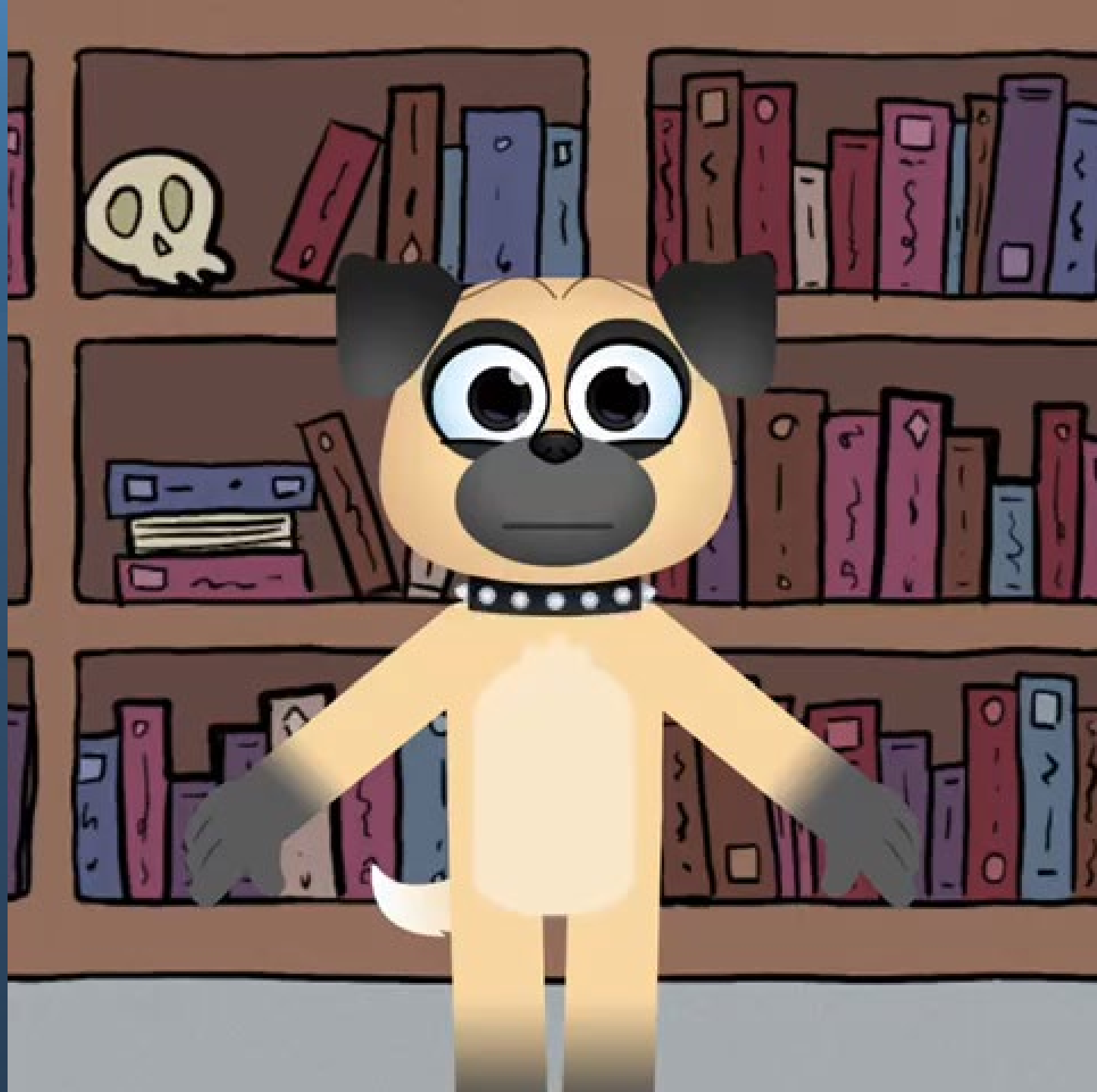


Exploring the Role and Impact of Generative AI in Academic Writing: Pilot Study on MSc Molecular Biology Students

Dr Jess Rollason and Dr Michael S Dodd
School of Life Sciences,
Coventry University



Background

AI in education

- A need to educate ethical use of AI to counter the “Ban AI” and foster the “Embrace AI” culture
- Educators can be apprehensive of using AI or worry about cheating
- A ‘digital divide’ is growing, institutions should empower ‘all’ students to use AI effectively and provide the knowledge and tools to do so - inclusion and equity
- There is a need for sustainable assessment strategies
- Use of AI is not going away and will become an essential transferable workplace skill

AI ‘blind spots’ the biggest threat to universities

Universities that only recognise academic integrity implications are ‘really missing the picture’

April 19 2024  #News #World news



if we continue blindly forward, we should expect to see increased inequality

COMMENTARY

AI and the next digital divide in education

Michael Trucano
July 10, 2023



Reconsidering assessment for the ChatGPT era: QAA advice on developing sustainable assessment strategies



Office for Artificial Intelligence

Conducting research into the skills that will be needed for future workforce training



Higher Education Policy Institute

Provide or punish? Students' views on generative AI in higher education

HEPI Policy Note 51

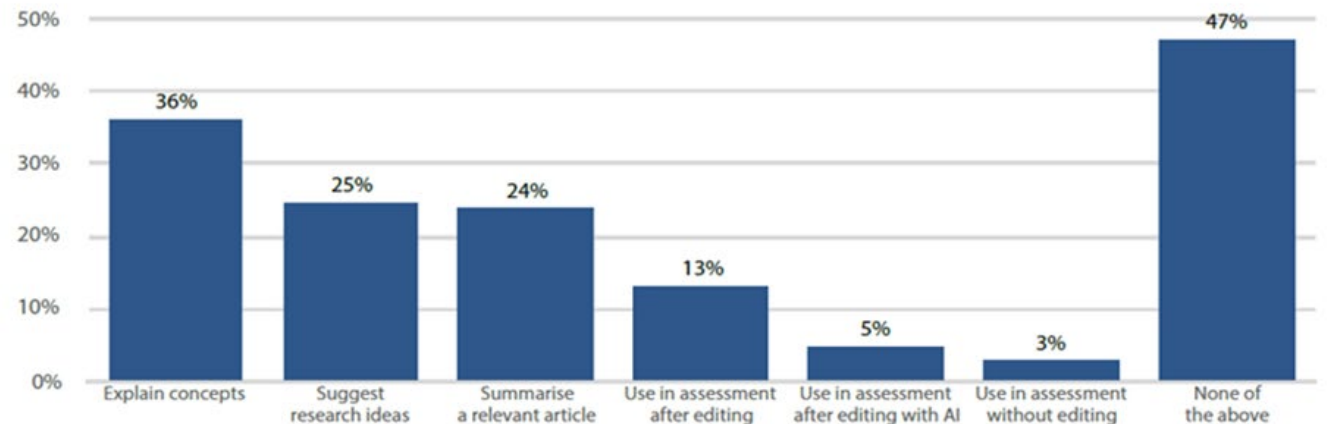
February 2024



Polled 1,250 UK undergraduate students on their attitudes to (AI) tools

- 53% have used generative AI to help them with assessments
- Worryingly 35% do not know how often it produces made-up facts, statistics or citations
- 73% expect to use AI after they finish their studies
- Only a fifth of students are satisfied with the support they have received on AI

Figure 4: 'When thinking about using generative AI to prepare assessed work, which of the following have you ever done? Tick all that apply.' All responses.



- Creating a supportive and inclusive environment
- Help students prepare for future careers
- Allow students to reflect, critique and draw conclusions on its use
- Use in researching, literature searching and formulating plans
 - Learning through doing
 - Competence based education

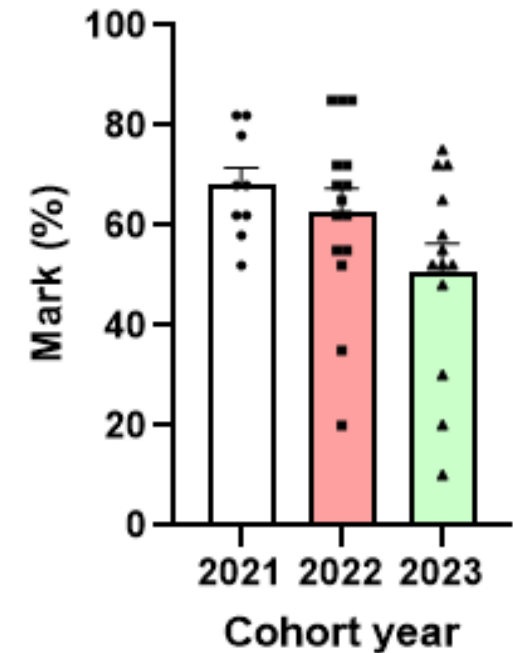
Assessment type	Strengths	Weaknesses	Academic integrity	Sustainability
Coursework that integrates Generative Artificial Intelligence by design - use of these tools is part of the assessment brief and outputs are critiqued or reflected upon	<p>Authentic - learning by doing, including using Generative Artificial Intelligence tools, can be built into assessment design</p> <p>Detection - detection is not necessary if using the AI tools is part of the assessment</p> <p>Resource - can repurpose existing assessments</p> <p>Synoptic - can be designed to test a range of knowledge / competencies and different elements of a module / programme</p>	<p>Accessibility - need to ensure fair access to Generative Artificial Intelligence tools for all students</p> <p>Resource - initial investment of time and ongoing review to take account of developments in AI tools.</p>	High	High

“ *The competence-based education model shifts the focus from what students **know** to what they can actually **do**.* ”

Plan

Aim and rationale

- Aim
 - 1. To improve the student's relationship with AI – making it a tool to aid, rather than punish
 - 2. To improve marks on critical review in our MSc module
- Rationale
 - Decrease in critical review marks for our module
 - MEQ, the critical review is highlighted as a challenging aspect of the module/course
 - Help prepare them better for their thesis, by improving their understanding how to do a critical review
 - We have started to see misuse of AI in these kind of assessments



Module Learning Outcomes

Medical Molecular Biology – MSc Molecular Biology

Critical review coursework

1. Explain in detail the molecular mechanisms that underlie selected diseases.
2. **Critically** review current advances in molecular biology that are aiding novel diagnostic or therapeutic strategies.
4. Communicate in an informed, **reasoned** and logical manner both orally and in writing

Cohort studied

10 MSc students in semester 2 of Molecular Biology

Student's were asked pre and post questionnaires – 5 engaged with the whole process

Pre-training questionnaire

Examples

- **Have you ever used AI or chatbots in your University Assignments?**
 - *Most did not admit to this, but this was not blinded*
 - *2 admitted to using it in the past*
- **What have you used AI or chatbots for?**
 - *Gathering the links for journals and authors*
 - *Understand what a topic is about, how and what to write about in the assignment*
- **Misuse of AI in a submitted piece of work can lead to academic misconduct**
 - *100% identified this as correct*
- **Use of AI should be acknowledged and referenced in a submitted piece of work**
 - *20% identified this as correct*

Pre-training questionnaire

Limitations of AI

- **AI and chatbots predicts the solution based on its massive dataset and therefore the answer generated is always right.**
 - 60% identified this was false
- **AI can replace human critical thinking?**
 - 80% identified this was false

Summary

- Most had a good understanding of what AI can do
- Most understood that AI cannot (currently) replace human critical thinking
- But most failed to recognise the importance of referencing when AI had been used



Tutorial on the ethical use of AI in University

- **How does AI work?**
 - biases, strengths, blindspots and limitations
- **Demonstrations**
 - Microsoft Co-Pilot
 - Adobe Express
 - Chat GPT
- **Fact checking task**

HOW MAY I HELP YOU?

ARTIFICIAL INTELLIGENCE

IS NOT ALWAYS YOUR FRIEND



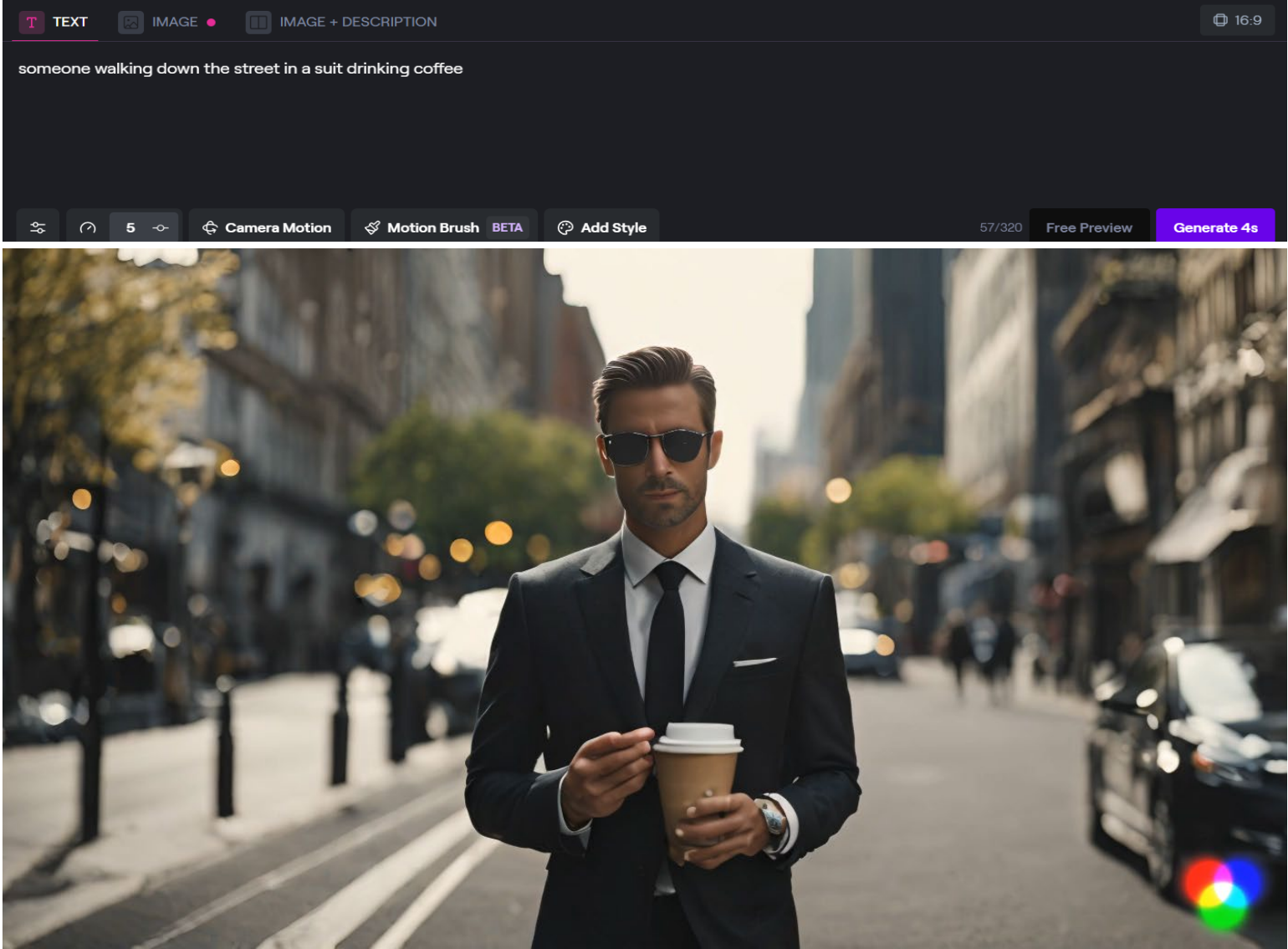
The dangers of AI

From afar everything looks ok, the structure is there and looks like your work is well formatted



Zoom in and look at the detail and it's all wrong – it has the feel without the substance

The dangers of bias



Fact checking task – ChatGPT 3.5



Prompt: History of diabetes with citations in APA format

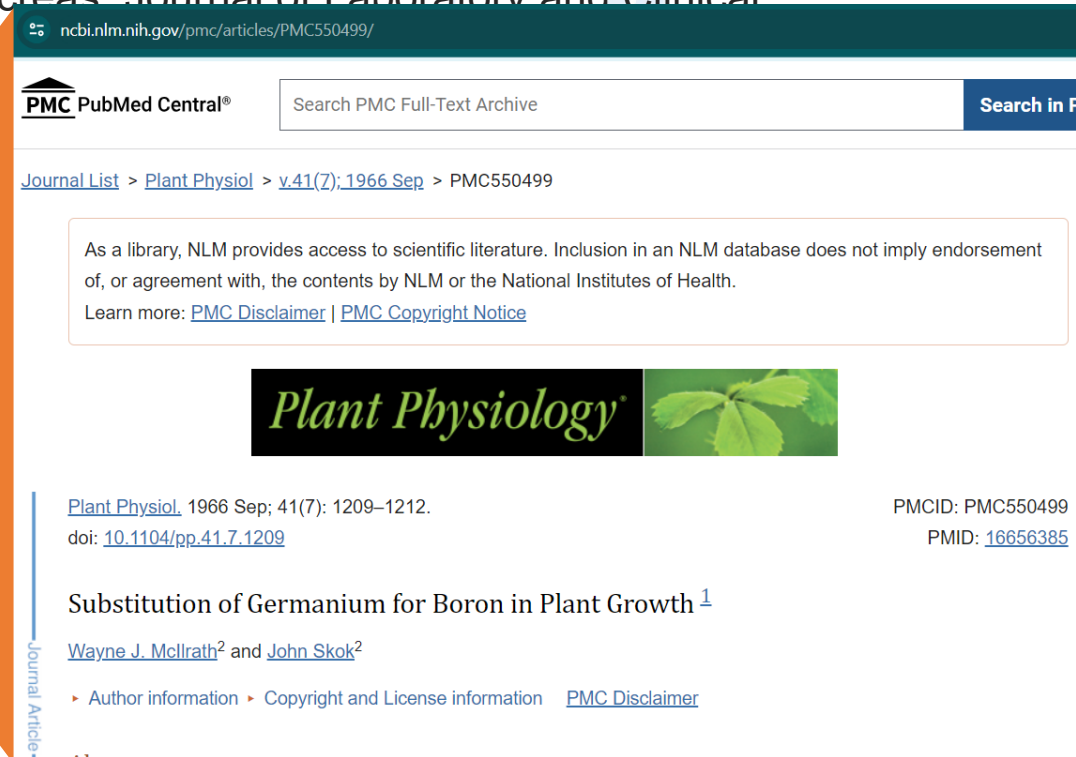
- **Ancient Observations:** Diabetes has been recognized since ancient times. The term "diabetes" is derived from the Greek word "siphon," reflecting the frequent urination associated with the condition (Kaiser & Feng, 2006).
- **Middle Ages:** In the Middle Ages, diabetes was identified through the sweet taste of urine, as physicians would literally taste the urine to diagnose the disease (Smith, 2010).
- **17th Century:** Thomas Willis, in the 17th century, described diabetes as a melting down of muscles and flesh into urine, highlighting the body's inability to properly utilize nutrients (Willis, 1674).
- **19th Century:** The 19th century saw advancements in understanding the role of the pancreas in diabetes. Paul Langerhans discovered the pancreatic islets, later named after him, which contain insulin-producing beta cells (Langerhans, 1869).
- **20th Century:** The discovery of insulin in the 1920s by Frederick Banting and Charles Best revolutionized diabetes treatment, saving countless lives (Banting & Best, 1922).
- **Modern Era:** Advances in technology have led to the development of insulin pumps, continuous glucose monitoring, and various medications to manage diabetes. Research continues to explore the genetic and environmental factors contributing to the disease (American Diabetes Association, 2020).

Reference list

Prompt: History of diabetes with citations in APA format

Contributions to the microscopic anatomy of the pancreas

- American Diabetes Association. (2020). Diabetes: A historical perspective. <https://www.diabetes.org/diabetes/history>
- Banting, F. G., & Best, C. H. (1922). The internal secretion of the pancreas. *Journal of Laboratory and Clinical Medicine*, 7(5), 251-266.
- Kaiser, N., & Feng, H. (2006). Historical perspectives of diabetes. *Text* (3rd ed., pp. 3-12). Lippincott Williams & Wilkins.
-  Langerhans, P. (1869). **Beiträge zur mikroskopischen Anatomie des Pankreas**. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC550499/>
- 
- Smith, A. F. (2010). Diabetes mellitus: A historical perspective.
- Willis, T. (1674). *Pharmaceutice rationalis, sive Diatriba de Medicamentis*. <https://archive.org/details/pharmaceuticerat00will>




ncbi.nlm.nih.gov/pmc/articles/PMC550499/

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Journal List > Plant Physiol > v.41(7); 1966 Sep > PMC550499

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Plant Physiology 

Plant Physiol. 1966 Sep; 41(7): 1209-1212. PMID: PMC550499
doi: [10.1104/pp.41.7.1209](https://doi.org/10.1104/pp.41.7.1209) PMID: [16656385](https://pubmed.ncbi.nlm.nih.gov/16656385/)

Substitution of Germanium for Boron in Plant Growth ¹

Wayne J. McClrath² and John Skok²

▶ Author information ▶ Copyright and License information [PMC Disclaimer](#)

Reference list

Prompt: History of diabetes with citations in APA format

Real authors – released paper in 2006
Real textbook
No link between the two

- American Diabetes Association. (2020). Diabetes: A historical perspective. <https://www.diabetes.org/diabetes/history>
- Banting, F. G., & Best, C. H. (1922). The internal secretion of the pancreas. *Journal of Laboratory and Clinical Medicine*, 7(5), 251-266.
- ✘ ▪ Kaiser, N., & Feng, H. (2006). Historical perspectives of diabetes. *In Diabetes Mellitus: A Fundamental and Clinical Text* (3rd ed., pp. 3-12). Lippincott Williams & Wilkins.
- ✔ ▪ Langerhans, P. (1869). *Beiträge zur mikroskopischen Anatomie der Bauchspeicheldrüse*. Dissertation.
✘ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC550499/>
- Smith, A. F. (2010). Diabetes mellitus: A historical perspective. *Nursing Clinics*, 45(1), 1-8.
- Willis, T. (1674). *Pharmaceutice rationalis, sive Diatriba de Medicamentorum operationibus in humano corpore*. <https://archive.org/details/pharmaceuticerat00will>

"The best way to think about this is you are chatting with an omniscient, eager-to-please intern who sometimes lies to you," Prof Mollick on NPR

Task

How to better prepare students for critical reviews

- Students were given a week to use generative AI to write a 500 word lay summary on their topic, either:
 - Metabolism and it's links to heart disease – Dr Mike Dodd.
 - Antimicrobial resistance mechanisms and the impact on the treatment of infectious disease – Dr Jess Rollason
- They used the lay summary to find an interesting research area in this topic – e.g. a specific cardiac disease, an infectious disease with AMR
- They were told to edit this summary and make sure it was focused
- Submit their summary to Turnitin

Feedback

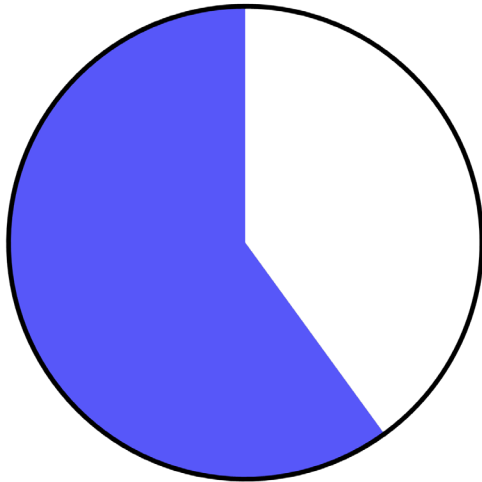
Post lay summary

- Students submitted their lay summary into Turnitin – partly to ensure that they changed content for real submission, but mainly to provide feedback and feed-forward comments
- Feedback broken down into
 - What is good
 - Some pitfalls of AI
 - Feed-forward to the critical review
- 1.5 hour feedback session with the class, explaining the critical review in more detail and how to use their lay summary
- Students engaged well with this process, 8 out of 10 did the task and we provided them with areas to work on and provided example sources they could use to develop their review

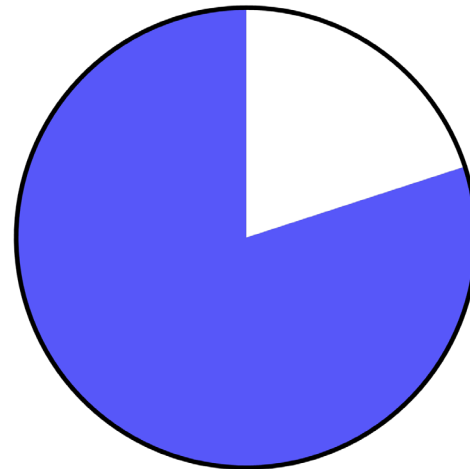
Post-training questionnaire

Key findings

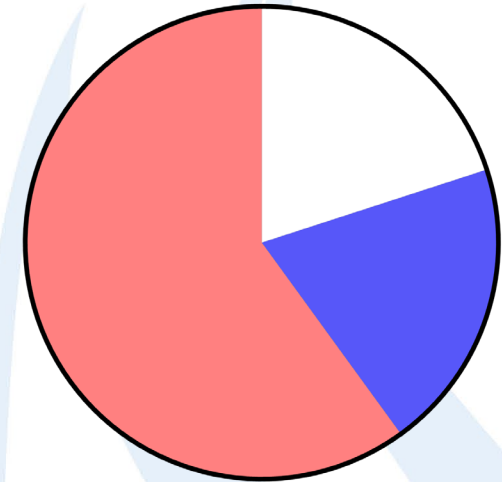
Because of an algorithm AI and chatbots cannot provide misinformation



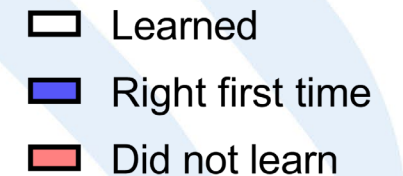
AI and chatbots can provide citations and references that do not exist or are irrelevant



Use if AI should be acknowledged and referenced in a submitted piece of work



We asked the students the same questions as before, looking for responses where they “**learned**”
= **wrong first time, right the second**



Post-training questionnaire

Do you thinking using the AI has given you a good platform for writing your critical review?

- Yes, can provide background knowledge and starting point on new topics
- Yes, I gain information very quickly
- It might have helped me in structuring my work but on the long run I don't think it was that helpful as said it lacks the human touch or critical thinking so it can't provide any accurate things about the searched topic.
- Not exactly
- Yes

Post-training questionnaire

What would you improve about the activity?

- How to implement the knowledge gained into assignments
- It was really helpful the way we were taught about using the AI. Although I have some previous experience in using AI chatbots doing this activity helped me learn a new perspective from a different pov.

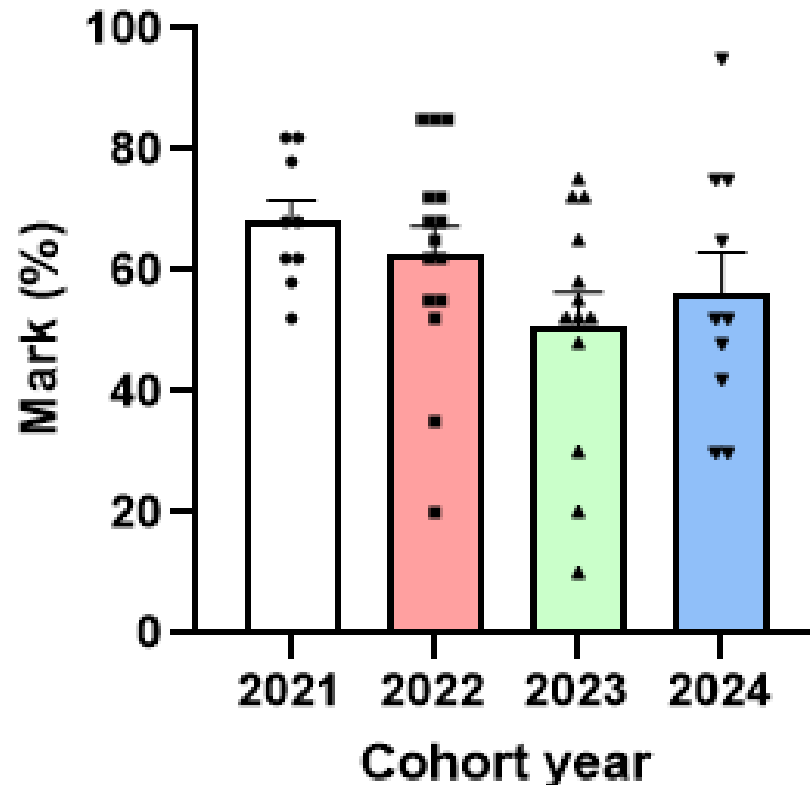
Post-training questionnaire

What have you learnt from this process?

- That it can be ethically used to generate ideas
- You can gain some valuable insight into different subject areas depending on which AI you use
- I can't exactly use everything generated from AI and copy to the assignment. It can't give proper referencing, sometimes the data might be incorrect and I have to check it on other information source which can be adding time for my work.
- Different AI tools and How to use AI chat bots

Critical review marks

Comparison with the last 3 years



Going forward

1. Moving away from lay summary to using AI to help generate a plan for their critical review
2. Redesign of the pre and post questionnaire
3. Opening it up to larger cohorts at both PG and UG level. Increase the reach.
4. New AI Educator Working Group – to keep up with the tech, implementation in assessment design, education of staff and students, ensure inclusivity.

Summary

1. We appeared to improve the student's relationship with AI
2. Improved marks on critical review in our MSc module – although we need larger cohorts to unpick this



*Credit: Dr Mike Dodd
Module Leader, Data Analysis
and Content Delivery*



*Credit: Henry Mandale
AI Technologist
Viggle.ai*



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