Flying in a Half-Built Plane: Exploring Biomedical Science Student Perception and Experience with GenAI

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Department: **Department of Anatomy and Physiology**

What do we need to fly a plane?

A Plane

Someone to fly the plane

Passengers

What if the plane is still being built mid-flight?

That's where we are in higher education today with Generative AI.

How do students feel when no one knows the destination?

That's where we are in higher education today with Generative AI.

We are asking biomedical science students to board an unfinished plane.

What is the current conversation?

Critiques

- GenAI reduces critical thinking.
- Students will use the tool to as a shortcut to get answers.
- Undermines skill development.

(Essel et al., 2022; Al Kahf et al., 2023; Wang, 2024, Almassaad et al., 2024;Han et al., 2024;Kazanidis & Pellas, 2024)

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Enthusiasts

- GenAI will transform education.
- GenAI enhances learning efficiency.
- GenAI supports individualised learning.

(Ali et al., 2025; Schenck, 2024; Ruiz-Rojas et al., 2024; Lin et al., 2024; Barthélémy Michalon & Camacho-Zuñiga, 2023; O'Dea et al., 2024; Chan & Hu, 2024)

We do not actually know...

- The conversation is reductive. This complex issue is reduced into simple adoption versus resistance.
- There is **no solid evidence** that GenAI improve/ worsen learning outcomes.
- The landscape has an adoption-centric bias. No discussion on students who do not use GenAI.

This is concerning for biomedical science education

- **Biomedical students' choices will shape human health and scientific progress.**
  - consequences ripple beyond grades.

- **Understanding how students navigate GenAI is essential.**
  - To co-design frameworks that protect scientific rigour.

The three research questions

1. Does using GenAI make a difference to academic performance?

2. How do biomedical science students engage with GenAI?

3. What drives their decisions to adopt or avoid these tools?

Two-part study: Part 1

1. Does using GenAI make a difference to academic performance?

2. How do biomedical science students engage with GenAI?

↓

Analysis of GenAI declarations from two summative assignments, linked to academic performance data.

Example GenAI Declaration Form

Assignment 1 Submission Detail:

Include e a statement on how you have (or if you have not) used generative AI in the preparation of the assessment.

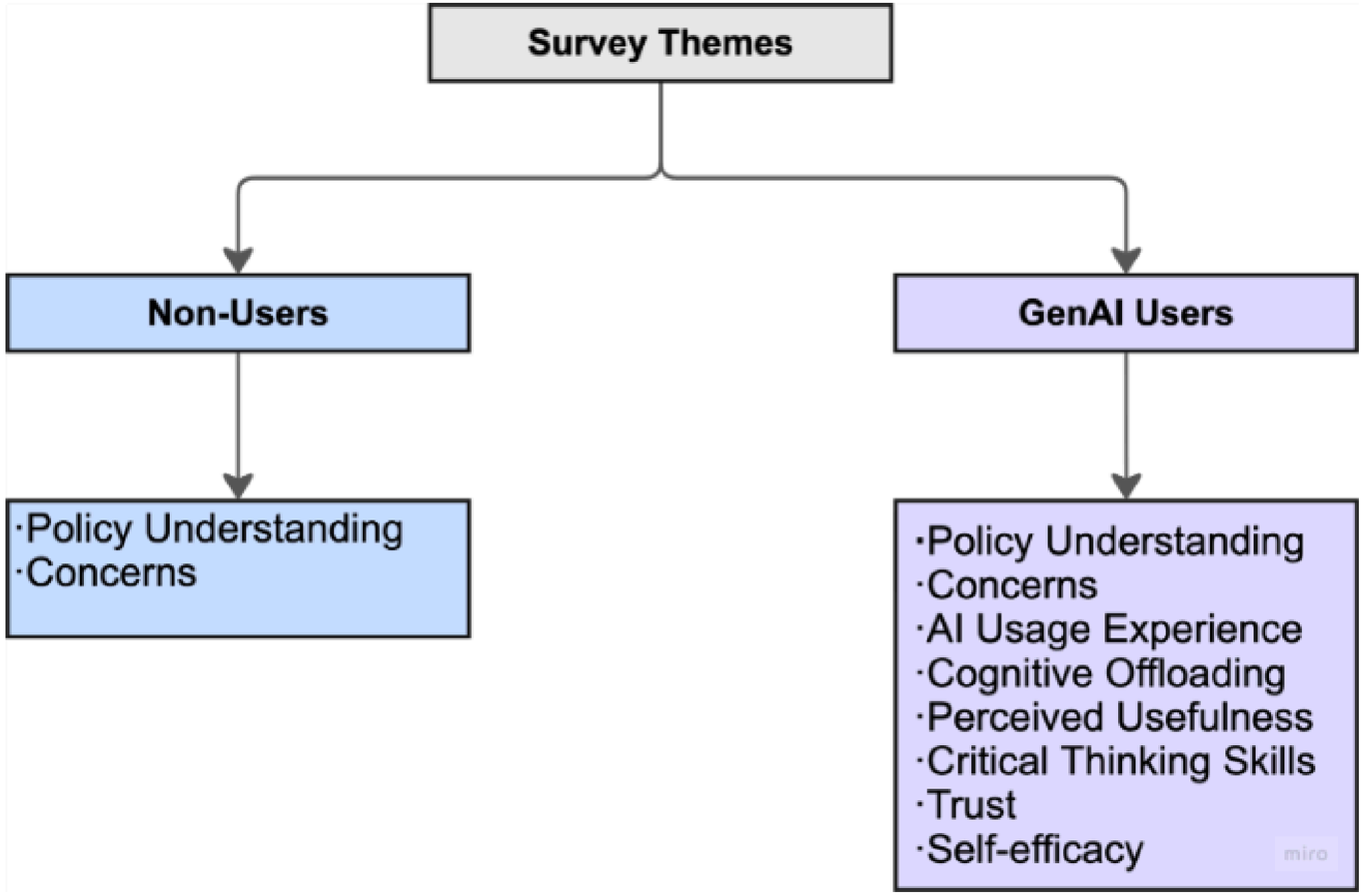
Student Assignment 1

[redacted]

Declaration Form
I declare I have not used GenAI for this assignment.

Human Ethics Reference Number: 2025-32859

Two-part study: Part 2- Survey



2. How do biomedical science students engage with GenAI?

3. What drives their decisions to adopt or avoid these tools?

Survey capturing perspectives from both users and non-users.

N=54

N= 249

Human Ethics Reference Number: 2025-32663

Two-part study: Part 2- Focus groups

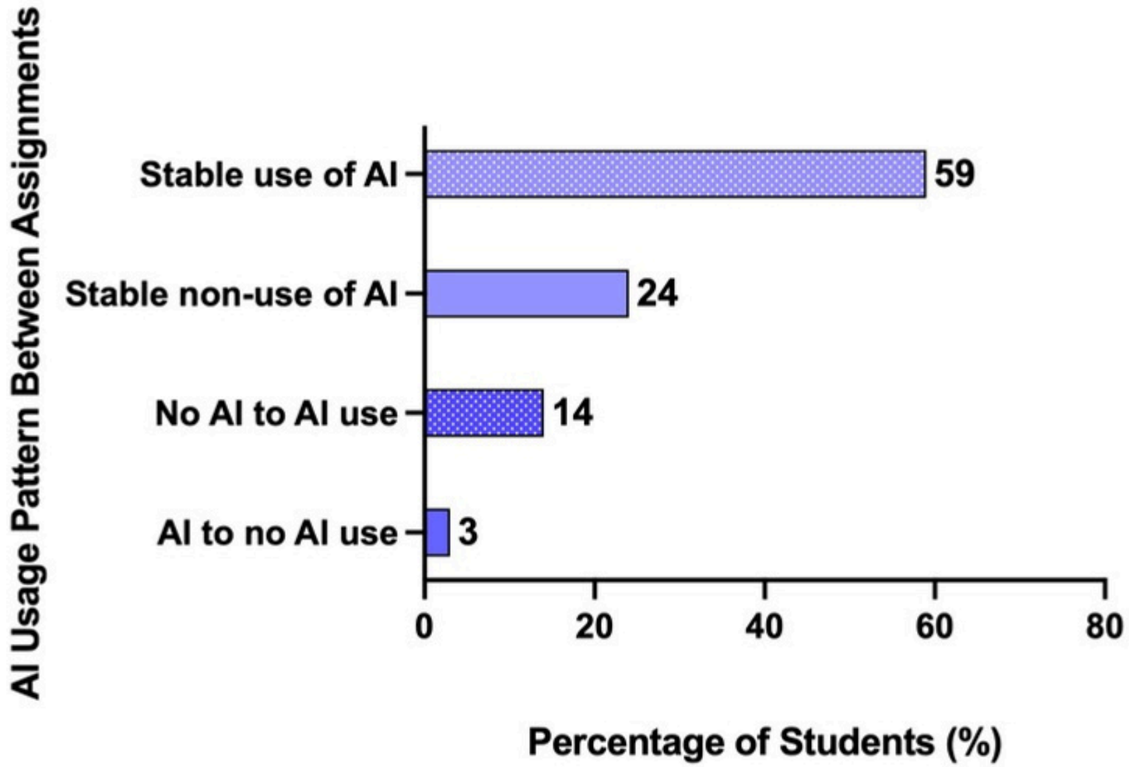
2. How do biomedical science students engage with GenAI?

3. What drives their decisions to adopt or avoid these tools?

8 focus groups (N= 30) analysed using **reflexive thematic analysis**, giving equal weight to all perspectives including often-overlooked non-user views.

Human Ethics Reference Number: 2025-32663

Finding 1: Fluid Engagement

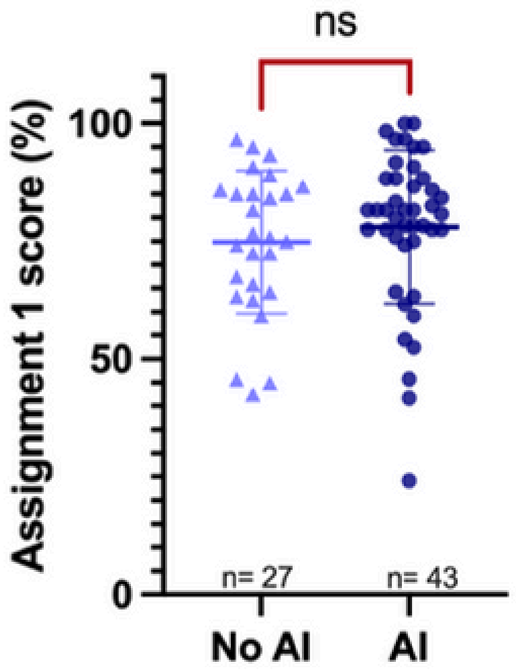


Engagement with GenAI is fluid, with a notable proportion of students switching between assignments

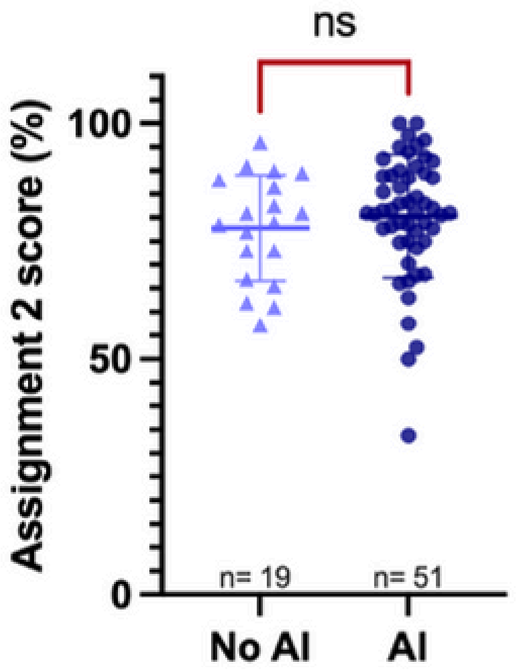
This shows that use isn't a stable trait.

Finding 2: No correlation between GenAI Use and Academic Performance

A.

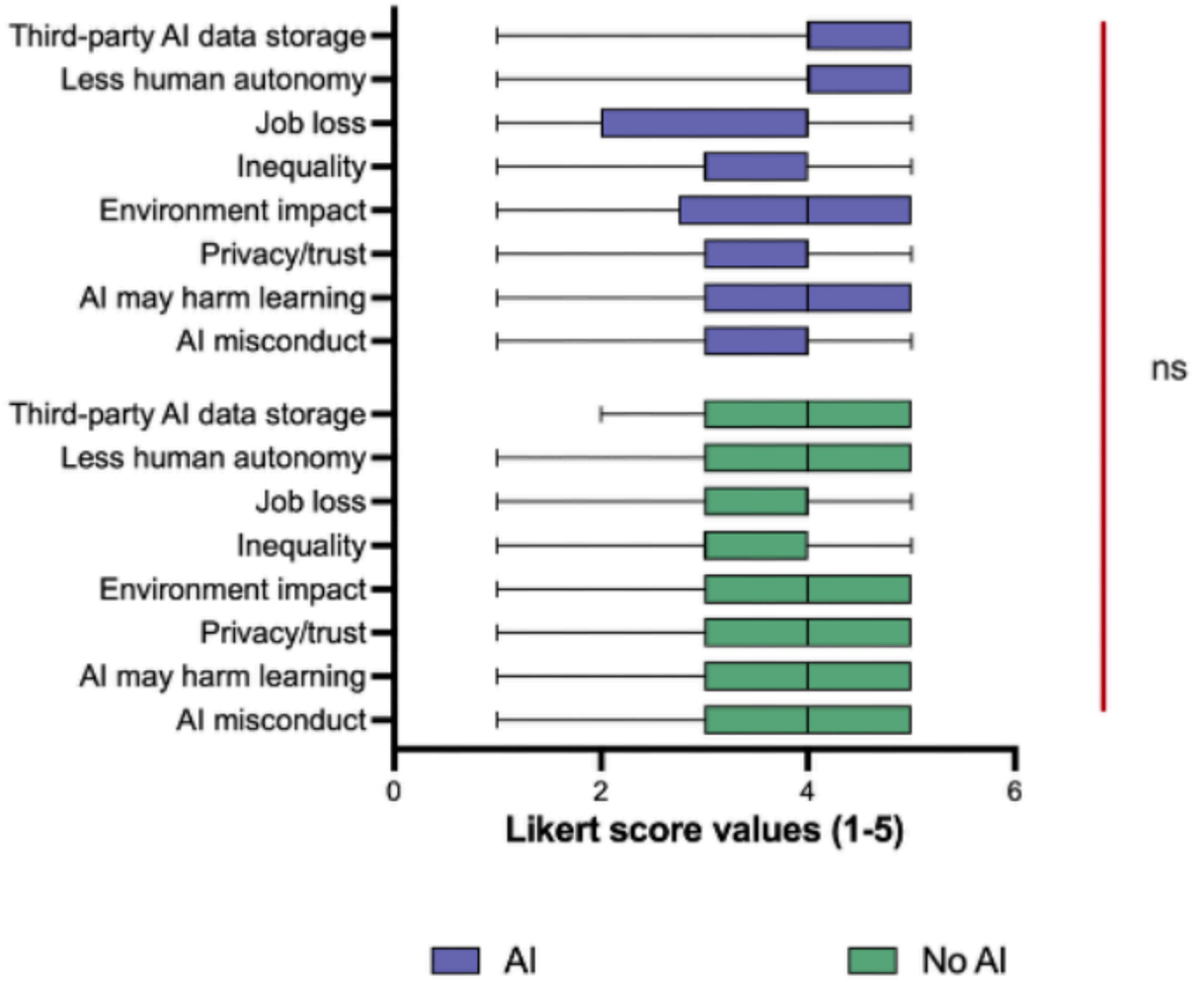


B.

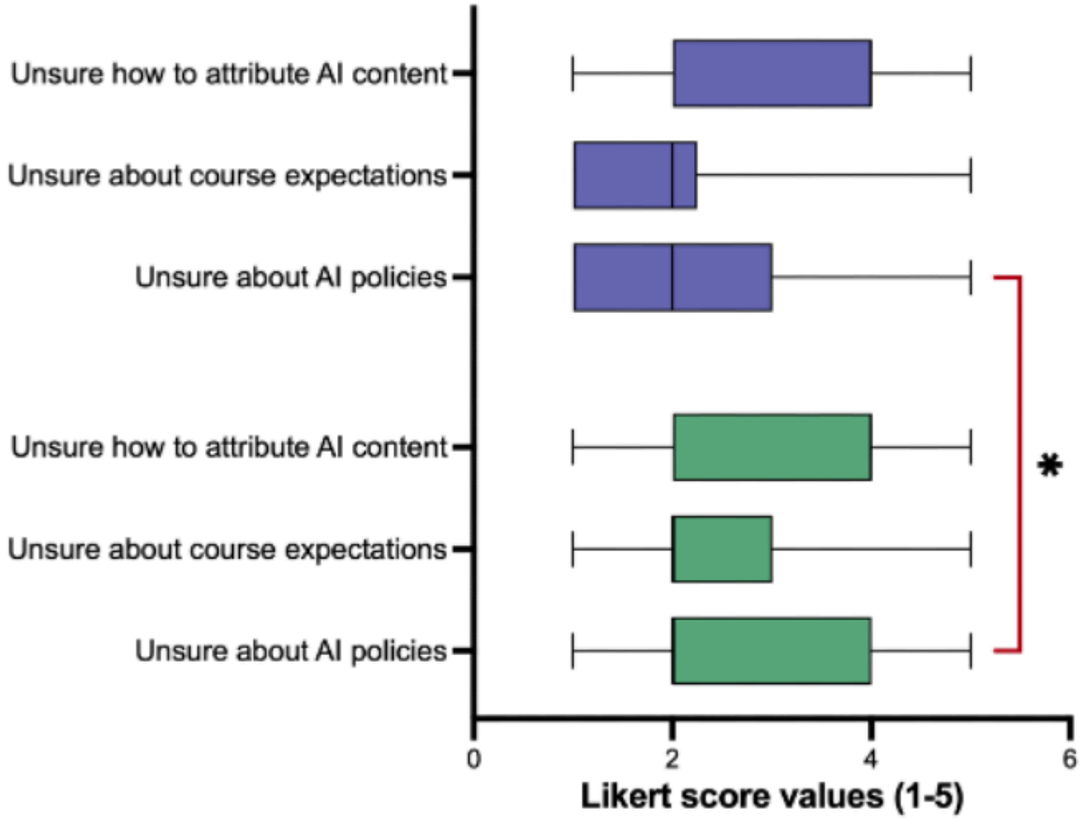


The real question isn't whether students use GenAI, but **how** they use it.

Finding 3: Both Users and Non-Users show concern about GenAI



Finding 4: Non-users are more unsure about University Policy compared to GenAI users



Their resistance stems from the ambiguity of the policy environment.

Finding 5: The multi-faceted reasons for why Non-Users avoid GenAI Fear of Intellectual Complacency

"I believe that GenAI is one of the main reasons for **laziness**, so I try not to use it because if I started using it my brain will just automatically prefer that easier path and I will be **too relied** on it and more concerned about **getting the answer than learning it.**"

- James (Pseudonym)

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- James (Pseudonym)

- Reliance on external tools shifts focus from genuine learning to pure efficiency.
- There is fear about reduced learning quality and academic growth.

Finding 5: The multi-faceted reasons for why Non-Users avoid GenAI Ethical concerns

"Why write if AI can do it? Why draw if AI can do it? Why study if AI can do it? Of course, humans do these things as a form of creative expression and life fulfilment, and by relying on AI you are denying yourself the joy of doing."

- Archie (Pseudonym)

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- Students expressed concern about a decline in educational motivation if human input disappears.
- Technology separates knowledge acquisition from personal effort.

Finding 5: The multi-faceted reasons for why Non-Users avoid GenAI Disadvantage fears

“I haven't used it, but it has decreased my confidence when I hear other students using them to score highly on quizzes. **I feel I am behind by not using GenAI.**”

- Joseph (Pseudonym)

Finding 5: The multi-faceted reasons for why Non-Users avoid GenAI Disadvantage fears

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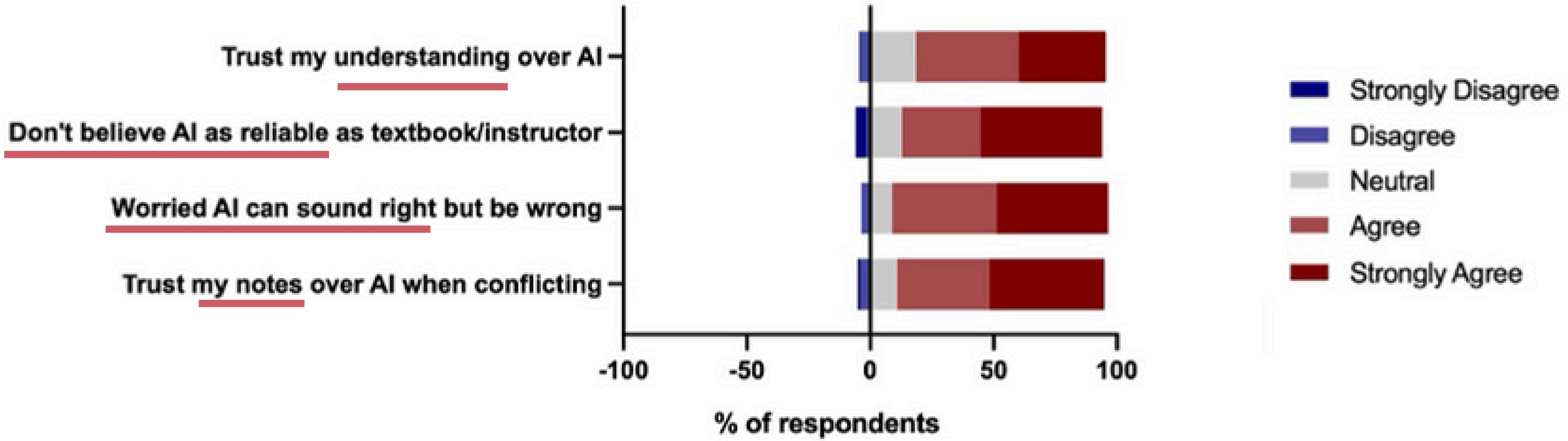
- Joseph (Pseudonym)

- Avoidance of GenAI might disadvantage them.

- Importance of creating shared dialogue.
  - Transparency in what is fair and what is not.

Finding 6: GenAI Users appear to trust verifiable sources more than GenAI



Although students use GenAI, they displayed strong distrust of this tool.

Why do they still use it then?

Finding 7: Drivers for GenAI adoption - A Helpful learning partner

"I would have skipped a complex practice question, but I decided to **break it down** with the help of a GenAI tool. The more I practiced this way, **the more comfortable I became** with tackling difficult questions."

- Andy (Pseudonym)

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- Andy (Pseudonym)

- GenAI helps with scaffolding problem-solving.
  - Deepening understanding.
  - Supporting active reasoning rather than complete mental offloading.

Finding 7: Drivers for GenAI adoption - Psychological reassurance

"I mostly use for **AFFIRMATION** of my understanding of a concept. I also only use it when studying, never during assessments, as to make sure I am not committing academic misconduct."

- Ethan (Pseudonym)

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- Ethan (Pseudonym)

- GenAI enhances students' confidence in their understanding of the learning material.

Finding 7: GenAI User Concerns - Lack of clear institutional guidance

“I'm very paranoid of even something that I learned through the university, or I just do normally without AI is then persecuted as being AI usage.”

- Amelia (Pseudonym)

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- Amelia (Pseudonym)

- There was less clarity and consistency around what forms of GenAI use were permitted or prohibited.
- Responsible use feels risky and uncertain.

Finding 8: Student decision-making cycle

“Whenever I complete a challenging physiology question, I will always always always attempt and complete it first. However, I do most of the time insert my response and the question into a GenAI to see what it thinks. I sometimes get a "This is great!!"; or, I get a "This is not completely true...". Lots of the time I think my answer is very good and then GenAI goes "no this sucks!!""

- Anna (Pseudonym)

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- Anna (Pseudonym)

- Students were not passively consuming GenAI outputs.
- This pattern, observed across thousands of student responses, shows how students ensured their responsible use of GenAI.
  - This was not captured by existing literature.

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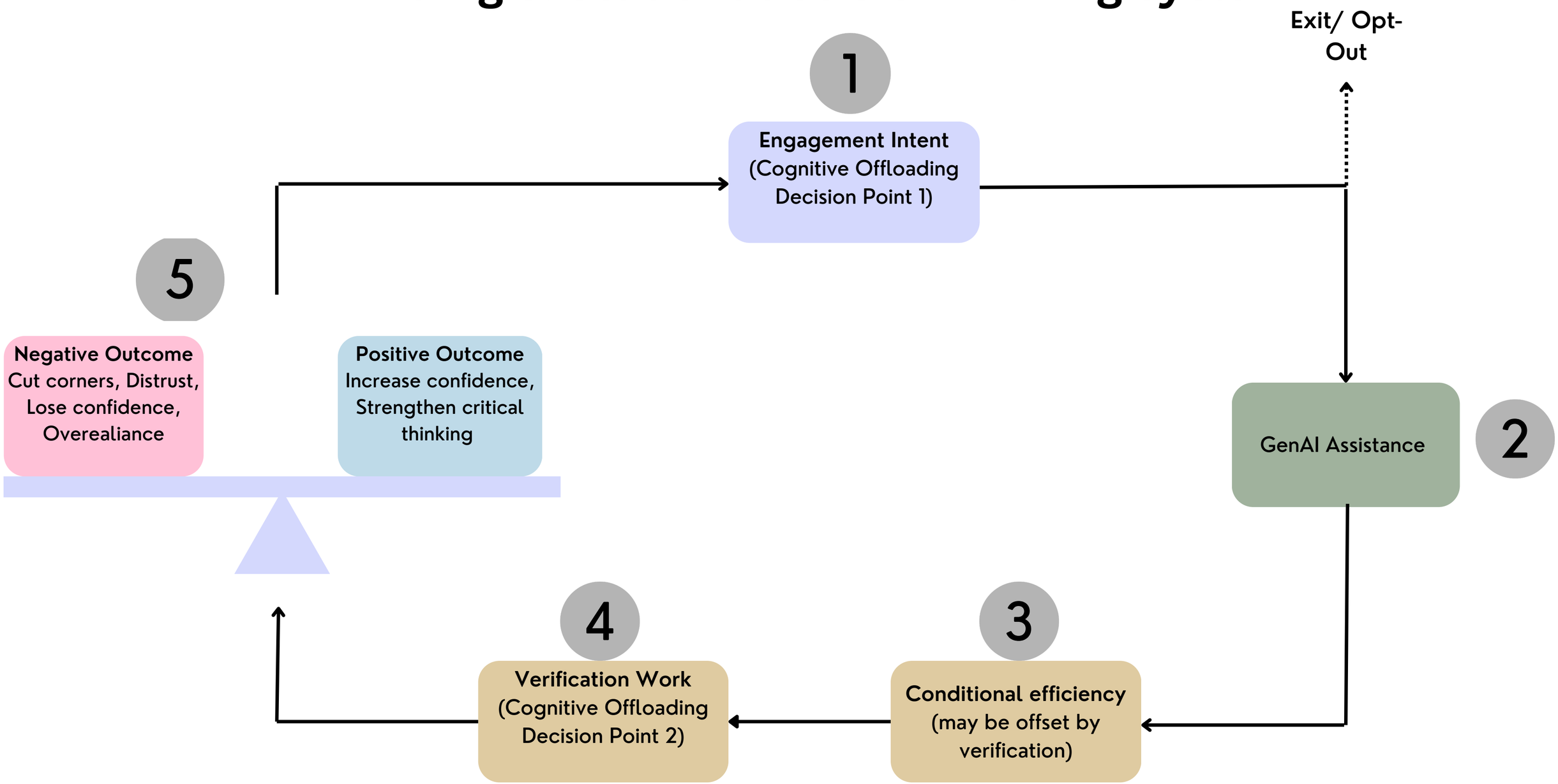


What is the take home message?

How do biomedical science students engage with GenAI?

- Engagement isn't fixed.
  - Students switch between using and avoiding GenAI.

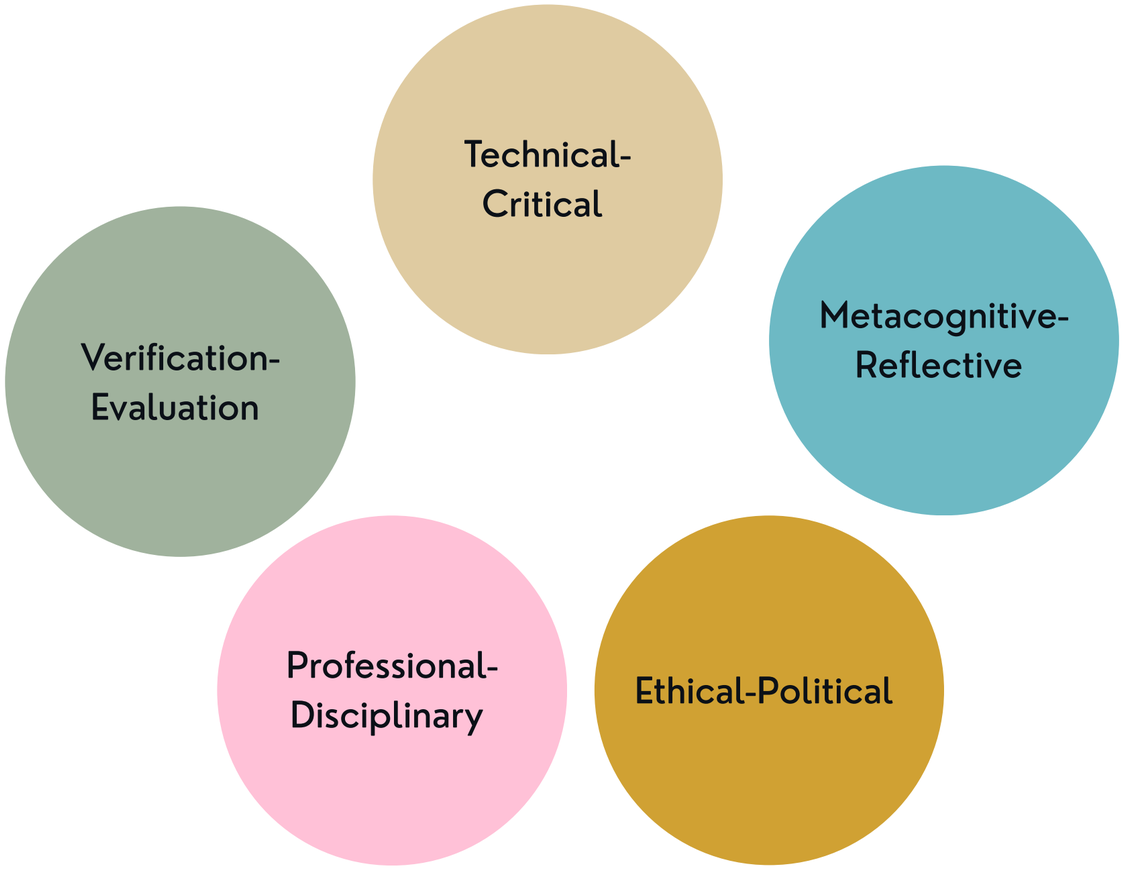
Does using GenAI make a difference to academic performance?

- No automatic performance boost.
  - Using GenAI didn't mean higher marks, avoiding it didn't mean worse outcomes.

What drives their decisions to adopt or avoid these tools?

- GenAI created new academic labour.
  - Students cross-check, test, and validate outputs; this can build or undermine confidence.
- Decisions are deliberate.
  - Both users and non-users showed reasoning and judgment, not blind adoption or rejection.

Implications for Biomedical Science Education



- Policies that simply permit or prohibit AI use overlook the complexity of student decision-making.
- What is needed are comprehensive frameworks that support students in developing the judgment required to engage with these tools responsibly.

The Future Belongs to Those Who Use GenAI with Judgement

This weird ChatGPT cartoon says it all, GenAI can generate things fast, but it doesn't mean it's right.

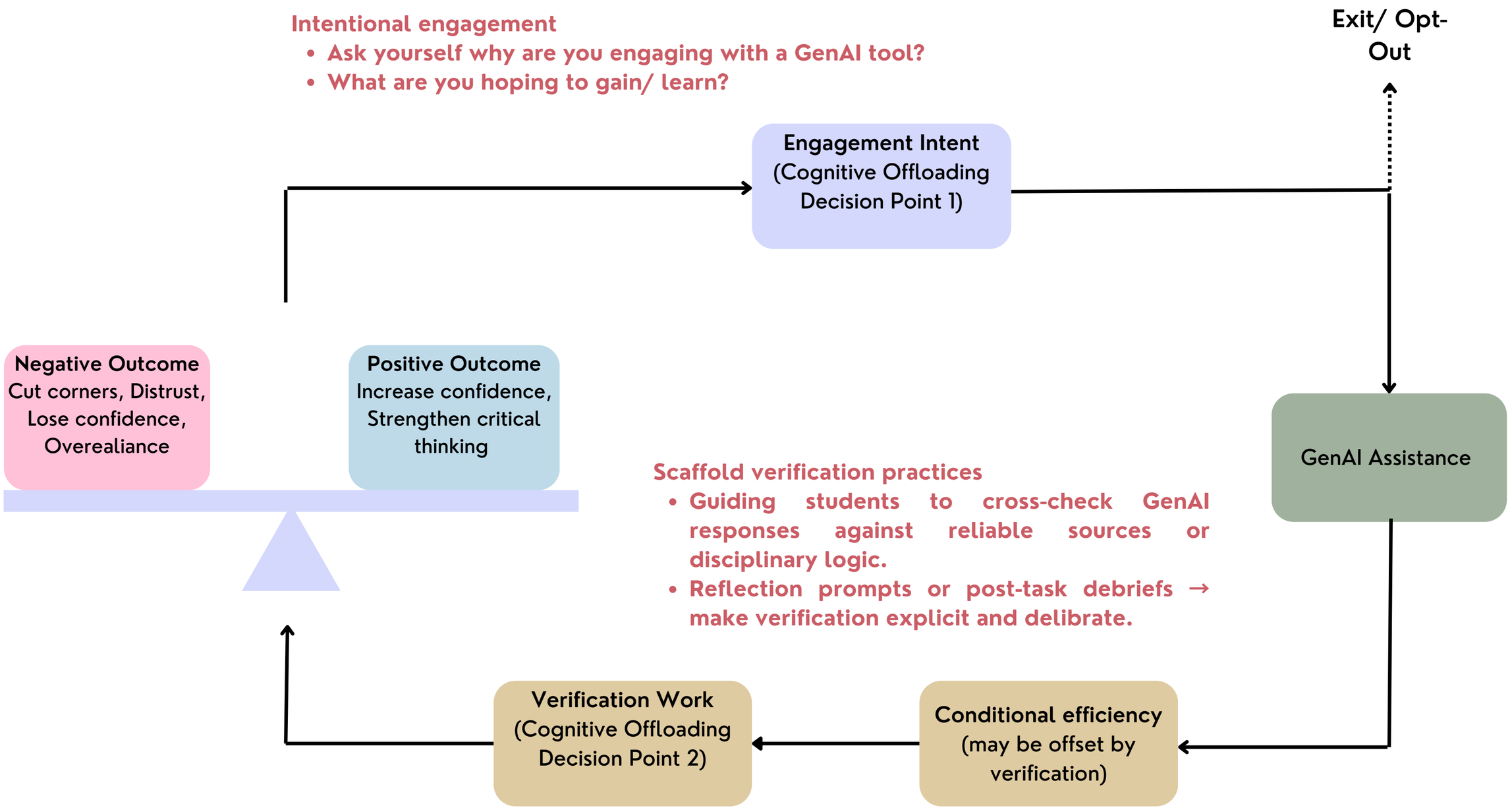
We need a new pedagogy that places human judgment, reflection, and verification at the heart of how we use GenAI.

Acknowledgement

Supervisors
- A/Prof Angelina Fong
- A/Prof Saw Hoon Lim

- Department of Anatomy and Physiology SoTL Group
- Participants of the study

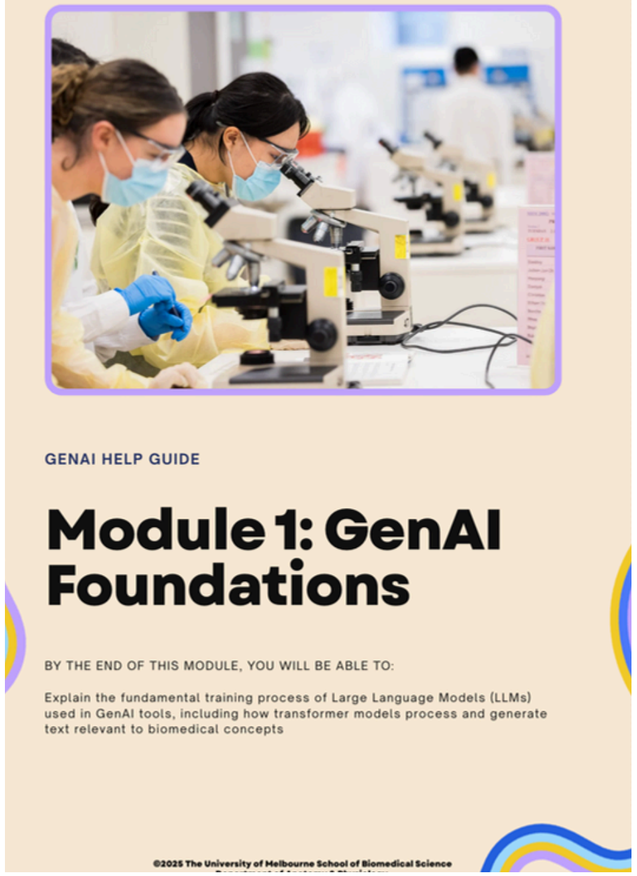
What does the future of education look like?



What does the future of education look like?

Contact us to get a copy of the GenAI Learning Resource for your subject!

Learn-WithGenAI@unimelb.edu.au.

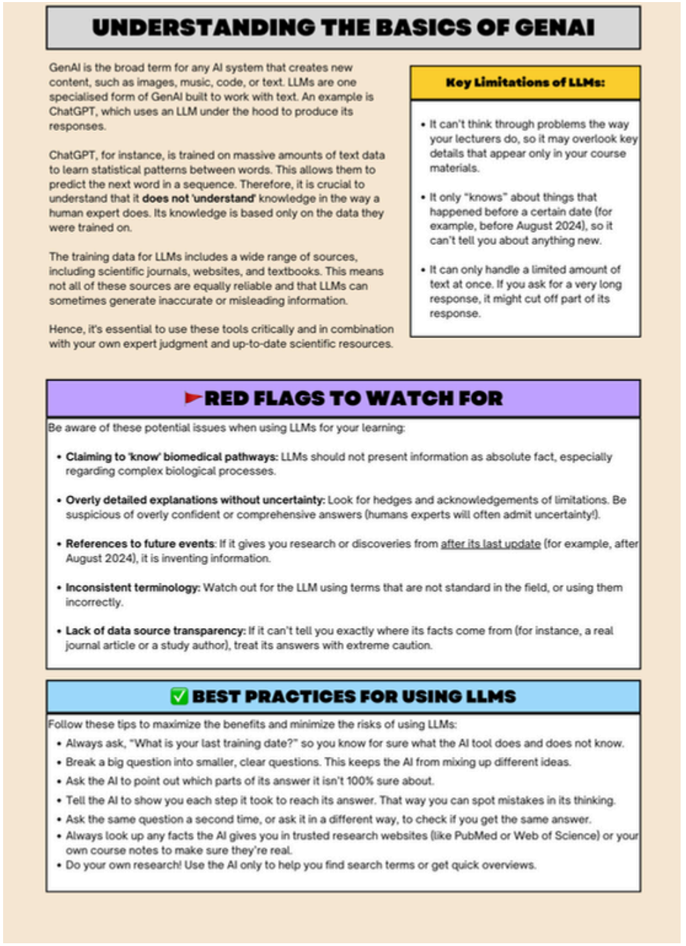


GENAI HELP GUIDE

Module 1: GenAI Foundations

BY THE END OF THIS MODULE, YOU WILL BE ABLE TO:

Explain the fundamental training process of Large Language Models (LLMs) used in GenAI tools, including how transformer models process and generate text relevant to biomedical concepts



UNDERSTANDING THE BASICS OF GENAI

GenAI is the broad term for any AI system that creates new content, such as images, music, code, or text. LLMs are one specialised form of GenAI built to work with text. An example is ChatGPT, which uses an LLM under the hood to produce its responses.

ChatGPT, for instance, is trained on massive amounts of text data to learn statistical patterns between words. This allows them to predict the next word in a sequence. Therefore, it is crucial to understand that it **does not 'understand'** knowledge in the way a human expert does. Its knowledge is based only on the data they were trained on.

The training data for LLMs includes a wide range of sources, including scientific journals, websites, and textbooks. This means not all of these sources are equally reliable and that LLMs can sometimes generate inaccurate or misleading information.

Hence, it's essential to use these tools critically and in combination with your own expert judgment and up-to-date scientific resources.

Key Limitations of LLMs:

- It can't think through problems the way your lecturers do, so it may overlook key details that appear only in your course materials.
- It only "knows" about things that happened before a certain date (for example, before August 2024), so it can't tell you about anything new.
- It can only handle a limited amount of text at once. If you ask for a very long response, it might cut off part of its response.

►RED FLAGS TO WATCH FOR

Be aware of these potential issues when using LLMs for your learning:

- **Claiming to 'know' biomedical pathways:** LLMs should not present information as absolute fact, especially regarding complex biological processes.
- **Overly detailed explanations without uncertainty:** Look for hedges and acknowledgements of limitations. Be suspicious of overly confident or comprehensive answers (humans experts will often admit uncertainty!).
- **References to future events**: If it gives you research or discoveries from after its last update (for example, after August 2024), it is inventing information.
- **Inconsistent terminology:** Watch out for the LLM using terms that are not standard in the field, or using them incorrectly.
- **Lack of data source transparency:** If it can't tell you exactly where its facts come from (for instance, a real journal article or a study author), treat its answers with extreme caution.

✅ BEST PRACTICES FOR USING LLMS

Follow these tips to maximize the benefits and minimize the risks of using LLMs:

- Always ask, "What is your last training date?" so you know for sure what the AI tool does and does not know.
- Break a big question into smaller, clear questions. This keeps the AI from mixing up different ideas.
- Ask the AI to point out which parts of its answer it isn't 100% sure about.
- Tell the AI to show you each step it took to reach its answer. That way you can spot mistakes in its thinking.
- Ask the same question a second time, or ask it in a different way, to check if you get the same answer.
- Always look up any facts the AI gives you in trusted research websites (like PubMed or Web of Science) or your own course notes to make sure they're real.
- Do your own research! Use the AI only to help you find search terms or get quick overviews.

SUMMARY TABLE

QUESTIONS	⚠️ WHAT CAN GO WRONG	🔍HOW TO NOTICE IT QUICKLY	✅WHAT YOU SHOULD DO RIGHT AWAY
How is the AI generating its answers?	It simply matches word patterns, not real understanding, and may state these patterns as facts.	It claims "I understand" or "This is correct" without showing any proof.	Ask it to walk you through every step it used, ask "When were you last trained?", then check key facts in trusted sources.
Is the AI making up studies, statistics, or references?	It may invent fake research papers, numbers, or DOIs that don't actually exist.	It gives you study titles or links you cannot find online.	Search PubMed or Google Scholar for the reference; if you can't find it, discard it.
Is the advice too general and ignoring my specific context?	It may overlook your course level, lab setup, patient group, or any special conditions you have.	The suggestions sound broad and never mention your situation or details.	Tell the AI exactly who you are and what you need (for example: "I'm a third-year physiology student trying to understand glucose regulation"), then check field-specific guidelines.
Am I trusting the AI without checking its work?	You might accept mistakes or invented details as fact if you don't verify.	You'll see no explanation of how the AI verified each fact, and it never names any real experts, articles, books, or studies to back up its statements.	Note down its answers, then confirm each point against at least two real sources (textbook, journal article) and ask a lecturer or expert if you are really unsure.

🎉KEY TAKEAWAY

LLMs are powerful tools, but they are not a substitute for critical thinking and expert knowledge. Understanding their limitations and following best practices will allow you to leverage their potential for biomedical learning while avoiding common pitfalls. **Remember to always verify information and consult reliable sources.**

Please feel free to visit resources developed by the academic skills team for further information.

What does the future of education look like?

GenAI hub

Welcome to the GenAI hub, a focused starting point for academic teaching staff, providing classroom activities, practical workflows, case studies and support.

Educators should be aware that GenAI tools are not always accessible, and some students may wish to opt out of using them. When planning activities with GenAI, it is recommended to incorporate accessible alternatives.

Watch the video to hear how Teaching and Learning Innovation works with students and academics to integrate GenAI in pedagogically responsible ways.

Practical uses of GenAI for educators

Discover practical ways to enhance teaching with GenAI, from streamlining workflows to strengthening assessment design.

GenAI library: Activities for the classroom

Explore ready-to-use activities, from critical evaluation to practical creation and classroom simulations.

Teaching with GenAI: Case studies

Browse case studies highlighting how educators are using GenAI in teaching and assessment at the University of Melbourne.

Further support

Access support and guidance for planning and using GenAI in your teaching.

Resources

AI at Melbourne

Guidelines and resources for using AI at the University of Melbourne.

Navigating GenAI: Policy, practice and integrity in teaching and learning

This resource helps teaching staff navigate the use of generative AI in the University of Melbourne context.

Guidelines for allowing student GenAI use in assessment

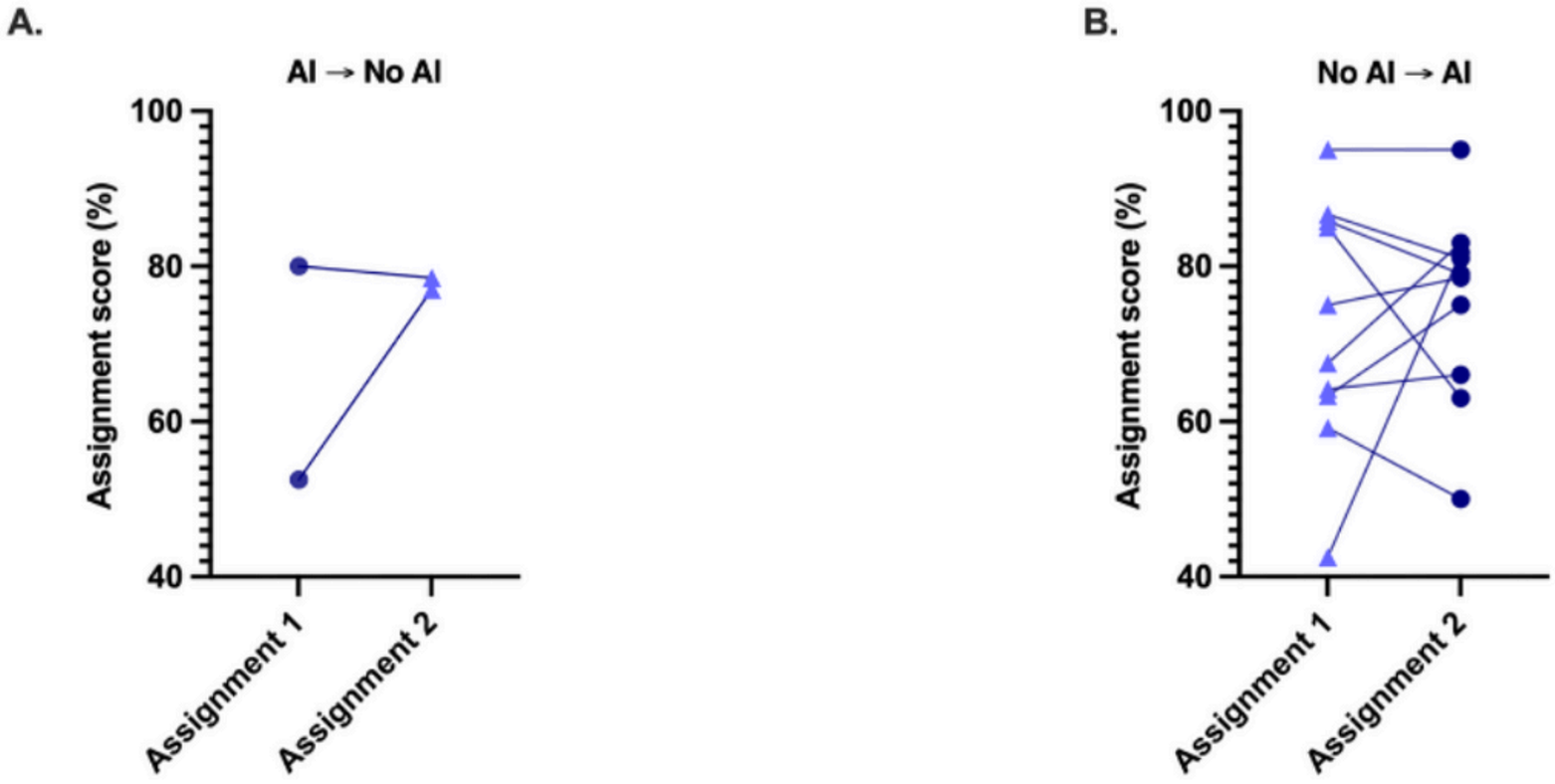
This guide provides statements defining several levels of AI use that subject coordinators can add to their assessments.

Artificial intelligence in teaching, learning and assessment

Resources and guidance on using AI tools in teaching, learning and assessment.

Innovative Teaching and Learning with GenAI Showcase
27th Oct 2:00-3:30 PM

Appendix A:


A.
AI → No AI
Assignment score (%)
100
80
60
40
Assignment 1
Assignment 2
B.
No AI → AI
Assignment score (%)
100
80
60
40
Assignment 1
Assignment 2