

From panic to pedagogy:
it's about time we moved
the generative AI
conversation on. . .

Michael Grove
Deputy Pro-Vice Chancellor (Education Policy &
Academic Standards)

M.j.Grove@bham.ac.uk



UNIVERSITY OF
BIRMINGHAM



Thoughts on designing policy, pedagogy, and programme level practice (in the mathematical sciences).

Michael Grove

Professor of Mathematics and Mathematics
Education

M.j.Grove@bham.ac.uk

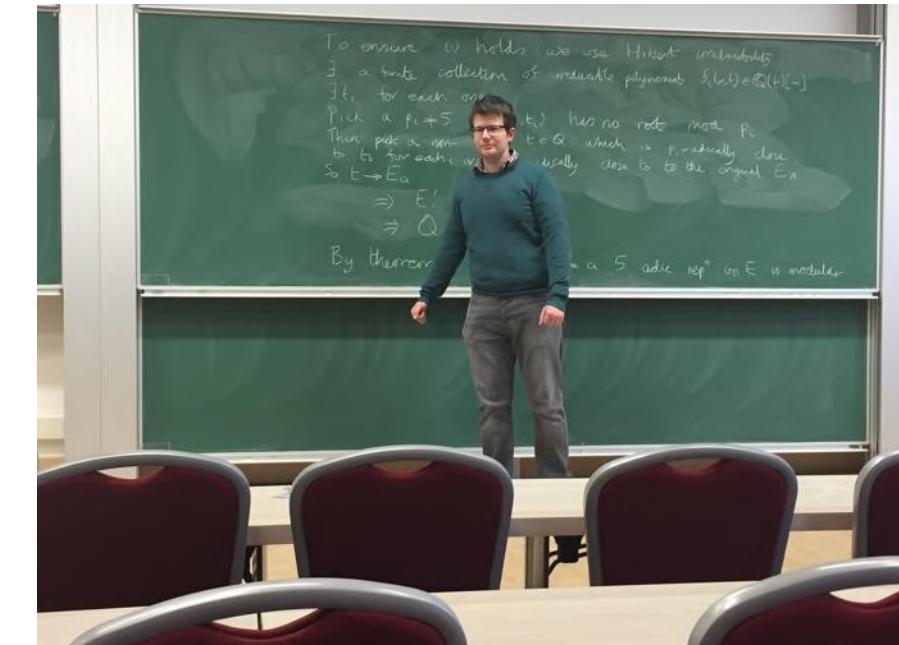


UNIVERSITY OF
BIRMINGHAM



UNIVERSITY OF
BIRMINGHAM

SCHOOL OF
MATHEMATICS



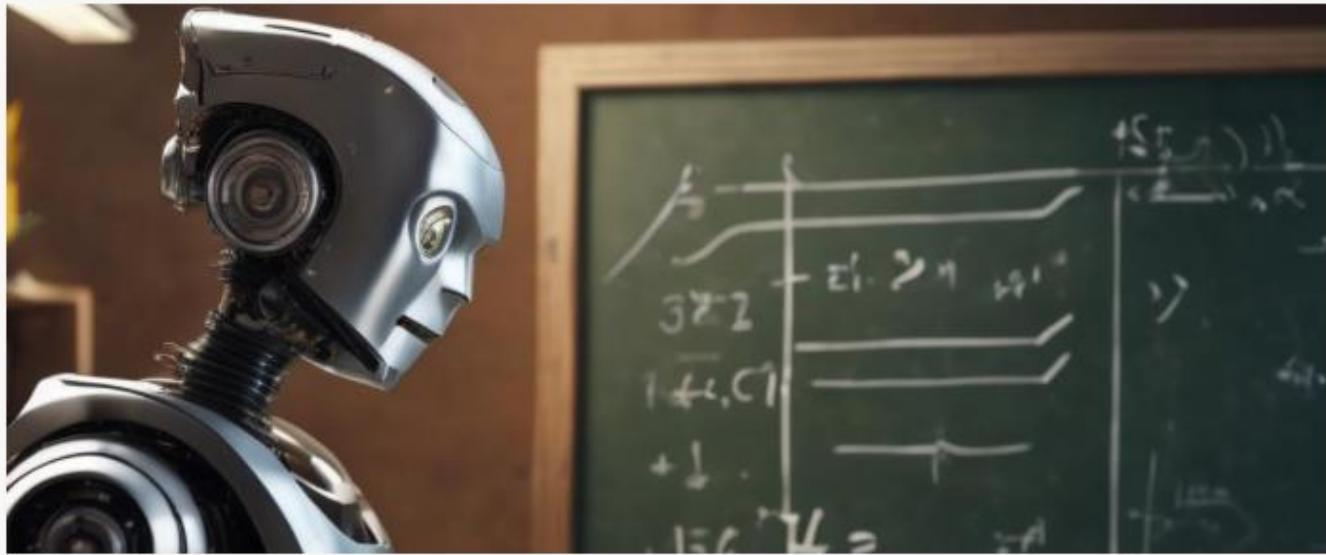
This time last year . . .

Generative AI: Its implications, and opportunities, for policy, pedagogy and practice within the mathematical sciences

Michael Grove
Deputy Pro-Vice Chancellor (Education Policy & Academic Standards)
M.i.Grove@bham.ac.uk



GENERATIVE AI ASSESSMENT - WORKSHOP



Workshop on Rethinking Assessment in The Mathematical Sciences in Times of Generative AI

Date: Wednesday 17th July 2024

Time: 10am - 4pm

Location: School of Mathematics & Statistics, University of Glasgow

Contact: Dr Jennifer Gaskell (jennifer.gaskell@glasgow.ac.uk)

Registration: Please register for the event [here](#)

Description: Are you redesigning your assessments and rethinking your learning outcomes as generative AI technologies advance? Do you wish to learn more about methods to incorporate into your own teaching?

What's 'new'?

"In 2025, we find that the student use of AI has surged in the last year, with almost all students (92%) now using AI in some form, up from 66% in 2024, and some 88% having used GenAI for assessments, up from 53% in 2024. The main uses of GenAI are explaining concepts, summarising articles and suggesting research ideas, but a significant number of students – 18% – have included AI-generated text directly in their work."

When asked why they use AI, students most often find it saves them time and improves the quality of their work. The main factors putting them off using AI are the risk of being accused of academic misconduct and the fear of getting false or biased results. Women are more worried about these factors than men, and men report more enthusiasm for AI throughout the survey, as do wealthier students and those on STEM courses."



Higher Education Policy Institute

Student Generative AI Survey 2025

Josh Freeman

February 2025

Kortext

HEPI Policy Note 61

Recommendations:

1. Every institution should continually review all its assessments and assessment procedures to keep up with the growing power of AI tools and students' competency in using them.
2. ...every member of staff involved in setting exams should have a deep working understanding of AI tools
3. Institutions should adopt a nuanced policy which reflects the fact that student use of AI is inevitable and often beneficial.
4. Institutions should keep AI policies under constant review as the capabilities of AI technologies develop.
5. ... institutions should seek opportunities to cooperate.

The experience of using generative AI tools (in/with mathematics), is more the good . . .



July 2025: How does ChatGPT 4o3 deal with more advanced mathematical topics?

With great thanks to
Joe Kyle

If I have a metric d on \mathbb{R}^2 can I prove that the closed unit ball with respect to d

closed unit ball with respect to d

Counterexample (Sketch):

Define a non-convex metric on \mathbb{R}^2 . For

$d(x,$

Where $C \subset \mathbb{R}^2$ is a cone (say, direction

This is a valid metric (though more tech
may no longer be convex — it can “bulg

for all metrics.

When is it convex?

The gap between ‘free’ and ‘paid’
versions of GAI tools appears to
have closed in terms of ‘accuracy’
or ‘correctness’ but still exists in
‘elegance’ and clarity of
exposition.

Conclusion:

You cannot prove that the closed unit ball
assumptions — such as d being induced

This is not generally true for arbitrary metrics.

1. Metric Space example

If I have a metric d on \mathbb{R}^2 can I prove that the closed unit ball with respect to d must be convex?

No, in general, the **closed unit ball** in \mathbb{R}^2 with respect to a **metric $d** is **not necessarily convex**.$

Explanation

A **closed unit ball** with respect to a metric d is defined as:

$$B_d(0, 1) = \{(x, y) \in \mathbb{R}^2 : d((x, y), (0, 0)) \leq 1\}.$$

Convexity of a set S means that **for any two points in $S**$, the entire **line segment** between them is also in S . That is:

$$\forall u, v \in S, \forall t \in [0, 1] : tu + (1 - t)v \in S.$$

However, a **general metric** on \mathbb{R}^2 does not necessarily respect the linear structure of \mathbb{R}^2 in such a way that the unit ball is convex.

—

Example of a Non-Convex Unit Ball

Consider the metric you asked about earlier:

$$d((x, y), (x', y')) = |x - x'| + d_0(y, y')$$

where d_0 is the discrete metric on \mathbb{R} .

In this metric:

* $d((x, y), (0, 0)) \leq 1$ consists of:

* All points where $y = 0$ and $|x| \leq 1$, because $d_0(y, 0) = 0$, or * All points where $y \neq 0$, but then $d_0(y, 0) = 1$, so $|x| \leq 0$, meaning $x = 0$.

Thus, the closed unit ball is:

$$B_d(0, 1) = \{(x, 0) : |x| \leq 1\} \cup \{(0, y) : y \neq 0\}.$$

This is **not convex**, because, for example:

* $(1, 0)$ and $(0, 1)$ are both in the ball, but their midpoint $(0.5, 0.5)$ is **not in the ball**.

Comment

This rather exotic metric is quite useful for exhibiting weirdness in a metric space.

The closed unit ball is indicated below. The vertical line (up the y-axis) stretches for ever in both directions. The red dashed line illustrates the non-convexity although this is also pretty clear.

We are trying new approaches

Problem 1: Pastry cutting

A manufacturer of cakes and pastries has engaged your group as consultants to give advice to the production manager. The key part of the production process for a particular product requires the cutting of circular and semi-circular disks from sheets of rolled pastry.

What is the optimal arrangement of the pastry cutting heads to minimise wastage?



UNIVERSITY OF BIRMINGHAM | SCHOOL OF MATHEMATICS

Problem 3: Is there a risk the UK will have an energy gap?

You are tasked with advising the UK government on the future electricity needs of the UK in 2040. In particular the government wishes to know if there is an 'energy gap' and if so the possible measures needed to address it.

There are two datasets listed in the Project 3 brief.



UNIVERSITY OF BIRMINGHAM | SCHOOL OF MATHEMATICS

Problem 2: Sustainable Harvests

An important challenge faced by the UK's farming industry is determining how many plants are to be planted on a given area of ground surface.

You are tasked with developing a mathematical model to describe the yield (total plant material) of a crop at any time during the period from planting to harvest. Of particular interest is the effect on yield of differing numbers of plants per area for crops commonly harvested within the UK.



UNIVERSITY OF BIRMINGHAM | SCHOOL OF MATHEMATICS

Problem 4: Water Pollution

For a new housing development, a developer needs to discharge polluted water back into the local river. Council regulations allow this, but only if the concentration of pollutants entering the river is in a certain range.

The developer has been advised a biological treatment system is likely to be the most reliable in dealing with the waste produced. Is it?



UNIVERSITY OF BIRMINGHAM | SCHOOL OF MATHEMATICS

- Use of generative AI tools promoted and actively encouraged.
- But a range of mitigations incorporated:
 - Group-based activities.
 - Assessment variety (written, video, presentation, oral assessment).
 - Peer assessment (of contributions) and peer review.
 - Open-ended and multi-stage problems.
 - Modified tasks:
 - Context specific (historical and region).
 - Large data sets.
 - Requiring information accessed via institutional subscription.
 - Reflective diary component.
 - Recalibration of grading schemes.

What's unchanged? The limits of AI detection. . .

- Generative AI tools are evolving faster than detection systems can keep pace.
- Current detectors (e.g. Turnitin, GPTZero, Copyleaks) continue to show inconsistent accuracy - with both missed AI content and false positives.
- Evasion is easy: tools like *Undetectable AI* or rephrasing with another AI model can bypass most detection methods.
- Bottom line: Detection is unreliable and always will be. Deliberate design is the better safeguard.

ORIGINAL ARTICLE

Open Access



Testing of detection tools for AI-generated text

Debora Weber-Wulff¹, Alla Anohina-Naumeca², Sonja Bjelobaba^{3*} , Tomáš Foltýnek⁴, Jean Guerrero-Dib⁵, Olumide Popoola⁶, Petr Šigut⁴ and Lorna Waddington⁷

*Correspondence:
sonja.bjelobaba@crb.uu.se

¹ University of Applied Sciences HTW, Berlin, Germany

² Riga Technical University, Riga, Latvia

³ Uppsala University, Uppsala, Sweden

⁴ Masaryk University, Brno, Czechia

⁵ Universidad de Monterrey, San Pedro Garza García, Mexico

⁶ Queen Mary University of London, London, UK

⁷ University of Leeds, Leeds, UK

Abstract

Recent advances in generative pre-trained transformer large language models have emphasised the potential risks of unfair use of artificial intelligence (AI) generated content in an academic environment and intensified efforts in searching for solutions to detect such content. The paper examines the general functionality of detection tools for AI-generated text and evaluates them based on accuracy and error type analysis. Specifically, the study seeks to answer research questions about whether existing detection tools can reliably differentiate between human-written text and ChatGPT-generated text, and whether machine translation and content obfuscation techniques affect the detection of AI-generated text. The research covers 12 publicly available tools and two commercial systems (Turnitin and PlagiarismCheck) that are widely used in the academic setting. The researchers conclude that the available detection tools are neither accurate nor reliable and have a main bias towards classifying the output as human-written rather than detecting AI-generated text. Furthermore, content obfuscation techniques significantly worsen the performance of tools. The study makes several significant contributions. First, it summarises up-to-date similar scientific and non-scientific efforts in the field. Second, it presents the result of one of the most comprehensive tests conducted so far, based on a rigorous research methodology, an original document set, and a broad coverage of tools. Third, it discusses the implications and drawbacks of using detection tools for AI-generated text in academic settings.

Keywords: Artificial intelligence, Generative pre-trained transformers, Machine-generated text, Detection of AI-generated text, Academic integrity, ChatGPT, AI detectors

Introduction

Higher education institutions (HEIs) play a fundamental role in society. They shape the next generation of professionals through education and skill development, simultaneously providing hubs for research, innovation, collaboration with business, and civic settings.



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

We remain dominated by assessment. . .

. . . which remains very traditional. . .

“Here we specifically consider the changes made by mathematical sciences departments to their assessment practices in the period from March 2020 until January 2021 and their proposed adjustments for the remainder of the 2020/21 academic year. We found that departments were using a range of different approaches regarding the release of their assessments. . .”

Henley, Grove & Hilliam, 2022

Grove, 2024 (<https://tinyurl.com/4httww3hv>)

Generative AI technologies and their role within assessment design

Michael Grove (Deputy Pro-Vice-Chancellor, Education Policy and Academic Standards, and Professor of Mathematics and Mathematics Education)
Contact: m.j.grove@bham.ac.uk

Introduction

Assessment serves multiple purposes within education (Brown, Bull and Pendlebury, 2013). One of its primary functions is to provide evidence of student learning that accurately reflects the efforts of an individual, and clearly demonstrates mastery of their knowledge, understanding, and skills. However, recent advances in, and the availability of, generative AI technologies mean that such tools now have the potential to be increasingly used by students for the completion of their assessments. This necessitates careful consideration of assessment design to ensure that where generative AI tools might be used by learners, their use is responsible, and the contribution of the individual learner to the work can be clearly demonstrated.

Importantly, consideration of the implications of generative AI technologies should not be used to automatically favour one assessment type over another, such as for example the increased use of invigilated on-campus examinations, which themselves have both benefits and limitations in assessing students' learning (Buckley, 2023). Instead, this offers a timely opportunity for academic members of staff to consider good assessment design and more broadly seek to answer the questions: Why are students being assessed? To what extent are they being assessed? What is being assessed and why? This should be undertaken alongside carefully examining how evidence of individual student learning and the associated achievement of learning outcomes is being collected at a programme, rather than module, level.

Considerations for assessment design

Whilst academic staff may not be required to use generative AI technologies within their teaching, all must now consider the potential impact upon student learning and assessment.

It's time to move the conversation on.



Blog News Publications

Latest Blogs



It's time we moved the generative AI conversation on

16 July 2025 by Michael Grove

We are well beyond the tipping point. Students are using generative AI – at scale. According to HEPI's Student Generative AI Survey 2025, 92% of undergraduates...

Released: 16 July
2025

<https://www.hepi.ac.uk/2025/07/16/its-time-we-moved-the-generative-ai-conversation-on/>

Release: w/c 21
July 2025

Designing the Student Learning Journey: A Practical Approach to Integrating Generative AI within Higher Education

Designing the Student Learning Journey: A Practical Approach to Integrating Generative AI within Higher Education

Michael Grove

Deputy Pro-Vice Chancellor, Education Policy & Academic Standards

Professor of Mathematics and Mathematics Education

The University of Birmingham, UK

m.j.grove@bham.ac.uk, ORCID: 0000-0002-3150-125X

Published Online: 7 July 2025

Abstract

Generative AI technologies are reshaping higher education, transforming how students access knowledge, engage with learning, and complete assignments. While institutional responses have largely focused on academic integrity and assessment security, this paper argues for a proactive, programme-level approach that embeds generative AI thoughtfully and ethically across the student learning journey. Drawing on examples from the mathematical sciences, it presents a practical framework to support curriculum teams in aligning AI use with programme outcomes, disciplinary values, and assessment design. Key recommendations include designing progression from foundational to advanced AI-supported tasks; fostering coherent, programme-wide expectations for ethical and transparent AI use; and developing students' critical AI literacy as a core graduate attribute. The paper also highlights the importance of equitable access to tools, respecting disciplinary contexts, and rethinking assessment formats to promote higher-order thinking. A programme-level checklist is provided to guide planning and implementation. By integrating generative AI with intentionality, institutions can move beyond reactive policies towards learning environments that prepare students for a future in which human and AI capabilities will increasingly work in partnership.

1. Introduction

To date, much of the discourse surrounding generative artificial intelligence (generative AI) in higher education has centred on its implications for assessment: how to detect it, how to mitigate risks, and how to ensure academic integrity. While these are important concerns, a singular focus on assessment risks overlooking the wide, and arguably more transformative, potential of generative AI technologies to support and enhance student learning. These tools, now widely accessible, offer students new ways to explore ideas, test understanding, and personalise their learning experience. Importantly, the ability to use generative AI tools effectively, ethically, and critically will become an increasingly vital graduate attribute.

It would be a mistake to begin by assuming that all students will use generative AI inappropriately or with the intention of gaining unfair advantage. Many are now entering higher education having already experimented with such tools in school or college (Freeman, 2025). They will continue to use these tools to make sense of complex material, generate examples, or check their understanding, especially when they are unsure where else to turn, when support is not available at convenient times, or when it doesn't align with their preferred learning approach. The appeal is clear.

M. J. Grove (2025)

What needs to change?

From	To
Panic and policy	Pedagogical design
Module-by-module variation	Programme-level coherence
"Don't use AI tools"	"Use AI tools well and responsibly"
Detection (tools)	Assessment by design
One-size-fits-all rules	Disciplinary nuance
Policy patching	Planned progression
Teaching about AI	Teaching with AI

It's time to shift from managing AI to designing with it.

What principles should guide learning design?

1. Intentionality

AI integration should be *designed*, not defaulted.

Decisions about AI use must be purposeful, aligned to learning aims, and not left to chance.

2. Coherence

Students need a *joined-up experience* across the programme.

Inconsistency between modules creates confusion, inequity, and risk.

3. Transparency

Expectations around AI use must be *clear, fair, and well communicated* to students and staff.

Unstated assumptions are a recipe for misunderstanding or misconduct.

4. Equity

Access, confidence, and capability with AI vary.

Curriculum design must reduce, not reinforce, these gaps.

5. Disciplinary Integrity

AI use should support, not undermine, what your subject values most.

Respect the forms of knowledge, communication, and reasoning that define the discipline.

6. Partnership

Treat students as *participants*, not problems.

They are already using AI. We need to guide, support, and learn with (and from) them.

7. Academic Integrity by Design

Instead of relying on detection or restriction, we ensure integrity through thoughtful task and (learning) environmental structure.

8. Future-Facing Education

Generative AI is not a passing phase. We need to prepare students for a future where human and AI capabilities interact.

From principles to practice: The seven pillars of design

1. Purpose and Progression

Embed AI use intentionally across the curriculum, aligned with learning outcomes.

Support students to move from basic familiarity to critical, reflective, and independent use.

2. Designing the Learning Environment

Protect what AI cannot replace: dialogue, collaboration, feedback, challenge.

Ensure that AI-supported tasks enhance learning, not bypass it.

Coordinate use across modules to avoid isolated or inconsistent practice.

3. Ethical Use and Acceptable Practice

Develop consistent frameworks (e.g. traffic light or five-level models) to guide student choices and encourage dialogue about learning.

Ensure expectations are transparent, fair, and embedded in programme guidance.

Design tasks so that misuse becomes irrelevant or structurally impossible.

4. Respecting the Discipline

Ensure AI use aligns with disciplinary norms and values.

In mathematics, preserve reasoning and proof, but use AI for exploration, explanation, or critique.

5. Digital and AI Literacy

Treat AI literacy as a core graduate attribute.

Scaffold capability and confidence across the programme.

Support equitable access and avoid over-reliance on premium tools.

Model thoughtful, visible use of AI in teaching, resources, and feedback.

6. Assessment Design

Move from detecting AI to designing assessments it *can't complete alone*.

Use formats that require reasoning, critique, or originality.

Balance *Assured* (AI-free) and *Exploratory* (AI-integrated) assessments to maintain rigour and foster innovation.

7. Supporting Students

Help students use AI responsibly in self-directed learning.

Support reflection, metacognition, and ethical decision-making.

Respect students who choose *not* to use AI and ensure inclusive alternatives.

Design decisions still require local judgement.

1. Embedded AI in common tools

(e.g. Overleaf, Word, Grammarly) - where is the line between tool and tutor?

2. Assessment criteria in a generative AI age

What counts as original work now? Where do we draw the line between support and misconduct?

3. Scaffolding AI literacy across years

How do our expectations of students evolve from Year 1 to final year?

4. Supporting non-users

How do we accommodate students who choose not to use AI: ethically, environmentally, or personally?

5. Staff development and consistency

How do we ensure staff are supported, confident, and aligned especially in cross-disciplinary programmes?

6. Assessment load and feedback culture

If students increasingly draft with AI, how do we ensure feedback (and workload) remains meaningful?

Designing learning activities with AI in mind: examples from the mathematical sciences.

Socratic Opponent

Clarifying Statistical Misconceptions

Students critique and revise AI-generated explanations of concepts like p-values or confidence intervals.

Promotes conceptual precision and the ability to identify misleading reasoning.

Dialogue Partner

Scripted Conversation with a Mathematician

Students co-write and refine an AI-generated dialogue with a historical mathematician to explore a concept.

Encourages creativity, clarity, and critical thinking through narrative learning.

Role⁶	Description	Example of implementation
Possibility engine	AI generates alternative ways of expressing an idea	Students write queries in ChatGPT and use the Regenerate response function to examine alternative responses.
Socratic opponent	AI acts as an opponent to develop and argument	Students enter prompts into ChatGPT following the structure of a conversation or debate. Teachers can ask students to use ChatGPT to prepare for discussions.
Collaboration coach	AI helps groups to research and solve problems together	Working in groups, students use ChatGPT to find out information to complete tasks and assignments.
Guide on the side	AI acts as a guide to navigate physical and conceptual spaces	Teachers use ChatGPT to generate content for classes/courses (e.g., discussion questions) and advice on how to support students in learning specific concepts.
Personal tutor	AI tutors each student and gives immediate feedback on progress	ChatGPT provides personalized feedback to students based on information provided by students or teachers (e.g., test scores).
Co-designer	AI assists throughout the design process	Teachers ask ChatGPT for ideas about designing or updating a curriculum (e.g., rubrics for assessment) and/or focus on specific goals (e.g., how to make the curriculum more accessible).
Exploratorium	AI provides tools to play with, explore and interpret data	Teachers provide basic information to students who write different queries in ChatGPT to find out more. ChatGPT can be used to support language learning.
Study buddy	AI helps the student reflect on learning material	Students explain their current level of understanding to ChatGPT and ask for ways to help them study the material. ChatGPT could also be used to help students prepare for other tasks (e.g., job interviews).
Motivator	AI offers games and challenges to extend learning	Teachers or students ask ChatGPT for ideas about how to extend students' learning after providing a summary of the current level of knowledge (e.g., quizzes, exercises).
Dynamic assessor	AI provides educators with a profile of each student's current knowledge	Students interact with ChatGPT in a tutorial-type dialogue and then ask ChatGPT to produce a summary of their current state of knowledge to share with their teacher/for assessment.

But we need to engage with the pedagogy underpinning learning, teaching and assessment tasks.

Sharples (2023) in UNESCO Quick Start Guide ‘ChatGPT & Artificial Intelligence in Higher Education’

Is it because the data is paired?

S

Socratic Tutor in Mathematics • Custom Gem

Excellent! Yes, that's exactly it. Your data is **paired**.

Now, thinking about a specific statistical test for paired data, aimed at seeing if there's a difference between the "before" and "after" scores, have you come across any tests that fit this description in your reading or searches? If not, no worries at all, but it's worth a moment to see if anything springs to mind.

This type of test specifically looks at the *differences* for each pair of scores.

Is it the Coxon test? I have just looked at Google.

S

Socratic Tutor in Mathematics • Custom Gem

⚠ This is for informational purposes only. For medical advice or diagnosis, consult a professional.

You're very close with that name! The "Coxon test" sounds like you've seen parts of the name of a relevant test.

The test you're likely looking for is the **Wilcoxon Signed-Rank Test**.

You also mentioned "parametric" and "non-parametric" tests earlier. What did you recall about the difference between them, and why might that distinction be important for deciding between the Wilcoxon Signed-Rank test and another common test for paired data, the **Paired samples t-test**? (Yes, there are two main contenders for paired data!).



So I guess that would mean the other hypothesis, I think

I don't know - can you just tell me what test I need to do on my data and how to do it. It is getting late and i am in a rush.

S • Custom Gem

the pressure of time, and it's natural to want a quick answer when my role is to help you *understand* the process, so you're better and for future statistical challenges. Just giving you the answer won't understanding.

characteristics of your data:

the **same students** both *before* and *after* an intervention (the

re's a **difference or improvement**.

nd of test do you think would be most appropriate to compare two ne individuals? We touched on a key term earlier that describes this o you remember it?



I'm not sure it does make sense - is there another way to think about this?

that must be the contradiction right?

S Study Buddy for Real Analysis • Custom Gem

Show thinking ▾

Of course! Let's set aside the epsilon-proof for a moment and come at it from a different angle. This is a great way to build intuition.

Let's think about **subsequences**.

A subsequence is just what it sounds like: a sequence made by picking out some of the terms from the original sequence, while keeping them in the same order.

For our sequence $x_n = (-1)^n$:

{-1, 1, -1, 1, -1, 1, ...}

Finding Subsequences

We can actually pull out two very simple subsequences from this:

1. **The "Odd" Subsequence:** Let's just look at the terms in the odd-numbered positions (1st, 3rd, 5th, etc.).
What does that subsequence look like?
2. **The "Even" Subsequence:** Now let's just look at the terms in the even-numbered positions (2nd, 4th, 6th, etc.).
And what does that subsequence look like?

What are the limits of those two subsequences?

This is leading to a really important rule in analysis:

If a sequence converges to a limit L, then every single one of its subsequences must also converge to that same limit L.

Thinking about that rule, can you see how it helps us with $(-1)^n$?

And this one has subsequences that don't converge to the same limit? Right?

S Study Buddy for Real Analysis • Custom Gem

Show thinking ▾

You've got it! That is precisely the reason.

Let's write it out clearly.

The Subsequences

- The "**Odd**" Subsequence (the 1st, 3rd, 5th, ... terms) is:
{-1, -1, -1, -1, ...}
This is a constant sequence, and its limit is clearly **-1**.
- The "**Even**" Subsequence (the 2nd, 4th, 6th, ... terms) is:
{1, 1, 1, 1, ...}
This is also a constant sequence, and its limit is **1**.

The Conclusion

We have found two subsequences of $(-1)^n$ that converge to two **different** limits (-1 and 1).

Because of the rule that *all* subsequences of a convergent sequence must converge to the *same* limit, we can definitively say that the sequence $(-1)^n$ **does not converge**.

Hopefully, that way of thinking about it feels a bit more solid. It's a very powerful tool for proving divergence! 

And if students are using generative AI tools for feedback and checking, why can't we?

 UNIVERSITY OF BIRMINGHAM

[Home](#)

Essay Marking Assistant

This is a prototype service designed to explore the use of language AI in helping augment the marking of essays

[Try it now](#) [Find out more](#)

What our tool does.

Marker insights in minutes

Based on marking criteria the service highlights content that matches expected understanding

AI models based on marking scheme

Based on AI language models developed against specific essays marking schema.

Overall Sentiment

Overall Sentiment Analysis showing Positive, Neutral, and Negative tones.

Sentiment by sentence

Sentiment analysis for individual sentences, showing Positive, Neutral, and Negative tones.

Create an Assistant

Assistant name
UoB Rubric Generator

Short description of what the assistant does

The AI rubric generator is a tool designed to streamline the assessment process for university academic staff. It automatically creates customised

System message

Understanding Educational Context:
You should be trained on a large dataset of educational resources, including:
Learning objectives (Bloom's Taxonomy, etc.)
Assessment design principles
Common assignment types and their evaluation criteria
Examples of effective rubrics across various disciplines.

Starter message to the Assistant

Introduce yourself.

AI model

GPT-4o

[Save Changes](#)

Principles on the Use of Artificial Intelligence Tools to Support Grading and the Provision of Student Feedback

In 'Generative Artificial Intelligence'

- > Generative Artificial Intelligence and its role within teaching, learning and assessment
- > Programme handbook and Canvas statements relating to the use of Generative AI tools
- > Guidance for Academic Schools Relating to PGT Dissertations and the use of Generative Artificial Intelligence Tools
- > Principles on the Use of Artificial Intelligence Tools to Support Grading and the Provision of Student Feedback
- > Acknowledging and Citing the Use of Generative AI by Students
- > GAI Community of Practice (MS Teams)

Assessment is a crucial part of the learning process and makes more difference to how students approach their learning than any other aspect of their studies, including the teaching. Assessment has an important role in determining whether a student has met the learning outcomes of their programme of study, however it has a much more important effect in guiding and motivating how students learn, particularly when coupled with the provision of high-quality and timely feedback.

Artificial intelligence (AI) and generative AI tools now offer great potential to assist with our assessment and feedback practices within higher education. This not only includes the provision of more rapid and efficient feedback at scale, but also the ability for staff to better identify and support student learning gaps, and for students to access feedback that is more immediate and dialogical in its nature. But careful consideration of their implementation is needed to ensure that the assessment of student work, and the associated provision of feedback, is an activity that remains the responsibility of academic members of staff based upon disciplinary expertise and academic judgement.

As a university we are keen to harness the potential of AI tools and technologies where they enhance and support student learning, all whilst ensuring their responsible and ethical implementation to protect users and their information. In alignment with our *Guiding Framework for the Introduction of Generative AI Within Teaching, Learning and Assessment*, these new University-wide principles aim to achieve a balance between encouraging and supporting innovation in the use of AI tools within assessment and feedback and managing potential risks associated with their ongoing development and use. They will be regularly reviewed alongside the Guiding Framework.

Principles

	Analysis	Sentiment Analysis	AI Mark	AI Marker Comment	Model Comment
Extra-Curricular	Does the activity described take place outside of the student's University course, i.e. it was not part of a degree programme, module or a placement that is part of their study. CPD, internships and summer activities are fine as they aren't part of a student's course.	✓ 100%	Presenting at open days is a voluntary activity outside of academic coursework.	Criterion met fully	
Time-Frame	Did the activity take place while the student was at University, i.e. it did not take place while at College or School or at any other time. Please remember that ALL submissions are made by current University students, and the current date is December 2024.	✓ 100%	Activity took place while the student was at university, as indicated by their involvement in open days and offer holder days.	Criterion met fully	
Suitable-Activity	Might the activity described be helpful as part of a job application to highlight their personal attributes. Social activities like going on holiday, attending parties are not suitable. Nor are activities like medical appointments.	✓ 95%	Presenting and engaging with prospective students showcases valuable skills like public speaking and audience engagement, beneficial for job applications.	Criterion met fully	
Achievement	Does student's essay text describe an achievement that is something more than just the day to day tasks or responsibilities within a role - it something they have uniquely contributed. The description must refer to their own contributions.	✓ 80%	The student describes a specific achievement in tailoring presentations to diverse audiences and receiving positive feedback, showing personal growth and impact.	Criterion met fully	
Character Count	Are there more than 1500 characters?	✓ 1763 chars			
Word Count	Are there more than 150 words?	✓ 302 words			

Summary: what are my key messages?

1. **This is not about lowering standards:** It's about reaffirming what really matters in a degree: critical thinking, reasoning, and deep understanding, not just factual recall and reproducing answers without understanding.
2. **This isn't about integrating AI everywhere:** It's about deciding where it adds value, and being explicit about where it doesn't.
3. **We must rethink what a mathematics degree is for:** If AI can do parts of the work, what's left must be meaningful, human, and worth doing. That is the heart of disciplinary integrity.
4. **Design beats detection:** We maintain academic integrity through deliberate curriculum and assessment design, not by trying to catch students out.
5. **Programme-level thinking is essential:** Students need consistent, joined-up expectations. Local improvisation isn't enough - this needs to be designed across the whole programme.
6. **This is a curriculum design challenge, not a tech issue:** It's not about policies or tools, it is about an opportunity to design learning that's authentic, future-facing, and pedagogically sound. What we choose to design for now will shape what our graduates become.
7. **We must support students to use AI well, and ethically:** That includes building confidence, promoting critical reflection, supporting equitable access, and respecting those who choose not to use it.

Questions, comments, suggestions, ideas?

Michael Grove

Deputy Pro-Vice Chancellor (Education Policy
and Academic Standards)

Professor of Mathematics and Mathematics
Education

m.j.grove@bham.ac.uk



UNIVERSITY OF
BIRMINGHAM

