Ethical Use of Artificial Intelligence

https://bit.ly/4jxAWMs

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Prologue: AI Landscape in Academia

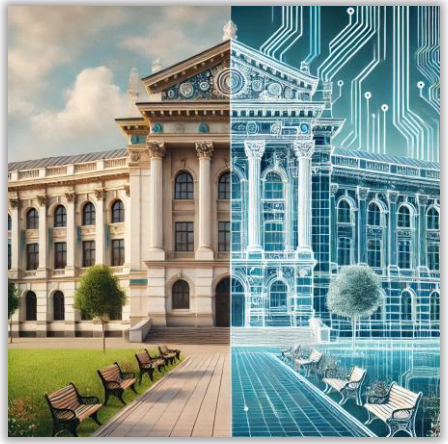
Statistics from UK think tank:
Higher Education Policy Institute (HEPI).
Student Generative AI Survey 2025

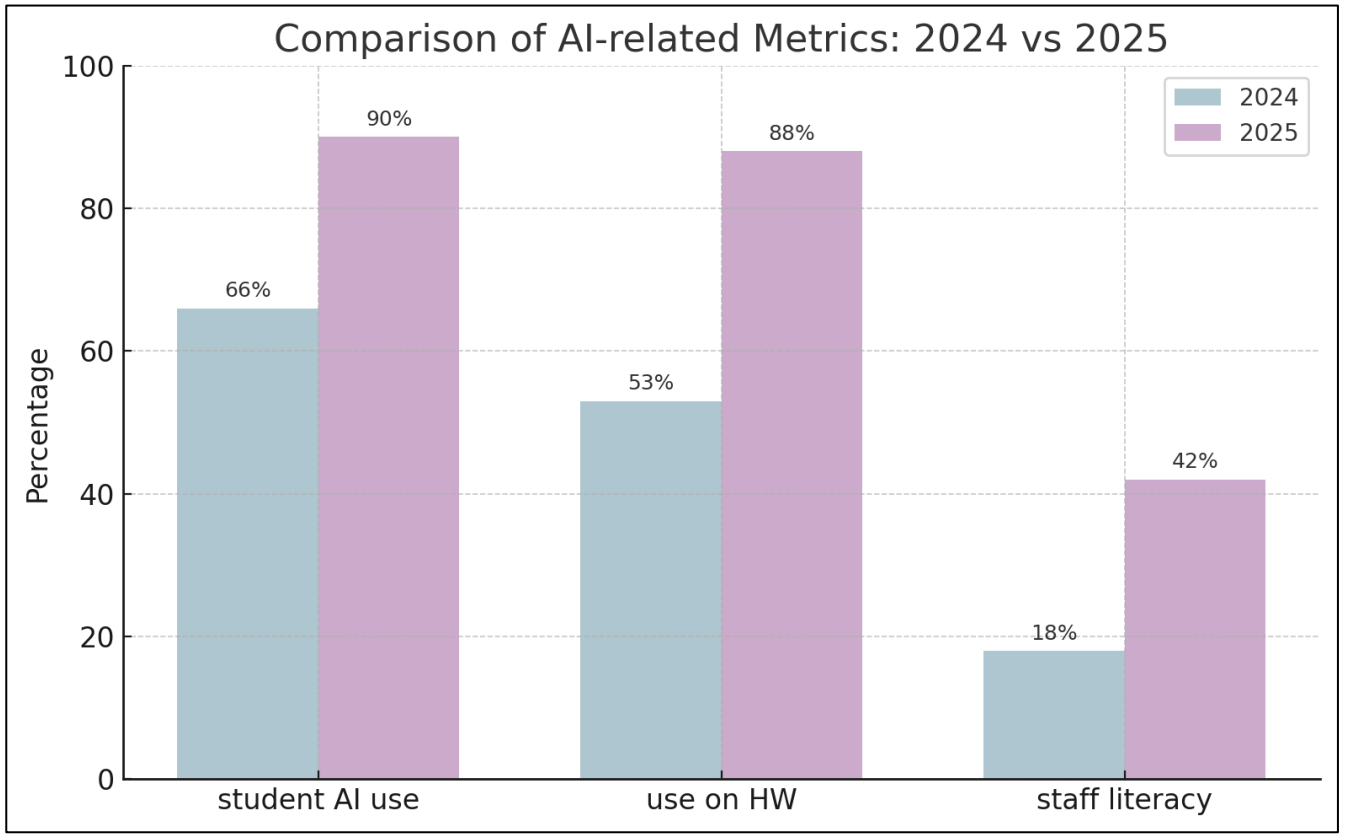
Generative AI is mainstream among university students.

- 90% of students reported using AI (vs. 66% in previous year's report)
- 88% of students reported using AI on homework (vs. 53% from last year)

Staff AI literacy is improving.

- 42% of students believed staff were 'well-equipped' to help with AI (vs. 18% last year)





Prologue: AI Landscape in Academia

Statistics from UK think tank:
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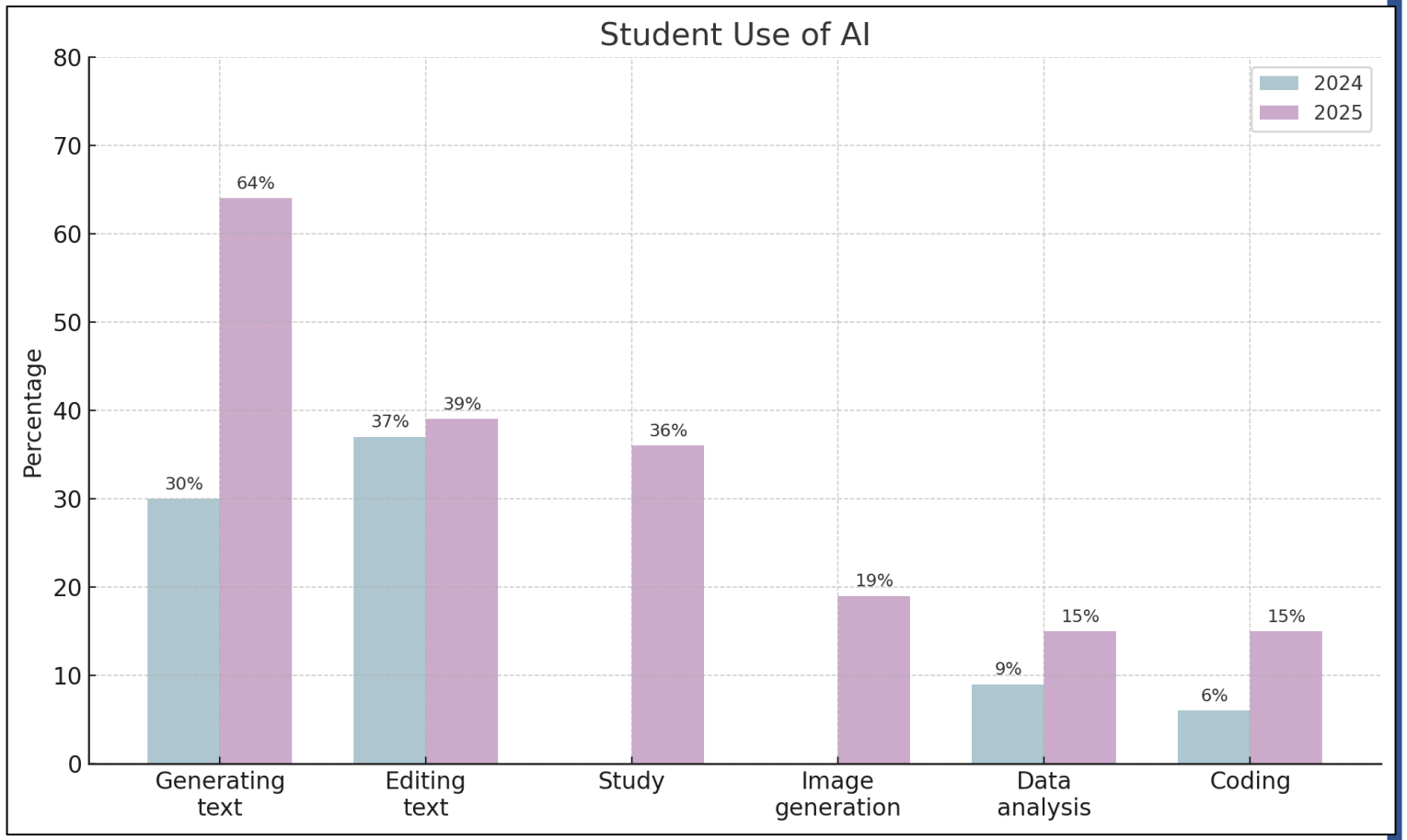
Student Generative AI Survey 2025

Students were polled on common general uses of AI:

- Generating text
- Editing / cleaning writing
- Generating summaries / quizzes
- Image generation
- Data analysis
- Coding

Other uses:

- Compile references
- AI companions / friends

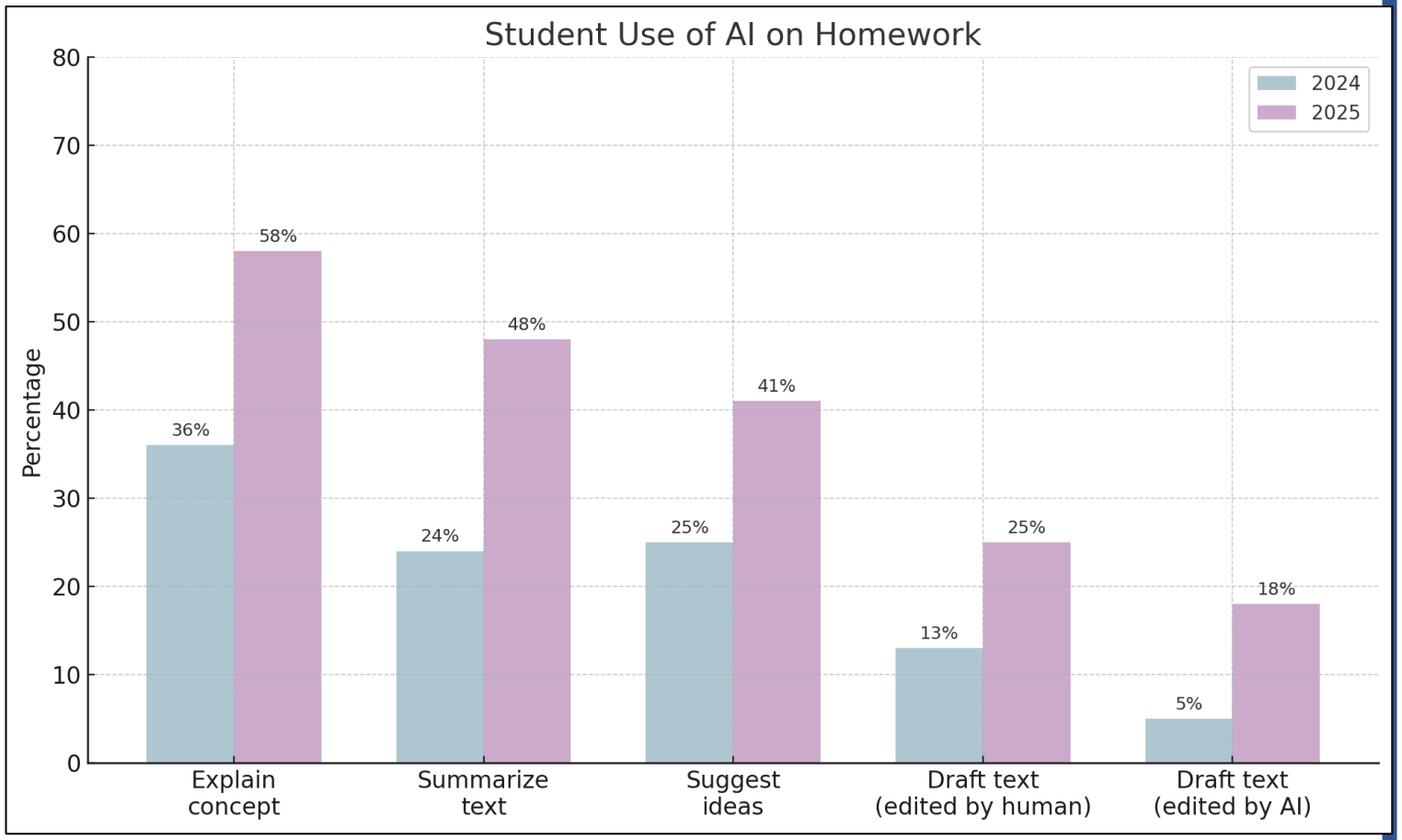


Prologue: AI Landscape in Academia

Statistics from UK think tank:
Higher Education Policy Institute (HEPI).
Student Generative AI Survey 2025

Students were polled on common uses for AI on homework:

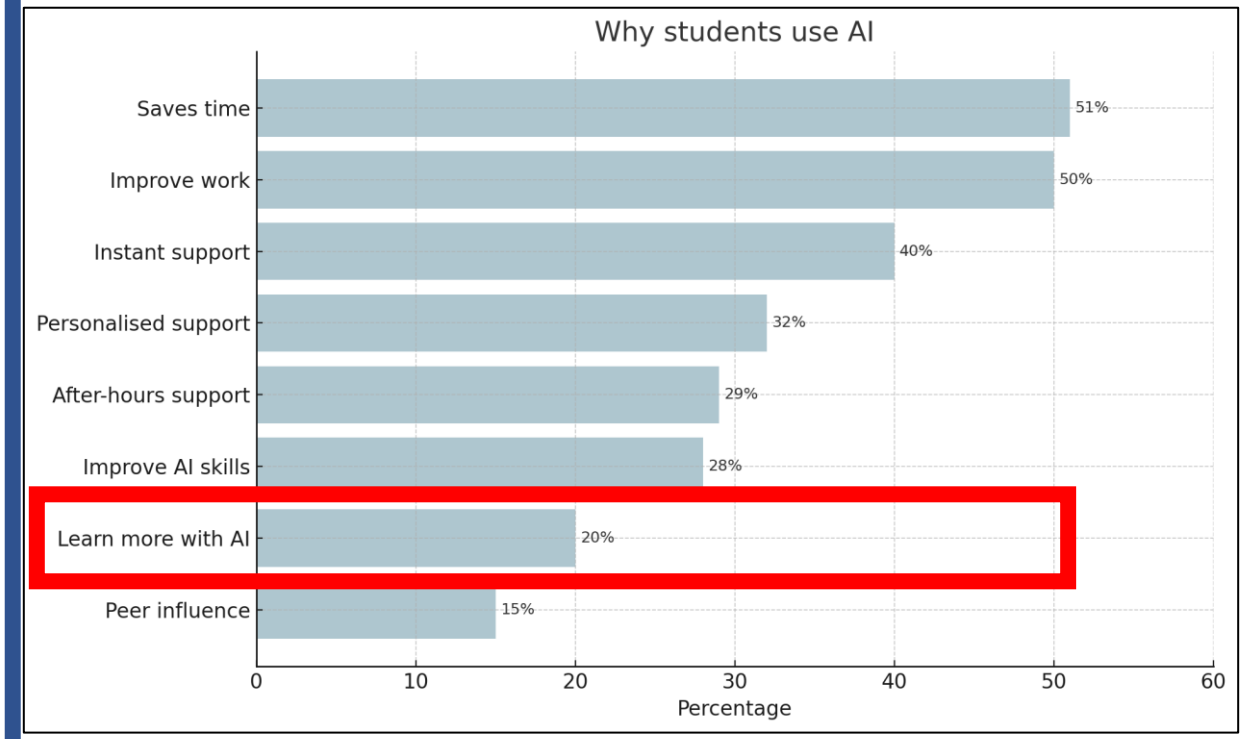
- Explain concepts or theories
- Summarize articles
- Suggest research ideas
- Generate draft text
  - … to be edited by hand
  - … to be further edited by AI

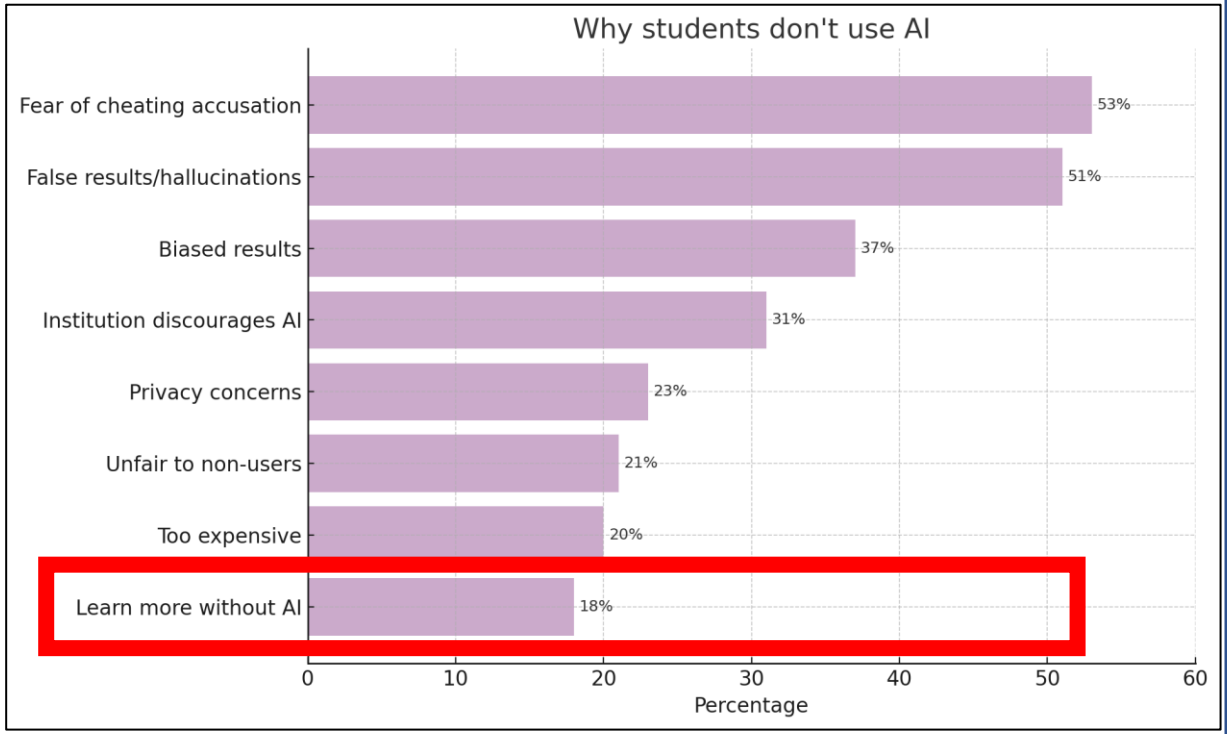


Prologue: AI Landscape in Academia

Statistics from UK think tank:
Higher Education Policy Institute (HEPI).
Student Generative AI Survey 2025

Students were polled on why they use / don't use AI





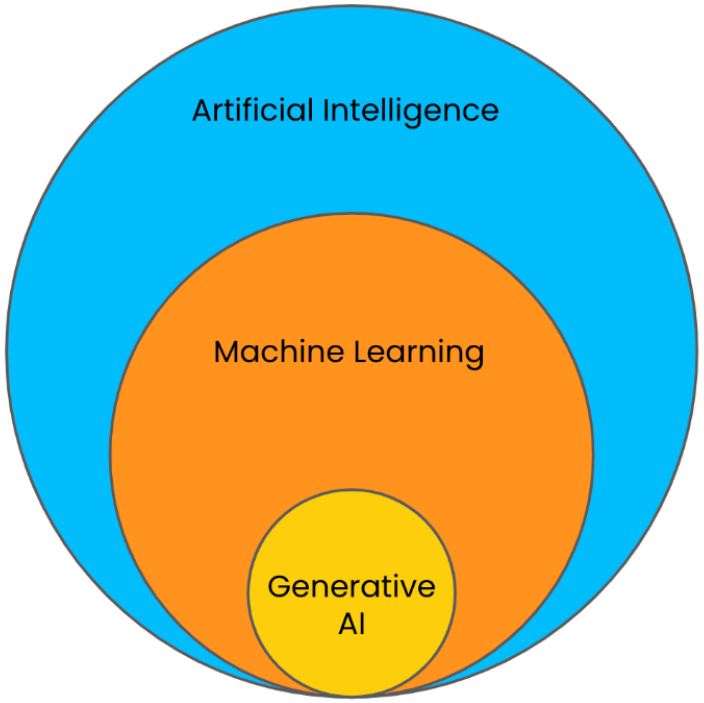
"Hiring entry level positions is **harder** because educational institutions **aren't** teaching AI!"

-- Matt Glickmann, CEO Genesis Computing
"AI Agents For Business: AI Agents and the Future of Work"

Prologue: AI Landscape in Academia

What is AI?

Artificial Intelligence (AI) Software that performs tasks **normally requiring human cognition** (pattern recognition, reasoning, language).



Machine Learning (ML) Sub-field of AI that **learns patterns from data** instead of relying on explicit rules.

Generative AI (Gen-AI) ML models that **create new content** (text, code, images, music) rather than just making predictions.

What is AI?

Generative AI (Gen-AI) ML models that **create new content** (text, code, images, music) rather than just making predictions.

Domain	Model Examples	Common Architecture
Text	GPT, Claude, Gemini	Transformers
Image	DALL·E, Midjourney, SDXL	Diffusion
Video	Sora, Runway Gen-2	Diffusion + Transformers
Audio	Jukebox, MusicGen	Autoregressive
Multimodal	GPT-4o, Gemini 2.5, Claude 4	Transformer Hybrids

What AI *isn't*.

AI is a computer algorithm; it does not 'think', 'know', or 'understand' like we do.	LLM's are trained to recognize patterns in data. Output does not come from semantic **understanding**, but from **predicting** next word based on *learned patterns*.
Bigger / newer does not always mean more accurate.	Sometimes AI 'sees' patterns that are not there… New 'reasoning' versions show *higher* 'hallucination' rates *(in some domains)* than earlier releases. (*)
AI is not objective. It has bias, just like humans.	Models inherit racial, gender, and cultural biases present in their training data.
AI does not always generate *new or unique* content.	AI will sometimes produce content directly from its training data. Even private or copyrighted content.
AI is not "*free*".	Many AI will store sessions for future training / analysis.

(*) Metz, C., & Weise, K. (2025, May 5). *A.I. is getting more powerful, but its hallucinations are getting worse*. The New York Times.

Key Foundation Models

"The pace of AI change today, as **fast** as it is, is the **slowest** it will be in the future."
- S. Srivastava, CDO Genpact

AI rankings from https://lmarena.ai/

ChatGPT (OpenAI)

helpful

* API used for many other AI apps
* Pioneer of new model types (multimodal, reasoning, agentic, canvas)

May 2024	**GPT-4o**	- image generation updated *Mar 2025*
Feb 2025	**GPT-4.5**	- agentic, "deep research" model
Apr 2025	**o3**	- agentic, chain of thought reasoning

Claude (Anthropic)

harmless

* focus on ethics, alignment, safety
* hybrid chain of thought reasoning with visible "extended thinking"
* **very good** for coding

May 2025 **Sonnet 4** & **Opus 4** - reasoning, agentic models

Gemini (Google)

honest

* focus on research & problem solving
* internal chain of thought reasoning
* **very good** at solving math problems
* **very good** for tutoring (LearnLM)

Mar 2025 **Gemini 2.5 Flash** & **Pro** - reasoning, agentic models
(see also **Gemini Diffusion** and **Veo 3**)

deepseek (DeepSeek)

* Open weight models (MIT License)
* Pioneered "Mixture of Experts" method
* **very cheap!**

Mar 2025	**V3**	- basic model, comparable to GPT-o1
May 2025	**R1**	- reasoning model

LE CHAT MISTRAL (Mistral AI)

* Emphasis on free / open-source models and speed

May 2025 **Mistral / Pixtral / Codestral / Mathstral**
- canvas interface (like GPT-4o)
- agentic web search

LLaMA (Meta)

* open source and open weight
* no reasoning models

Apr 2025 **LLaMa 4 Scout** - small, efficient, fast, MoE
LLAMa4 Maverick - medium size, multimodal, MoE

Grok (xAI)

* Creativity over correctness

Feb 2025 **Grok 3** - comparable to GPT-4o, some reasoning

Principles for ethical AI use by students.

Transparency	Follow course guidelines. Tell which AI tool you used and how.
Accountability	Verifying AI output for correctness is <u>your</u> responsibility.
Fairness	Review output and sources for bias and loaded language.
Privacy	Keep personal data and copyrighted material out of prompts. Ensure that AI is not reproducing copyrighted material in outputs.
Integrity	Final work should be your own. Use AI to **support** *(rather than **circumvent**)* learning.

California State University. *Ethical and responsible use of AI for students*. https://genai.calstate.edu/communities/students/ethical-and-responsible-use-ai-students

Transparency

- Follow university and course guidelines for AI use.
- When unsure, **ask your professor**!
  - University courses are designed to **facilitate *your* learning**.
  - Some exercises are **critical** to master yourself for application in parallel domains.
  - Some exercises may have parts which are not so critical.
  - You can learn from second opinions / feedback from AI as well.
  - AI can help with clarifying / summarizing material or investigating further...
    but sometimes personal struggle is the best tool for learning.
- Acknowledge contributions from AI in any assessed work.
  - *Example: "Edited wording with ChatGPT-4o; prompt in appendix."*

Accountability

You are responsible for work you create (even if you were aided by AI).

- **AI may hallucinate facts / information.** → up to 50% of the time! (*)
  - You **must** verify factual claims from AI!
    - Ask for sources or citations! Look for inconsistencies! Look for out of date info!
    - Check with multiple AI's / run multiple prompts!
- **AI may hallucinate citations / references.**
  - You **must** check that references exist! Verify links! **Verify titles and authors!**
- **AI may generate incorrect summaries.** → 26-73% of the time! (**)
  - You **must** check that references / articles match AI descriptions!
  - Note that AIs **frequently** overgeneralize, drop qualifiers, or miss key points!
  - Don't blindly trust AI summaries for important information!

(*) Technijian. (2025). *ChatGPT is getting smarter, but its hallucinations are spiraling out of control.*

(**) Peters, U. & Chin-Yee, B. (2025). *Generalization bias in large language model summarization of scientific research*. *Royal Society Open Science, 12*(4), 241776.

Fairness and Bias

AI is not “objective”.

Biases in training data can lead to incorrect / incomplete output.

- Check that content represents all perspectives
  - Does it omit certain veiwpoints?
  - Does it promote stereotypes?
- Check sources to see if they are biased towards an ideology or group.
- Critically evaluate output.
  - Does it serve a specific group or business?
  - Is it fact-based, or emotional / manipulative?

Aside: Basic checks on AI output

Accuracy / Source Check

- Verify facts and statistics in multiple reputable sources
- Open each link or DOI directly (verify author & title)
- Challenge the AI about unsourced information
- Check for outdated information (confirm publication date)

Bias Check

- Are multiple perspectives presented?
- Does it reinforce stereotypes?
- Are sources (reasonably) fair and unbiased, or ideological?

Logical-Consistency Check

- Do arguments flow coherently?
- Are broad claims / statements based on limited evidence?
- Are there contradictions or leaps in reasoning?

Emotional / Manipulative Language Check

- Is wording neutral and fact-based, or using loaded terms inciting fear or hype?
- Does output try to steer you towards and action or belief without evidence?

(From *2025 Student Guide to Artificial Intelligence, p7)*

Privacy

- Do not enter **private** or **confidential** data or information into an AI tool
  - Data could be used for **future training**, but standard attacks **expose training data**.
  - Data could be **stored** for analysis, and could resurface due to **hacks, lawsuits, etc**.
  - Especially for research data, this will violate multiple confidentiality rules.
  - Anything with personally identifiable information may violate FERPA.
- Many professors retain copyright over their course materials, assignments, exams, etc.
  - Uploading / analyzing these materials on an AI violates their intellectual property rights (especially if the AI uses their materials for training).
- When collaborating with others, respect their intellectual property
  - Do not upload a collaborator's work to an AI (for refining or editing) without their explicit permission

Integrity

- Use AI to **enhance your education** rather than **do your work** for you
  - Do not ask an AI to do something that you yourself could not do.
    (Never ask AI to do anything that you cannot check!)
  - Use it as a **helper**, rather than a **replacement.**
  - Use it as a "draft-collaborator" rather than a "ghost-writer."

- In university, the **value** of most work is not the **result**, but the **journey!**
  (…as opposed to the private sector, where output is all that matters…)
  - Writing and homework assignments are *tools* to build *critical thinking*, *analytical reasoning*, and *intellectual endurance*.
  - The most important skill is learning *how to learn*!
    - "You can't get fit by watching people go to the gym!"

Aside: Beware excessive “cognitive offloading”

Cognitive offloading is the use of tools to reduce mental effort required to perform a task.

- Pro: frees up mental bandwidth and improves productivity
- Con: overuse can weaken memory, critical thinking, and problem-solving abilities

Studies show that over-reliance on AI **reduces** knowledge **comprehension** and **retention**.

- Ju, Qirui. Experimental evidence on negative impact of generative AI on scientific learning outcomes. arXiv preprint arXiv:2311.05629 (2023).

  *“[In GRE reading comprehension questions]…complete reliance on AI for writing tasks led to a **25.1% reduction in accuracy**. In contrast, AI-assisted reading resulted in a 12% decline.”*

Aside: Beware excessive “cognitive offloading”

- Zhai, C., Wibowo, S. & Li, L.D. The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. *Smart Learn. Environ.* **11**, 28 (2024).

  *“…although AI tools can aid decision-making and improve efficiency, they often lead to **reduced critical and analytical thinking skills**, especially when students become overly dependent on AI-generated content”*

- Wecks, Janik Ole, et al. Generative AI Usage and Exam Performance. arXiv preprint arXiv:2404.19699 (2024).

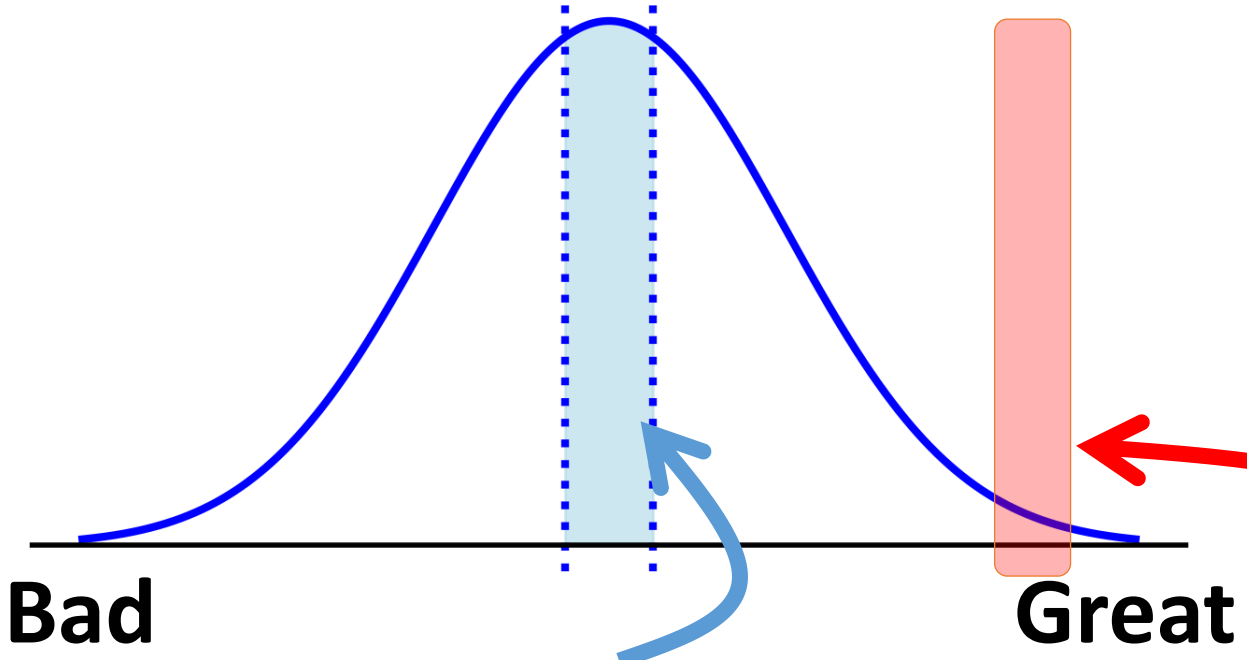
  *“… we find that students using GenAI tools score on average **6.71 (out of 100) points lower** than non-users. …. additional analyses show that the effect is **particularly detrimental** to students with **high learning potential**, suggesting an effect whereby GenAI tool usage hinders learning.”*

- Gerlich, M. AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking. *Societies*, *15*(1), 6 (2025).

  *“The findings revealed a significant negative correlation between frequent AI tool usage and critical thinking abilities, mediated by increased cognitive offloading. **Younger participants exhibited higher dependence on AI tools and lower critical thinking scores compared to older participants**.”*

Good use of AI – shift work to “higher order structure”

AI is probabilistic



- AI enhances what you already know; but can’t reliably fill in gaps you haven’t thought through.
- AI is a tool, not a substitute: it helps shape and realize your ideas, but it can’t invent depth you don’t provide.
- Weak input leads to bland output.

Default AI output is here:

- Bland
- Homogeneous
- Character-less

Human input, guidance, and critical verification is needed to get here.

Sample prompt for video clip

Alex Olteanu at DataCamp using Veo 3

8 second video clip.
Single scene.
Video and audio.

Prompt specifies

- setting (location, time, environment)
- lighting
- subject description
- action sequence
- emotional subtext
- sound design
- visual style
- pacing
- camera framing
- technical camera details

Interior of a quiet, lived-in home during early morning. Natural light filters softly through a hallway window. A woman in her late 30s opens a hallway closet filled with old coats, folded linens, and a few unlabeled cardboard boxes. She pulls one of the boxes down gently and kneels to the floor. The camera remains still at a medium-wide angle, eye-level. She opens the box and carefully unwraps a small item inside: a pair of pristine white baby shoes, nestled in tissue paper. She sits back on her heels, holding the shoes in her lap. Her expression is unreadable — not sad, just present and still. The shot is quiet and unhurried. No music. Emphasize natural ambience — soft house sounds, the creak of the closet door, cardboard rustling, and subtle distant details like a ticking clock or a bird outside the window. The moment should feel hushed and real. Visual style: warm, grounded realism with natural lighting. Avoid cinematic over-stylization. Maintain a single, continuous shot without cuts or zooms. Do not include any on-screen text or captions.

Sample prompt for code creation

normal probabilities and quantiles

I'd like to create an artifact for computing standard normal probabilities and quantiles. Displayed output should look as like the attached mock-up. Please generate full, runnable react code. Don't use the recharts library. Details follow.

The top line of the display should include a selector box and two colored input boxes arranged inside a probability statement (in large, bold font), as drawn.
"P(<select box for type> <blue input box for quantile, q>) = <red input box for probability, p>"

The selector box should allow switching between four types of probability:
* "|Z| ≥ " (default value)
* "|Z| ≤ "
* " Z ≥ "
* " Z ≤ "

When the selector box changes, don't change the quantile in the blue box, but instead update the probability shown in in the red box (using the normalCDF functions given for quantiles below).

The two input boxes should be highlighted in light blue and light red as shown. When the user changes the value in one input box, the other input box should change accordingly.

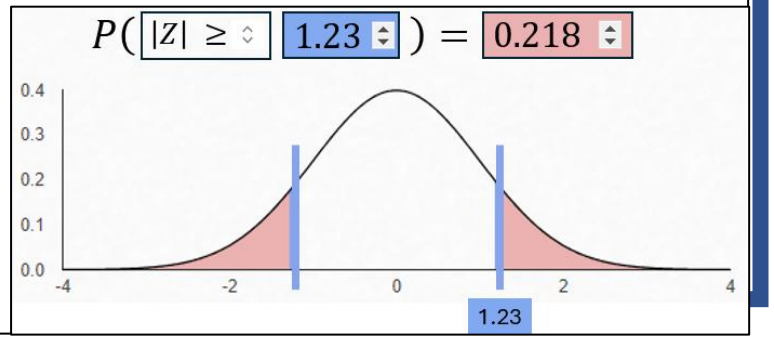
The blue input box gives a quantile value (refered to internally as q). When computed, the displayed values should show only two significant digits (using q.toFixed(2)). When input, it should accept minimum allowed value 0, maximum allowed value 4, default value 2, and increment amount 0.01. When a value is entered by the user into the blue box, the corresponding normal probability, p, should be computed and written in the red box (depending on the selector value).
* If "|Z| ≥ " the probability is p = 2 * (1 - normalCDF(q))
* If "|Z| ≤ " the probability is p = 2 * normalCDF(q) - 1
* If " Z ≥ " the probability is p = 1 - normalCDF(q)
* If " Z ≤ " the probability is p = normalCDF(q)

For this box you can use the following style:

The red box gives probability values (refered to internally as p). When computed, the displayed values should show only three significant digits (using p.toFixed(3)). When input, it should accept minimum allowed value 0.001, maximum allowed value 0.999, default value 0.046, and increment amount 0.001. When a value is entered by the user into the red box, the corresponding quantile, q, should be computed and written in the blue box (depending on the selector value).
* If "|Z| ≥ " the quantile is q = inverseNormalCDF(1 - p/2)
* If "|Z| ≤ " the quantile is q = inverseNormalCDF((p + 1)/2)
* If " Z ≥ " the quantile is q = inverseNormalCDF(1 - p)
* If " Z ≤ " the quantile is q = inverseNormalCDF(p)

Underneath the probability statement, a graph of the standard normal pdf should be drawn in an 800 x 300 window uisng thick black lines. Appropriate quantile makers (in thick blue line '#e6f3ff') should be marked at x=q (and x=-q for |Z| probability statements) and corresponding areas under the curve should be filled (in light red '#ffe6e6'). Whenever any part of the probability statement is updated (type selector, p input or q input) the plot should be updated.
* If "|Z| ≥ " draw thick vertical blue lines at x=c and x=-c and shade regions x<=c and x>=-c
* If "|Z| ≤ " draw thick vertical blue lines at x=c and x=-c and shade between -c and c
* If " Z ≥ " draw thick vertical blue line at x=c and shade region x>=c
* If " Z ≤ " draw thick vertical blue line at x=c and shade region x<=c

Draw the x-axis and label x-ticks at -4,-3,-2,-1,0,1,2,3,4. On the far left draw a y-axis with y-ticks at 0.0,0.1,0.2,0.3,0.4.



Sample prompt for code creation

linear regression and outliers

I would like to make a dynamic plot for visualizing the effect of outliers on regression lines using react, babel, plotly, jstat, and tailwind. Please help code a react component which does the following. (Give full html code loading all required css and js libraries from online repositories.)

Use title "Regression and Outliers".

At the top of the component should be input boxes (arranged in two rows) for
"# Samples n:" $n with min=2, max=100, step size=1, default value=10
"Error Dev. σ:" $sigma with min=0.01, max=3.00, step size=0.01, default value=1.00
"True Intercept:" $b0 with min=-5, max=5 step size=0.1, default value=0
"True Slope:" $b1 with min=-5, max=5 step size=0.1, default value=2
Inputs should be possible using "up"/"down" selectors or else by directly typing into box. Values should be clamped to the given min and max. The four input boxes should be highlighted in light blue.
Underneath these should be a slider:
"Outlier distance": $out_d with min=-10, max=10, step size=0.1, default value=1
To the right of the slider should be a button "Rerandomize". The slider should be red, and the button should be black.

Underneath should be a plot showing a scatterplot and regression line of data. More detail follows.

On load and when clicking "Rerandomize", 100 random data points should be computed as follows
* array of $x values should be chosen with uniform distribution on [0, 20]
* array of $e values should be chosen from a normal mean=0 std.dev.=$sigma distribution
* array of $y values should be given by $y = $b0 + $b1 * $x + $e
When $sigma is changed, the $e values should be rescaled $e = $e * $new_sigma / $old_sigma, and $y should be recomputed.
When $b0 or $b1 are changed, the $y values should be recomputed using the same $x and $e.

On load, when clicking "Rerandomize", and whenever $n or $y is changed, a *base* best fit regression line through ONLY THE FIRST $n points ($x,$y) should be computed with regression coefficients $base_b0 and $base_b1

On load or when clicking "Rerandomize", an extra *outlier* point ($out_x, $out_y) should be computed. $out_x should be chosen from uniform distribution on [0,20], and $out_y should be equal to
$out_y = $out_x * $b1 + $b0 + $out_d
Whenever $out_d is changed the outlier y-value $out_y should be shifted accordingly $out_y = $out_y + ($new_out_d - $old_out_d).

Any time either $y or $out_y changes, a second best fit *outlier* regression line through the first $n points ($x,$y) and the point ($out_x,$out_y) should be computed with regression coefficients $out_b0 and $out_b1

In the main plot window, a scatterplot of ONLY THE FIRST $n points ($x,$y) should be plotted using large blue dots. In addition the ($out_x,$out_y) point should be plotted using a large red dot. The *base* regression line
y = $base_b1 * x + $base_b0
should be drawn as a blue line and the *outlier* regression line
y = $out_b1 * x + $out_b0
should be drawn with a red line.

The plot window should be updated whenever any of the input values change (after computing the changed $x, $y, $base_b0, $base_b1, etc values).

Underneath the plot should be two columns of information. The left column, written in blue, should contain information about the *base* regression line.
* "Intercept: " $base_b0
* "Slope: " $base_b1
* "R: " coefficient of correlation for first $n points of ($x,$y)
* "R²: " coefficient of determination (r^2)
The right column, written in red, should contain the same information about the *outlier* regression line.
* "Intercept: " $out_b0
* "Slope: " $out_b1
* "R: " coefficient of correlation for first $n points of ($x,$y) and ($out_x,$out_y)
* "R²: " coefficient of determination (r^2)

Summary. When to use AI

Use AI when it *adds* learning value

Example Use	*Why it helps*
Brainstorm ideas / angles	Sparks creativity, widens option space
Draft an outline	Off-loads structure work so you focus on content
Concept explanations & analogies	24 / 7 tutoring; you still verify facts
Grammar / syntax polish	Mechanical clean-up ≠ conceptual shortcut
Quick code prototyping	Generates starter functions you refine

Summary. When not to use AI

Risky Uses	***Why to avoid / restrict***
Generating entire assignment text	Violates academic integrity; weakens mastery
Copy-paste citations sight-unseen	Copy-paste citations sight-unseen
“One-click” homework answers	“One-click” homework answers
Sensitive data in prompts	Sensitive data in prompts
Uploading PDFs for summary	Fair-use / license issues; check campus policy first

Summary. Verify before you trust!

Critical Check	Quick Method
Facts & stats	Open source link; cross-check in a second database
Quotes	Google exact phrase + author
Citations	Confirm journal / DOI exists
Code	Run unit tests / linter
Images	Reverse-image search for originals

Summary. Prompting guide: PARTS Framework

P-A-R-T-S element	Example for a history essay
Persona	“You are an academic writing coach.”
Act	“Help brainstorm a thesis statement.”
Recipient	“First-year undergrad.”
Theme	“Industrial Revolution & labour rights.”
Structure	“Return a bullet-point outline (max 200 words).”

Google LearnLM:
https://services.google.com/fh/files/misc/learnlm_prompt_guide.pdf

Summary. AI Tutor, not cheatsheet

Learning-centred practice	Instead of …
Ask for Socratic questions that reveal gaps	Asking for final answer directly
Request step-by-step scaffold	Copying full solution
Invite follow-up quizzes	Skipping self-testing
Compare multiple perspectives	Accepting first answer

https://bit.ly/4jxAWMs

Primary sources (further reading):

Anderson, D. J., Watson, C. E., & Altman, M. (2025). *Student Guide to Artificial Intelligence* (AI-U/v2.0). Imagining the Digital Future Center at Elon University and the American Association of Colleges and Universities. https://studentguidetoai.org/wp-content/uploads/2025/03/Student-Guide-to-AI-2025.pdf

California State University. (2025). *Ethical and responsible use of AI for students*. Cal State Generative AI Initiative. https://genai.calstate.edu/communities/students/ethical-and-responsible-use-ai-students

Freeman, J. (2025, February 26). *Student Generative AI Survey 2025* (HEPI Policy Note 61). Higher Education Policy Institute. https://www.hepi.ac.uk/2025/02/26/student-generative-ai-survey-2025/

StraighterLine. (2024). *How to use AI ethically as a student*. https://www.straighterline.com/blog/how-to-use-ai-ethically-as-a-student