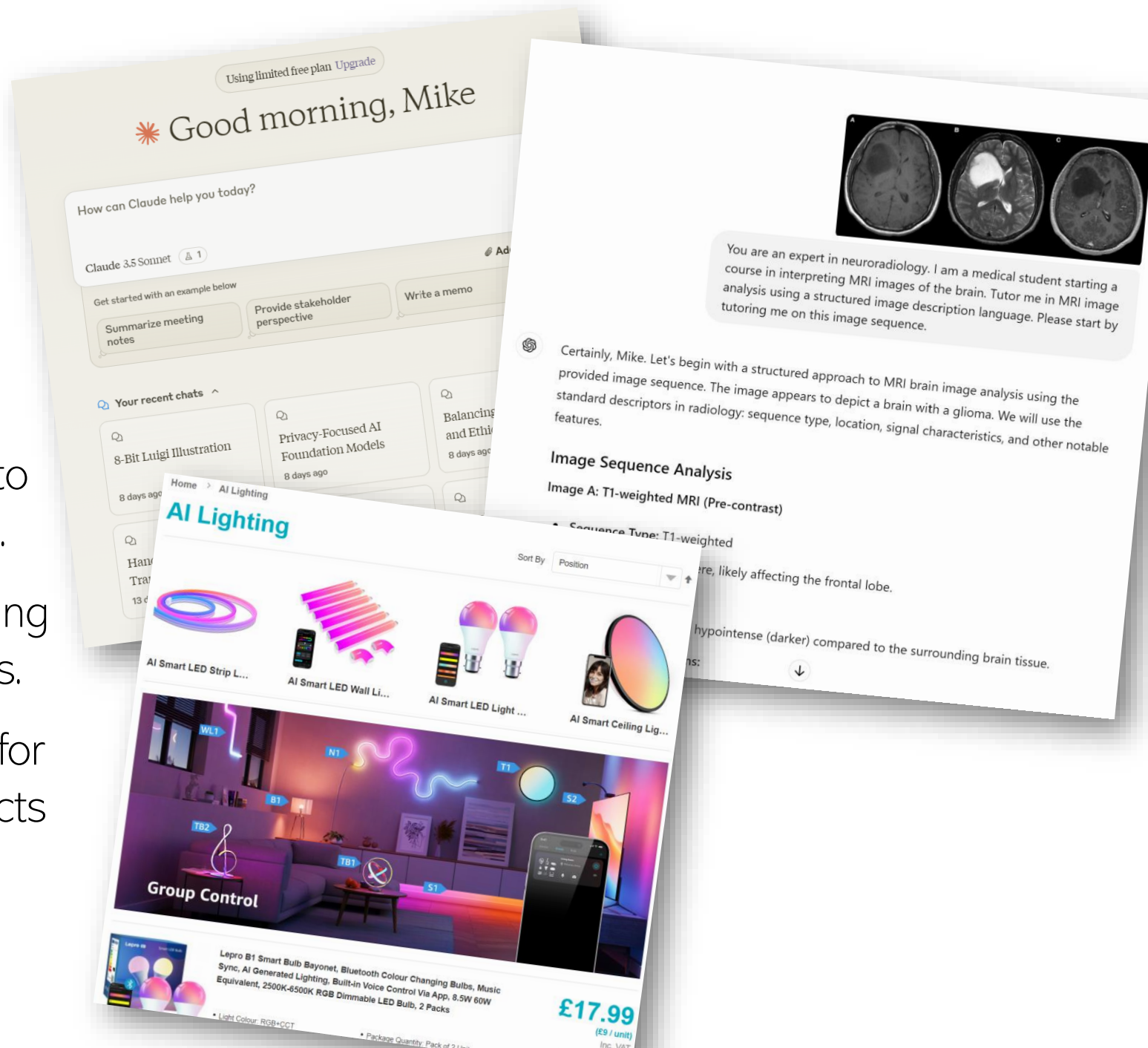
From 10 years to design an AI tutoring system to 10 minutes!

From highly specialised teaching, to personalized tutoring on any topic.

From institutional “intelligent tutoring systems” to free creative assistants.

From expensive “expert systems” for businesses to household AI products

A new era of consumer AI



What is generative AI?



# ChatGPT

Large Language Model from OpenAI

Highly-trained text completer and style copier

It can generate up to 100,000 words (300 pages)

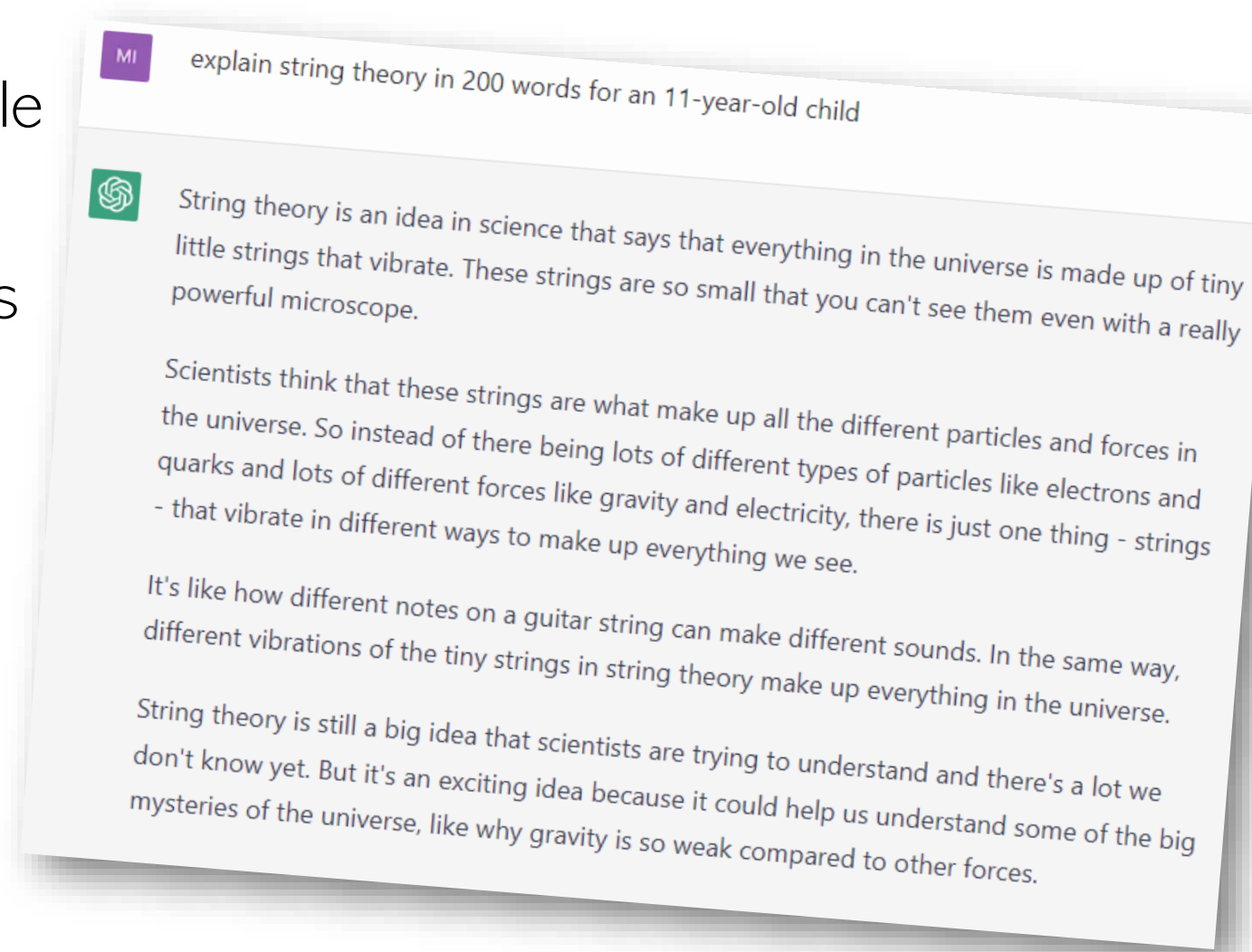
It can write in any style in multiple languages

It can be given a direct instruction

It can engage in conversation

It can interpret text and images

**It is a general-purpose language tool**



MI

explain string theory in 200 words for an 11-year-old child



String theory is an idea in science that says that everything in the universe is made up of tiny little strings that vibrate. These strings are so small that you can't see them even with a really powerful microscope.

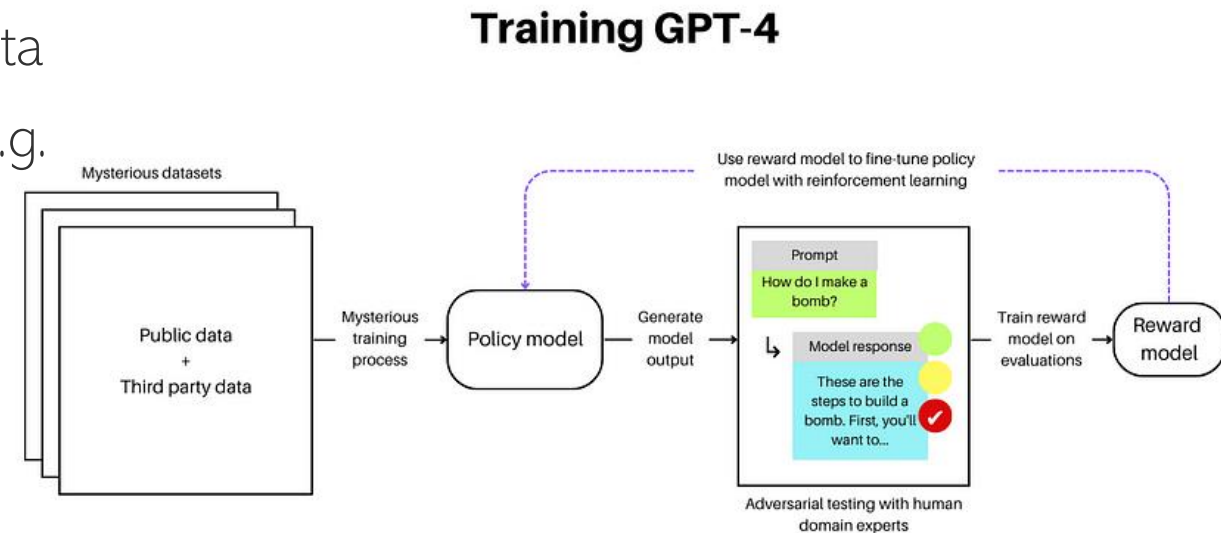
Scientists think that these strings are what make up all the different particles and forces in the universe. So instead of there being lots of different types of particles like electrons and quarks and lots of different forces like gravity and electricity, there is just one thing - strings - that vibrate in different ways to make up everything we see.

It's like how different notes on a guitar string can make different sounds. In the same way, different vibrations of the tiny strings in string theory make up everything in the universe.

String theory is still a big idea that scientists are trying to understand and there's a lot we don't know yet. But it's an exciting idea because it could help us understand some of the big mysteries of the universe, like why gravity is so weak compared to other forces.

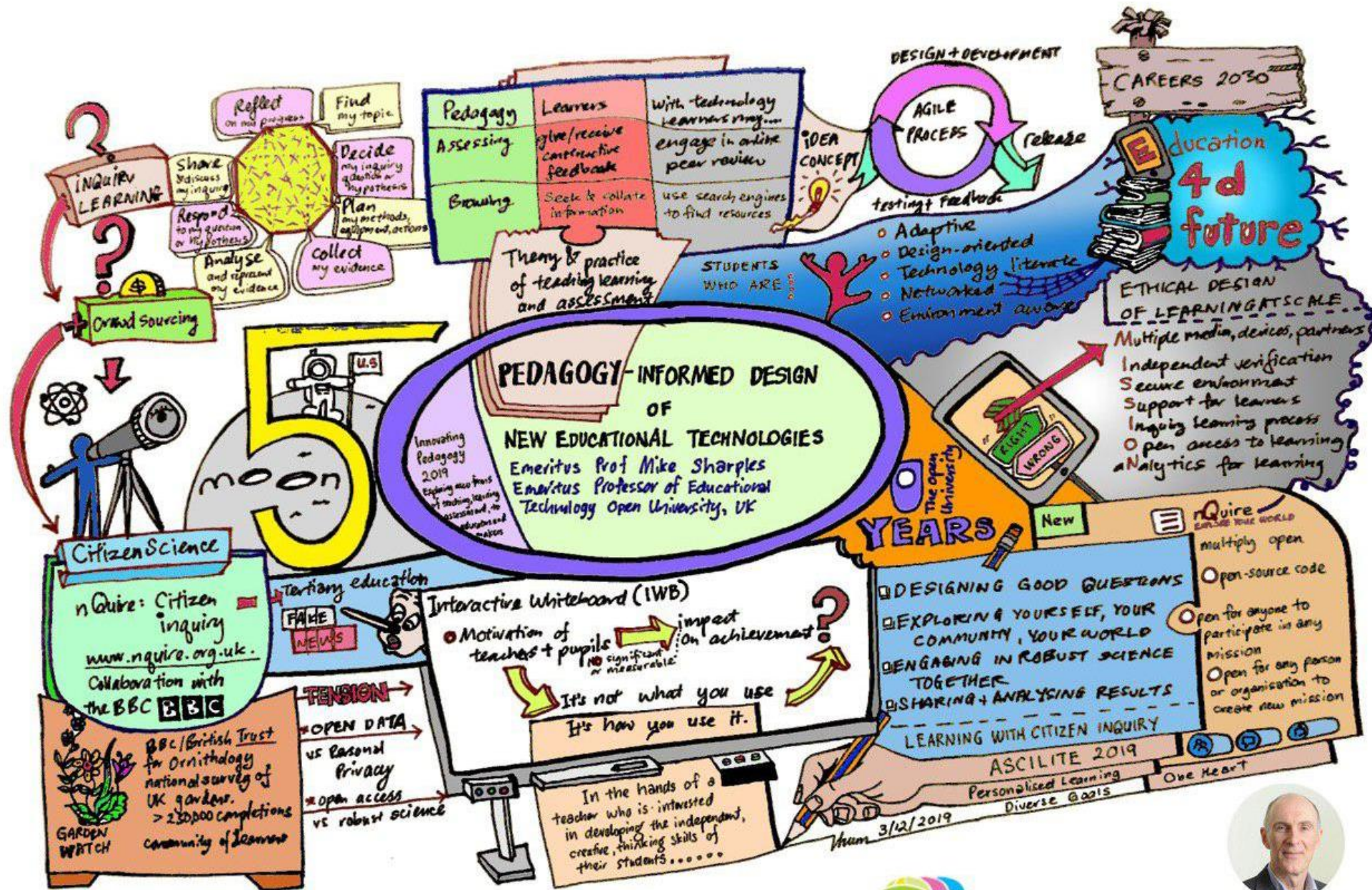
# How GPT is trained

1. GPT is **trained** on a vast amount of internet data (13 trillion “tokens”) to predict future words, e.g. “The capital of Chile is...”
2. GPT is “**fine-tuned**” to answer questions by giving it example prompts and responses.  
Prompt: “What is the capital of Ukraine?”  
Response: “Kyiv”.
3. GPT is optimized through “**reinforcement learning from human feedback**” (RLHF) by giving sample GPT responses to humans and asking them to rate these as acceptable or not.



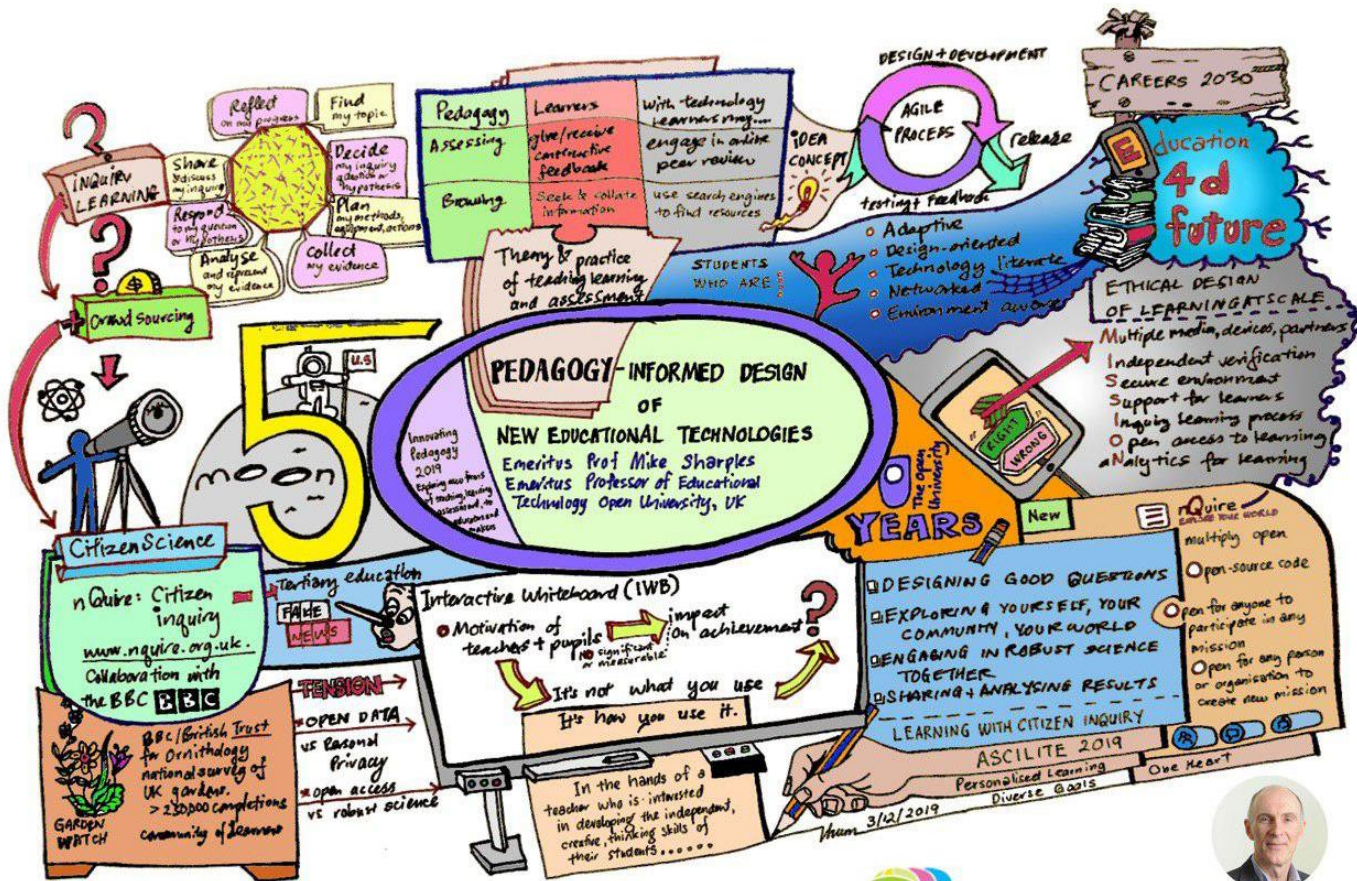
<https://towardsdatascience.com/gpt-4-vs-chatgpt-an-exploration-of-training-performance-capabilities-and-limitations-35c990c133c5>







“Please explain this diagram then create a simplified version of it”



Read the handwriting

Understand the visual content and purpose of the diagram

Interpret each image

Understand the text and images in context

Explain each part of the diagram

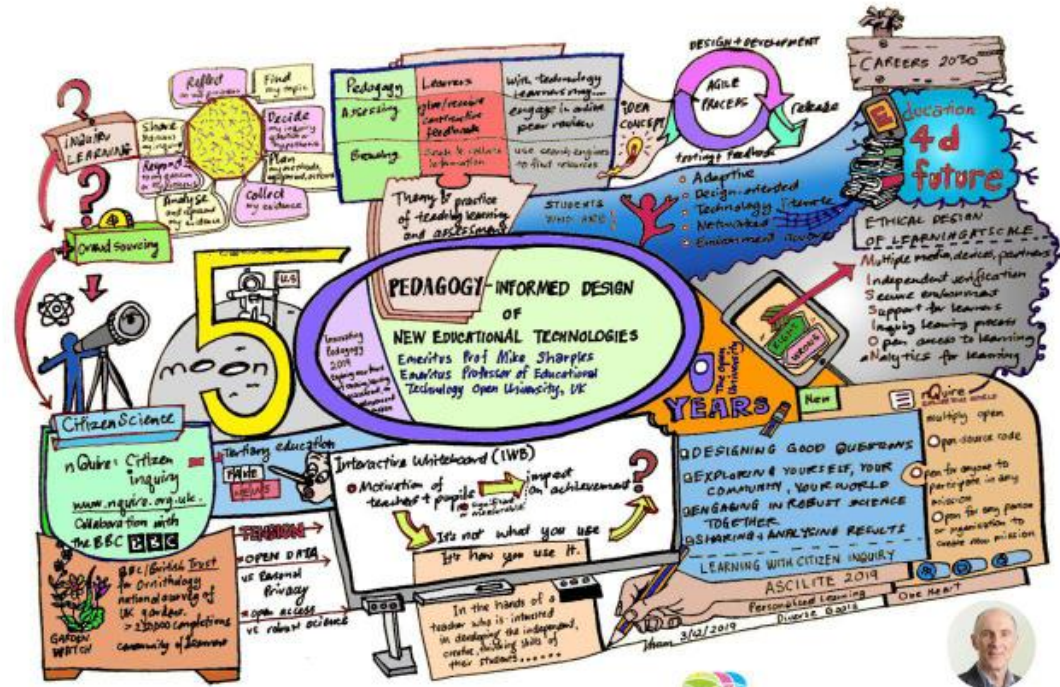
Select the elements to simplify

Design a simplified diagram



# ChatGPT 4.0

MI You

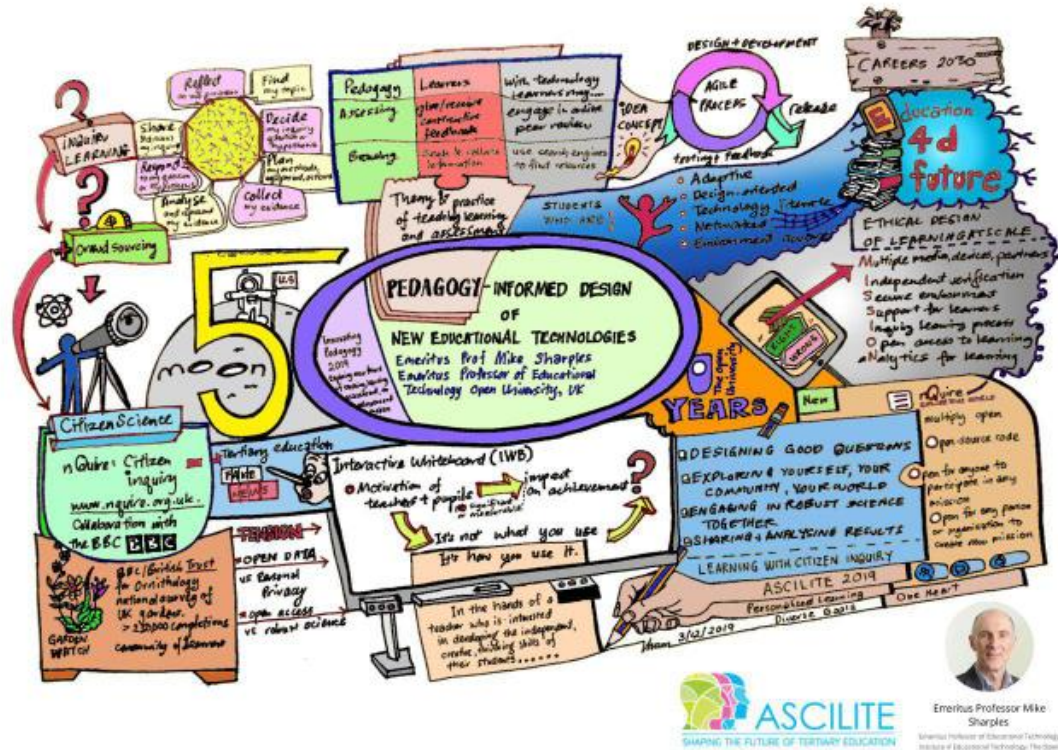


Emeritus Professor Mike Sharples  
Emeritus Professor of Educational Technology  
Institute of Educational Technology, The Open University, UK

Please explain this diagram, then create a simplified version of it

# ChatGPT 4.0

MI You



Please explain this diagram, then create a simplified version of it

## ChatGPT

The diagram you've provided is a visual representation of a concept or framework related to educational technologies and pedagogy. Here's a breakdown of the key elements and their possible meanings:

1.

**Pedagogy-Informed Design:** This is the central theme of the diagram. It suggests that educational design, especially with new technologies, should be informed by pedagogical theories and practices.

2.

**New Educational Technologies:** The diagram references emerging technologies in education, possibly including digital platforms and interactive tools that support learning.

3.

**Citizen Science:** This section suggests the involvement of the general public in scientific research, possibly through data collection and analysis, often facilitated by digital technology.

4.

**Inquiry Learning:** The diagram illustrates a process of learning that involves asking questions, collecting evidence, and analyzing results, which is a key component of constructivist learning theories.

5.

**Design and Development Process:** Agile practices are mentioned here, implying a flexible and iterative approach to the development of educational technologies.

6.

**Education 4D Future:** This likely refers to a futuristic view of education that includes dimensions beyond traditional learning environments, possibly embracing virtual reality, augmented reality, and other immersive technologies.

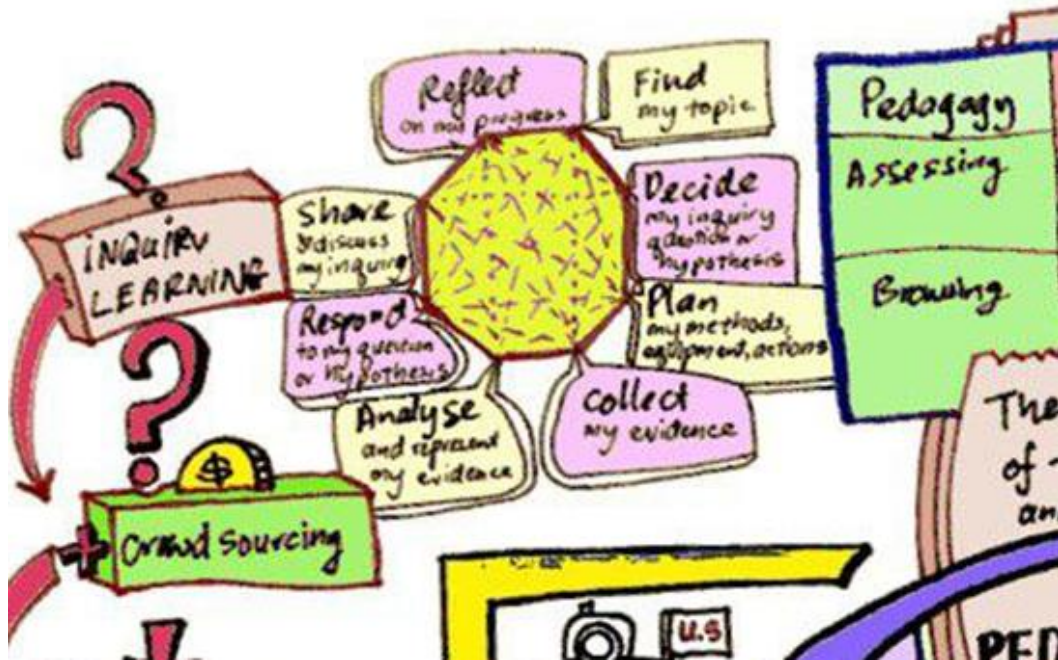
7.

**Careers 2030:** This section is probably speculating on the future of careers and the necessary skills and knowledge that will be required in the future workforce.

8.

**Designing Good Questions:** This part emphasizes the importance of question design in educational settings, encouraging exploration, engagement, and in-depth analysis.





4.

**Inquiry Learning:** The diagram illustrates a process of learning that involves asking questions, collecting evidence, and analyzing results, which is a key component of constructivist learning theories.



The person mentioned, Emeritus Professor Mike Sharples, is likely a scholar in the field of educational technology, and the reference to ASCILITE (Australasian Society for Computers in Learning in Tertiary Education) suggests that this diagram might have been part of a presentation or publication related to a conference or workshop organized by this society.

To create a simplified version of this diagram, we would focus on the main themes without the detailed explanations and examples. The simplified version would have the central idea of "Pedagogy-Informed Design" surrounded by key components like "Educational Technologies," "Inquiry Learning," "Agile Development," and "Future of Education." Each of these components would be represented by simple icons or single-word descriptions to convey the concept visually. Would you like me to create a simplified visual version of this diagram?

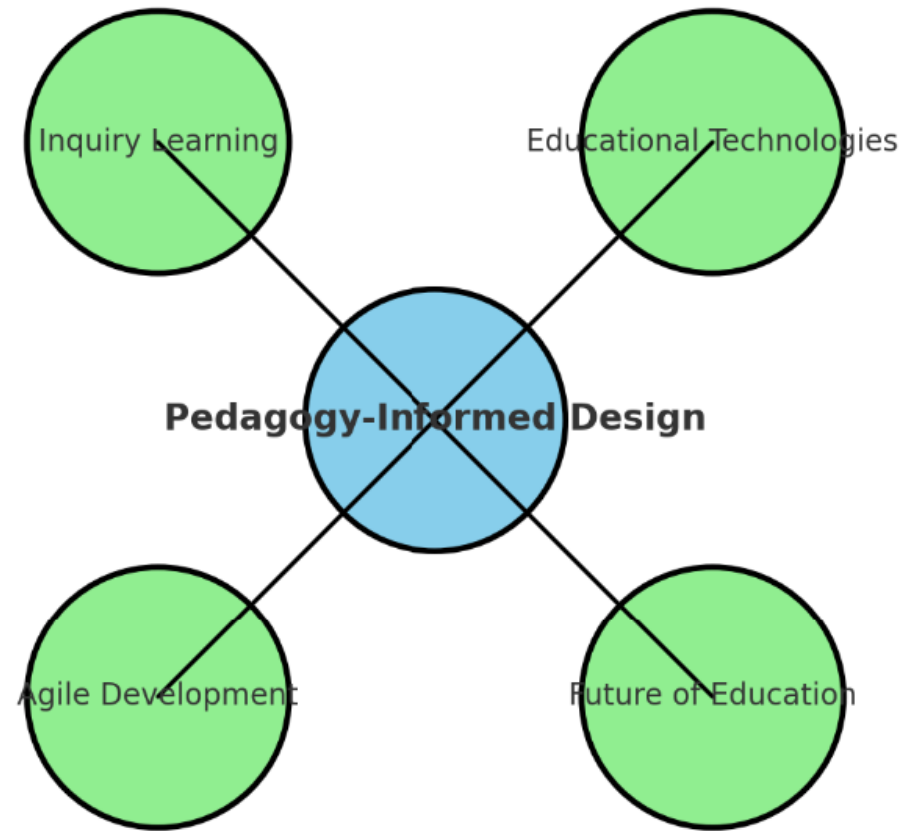
M

**You**

Yes please. Give it a try.

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M

You

Yes please. Give it a try.

Here is the diagram created using Python. It clearly highlights the central theme of "Pedagogy-Informed Design" with the key components "Educational Technologies," "Inquiry Learning," "Agile Development," and "Future of Education" connected around it. Each key component is represented by a circle and connected to the central concept. [↗]

# Other AI generators

## Language models

GPT-4 from OpenAI – powerful, multimedia, 100,000 word context window, free with Microsoft CoPilot, being integrated into Microsoft Office tools

Gemini 1.5 from Google – multimedia, reasoning and problem solving, free with Bard chat

LLaMA 2 from Meta – open source, 20 languages, small, simple, free, efficient

Claude-3 from Anthropic – trained on ethical principles, 200,000 words. Sonnet version free on claude.ai

Ernie from Baidu & Qwen from Alibaba – English/Chinese

Perplexity.AI – AI-driven search engine

## Image generators

DALL-E 3 from OpenAI, Midjourney, Stable Diffusion – free, open source

## Video generators

Runway, Kling

Plus: computer code, voice, music, specialist (e.g., BloombergGPT)



Adobe Firefly



Images: FLUX and Lora  
Video: Kling



# Open-source language models

Free and open access to pre-trained GenAI models

Can choose from a variety of models

Can run the model on a local computer

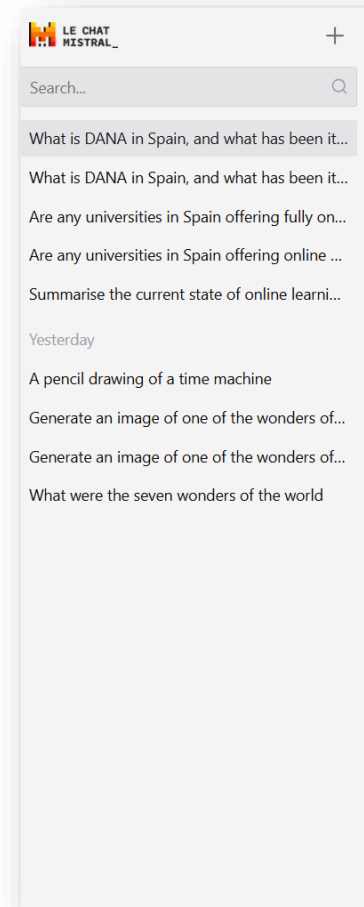
No user data is sent outside

Can inspect and extend the model

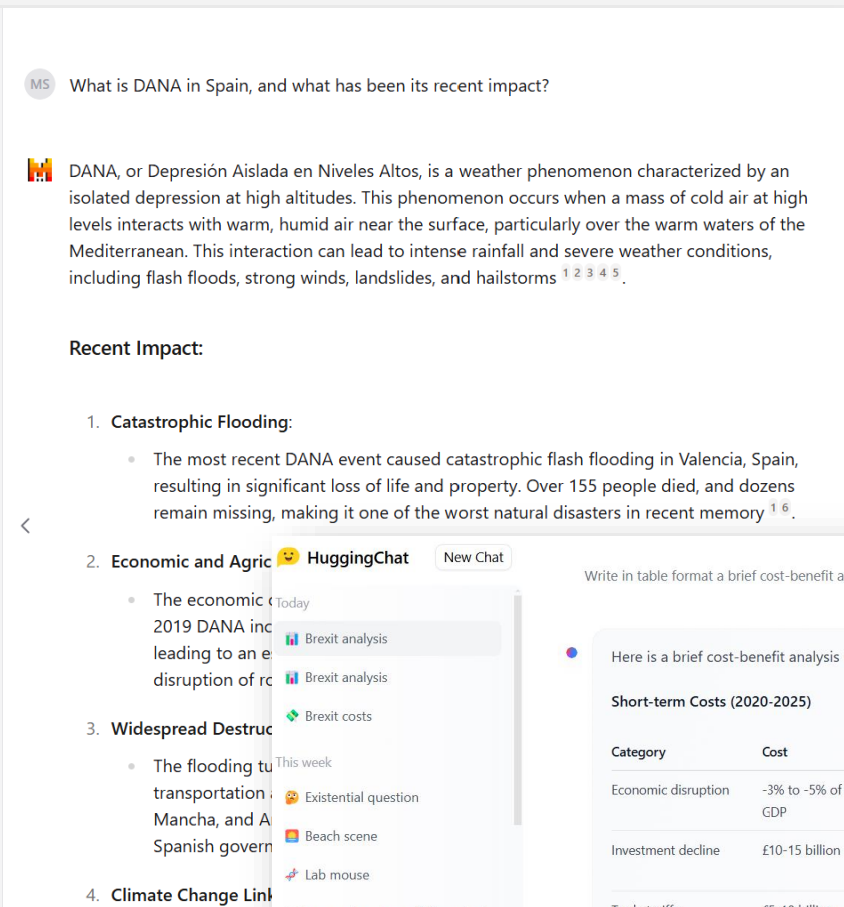
Join a community of open-source developers

Some open models have fewer constraints and safety checks

Build safe and secure educational tools on open-source foundation models



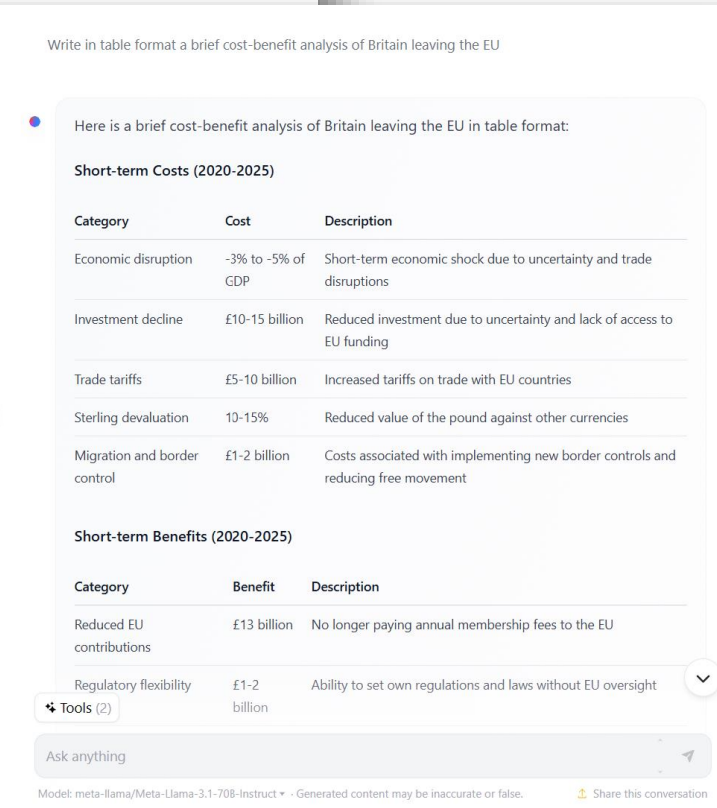
<https://chat.mistral.ai/chat>



# HuggingChat from Hugging Face

<https://huggingface.co/chat/>

# Le Chat from Mistral



# Generative AI and education

# Generative AI is an “arrival technology”\*

Unplanned

Imposed on education

Led by students – exploited by startup companies

Hugely disruptive

Can harm education if it is not well managed

Institutions are struggling to cope



\*Klopfer, Eric, Justin Reich, Hal Abelson, and Cynthia Breazeal. 2024. "Generative AI and K-12 Education: An MIT Perspective." An MIT Exploration of Generative AI, March. <https://doi.org/10.21428/e4baedd9.81164b06>.



## A Critique of Learning Styles

November 2022 -  
ChatGPT

You are a student on a Master of Education course. Write a high quality 500 word essay on A Critique of Learning Styles. The essay should include academic references and evidence from research studies. It should begin "The construct of 'learning styles' is problematic because"

The construct of 'learning styles' is problematic because it assumes that learners have distinct and consistent preferences for learning. This concept has gained popularity among educators and trainers, but there is little evidence to support the existence of such a fixed and reliable learning style. The use of learning styles in education may lead to harmful practices and prevent learners from developing skills and abilities that are essential for success.

One of the main issues with the concept of learning styles is the lack of empirical evidence to support it. A systematic review of studies investigating the relationship between learning styles and academic achievement found little to no evidence of a correlation between the two (Pashler et al., 2008). In fact, the review concluded that teaching according to learning styles might actually be detrimental to learning outcomes. Similarly, a recent meta-analysis of studies exploring the effectiveness of learning styles interventions also found little support for the idea (Rohrer & Pashler, 2012). The lack of empirical support for the concept of learning styles undermines the notion that individuals have consistent and reliable preferences for acquiring and processing information.

Another problem with the use of learning styles in education is that it may encourage fixed mindsets and discourage the development of essential skills and abilities. According to the theory of growth mindsets, learners who believe that their intelligence and abilities are malleable are more likely to embrace challenges, persist in the face of setbacks, and ultimately achieve higher levels of success (Dweck, 2006). In contrast, the use of learning styles may encourage learners to see their abilities as fixed and unchangeable, leading to a belief that they are limited in their capacity to learn in certain ways. This can be particularly damaging for learners who may not have been exposed to certain ways of learning or who may have been discouraged from pursuing certain subjects or activities due to their perceived learning style.

Finally, the use of learning styles in education may lead to harmful practices such as tracking and labeling students. In tracking, learners are sorted into groups based on their perceived learning style, which can reinforce stereotypes and limit opportunities for growth and exploration (Gurung, 2004). Labeling students according to their learning style can also be harmful, as it may encourage teachers and learners to focus on weaknesses rather than strengths and may stigmatize learners who do not fit neatly into a particular category.

In conclusion, the construct of learning styles is problematic because it lacks empirical support, may discourage the development of essential skills and abilities, and can lead to harmful educational practices such as tracking and labeling. As educators, it is important to recognize the limitations of learning styles and instead focus on evidence-based practices that promote learning and growth for all learners, regardless of their perceived learning style.

### References:

Dweck, C. (2006). *Mindset: The new psychology of success*. Random House.

Gurung, R. (2004). Black and white thinking about learning styles: A response to the Journal of College Reading and Learning. *Journal of College Reading and Learning*, 34(2), 7-17.

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 9(3), 105-119.

Rohrer, D., & Pashler, H. (2012). Learning styles: Where's the evidence? *Medical Education*, 46(7), 634-635.

## A Critique of Learning Styles

The construct of 'learning styles' is problematic because it assumes that learners have distinct and consistent preferences for acquiring and processing information. This idea has gained popularity among educators and trainers, but there is little evidence to support the existence of such a fixed and reliable construct. Furthermore, promoting the use of learning styles in education may lead to harmful practices and prevent learners from developing skills and abilities that are essential for success in the 21st century.

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Rohrer, D., & Pashler, H. (2012). Learning styles: Where's the evidence? *Medical Education*, 46(7), 634-635.

Invented  
research  
study

Fake  
academic  
paper

# Generative AI hallucinates

It doesn't "know" it shouldn't invent research studies,

it has no explicit model of how the world works,

and is amoral.

**It is a language model, *not* a database or reasoning system**

## Limitations

Despite making significant progress, our InstructGPT models are far from fully aligned or fully safe; they still generate toxic or biased outputs, make up facts, and generate sexual and violent content without explicit prompting. But the safety of a machine learning system depends not only on the behavior of the underlying models, but also on how these models are deployed. To support the safety of our API, we will continue to review potential applications before they go live, provide content filters for detecting unsafe completions, and monitor for misuse.

<https://openai.com/blog/instruction-following/>



The construct of 'learning styles' is problematic because it implies a static and narrowly defined approach to the way individuals process and learn. Despite the widespread popularity of this concept, there is a lack of empirical evidence to support the effectiveness of learning styles in enhancing educational outcomes. This essay explores the concept of learning styles, its origins, and its implications for educators, supported by research evidence.

March 2023 – GPT-4

The concept of learning styles has its roots in the work of Dunn and Dunn (1978), who posited that students have different preferred ways of processing information, including visual, auditory, reading/writing, and kinesthetic modalities. The VARK model (Fleming, 2001) expanded upon this idea, adding the reading/writing preference as a fourth category. Other models, such as Kolb's experiential learning theory (Kolb, 1984) and Gardner's theory of multiple intelligences (Gardner, 1983), further contributed to the proliferation of learning styles theories in education.

Despite the intuitive appeal of these theories, numerous research studies have consistently failed to support the effectiveness of learning styles in improving educational outcomes. For instance, a meta-analysis conducted by Pashler et al. (2008) found insufficient evidence to support the idea that tailoring instruction to students' learning styles resulted in improved learning. Similarly, a review by Coffield et al. (2004) identified more than 70 learning styles models and concluded that there was little scientific evidence to support the use of any of them in practice.

One of the primary criticisms of learning styles is the lack of a clear and consistent definition of what constitutes a learning style (Coffield et al., 2004). This has led to the proliferation of multiple, often contradictory, models that make it difficult to operationalize and test the theory. Furthermore, many of the assessments used to determine students' learning styles have been found to lack reliability and validity (Kirschner & van Merriënboer, 2013), further casting doubt on the utility of this concept in educational settings.

Another issue with learning styles is the oversimplification of the learning process. By categorizing students into distinct learning styles, the theory disregards the complex and dynamic nature of human cognition (Kirschner & van Merriënboer, 2013). In reality, learners are not limited to a single mode of processing information, and the effectiveness of a particular learning approach may vary depending on the context and the specific task at hand (Willingham, 2009).

Moreover, the focus on learning styles may inadvertently encourage teachers to limit their instructional methods, potentially hindering the development of a diverse repertoire of cognitive skills in students (Riener & Willingham, 2010). Instead of catering to specific learning styles, researchers have argued that teachers should emphasize the use of evidence-based instructional strategies that are effective across a wide range of learners, such as spaced repetition, retrieval practice, and elaboration (Dunlosky et al., 2013).

In conclusion, the concept of learning styles is problematic due to its lack of empirical support, inconsistent definitions, and oversimplification of the learning process. Rather than relying on this flawed theory, educators should focus on adopting evidence-based instructional strategies that promote learning for all students. Ultimately, fostering a diverse set of cognitive skills and flexible thinking will better prepare learners for the complex and dynamic challenges they will face in their lives.

#### References:

- Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004). Learning styles and pedagogy in post-16 learning: A systematic and critical review. Learning and Skills Research Centre.
- Dunn, R., & Dunn, K. (1978). Teaching students through their individual learning styles: A practical approach. Reston Publishing Company.
- Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, 14(1), 4-58.
- Fleming, N. D. (2001). Teaching and learning styles: VARK strategies. Christchurch, New Zealand.
- Kirschner, P. A., & van Merriënboer, J. J. (2013). Do learners really know best? Urban legends in education. *Educational Psychologist*, 48(3), 169-183.
- Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 9(3), 105-119.
- Riener, C., & Willingham, D. (2010). The myth of learning styles. *Change: The Magazine of Higher Learning*, 42(5), 32-35.
- Willingham, D. T. (2009). Why don't students like school? A cognitive scientist answers questions about how the mind works and what it means for the classroom. Jossey-Bass.

Can we detect AI essays?

**Plagiarism detectors don't work –**  
the text is generated, not copied



Plagiarism detectors don't work –  
the text is generated, not copied

## Humans cannot reliably detect AI

In a blind study at the University of Reading, scores for entirely AI-generated (GPT-4) undergraduate assignments were on average half a grade boundary higher than those of real students. 94% of the AI submissions were undetected by human assessors.

RESEARCH ARTICLE

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

Peter Scarfe<sup>1</sup>\*, Kelly Watcham<sup>1</sup>, Alasdair Clarke<sup>2</sup>, Etienne Roesch<sup>1</sup>

<sup>1</sup> School Psychology and Clinical Language Sciences (PCLS), University of Reading, Reading, United Kingdom, <sup>2</sup> Department of Psychology, University of Essex, Colchester, United Kingdom

\* These authors contributed equally to this work.

\* [p.scarfe@reading.ac.uk](mailto:p.scarfe@reading.ac.uk)

#### Abstract

The recent rise in artificial intelligence systems, such as ChatGPT, poses a fundamental problem for the educational sector. In universities and schools, many forms of assessment, such as coursework, are completed without invigilation. Therefore, students could hand in work as their own which is in fact completed by AI. Since the COVID pandemic, the sector has additionally accelerated its reliance on unsupervised ‘take home exams’. If students cheat using AI and this is undetected, the integrity of the way in which students are assessed is threatened. We report a rigorous, blind study in which we injected 100% AI written submissions into the examinations system in five undergraduate modules, across all years of study, for a BSc degree in Psychology at a reputable UK university. We found that 94% of our AI submissions were undetected. The grades awarded to our AI submissions were on average half a grade boundary higher than that achieved by real students. Across modules there was an 83.4% chance that the AI submissions on a module would outperform a random selection of the same number of real student submissions.

Scarfe P, Watcham K, Clarke A, Roesch E (2024) A real-world test of artificial intelligence infiltration of a university examinations system: A “Turing Test” case study. *PLoS ONE* 19(6): e0305354.

Plagiarism detectors don't work – the text is generated, not copied

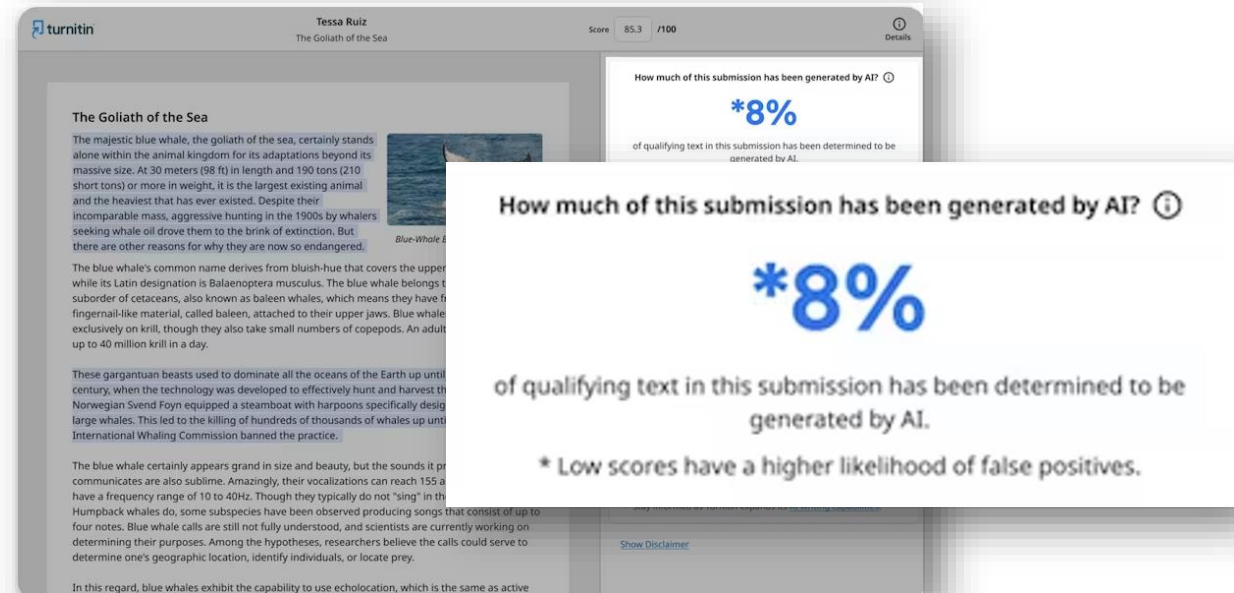
Humans cannot reliably detect AI

In a blind study at the University of Reading, scores for entirely AI-generated undergraduate assignments were on average half a grade boundary higher than those of real students. 94% of the AI submissions were undetected by human assessors.

AI detectors cannot reliably detect AI

1% false positives for entire text.

More likely to mis-classify the text of non-native English writers.



Turnitin detector tool

## GPT detectors are biased against non-native English writers

Weixin Liang<sup>1\*</sup>, Mert Yuksekogunul<sup>1\*</sup>, Yining Mao<sup>2\*</sup>, Eric Wu<sup>2\*</sup>, and James Zou<sup>1,2,3,+</sup>

<sup>1</sup>Department of Computer Science, Stanford University, Stanford, CA, USA

<sup>2</sup>Department of Electrical Engineering, Stanford University, Stanford, CA, USA

<sup>3</sup>Department of Biomedical Data Science, Stanford University, Stanford, CA, USA

<sup>+</sup>Correspondence should be addressed to: jamesz@stanford.edu

\*these authors contributed equally to this work

### ABSTRACT

The rapid adoption of generative language models has brought about substantial advancements in digital communication, while simultaneously raising concerns regarding the potential misuse of AI-generated content. Although numerous detection methods have been proposed to differentiate between AI and human-generated content, the fairness and robustness of these detectors remain underexplored. In this study, we evaluate the performance of several widely-used GPT detectors using writing samples from native and non-native English writers. Our findings reveal that these detectors consistently misclassify non-native English writing samples as AI-generated, whereas native writing samples are accurately identified. Furthermore, we demonstrate that simple prompting strategies can not only mitigate this bias but also effectively bypass GPT detectors, suggesting that GPT detectors may unintentionally penalize writers with constrained linguistic expressions. Our results call for a broader conversation about the ethical implications of deploying ChatGPT content detectors and caution against their use in evaluative or educational settings, particularly when they may inadvertently penalize or exclude non-native English speakers from the global discourse.

<https://arxiv.org/pdf/2304.02819.pdf>

What policy should institutions  
adopt?



## Ban

Confident students will continue to use AI and will challenge decisions based on AI detectors.

## Evade

Invigilated exams are costly and limited.

Asking students to state when they use AI will become increasingly difficult

## Adapt

Requires new methods of assessment, new policies and guidelines

## Embrace

Involves a long process of building trust

### Australian universities to return to 'pen and paper' exams after students caught using AI to write essays

Australia's leading universities say redesign of how students are assessed is 'critical' in the face of a revolution in computer-generated text

- Follow our Australia news live blog for the latest updates
- Get our morning and afternoon news emails, free app or daily news podcast

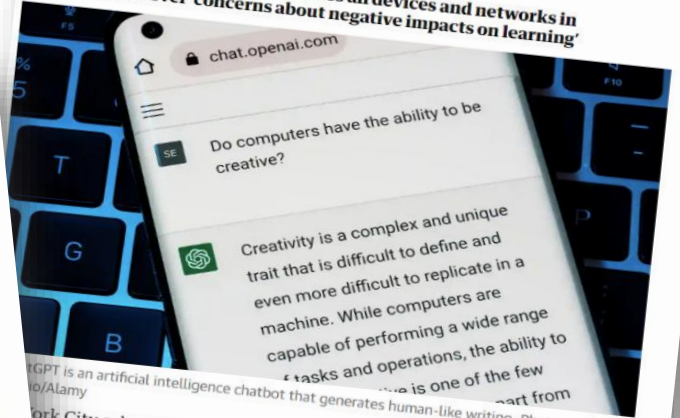


While some universities seek to deal with threats to academic integrity, one ex were fighting a losing battle to contain AI. Photograph: Jonathan Raa/NurPhoto/Australia's leading universities have been forced to change the way they and other assessments amid fears students are using emerging AI intelligence software to write essays.

The Guardian, 10 January 2023

### New York City schools ban AI chatbot that writes essays and answers prompts

ChatGPT tool will be forbidden across all devices and networks in public schools over 'concerns about negative impacts on learning'



ChatGPT is an artificial intelligence chatbot that generates human-like writing. Photograph: New York City schools have banned ChatGPT, the artificial intelligence that generates human-like writing including essays, amid fears that

The Guardian, 6 January 2023

ZDNET tomorrow belongs to those who embrace it today

### Singapore open to ChatGPT use in schools, but urges caution

Schools are given "guidance and resources" to use artificial intelligence tools, including ChatGPT, to enhance learning, but students first must understand basic concepts and do not become over-reliant on technological tools, says education minister.



Written by Eileen Yu, Senior Contributing Editor on Feb. 6, 2023



Singapore supports the use of artificial intelligence (AI) tools such as ChatGPT in schools, but wants to ensure students do not become over-reliant on them and understand the limits of these technologies.

<https://www.zdnet.com/article/singapore-open-to-chatgpt-use-in-schools-but-urges-caution/>

## Ban

Confident students will continue to use AI and will challenge decisions based on AI detectors.

## Evade

Invigilated exams are costly and limited.

Asking students to state when they use AI will become increasingly difficult

## Adapt

Requires new methods of assessment, new policies and guidelines

## Embrace

Involves a long process of building trust

# RUSSELL GROUP

## Russell Group principles on the use of generative AI tools in education

*Our universities are committed to the ethical and responsible use of generative AI and to preparing our staff and students to be leaders in an increasingly AI-enabled world.*

*The rise of generative artificial intelligence (AI) has the potential for a profound impact on the ways in which we teach, learn, assess, and access education. Our universities wish to ensure that generative AI tools can be used for the benefit of students and staff – enhancing teaching practices and student learning experiences, ensuring students develop skills for the future within an ethical framework, and enabling educators to benefit from efficiencies to develop innovative methods of teaching.*

*Valuable work undertaken by organisations such as the Quality Assurance Agency for Higher Education (QAA) and Jisc has helped develop the sector's understanding of the opportunities and considerations of generative AI<sup>12</sup>, and the Department for Education (DfE) has set out its position on the use of generative AI in the pre-university education sector<sup>3</sup>. Russell Group universities have contributed sector-wide insight and have been proactively working with experts to revise and develop policies that provide guidance to students and staff.*

*Collaboration, coordination, and consistency on this issue across the education and professional sectors – including professional bodies, schools, FE colleges and employers – will be crucial. In recognition of this, Russell Group universities have collectively developed the following principles that will guide the approach to generative AI tools across our universities and, we hope, beyond:*

1. Universities will support students and staff to become AI-literate.
2. Staff should be equipped to support students to use generative AI tools effectively and appropriately in their learning experience.
3. Universities will adapt teaching and assessment to incorporate the ethical use of generative AI and support equal access.
4. Universities will ensure academic rigour and integrity is upheld.
5. Universities will work collaboratively to share best practice as the technology and its application in education evolves.

### **1. Universities will support students and staff to become AI-literate.**

- 1.1 Generative AI tools are capable of processing vast amounts of information and generating responses but they have limitations.

## Emerging policy and strategy

**Amend assignments** to make them harder for AI to generate, for example based on lab work.

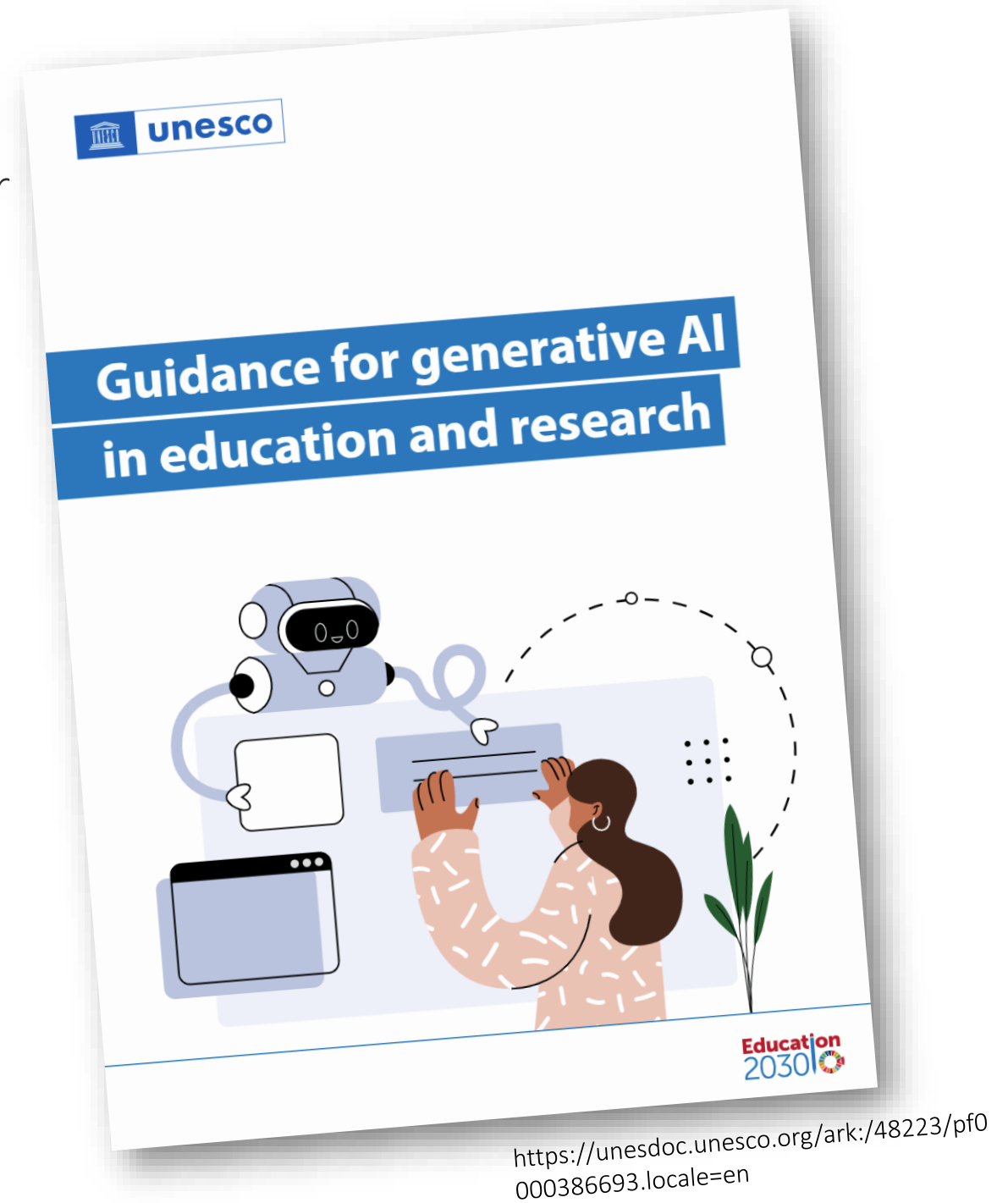
Move to more **authentic and process-based assessment**, such as a reflection on a placement, or project work with staged assessments, or a group assignment.

**Establish guidelines** for students and staff in use of generative AI.

**Support students** in becoming AI literate and developing strategies for effective learning.

Explain to students how they should **acknowledge use of generative AI** in assignments.

Manage **suspected breaches of guidelines**.



## Emerging policy and strategy

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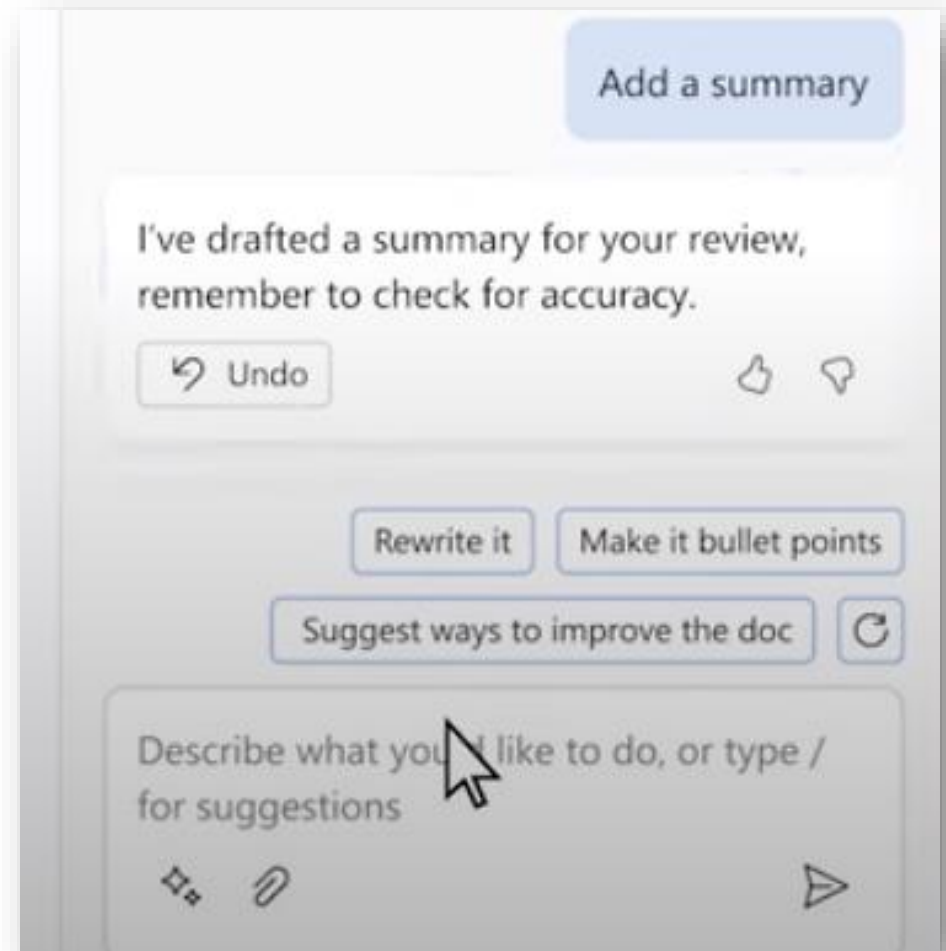
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Manage **suspected breaches of guidelines**.



Microsoft 365 Copilot in Word



Explain to students how they should **acknowledge use of generative AI** in assignments, for inclusive education

## Where to draw the line on “use of generative AI”?

Spell check?

Grammar check?

Style check?

Machine translation?

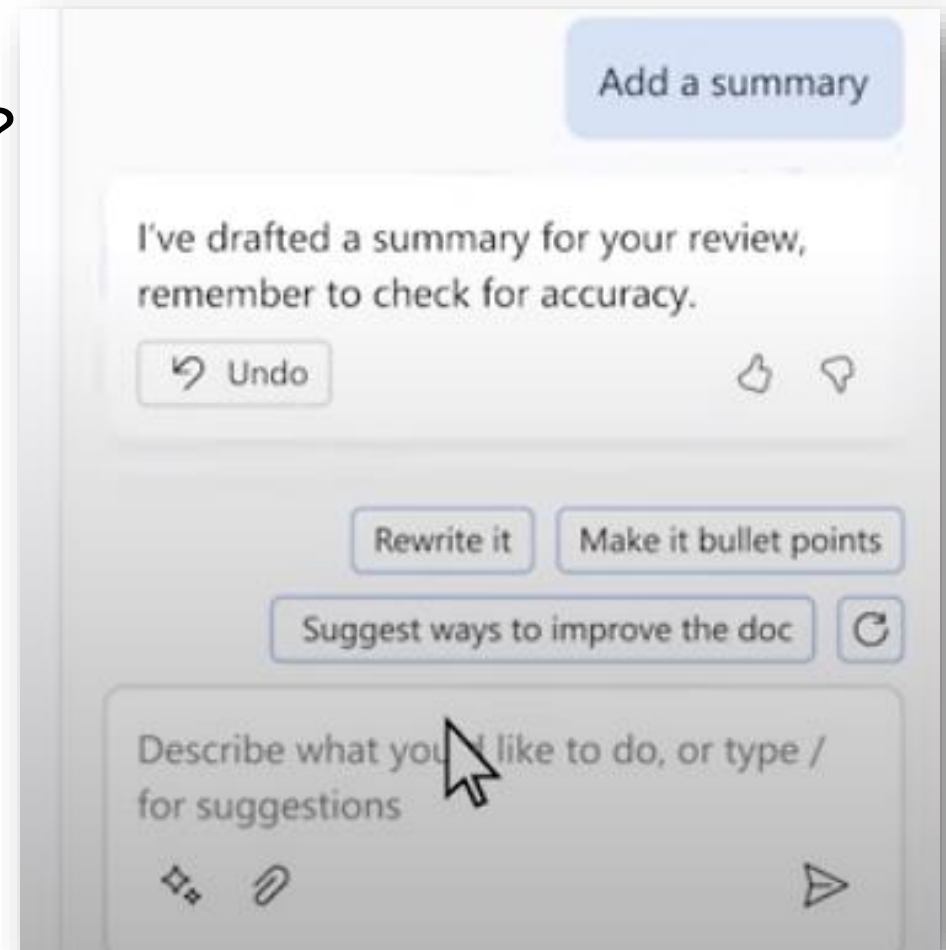
“Brainstorm ideas”?

“Continue writing”?

“Suggest ways to improve my document”?

“Rewrite my document”?

Generate all or part of an assignment?



Microsoft 365 Copilot in Word

How can education make good  
use of generative AI?

# Every powerful pedagogy could be augmented by AI

Adaptive teaching

Spaced learning

Personal inquiry

Dynamic assessment

Stealth assessment

Translanguaging

Crossover learning

Seamless learning

Incidental learning

Learning from gaming

Geo-learning

Learning through social media

Navigating post-truth societies

Explore first

Teachback

Learning through argumentation

Computational thinking

Learning from animations

Learning to learn

Assessment for learning

Formative analytics

Threshold concepts

Learning through storytelling

Learning in remote labs

Context-based learning

Event-based learning

Learning for the future

Embodied learning

Immersive learning

Maker culture

Bricolage

Massive open social learning

Crowd learning

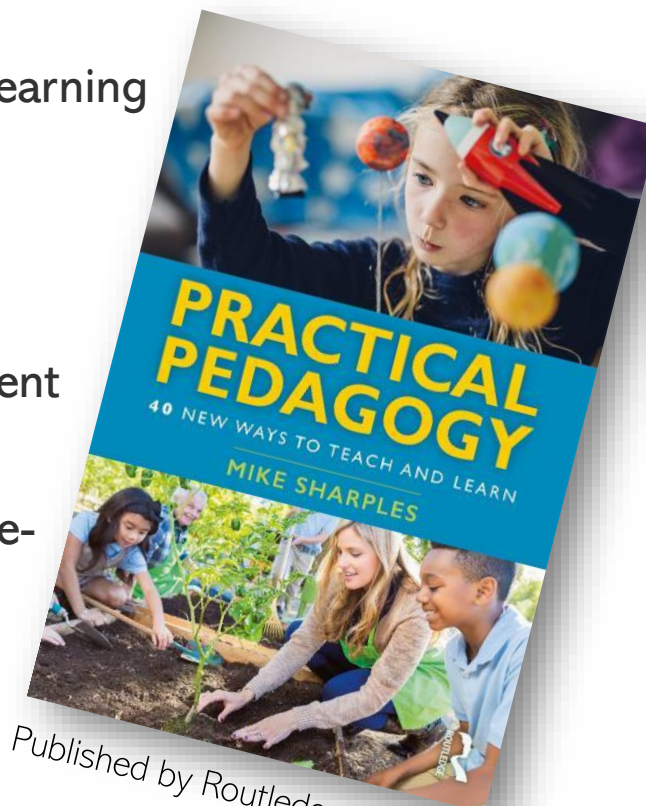
Citizen inquiry

Rhizomatic learning

Reputation management

Open pedagogy

Humanistic knowledge-building communities



Published by Routledge, 2019

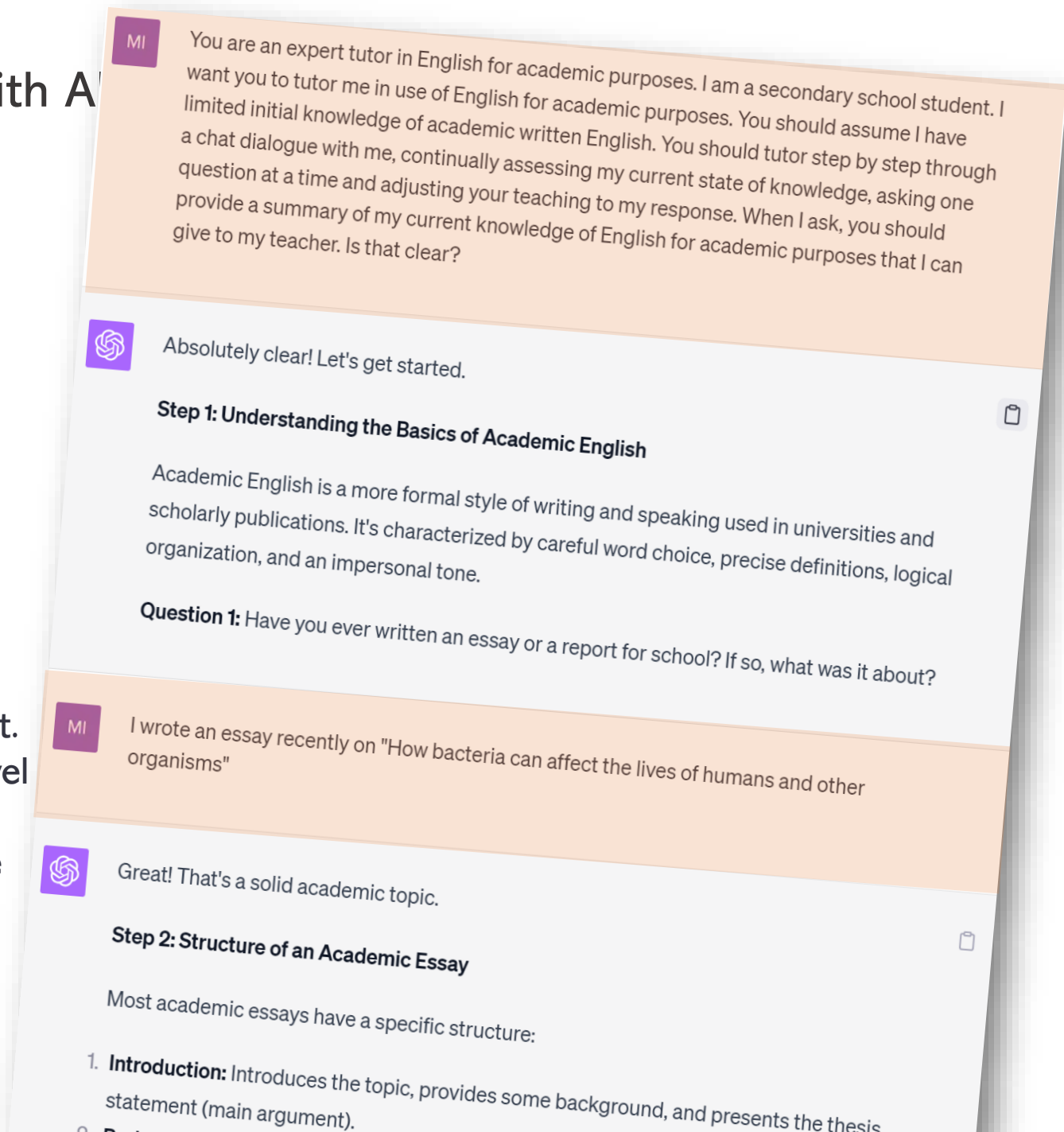
# New ways of teaching and learning with AI

## Personal Tutor

Students have a personal tutor for any topic.

Provide students with a prompt template:

You are an expert tutor in [subject]. I am a [level] student. I want you to tutor me in [topic]. You should assume [level of ability]. You should tutor step by step through a chat dialogue with me, continually assessing my current state of knowledge, asking one question at a time and adjusting your teaching to my response. When I ask, you should provide a summary of my current knowledge of [topic] that I can give to my teacher. Is that clear?





# New ways of teaching and learning with AI

## Personal Tutor

Students have a personal tutor for any topic.

**Question 5:** Let's practice! Imagine you read a book by Dr. Jane Smith in 2020 titled "Bacteria and Human Health." How would you cite this book in APA style in the reference list and as an in-text citation for a paraphrased idea?

MI

Smith, Jane (2020) *Bacteria and Human Health*. (Smith 2020)



You're on the right track! Let's make a few adjustments to align it perfectly with APA style:

**Reference List:**

Smith, J. (2020). *Bacteria and Human Health*. Publisher Name.

(Note: I added the publisher name as a placeholder. In a real citation, you'd replace "Publisher Name" with the actual name of the publisher.)

**In-text Citation for a Paraphrased Idea:**

(Smith, 2020)

You've got the basics down! Remember, the details matter in APA style, such as the placement of periods, italics for book titles, and the order of information.

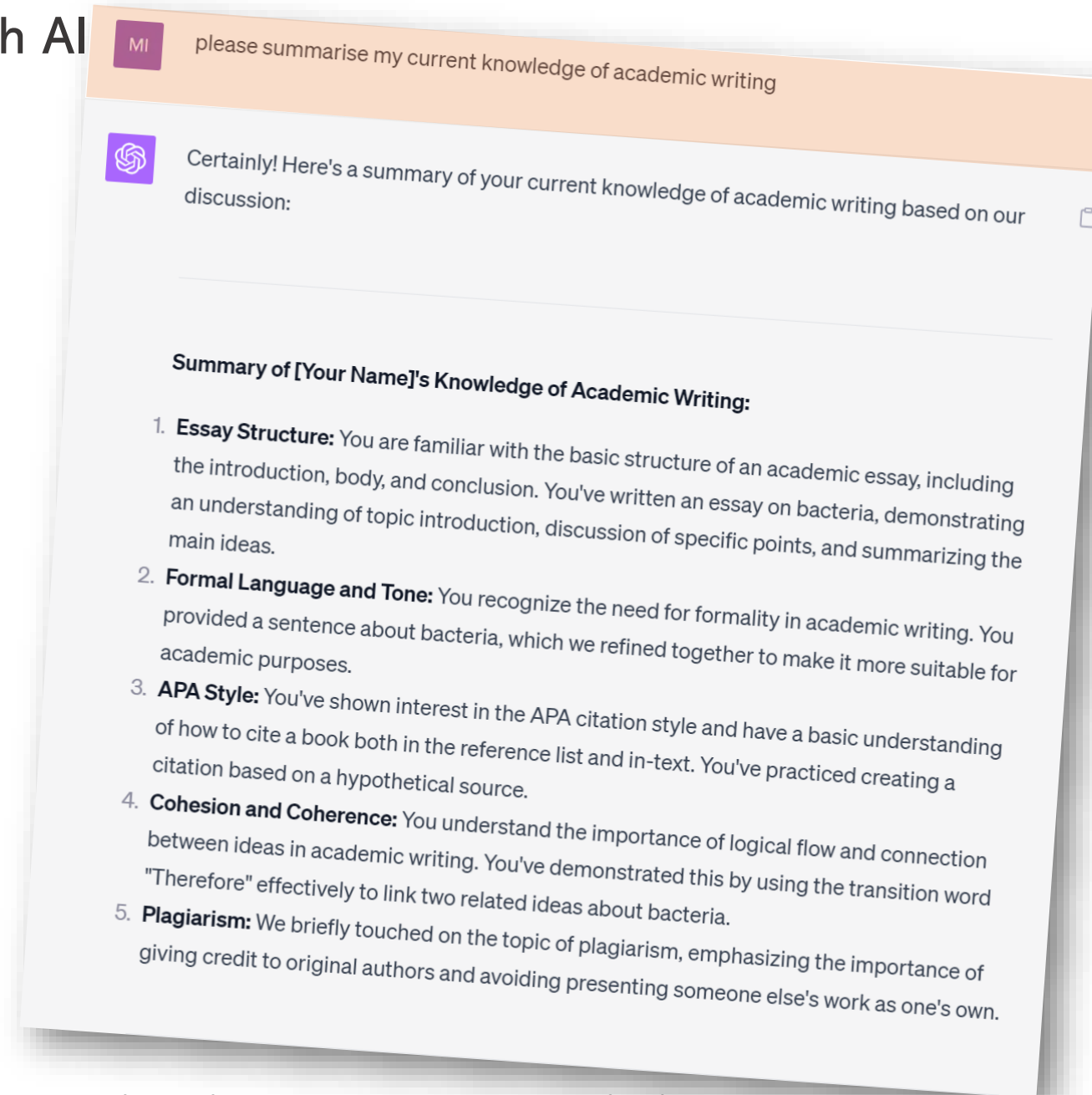
**Step 6: Cohesion and Coherence**

In academic writing, it's essential for your ideas to flow logically and be connected. This is achieved through the use of cohesive devices like transition words (e.g., however, furthermore, in addition) and referencing words (e.g., this, it, they).

New ways of teaching and learning with AI

## Dynamic Assessor

Students share summaries of their learning for dynamic assessment.



Summary assessment, based on my conversation with ChatGPT-4

# New ways of teaching and learning with AI

## Socratic Opponent

In an individual or group activity, students engage with ChatGPT in a Socratic dialogue, then each student writes an argumentative essay.

MI

Can conflict be fruitful?



Yes, conflict can indeed be fruitful in various ways. Here are some potential benefits of conflict:

- 1. Clarification of Ideas and Goals:** Conflict can bring to light differences in opinions, assumptions, and values. This can be useful for clarifying one's own position or understanding the position of others. It can also provide a valuable opportunity to re-evaluate and possibly improve plans, ideas, and goals.
- 2. Innovation and Creativity:** A well-managed conflict can lead to innovative solutions. As individuals or groups argue their point of view, they are often pushed to think more deeply and creatively to justify their positions or to come up with alternatives that can resolve the conflict.
- 3. Improved Relationships and Team Cohesion:** If conflict is addressed openly and respectfully, it can actually improve relationships. It allows people to understand each other's perspectives more fully, to address unspoken tensions, and to resolve issues that might have been simmering beneath the surface. This can ultimately strengthen team cohesion.
- 4. Personal Growth and Skills Development:** Managing conflict constructively can lead to personal growth. Individuals can develop skills in negotiation, problem-solving, critical thinking, and emotional intelligence.
- 5. Organizational Change and Progress:** At an organizational level, conflict can be a driving force for change and progress. When conflict arises from differences in values or goals, it can spur efforts to achieve better policies, systems, or structures.

However, it's important to note that whether conflict is destructive or constructive often depends on how it's managed. Poorly handled conflict can lead to stress, reduced morale, broken relationships, and reduced productivity. It's essential to promote a culture where differences can be expressed in respectful and constructive ways. This is often aided by good communication skills, empathy, and conflict resolution strategies.


# New ways of teaching and learning with AI

## Socratic Opponent

In an individual or group activity, students engage with ChatGPT in a Socratic dialogue, then **each student writes an argumentative essay.**

However, it's essential to note that the fruitfulness of conflict largely depends on how it's approached and managed. Constructive conflict resolution strategies, such as open communication, active listening, and empathy, can lead to positive outcomes. On the other hand, avoiding conflict or approaching it with aggression can exacerbate issues and lead to negative consequences.

MI But forcing individuals to face their beliefs, biases and assumptions could just lead to anger and denial. How could that be fruitful?

 You're right. Forcing individuals to confront their beliefs, biases, and assumptions can lead to immediate negative reactions such as anger, defensiveness, and denial. However, the potential fruitfulness comes from what happens after this initial reaction, and how the situation is managed:

1. **Opportunity for Reflection:** While the immediate reaction might be negative, the confrontation can plant a seed of introspection. Over time, individuals might reflect upon the conflict and gain insights about their own perspectives.
2. **Building Emotional Intelligence:** Facing challenging situations can lead to the development of emotional intelligence. By navigating conflicts, individuals can learn to regulate their emotions, understand the emotions of others, and improve their interpersonal skills.
3. **Skill Development:** Managing negative reactions such as anger and denial requires the development of conflict resolution skills. This includes active listening, empathy, and effective communication. Over time, individuals can become better at handling disagreements and diverse viewpoints.
4. **Encouraging Open Dialogue:** Confrontation can pave the way for open dialogue. If managed correctly, it can create a space where individuals feel safe to express their opinions and feelings, leading to a deeper understanding of diverse perspectives.



# New ways of teaching and learning with AI

## Co-designer

AI assists a group of students throughout a design process, to define the problem, challenge assumptions, brainstorm ideas, produce prototypes.

**MS** Brainstorm imaginative ideas for new forms of consumer digital media powered by AI. Highlight each idea in bold.

Here are some imaginative ideas for new forms of consumer digital media powered by AI:

**Neuroadaptive storytelling:** AI-powered narratives that adapt in real-time based on the reader's emotional responses, measured through biosensors. The story evolves uniquely for each reader, maximizing emotional impact and engagement.

**Holographic memory albums:** AI-generated 3D holographic recreations of personal memories, combining data from photos, videos, and social media to create immersive experiences of past events that can be "walked through" and interacted with.

**Synthetic celebrity personas:** Fully AI-generated celebrities with dynamically evolving personalities, appearances, and content creation. Fans can influence their development through interactions and feedback.

**Dream-to-media converter:** A device that records brain activity during sleep and uses AI to convert dreams into watchable "movies" or interactive VR experiences upon waking.

**AI-composed personal soundtracks:** An AI that composes a unique, ever-evolving musical score for your life, adapting to your activities, moods, and surroundings in real-time.

**Augmented reality conversation enhancer:** AI-powered AR glasses that provide real-time conversation suggestions, fact-checking, and contextual information during social interactions.

**Empathy amplifier media:** Content that uses AI to analyze and amplify the emotional resonance between the viewer and the characters or subjects, creating a hyper-empathetic viewing experience.

**Predictive life-logging:** An AI system that combines your personal data with predictive modeling to create speculative "memories" of future events in your life, presented as immersive media experiences.

Would you like me to elaborate on any of these ideas or brainstorm more?

# Teacher's assistant GPT

A "GPT" is a customized version of ChatGPT



## TeachSmart

By Michael Sharples 

Friendly pedagogy expert with advice on good ways to teach and learn.  
Based on "Practical Pedagogy: 40 New Ways to Teach and Learn".


How can I make my classes more engaging?

What is Spaced Learning?

Can ChatGPT be an effective personal tutor?

How can I teach English online?

<https://chatgpt.com/g/g-RCHNUwnD1-teachsmart>

 Message TeachSmart



Suggest one unusual but effective method to enhance the effectiveness of teaching within a university lecture.



One unusual but effective method to enhance the effectiveness of teaching within a university lecture is "Teachback." This innovative pedagogy involves students learning by explaining what they have just been taught to their peers. The process reinforces their understanding and helps identify any gaps in their knowledge.

### How Teachback Works:

1. **Introduce the Concept:** After teaching a new concept, ask students to explain it in their own words.
2. **Pair or Group Work:** Have students pair up or form small groups. Each student takes turns teaching the concept to the others.
3. **Feedback and Clarification:** Encourage students to ask questions and provide feedback to each other, which deepens their comprehension.
4. **Instructor Monitoring:** Walk around and listen to the explanations, providing guidance and correcting misconceptions as necessary.
5. **Reflection:** Have students reflect on what they learned from the exercise and how their understanding has improved.

### Benefits of Teachback:

- **Reinforcement of Learning:** Teaching others requires a thorough understanding of the material, thus reinforcing the student's own learning.
- **Active Engagement:** Students actively engage with the content, making the learning process more dynamic and interactive.
- **Immediate Feedback:** Peer feedback allows for immediate clarification of misunderstandings, which is essential for effective learning.

# Teacher's assistant GPT



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Message TeachSmart

Help me design an online course for AI literacy.



Designing an online AI literacy course can be a rewarding project, especially as interest in understanding AI basics continues to grow. Here's a structured plan using instructional design best practices and learning design principles. I'll outline a model incorporating the ADDIE framework and ABC Learning Design, both of which offer practical, adaptable approaches for online course creation.

### 1. Analyze (ADDIE - Analysis Phase)

- **Learner Profile:** Identify your target learners—whether they are complete beginners, industry professionals, or students with some technical background. This will shape both content depth and complexity.
- **Learning Objectives:** Define clear, measurable learning objectives. For instance:
  - *Understand the basic concepts and applications of AI.*
  - *Differentiate between machine learning, deep learning, and artificial intelligence.*
  - *Discuss ethical considerations in AI development.*
  - *Identify key AI tools and frameworks (like Python libraries for beginners).*
- **Assessment Needs:** Consider assessments that help track progress, such as quizzes, discussions, or practical projects.

### 2. Design (ADDIE - Design Phase)

- **Content Structure and Sequence:** Develop a course outline using a scaffolded approach, progressing from foundational topics to more complex AI concepts. Based on the **7Cs of Learning Design**:
  - **Conceptualize:** Plan core content areas—history of AI, types of AI, basic algorithms, ethical concerns.
  - **Capture:** Use media-rich resources to maintain engagement. Integrate short videos, readings, and interactive modules.
  - **Consolidate:** Summarize learning with end-of-unit reflections or summaries to solidify understanding.
- **Engagement Elements:** To ensure engaging learning experiences, you could integrate elements of **gamification** (quizzes or point-based systems) or **real-world applications** (case studies of AI

# Roles for generative AI in education

## **Possibility Engine**

AI generates alternative ways of expressing an idea

## **Socratic Opponent**

AI acts as an opponent to develop an argument

## **Collaboration Coach**

AI helps groups to research and solve problems

## **Lesson planner**

AI helps a teacher in planning a lesson or activity

## **Quiz generator**

AI helps a teacher to generate multiple choice quizzes

## **Personal Tutor**

AI tutors each student and gives immediate feedback

## **Dynamic Assessor**

AI provides educators with a profile of each student

## **Co-Designer**

AI assists throughout the design process

## **Exploratorium**

AI provides tools to discover, explore and interpret data

## **Storyteller**

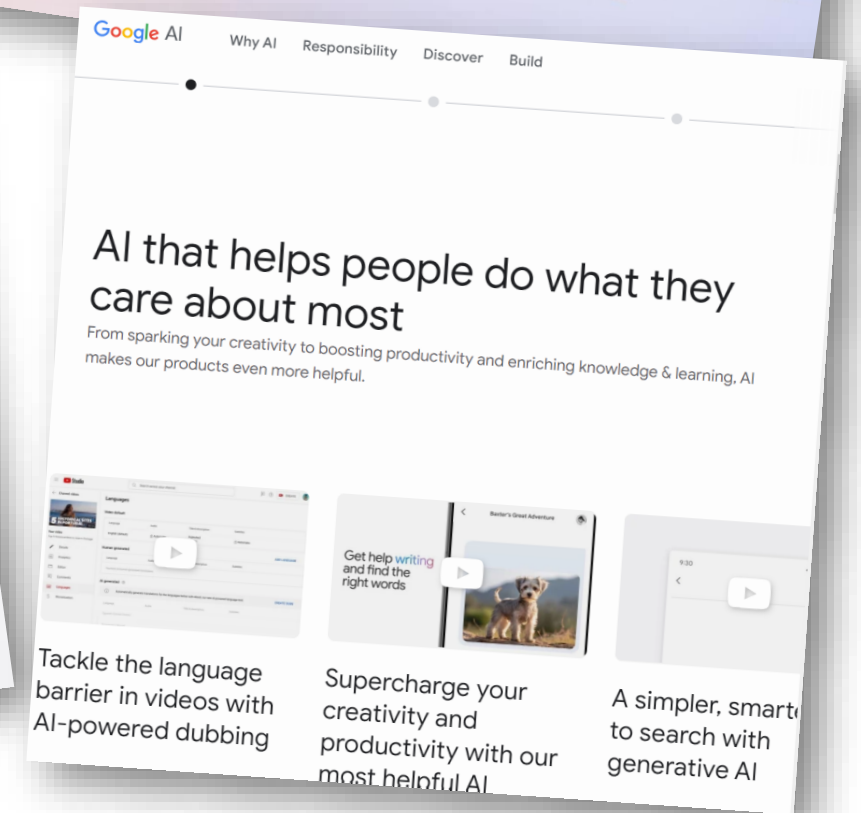
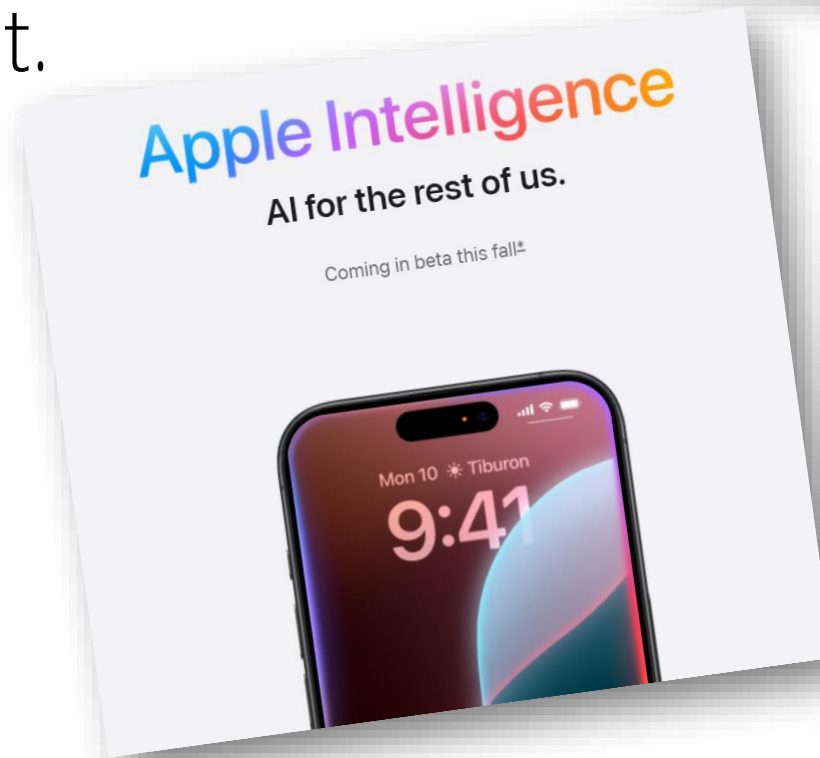
AI offers ways to explore roles and diversity



# Future directions for generative AI in education

AI will be embedded into all our tools for teaching, learning and work.

It will become a lifelong personal assistant.



Support or substitute?

Will AI personal assistants support or substitute for learning?

Depends how it they are designed and deployed.

Support learning - AI encourages students to reflect and explore

Substitute for learning – students come to rely on personal assistants that carry out routine tasks

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

**Computers & Education**

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**Impact of AI assistance on student agency**

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Peer feedback  
Educational technology

**ABSTRACT**

AI-powered learning technologies are increasingly being used to automate and scaffold learning activities (e.g., personalised reminders for completing tasks, automated real-time feedback for improving writing, or recommendations for when and what to study). While the prevailing view is that these technologies generally have a positive effect on student learning, their impact on students' agency and ability to self-regulate their learning is under-explored. Do students learn from the regular, detailed and personalised feedback provided by AI systems, and will they continue to exhibit similar behaviour in the absence of assistance? Or do they instead continue to rely on AI assistance without learning from it? To contribute to filling this research gap, we conducted a randomised controlled experiment that explored the impact of AI assistance on student agency in the context of peer feedback. With 1625 students across 10 courses, an experiment was conducted using peer review. During the initial four-week period, students were guided by AI features that utilised techniques such as rule-based suggestion detection, semantic similarity, and comparison with previous comments made by the reviewer to enhance their submissions if the feedback provided was deemed insufficiently detailed or general in nature. Over the following four weeks, students were divided into four different groups: control (AI) received prompts, (NR) received no prompts, (SR) received self-monitoring checklists in place of AI prompts, and (SAI) had access to both AI prompts and self-monitoring checklists. Results of the experiment suggest that students tended to rely on rather than learn from AI assistance. If AI assistance was removed, self-regulated strategies could help fill the gap but were not as effective as AI assistance. Results also showed that hybrid human-AI approaches that complement AI assistance with self-regulated strategies (SAI) were not more effective than AI assistance on its own. We conclude by discussing the broader benefits, challenges and implications of relying on AI assistance in relation to student agency in a world where we learn, live and work with AI.

Darvishi, A., Khosravi, H., Sadiq, S., Gašević, D., & Siemens, G. (2024). Impact of AI assistance on student agency. *Computers & Education*, 210, 104967.

# Question explorer chatbot



## Qreframer

By S BUCKINGHAM SHUM &

Reflect on assumptions behind your questions, and ask better questions

How on earth do we assess students in the age of AI?

Why can't people engage in civil dialogue any more?

What climate change action will have most impact ...

When will we permit only intelligent people ...

🔗 What is consciousness?



What is consciousness?



Hello! I'm here to help you reflect on your question and uncover deeper insights. Let's begin by identifying some implicit assumptions in your question about consciousness.

### Assumptions:

1. **Consciousness has a single, definable nature:** This assumes that there is one clear-cut definition or essence of consciousness that can be universally agreed upon.
2. **Consciousness can be understood or explained:** This implies that consciousness is something that can be comprehended, studied, and articulated, rather than being an inherently mysterious or subjective experience.
3. **Consciousness is separate from the physical body:** This presumes a distinction between consciousness and physical processes, suggesting a dualistic perspective.

Do any of these assumptions stand out to you as particularly insightful or worth exploring further? Please respond by choosing an assumption number, and we can dive deeper into related questions.



3



Great! Let's explore the assumption that "**Consciousness is separate from the physical body**". This raises several intriguing questions:

### New Questions:

- 3a. How might consciousness be integrated with physical processes in the brain and body?
- 3b. What evidence exists for and against the idea that consciousness is distinct from physical matter?



# Recommendations for generative AI in education

Form a **clear policy** for assessment and appropriate use of AI

Investigate **open-source** AI models

Explore **new roles** for AI based on effective methods of teaching and learning

Develop a program of **AI literacy** for students and staff



The infographic is titled "AI LITERACY" and features a brain icon with circuitry. It is organized into seven sections, each with a checkmark icon, a list of topics, and a brief description. The sections are: AI Concepts, AI Pedagogy, AI Creativity, AI in Society, AI Ethics, and AI Careers. Each section is separated by a horizontal line of orange dots.

Section	Topics	Description
AI Concepts	What is AI? Uses of AI Chat with AI	Symbolic and neural AI. Simulating human intelligence. Learning from data, AI reasoning. Modalities, architectures. AI can recognize, translate, analyze, generate. Prompt, chat. Agents, assistants.
AI Pedagogy	Learn and teach with AI Explore with AI Study with AI	Personalized learning. Study buddy, tutor, designer, translator, assessor. Learn by conversing, arguing, analyzing, exploring with AI. New AI-enhanced pedagogies. Generate lesson plans, assessments.
AI Creativity	Design with AI Create with AI Critique AI	AI design assistant. Define, ideate, plan, prototype, test, evaluate with AI. Create lessons, games, software, products. Collaborative and social AI learning. Critique outputs, products, assumptions.
AI in Society	Costs of AI Control of AI Inclusive AI	Financial and environmental costs, sustainability. Business models, open and closed. AI models, tools, agents. Data centers, cloud computing. Who controls AI, surveillance. Inclusive design and use.
AI Ethics	Limitations of AI Privacy and security of AI Safe and responsible AI	Hallucinations, errors, types of bias, adversarial attacks, robustness, threat detection. Data storage, integrity and security, safeguarding. Safe and responsible uses. Critical engagement.
AI Careers	Work with AI Care with AI Prosper with AI	Careers in AI. Changing workplace. AI in finance, business, computing, transport, agriculture, healthcare, energy, entertainment, education. How to prosper in an AI-infused world. AI futures.

Mike Sharples, 2024



# Teaching is a caring profession

We care for our students

We care about accuracy, integrity, truth

We care about our professional expertise

We care about our human knowledge and experience

AI doesn't care

Bring human care to AI in education



# Resources

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