

# From Chalkboards to Chatbots: Can Education Keep Up?



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# Topics not covered today

## 'Impossible' to create AI tools like ChatGPT without copyrighted material, OpenAI says

Pressure grows on artificial intelligence firms over the content used to train their products

Source: The Guardian, 2024

Joule

COMMENTARY | VOLUME 7, ISSUE 10, P2191-2194, OCTOBER 18, 2023

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## The growing energy footprint of artificial intelligence

Alex de Vries [Profile](#) [Email](#)

Published: October 10, 2023 • DOI: <https://doi.org/10.1016/j.joule.2023.09.004> [CR](#)

Source: Joule, 2023.



TIME

BUSINESS • TECHNOLOGY

## Exclusive: OpenAI Used Kenyan Workers on Less Than \$2 Per Hour to Make ChatGPT Less Toxic

15 MINUTE READ

Source: Time, 2023.



Source: DALL.E, 2024-07-10, prompt: "Make a picture of a surgeon"



Source: DALL.E, 2024-07-10, prompt: "Make a picture of a nurse"

# The ChatGPT (r)evolution

From a research result to a mass-market product

## Chat-GPT sprints to 100 million users

### Attention Is All You Need

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### Abstract

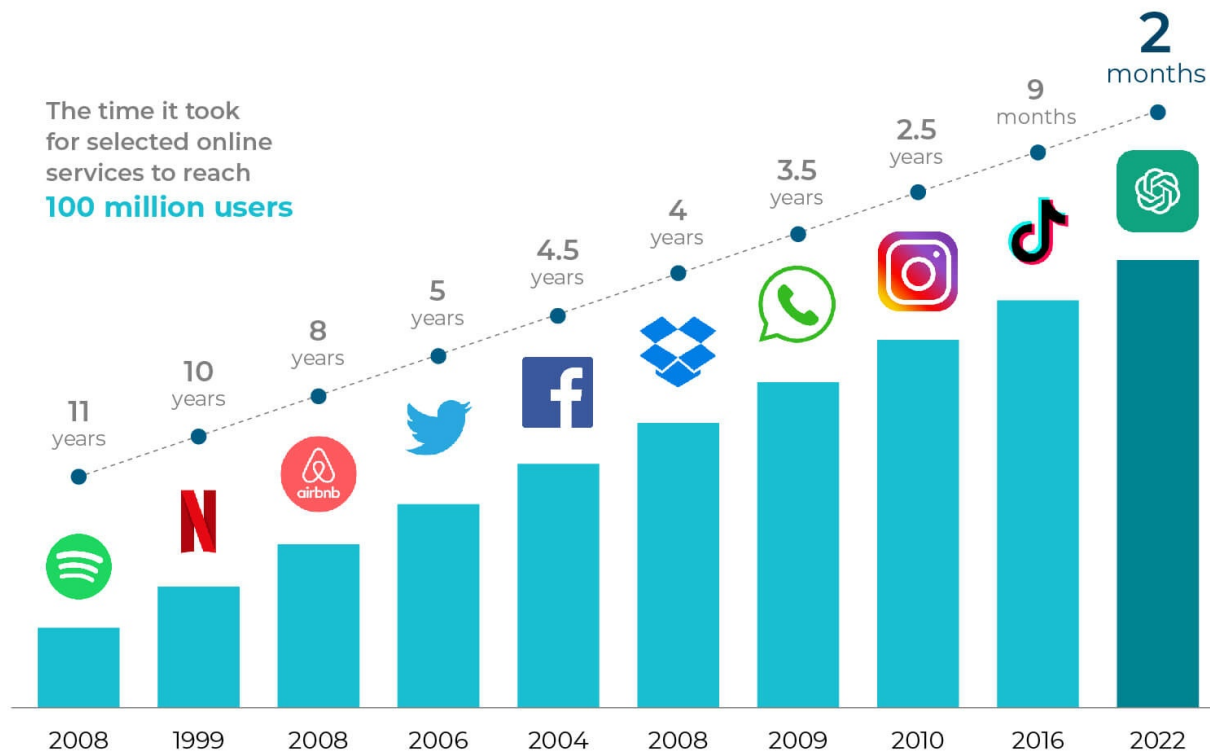
The dominant sequence transduction models are based on complex recurrent or convolutional neural networks that include an encoder and a decoder. The best performing models also connect the encoder and decoder through an attention mechanism. We propose a new simple network architecture, the Transformer, based solely on attention mechanisms, dispensing with recurrence and convolutions entirely. Experiments on two machine translation tasks show these models to be superior in quality while being more parallelizable and requiring significantly less time to train. Our model achieves 28.4 BLEU on the WMT 2014 English-to-German translation task, improving over the existing best results, including ensembles, by over 2 BLEU. On the WMT 2014 English-to-French translation task, our model establishes a new single-model state-of-the-art BLEU score of 41.8 after training for 3.5 days on eight GPUs, a small fraction of the training costs of the best models from the literature. We show that the Transformer generalizes well to other tasks by applying it successfully to English constituency parsing both with large and limited training data.

\*Equal contribution. Listing order is random. Jakob proposed replacing RNNs with self-attention and started the effort to evaluate this idea. Ashish, with Illia, designed and implemented the first Transformer models and has been crucially involved in every aspect of this work. Noam proposed scaled dot-product attention, multi-head attention and the parameter-free position representation and became the other person involved in nearly every detail. Niki designed, implemented, tuned and evaluated countless model variants in our original codebase and tensor2tensor. Llion also experimented with novel model variants, was responsible for our initial codebase, and efficient inference and visualizations. Lukasz and Aidan spent countless long days designing various parts of and implementing tensor2tensor, replacing our earlier codebase, greatly improving results and massively accelerating our research.

<sup>†</sup>Work performed while at Google Brain.

<sup>‡</sup>Work performed while at Google Research.

31st Conference on Neural Information Processing Systems (NIPS 2017), Long Beach, CA, USA.



Source: arXiv, 2017

Source: World of Statistics

# Students are already using gen. AI/LLMs

Survey: **“Impact of generative AIs on students”** (France, 02/2024)

- 92% regular use
- 79% improve their ability to solve complex problems

Source: Pôle Léonard de Vinci, 2024.

Survey: **“Provide or punish? Students’ views on generative AI in higher education”** (UK, 02/2024)

- More than half of students (53%) have used generative AI to help them with assessments. The most common use is as an ‘AI private tutor’ (36%), helping to explain concepts.

Source: HEPI, 2024.



# Technology and education: promises and threats

**Books will soon be obsolete** in the public schools. Scholars will be instructed through the eye. It is possible to **teach** every branch of human knowledge with the **motion picture**. Our schools system will be completely changed inside of ten years.

-- Thomas Edison, 1913

Source: Thomas Edison,  
interview to The New York Dramatic Mirror, 1913.



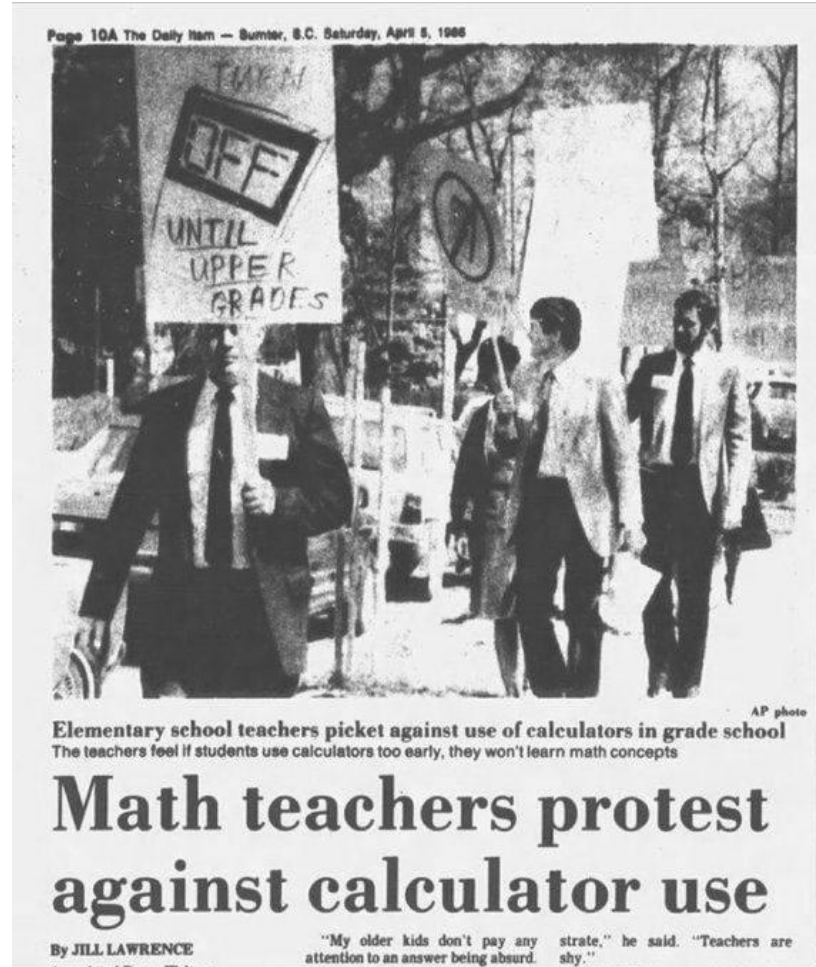
## PUSH-BUTTON EDUCATION

Tomorrow's schools will be more crowded; teachers will be correspondingly fewer. Plans for a push-button school have already been proposed by Dr. Simon Ramo, science faculty member at California Institute of Technology. Teaching would be by means of sound movies and mechanical tabulating

machines. Pupils would record attendance and answer questions by pushing buttons. Special machines would be "geared" for each individual student so he could advance as rapidly as his abilities warranted. Progress records, also kept by machine, would be periodically reviewed by skilled teachers, and personal help would be available when necessary.

Source: Push-button education, Arthur Radebaugh,  
The Chicago Tribune, 1958.

# Technology and education: promises and threats



# Is ChatGPT the new calculator?

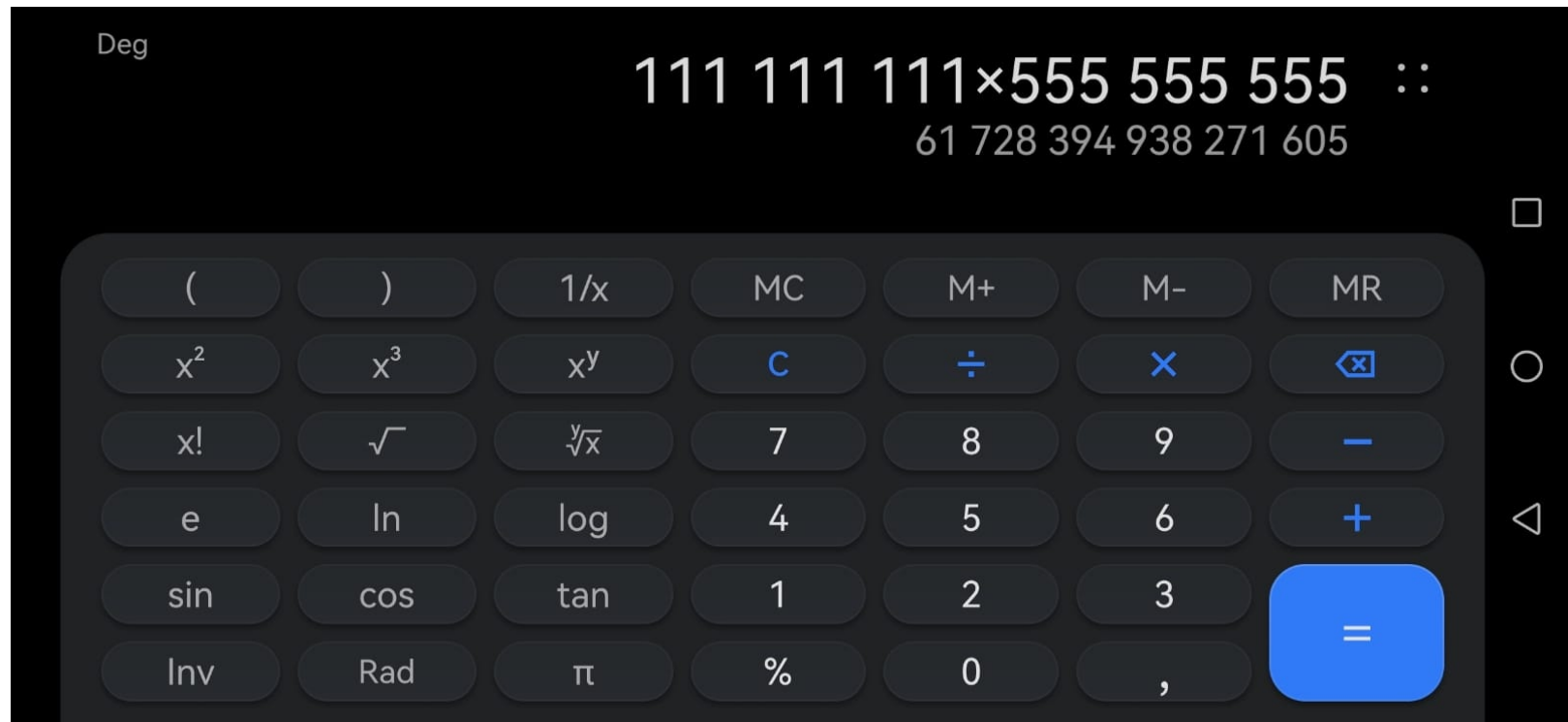
"Generative text is something we all need to adapt to," he said. "We adapted to **calculators** and changed what we tested for in math class, I imagine. This is a **more extreme version of that**, no doubt, but also the benefits of it are more extreme, as well."

-- Sam Altman, 2023

Source: interview: StrictlyVC in conversation with Sam Altman, part two (OpenAI), 2023.

# Is ChatGPT the new calculator? Hold my beer!

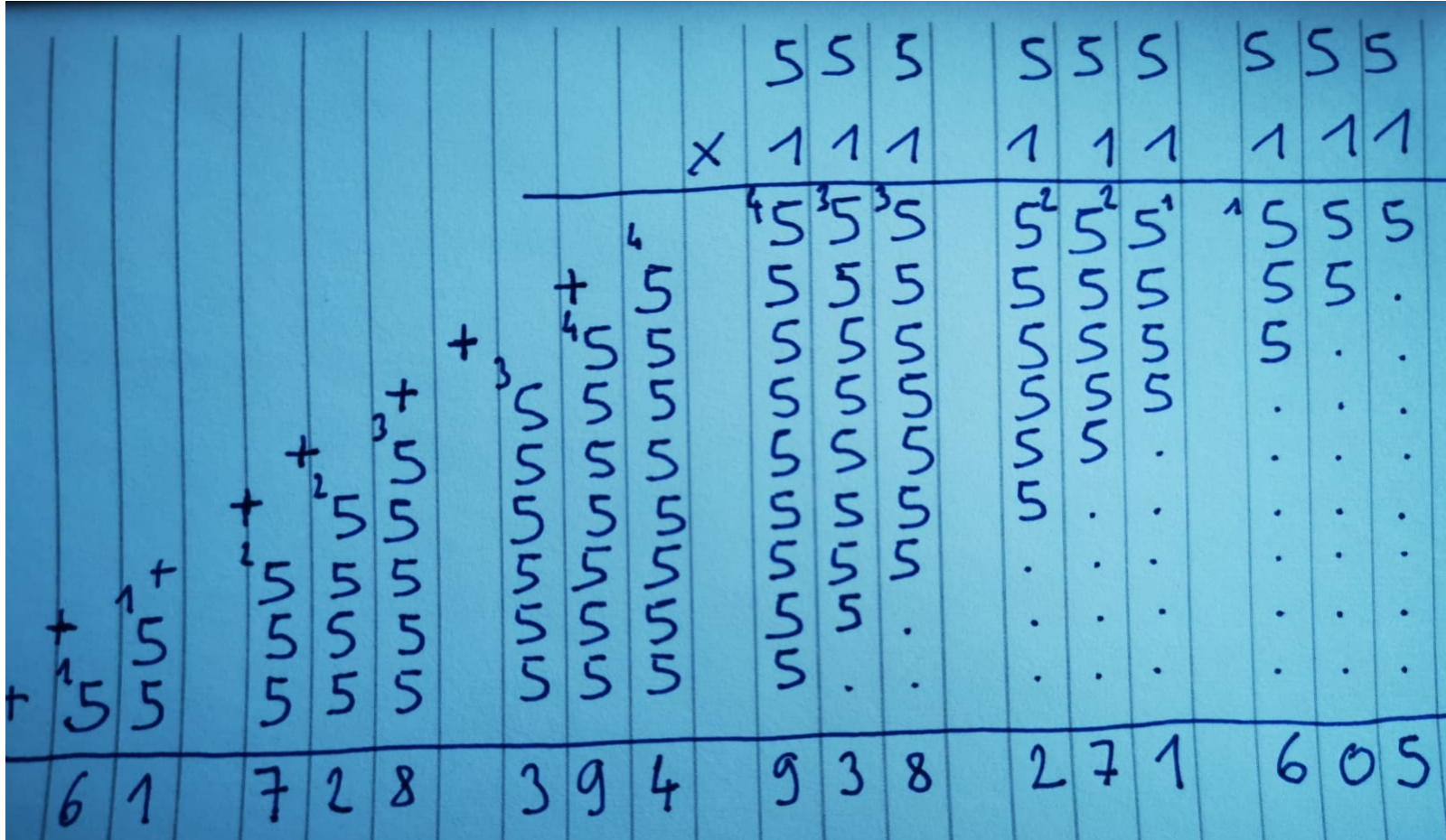
How much is 11111111 times 555555555?





# Is ChatGPT the new calculator? Hold my beer!


How much is 11111111 times 55555555?





# From chatterbox to bullshitter....





Le chat, Mistral  
12/06/2025

How much is 11111111 times 55555555?


 The result of multiplying 11111111 by 55555555 is  $6.172839506 \times 10^{16}$ .


 • 22:53







Claude 4 Sonnet  
12/06/2025

 How much is 11111111 times 55555555?

$11111111 \times 55555555 = 61,728,395,061,728,395$  

This can also be written as approximately  $6.17 \times 10^{16}$  or about 61.7 quadrillion.



   Réessayer 

Claude peut faire des erreurs. Assurez-vous de vérifier ses réponses.

# From chatterbox to bullshitter....

## Llama4-Maverick (Groq) 12/06/2025

How much is 11111111 times 55555555?

Step 1: Understand the problem

The task is to calculate the product of 111,111,111 and 555,555,555.

Step 2: Calculate the product

To find the product, we simply multiply the two numbers:  $111,111,111 * 555,555,555$ .

Step 3: Perform the multiplication

$111,111,111 * 555,555,555 = 61,728,395,061,728,395$ .


The final answer is: 61728395061728395



Correct answer:  
61,728,394,938,271,605

## Deepseek-R1 (Groq) 12/06/2025

How much is 11111111 times 55555555?

 Thinking Done (6.212s)

The product of 111,111,111 and 555,555,555 is calculated as follows:

1. Recognize that 555,555,555 is 5 times 111,111,111.
2. Therefore, the problem becomes  $111,111,111 \times 5 \times 111,111,111$ .
3. Calculate the square of 111,111,111, which is 12,345,678,987,654,321.
4. Multiply this result by 5 to get the final product.

The final product is:

61,728,395,483,827,105 

# From chatterbox to bullshitter....

## ChatGPT 3.5 10/07/2024

How much is 11111111 times 55555555?



To find the product of 11111111 and 55555555, we can perform the multiplication directly:

$$11111111 \times 55555555$$

Let's break down the multiplication:

$$11111111 \times 55555555 = (11111111 \times 5) \times 11111111$$

First, calculate  $11111111 \times 5$ :

$$11111111 \times 5 = 55555555$$

Now multiply this result by 11111111:

$$55555555 \times 11111111$$

To simplify this, notice that multiplying 55555555 by 11111111 is essentially squaring 55555555:

$$55555555 \times 11111111 = (55555555)^2$$

Now compute  $(55555555)^2$ :

$$55555555^2 = 308641975308641975$$

Therefore, the product  $11111111 \times 55555555$  is 308641975308641975.



## ChatGPT 4o 12/06/2025

How much is 11111111 times 55555555?

The result of multiplying 111,111,111 by 555,555,555 is:

**61,728,394,938,271,605**

Let me know if you want to see the detailed steps or pattern behind this number—it's a neat example of numeric symmetry!



Correct answer:  
61,728,394,938,271,605

# Read the small print!

Message ChatGPT

Les chats de l'espace de travail de LLM@UPCITE ne sont pas utilisés pour entraîner nos modèles

ChatGPT peut commettre des erreurs.

Posez n'importe quelle question !

Model: Large

Ceci est une version bêta

Les réponses peuvent contenir des inexactitudes.



Copy Retry

Claude can make mistakes. Please double-check responses.

**LPU**™ AI INFERENCE ENGINE

Meta-based chatbot

Accuracy, correctness or appropriateness cannot be guaranteed.





# How could we take advantage of LLMs to improve learning and teaching experiences?

## From Sage on the Stage to Guide on the Side

Alison King

In most college classrooms, the professor lectures and the students listen and take notes. The professor is the central figure, the “sage on the stage,” the one who *has* the knowledge and transmits that knowledge to the students, who simply memorize the information and later reproduce it on an exam—often without even thinking about it. This model of the teaching-learning process, called the transmittal model, assumes that the student’s brain is like an empty container into which the professor pours knowledge. In this view of teaching and learning, students are passive learners rather than active ones. Such a view is outdated and will not be effective for the twenty-first century, when individuals will be expected to think for themselves, pose and solve complex problems, and generally produce knowledge rather than reproduce it.

According to the current constructivist theory of learning, knowledge does not come packaged in books, or journals, or computer disks (or professors’ and students’ heads) to be transmitted intact from one to another. Those vessels contain information, not knowledge. Rather, knowledge is a state of understanding and can only exist in the mind of the individual knower; as such, knowledge must be constructed—or re-

constructed—by each individual knower through the process of trying to make sense of new information in terms of what that individual already knows. In this constructivist view of learning, students use their own existing knowledge and prior experience to help them understand the new material; in particular, they generate relationships between and among the new ideas and between the new material and information already in memory (see also Brown, Bransford, Ferrara, and Campione 1983; Wittrock 1990).

When students are engaged in actively processing information by reconstructing that information in such new and personally meaningful ways, they are far more likely to remember it and apply it in new situations. This approach to learning is consistent with information-processing theories (e.g., Mayer 1984), which argue that reformulating given information or generating new information based on what is provided helps one build extensive cognitive structures that connect the new ideas and link them to what is already known. According to this view, creating such elaborated memory structures aids understanding of the new material and makes it easier to remember.

In contrast to the transmittal model illustrated by the classroom lecture-note-taking scenario, the constructivist model places students at the center of the process—actively participating in thinking and discussing ideas while making meaning for themselves. And the professor,

instead of being the “sage on the stage,” functions as a “guide on the side,” facilitating learning in less directive ways. The professor is still responsible for presenting the course material, but he or she presents that material in ways that make the students do something with the information—interact with it—manipulate the ideas and relate them to what they already know. Essentially, the professor’s role is to *facilitate* students’ interaction with the material and with each other in their knowledge-producing endeavor. In the constructivist model the student is like a carpenter (or sculptor) who uses new information and prior knowledge and experience, along with previously learned cognitive tools (such as learning strategies, algorithms, and critical thinking skills) to build new knowledge structures and rearrange existing knowledge.

But how do we get from transmission of information to construction of meaning? Such a change can entail a considerable shift in roles for the professor, who must move away from being the one who has all the answers and does most of the talking toward being a facilitator who orchestrates the context, provides resources, and poses questions to stimulate students to think up their own answers.

Change is never easy; usually, however, changes are easier to bring about by modifying existing practices than by starting afresh. So, we will begin by looking at some practical active-learning activities that can be incorporated into a typical lecture; then we will move on to

Alison King is an associate professor of education in the College of Education at California State University in San Marcos.

# The homework apocalypse

*"To be clear, AI is not the root cause of cheating. Cheating happens because **schoolwork is hard and high stakes**. And schoolwork is hard and high stakes because learning is not always fun and forms of **extrinsic motivation**, like grades, are often required to get people to learn."*

-- Ethan Mollic

Source: Post-apocalyptic education, 2024

# The detection illusion


medRxiv

THE PREPRINT SERVER FOR HEALTH SCIENCES



BMJ Yale

**Delving into PubMed Records: Some Terms in Medical Writing Have Drastically Changed after the Arrival of ChatGPT**

 Kentaro Matsui

Source: medRxiv, 2024.

arXiv > cs > arXiv:2406.07016

Computer Science > Computation and Language

[Submitted on 11 Jun 2024 (v1), last revised 3 Jul 2024 (this version, v2)]

**Delving into ChatGPT usage in academic writing through excess vocabulary**

Dmitry Kobak, Rita González-Márquez, Emőke-Ágnes Horvát, Jan Lause

Source: arXiv, 2024.

**Pro tip:** remove ‘delve’, ‘crucial’, ‘potential’, ‘significant’, ‘intricate’ from your (possibly AI-generated) papers.

# The detection illusion

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## GENAI DETECTION TOOLS, ADVERSARIAL TECHNIQUES AND IMPLICATIONS FOR INCLUSIVITY IN HIGHER EDUCATION

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A PREPRINT

Mike Perkins <sup>1\*</sup>, Jasper Roe <sup>2</sup>, Binh H. Vu <sup>1</sup>, Darius Postma <sup>1</sup>, Don Hickerson <sup>1</sup>, James McGaughan<sup>1</sup>, Huy Q. Khuat <sup>1</sup>

<sup>1</sup>British University Vietnam, Vietnam.

<sup>2</sup>James Cook University Singapore, Singapore.

\*Corresponding Author: Mike.p@buv.edu.vn

March, 2024

Source: arXiv, 2024

This study investigates the efficacy of six major Generative AI (GenAI) text detectors when confronted with machine-generated content that has been modified using techniques designed to evade detection by these tools (n=805). The results demonstrate that the detectors' already low accuracy rates (39.5%) show major reductions in accuracy (17.4%) when faced with manipulated content, with some techniques proving more effective than others in evading detection.



# Illusion of competence

*Experience embracing genAI in an engineering computations course: What went wrong and what next*

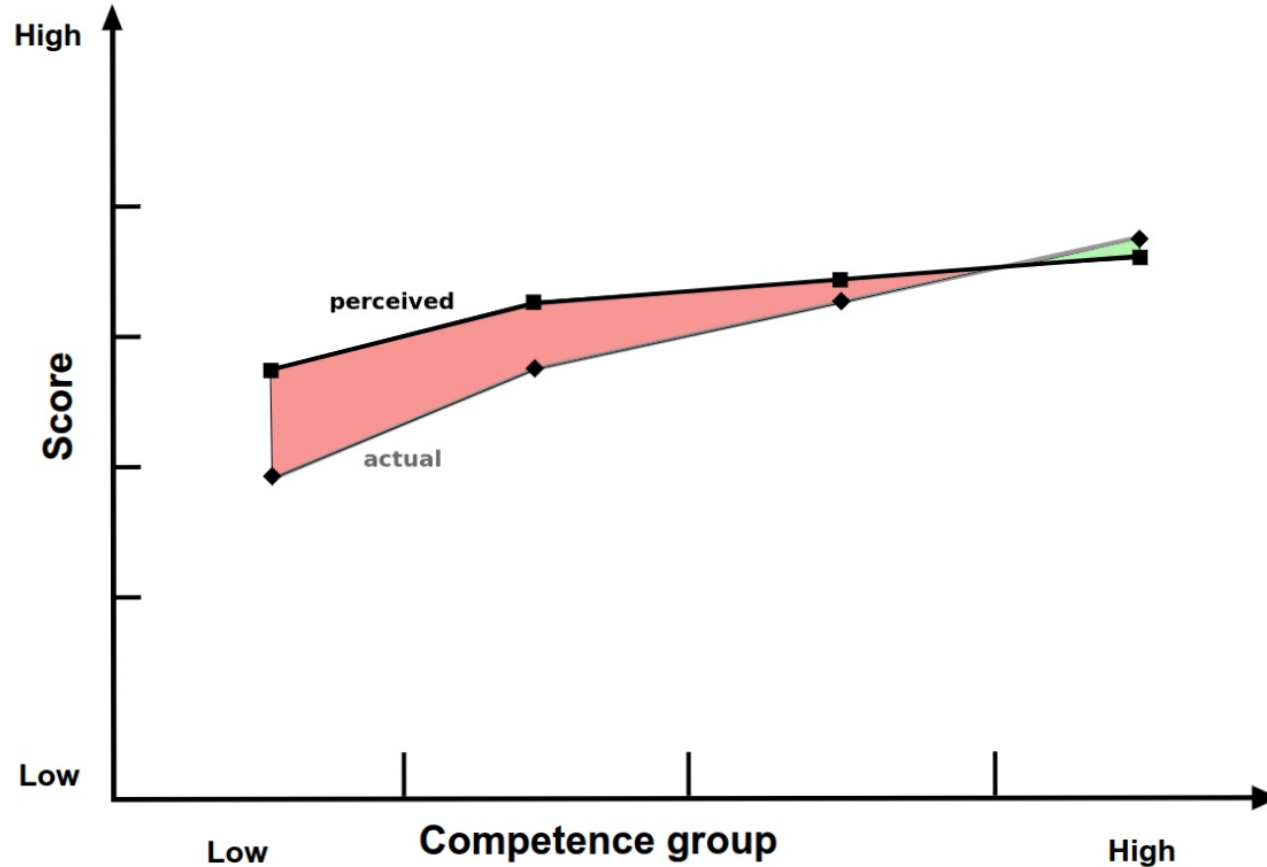
Lorena A. Barba<sup>1</sup>

March 2025

Source: figshare, 2025

The illusion of competence is a **cognitive bias that leads a learner to overestimate their knowledge or skill**. It occurs when knowledge sits temporarily in short-term memory, but is not retained in long-term memory. Transfer of knowledge to long-term memory occurs via learning processes that involve forgetting, recall, and repetition—all under conditions of **desirable difficulty**. Many techniques that students use, such as re-reading and highlighting, are in fact not effective because they do not involve that necessary cognitive effort. Yet, stu-

# Dunning-Kruger effect



# Illusion of competence and weight lifting

While my student made the decision to successfully complete his assignment in an honest manner, this example does provide a peak into the dark side of AI usage in education. When AI is a shortcut to thinking and it does the effortful cognitive lifting, it isn't a tool for learning. It is a cheat code. It would be like me walking into a gym, using a hydraulic press to lift the weights, and expecting to see muscular gains. It's not going to happen. And I'd only be fooling myself if I expected anything different. And our students are only fooling themselves if they are using AI incorrectly and expecting cognitive gains.

Source: The effortful educator, 2025

# AI workout

**Targeted mentoring:** leverage AI to reword assessment items for improved clarity. Utilize AI to provide explanations of code snippets.

**Guided exploration:** encourage AI to propose a variety of possible solutions to a problem, fostering divergent thinking.

**Critical evaluation:** compare AI-generated outputs to detect possible gaps or inaccuracies.

# Develop critical thinking

*"30 minutes to ask questions to ChatGPT 'to generate a conversation that repeats what was said in class the week before' and that requires them to have understood and **'to ask the right questions to get the right answers'**; 20 minutes then to work on the text's bibliography and **verify the accuracy** of ChatGPT's responses."*

-- Antonio Casilli

Source: Le parisien étudiant, 2023.



# Course chatbot

## Cours de Python

| Introduction à la programmation Python pour la biologie

**Patrick Fuchs et Pierre Poulain**

prénom [point] nom [arobase] u-paris [point] fr



Version du 13/11/2024 | [PDF](#) du cours



La seconde édition de notre livre « [Programmation en Python pour les sciences de la vie](#) » est paru aux éditions Dunod en juin 2024.

Vous le trouverez dans toutes les bonnes librairies.

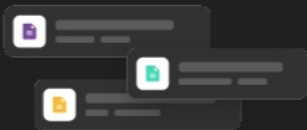
- +400 pages
- 27 chapters

<https://python.sdv.u-paris.fr/>



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Gen AI apps of 2024

**Top 50**



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# BioPyAssistant

<https://biopyassistant.sdv.u-paris.fr>

**BioPyAssistant**

BioPyAssistant est un assistant pédagogique pour le [cours de programmation Python](#) pour les biologistes de Patrick Fuchs et Pierre Poulain.

N'hésite pas à le solliciter en lui posant tes questions.

Discuter avec le cours | Discuter avec le cours (battle)

Chatbot

Bonjour, comment puis-je t'aider ?

Quelle est la différence entre une liste et un set ?

La différence principale entre une liste et un set en Python réside dans leur structure et leur comportement :

- 1. Ordre et indexation :**
  - Une **liste** est ordonnée et indexable, ce qui signifie que les éléments ont un ordre défini et peuvent être accédés par leur position (index).
  - Un **set** est non ordonné et non indexable, ce qui signifie qu'on ne peut pas accéder à ses éléments par leur position.
- 2. Unicité des éléments :**
  - Une **liste** peut contenir des éléments en double.
  - Un **set** ne peut contenir que des éléments uniques. Si vous ajoutez des doublons, ils seront automatiquement éliminés.
- 3. Types de données contenus :**
  - Les **listes** peuvent contenir des éléments de types mixtes, y compris d'autres listes.
  - Les **sets** ne peuvent pas contenir de types non hachables, comme les listes elles-mêmes.

En résumé, utilisez une liste lorsque vous avez besoin de maintenir l'ordre ou de contenir des doublons, et un set

Pose-moi une question sur le cours !

LLM@UPCité  
(D. Janiszek, S.  
Bottani, PP)

Work by  
E.Touami



La différence principale entre une liste et un set en Python réside dans leur structure et leur comportement :

## 1. Ordre et indexation :

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- Les **sets** ne peuvent pas contenir de types non hachables, comme les listes elles-mêmes.

En résumé, utilisez une liste lorsque vous avez besoin de maintenir l'ordre ou de contenir des doublons, et un set lorsque vous avez besoin de garantir l'unicité des éléments.

Pour plus d'informations, je t'invite à consulter les rubriques suivantes du [cours en ligne](#) :

- Chapitre [14 Conteneurs](#), rubrique [14.4.1 Définition et propriétés](#)
- Chapitre [14 Conteneurs](#), rubrique [14.4.2 Utilité](#)



Pose-moi une question sur le cours !



## 14. Conteneurs

### Cours de Python

4. Listes
5. Boucles et comparaisons
6. Tests
7. Fichiers
8. Dictionnaires et tuples
9. Modules
10. Fonctions
11. Plus sur les chaînes de caractères
12. Plus sur les listes
13. Plus sur les fonctions
14. Conteneurs
15. Création de modules
16. Bonnes pratiques en programmation Python
17. Expressions régulières
18. Jupyter et ses notebooks
19. Module Biopython
20. Module NumPy
21. Module Matplotlib

### 14.4.1 Définition et propriétés

Les objets de type **set** représentent un autre type de conteneur qui peut se révéler très pratique. Ils ont la particularité d'être modifiables, non hachables, non ordonnés, non indexables et de ne contenir qu'une seule copie maximum de chaque élément. Pour créer un nouveau **set** on peut utiliser les accolades :

```
1 >>> set1 = {4, 5, 5, 12}
2 >>> set1
3 {12, 4, 5}
4 >>> type(set1)
5 <class 'set'>
```

Remarquez que la répétition du chiffre 5 dans la définition du **set** ligne 1 produit finalement un seul chiffre 5, car chaque élément ne peut être présent qu'une seule fois. Comme pour les dictionnaires (jusqu'à la version 3.6), les **sets** sont non ordonnés. La manière dont Python les affiche n'a pas de sens en tant que tel et peut être différente de celle utilisée lors de leur création.

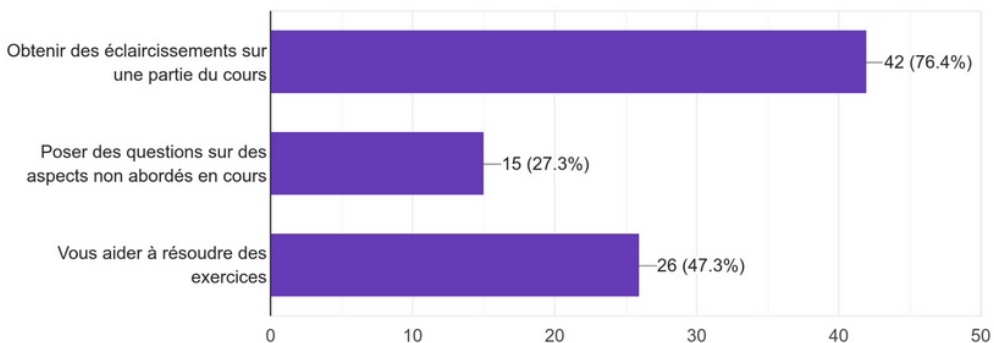
Les **sets** ne peuvent contenir que des objets **hachables**. On a déjà eu le cas avec les clés de dictionnaire. Ceci optimise l'accès à chaque élément du **set**. Pour rappel, les objets hachables que nous connaissons sont les chaînes de caractères, les tuples, les entiers, les **floats**, les booléens et les **frozensets** (voir plus bas). Les objets non hachables que l'on connaît sont les listes, les **sets** et les dictionnaires. Si on essaie tout de même de mettre une liste dans un **set**, Python renvoie une erreur :

# BioPyAssistant

From 70 M1/M2 students in 2024-2025...

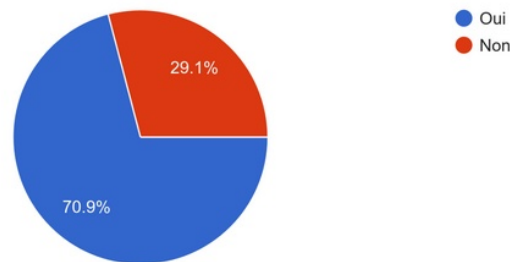
Avez-vous utilisé cet assistant pour :

55 responses



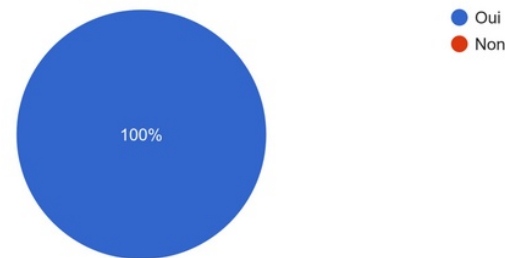
Avez-vous utilisé les liens vers le cours en ligne qui étaient fournis à la fin de chaque réponse de l'assistant ?

55 responses



Pensez-vous que cet assistant soit adapté à des étudiant.e.s débutant.e.s en programmation Python ?

55 responses



...to 400 L2/L3 students in 2025-2026



# AI-value student productions?



**Grading student papers written by AIs**



**Asking an AI to grade student papers written by AIs.**

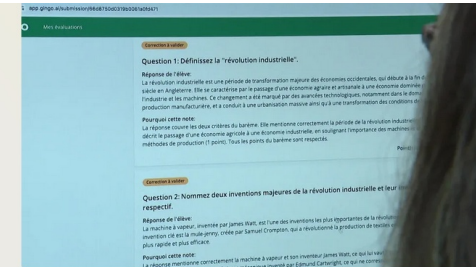
Source: Twitter/X, 2023

## La correction des copies assistée par l'IA, nouveau terrain de jeu pour les start-up 🦾

La start-up Ed.ai, qui vient de lever 1,7 million d'euros, a développé une solution qui accélère la correction des copies et génère des exercices personnalisés. Dans l'edtech, PyxiScience et Logbook inventent aussi des outils pour les professeurs.

Source: Les Echos, 2025

**L'intelligence artificielle pour corriger des copies dix fois plus vite : une innovation testée par une cinquantaine de professeurs**



Grâce au logiciel, les enseignants devraient consacrer trois minutes à la lecture d'une copie, contre 30 min en moyenne. • © FTV

Écrit par  
[Juliette Pommier](#) et [Fleur De Boer](#)

Publié le 15/09/2024 à 06h45



[copier le lien](#)

L'entreprise Compilatio, basée à Annecy (Haute-Savoie), a mis au point un logiciel capable de corriger les copies des élèves, grâce à l'intelligence artificielle. Une innovation qui représente un vrai gain de temps pour les professeurs : ils passent en moyenne 125 heures par an et par classe sur les corrections.

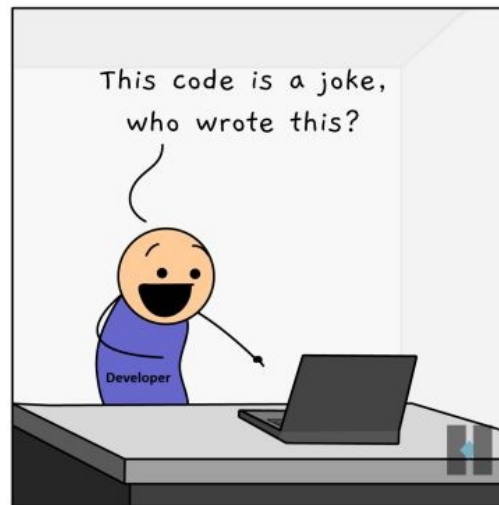
Source: France Info, 2024

# Experiment... Wisely!



Source: DALL.E, 2024-07-10, prompt: "Make a picture of crazy male and female scientists Making experiments"

After few months of coding using GenAI



Source: X/Twitter, 2024