

KEEPING AI GENERATED COURSE TEXT ON TOPIC

A TWO STAGE APPROACH TO CONFIRM SUBJECT FOCUS

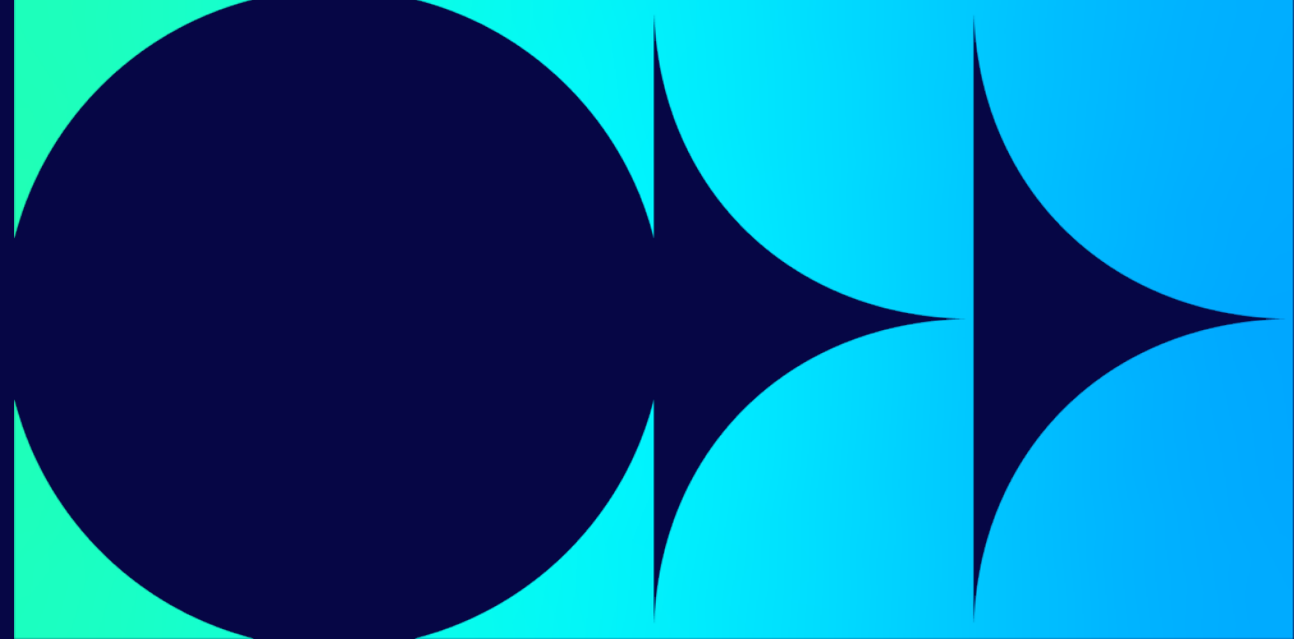
Chris Edwards

Institute of Educational Technology

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chris.Edwards@open.ac.uk

<https://iet.open.ac.uk/people/chris.edwards>



Can GenAI help us produce curriculum?

We reviewed all our institutional documentation on developing curriculum:

- from the initial idea,
- through the planning, development, and approval stages,
- to enrolling and presenting to students

Considering what role, if any, generative AI could play.

We found that almost every stage could benefit in some way.

In every instance, we agreed that in their current form, the genAI technologies are best considered as productivity tools. As such, they can, for example:

- help use do individual tasks more quickly
- sometime reduce the need to involve as many other members of staff
- help to nudge us out of a rut, if we are struggling to think of new ideas
- find relevant text we have already written by effectively searching and coherently presenting this

The next slide attempts to illustrate some of these...

Examples of how gen AI can assist with curriculum development

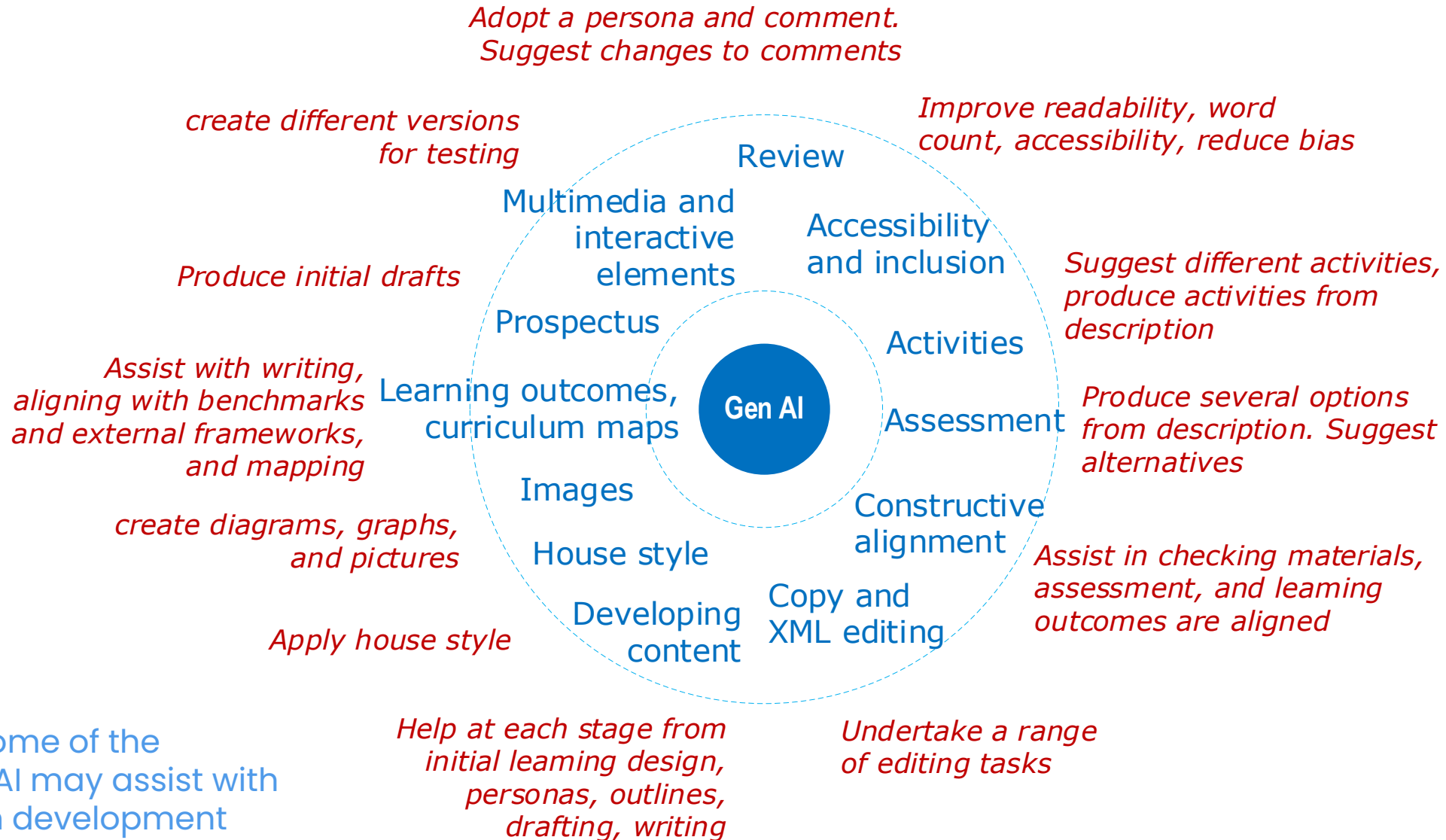


Figure 1, Some of the ways gen AI may assist with curriculum development

Stage 1

Triangulation of learning outcomes

Triangulation of learning outcomes

This makes use of a large language model (LLM) twice, with the second essentially providing a check on the first. Here are the steps:

- To start with, you need to have an agreed set of learning outcomes that are to be covered by the text you will generate. These can be taken from another reliable source, created using your own expertise, or themselves generated using an LLM. However sourced, these should be agreed by someone who knows the topic and the wider subject.
- **Step 1** – using your preferred prompting strategy, direct the LLM to produce the text that covers just these learning outcomes in an appropriate length. We used Retrieval Augmented Generation (RAG), calling on the text of other modules we had already written.
- Read this text to ensure you are content with it. You may need to run the prompt, or an adjusted prompt again.
- **Step 2** – With your final version of the text, begin a new conversation with the LLM. Ask it to identify the learning outcomes within the text. You might get a different number of statements. This is not a problem.
- **Step 3** – now compare the two sets of learning outcomes: the ones you had at the outset and these. Ask yourself these questions:
 - a) Do each of the new statements map onto the original list or are there additional statements?
 - b) Are all the original statements covered by the new list or are some not covered?

NB: Don't forget you need to properly cite the source for any words that are not your own

Triangulation of learning outcomes

- If the lists have the same coverage you can be fairly confident the text does cover what is needed without missing anything or adding subtopics that might distract or confuse.
- As you may get a slightly different set of learning outcomes each time Step 2 is run, you may wish to repeat steps 2 and 3 until you are fully satisfied.

Benefits:

- The time saving to you will depend on your own familiarity with working with learning outcomes and level of expertise in the subject matter.
- This could be an instance where you may find you no longer need to ask a colleague to check you have covered the learning outcomes. Allowing them to focus more on reviewing and academic editing.

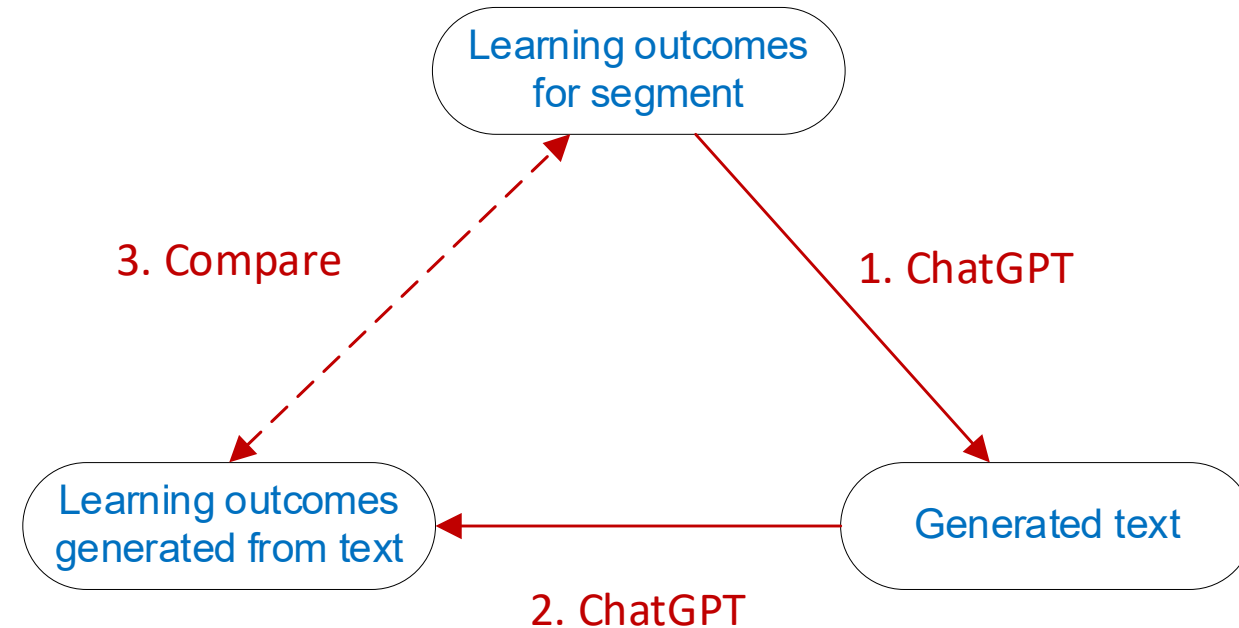


Figure 2, The triangulation of learning outcomes

Example: 2800 words in generated text

Original By the end of this section, you should be able to:

- define project management and highlight its importance in achieving project goals
- distinguish between different approaches to managing projects, their life cycles and their applications
- describe the role of a project manager (or equivalent role(s) in Agile and hybrid methodologies) and manage key relationships within a project
- demonstrate a range of skills and qualities essential for effective project management
- apply learned concepts practically, through completion of sequential assignments.

These two lists map quite well, suggesting some points to double check with the text.

Generated from the 2800 words of generated text, 1st attempt
By the end of this section, you should be able to:

Upon completion of this beginners' guide to project management, learners will be able to:

1. Describe the fundamentals and importance of project management in various organisations.
2. Identify the roles and responsibilities of a project manager.
3. Understand how project management contributes to organisational success by aligning tasks with goals, adapting to changes, and fostering teamwork for skill development.
4. Reflect on their personal experiences related to task organisation and planning.
5. Clearly define the concept of project goals and requirements and understand the significance of the SMART goals framework.
6. Recognise the different tangible and intangible benefits of a project and their alignment with project goals and the broader organisational strategy.
7. Understand and explain the five key project management processes - Initiating, Planning, Executing, Monitoring and Controlling, and Closing.
8. Apply the concepts of project management processes to real-world scenarios or case studies.
9. Analyse a chosen real-world project, identify key project management processes in it, and summarise their findings.

Stage 2

Improving confidence through aggregation

How to use aggregation to improve confidence

This method makes use of one of the characteristics of an LLM: The fact that it is built on statistical models. This stochastic nature of an LLM often results in a slight variation of output when presented with exactly the same prompt.

When working with computers we have become very used to always getting the same result whenever we repeat the same steps. Adjusting to systems where exact replication is not necessarily possible will take some time. *I cannot give you the steps I used to produce an AI generated text and expect you to get the same result.*

We can also use this feature when mapping text and learning outcomes...

Proposition:

When we prompt an LLM to produce a table indicating, with a '1', where there are semantic links between a series of texts and each of a set of learning outcomes, we would expect a slightly different table of results each time. By repeating this prompt say 10 times and aggregating the results, we should see a new table with results ranging from 0 to 10.

- Zeros indicate where there was no semantic link found in any of the 10 runs.
- '10's show where there a link found in every run

Mapping example...

This is a section of our results spreadsheet. The full spreadsheet maps 57 open educational resource (OER) descriptions against 21 learning outcomes.

| Name of OER/Free course/Free resource | Energy usage | | | Energy efficiency | | | Mobility | | | Energy Sources | | |
|---|--------------|-----|-----|-------------------|-----|-----|----------|-----|-----|----------------|------|------|
| | LO1 | LO2 | LO3 | LO4 | LO5 | LO6 | LO7 | LO8 | LO9 | LO10 | LO11 | LO12 |
| Introduction to Energy Management | 10 | 10 | 0 | 9 | 9 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| Smart cities | 7 | 5 | 8 | 4 | 1 | 7 | 3 | 3 | 2 | 1 | 1 | 0 |
| Smart cities: Principles of sustainable urban planning | 5 | 5 | 6 | 7 | 4 | 4 | 7 | 7 | 6 | 7 | 4 | 1 |
| Smart cities: Energy efficiency in buildings and urban energy supply | 7 | 8 | 5 | 10 | 10 | 9 | 0 | 0 | 0 | 5 | 4 | 2 |
| e-learning: energy management in a home | 10 | 10 | 2 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| e-learning: energy management in a home | 10 | 10 | 1 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| Future of Building services engineering | 4 | 5 | 2 | 10 | 10 | 10 | 0 | 0 | 0 | 3 | 3 | 1 |
| Introduction To Sustainable Energy | 2 | 2 | 2 | 2 | 2 | 1 | 4 | 6 | 4 | 10 | 10 | 3 |
| Why Energy Efficiency | 7 | 10 | 0 | 10 | 10 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Business Implications of Intelligent and Integrated Energy Systems | 3 | 4 | 10 | 3 | 4 | 3 | 0 | 0 | 0 | 3 | 3 | 2 |
| Introduction to energy transition: RES and smart grids | 1 | 1 | 4 | 0 | 0 | 5 | 1 | 2 | 2 | 8 | 9 | 0 |
| Sustainable Energy Production | 1 | 1 | 0 | 3 | 3 | 0 | 4 | 5 | 1 | 10 | 10 | 1 |
| Educational Videos and a quiz | 7 | 7 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 6 | 5 | 1 |
| Maak je meter slim | 2 | 2 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Renewable Energy Technology Fundamentals | 0 | 0 | 0 | 5 | 4 | 0 | 2 | 4 | 1 | 10 | 10 | 2 |
| Photovoltaik Solar Energy Systems | 0 | 0 | 0 | 7 | 9 | 0 | 0 | 1 | 1 | 9 | 10 | 1 |
| Rural Energy Systems and Decentralised renewable energy supply | 1 | 1 | 0 | 1 | 1 | 0 | 2 | 6 | 3 | 8 | 10 | 1 |
| Fundamentals Of Energy In Buildings | 3 | 4 | 0 | 10 | 10 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sustainable living: Saving energy | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Community Energy: A practical guide to reclaiming power | 0 | 2 | 1 | 0 | 0 | 0 | 4 | 6 | 6 | 4 | 7 | 0 |
| Introduction to energy transition: energy savings | 9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Digitalisation & sustainability - from duel to duet (section: smart technology) | 2 | 2 | 10 | 1 | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| Electric Industry Operations and Markets | 2 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Renewable Energy | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 1 | 10 | 10 | 0 |
| Fundamentals of photovoltaics | 0 | 0 | 0 | 6 | 7 | 0 | 0 | 0 | 0 | 9 | 10 | 1 |
| Energy in a Changing World | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 9 | 5 | 1 |
| Solar Energy Basics | 0 | 0 | 0 | 6 | 7 | 0 | 0 | 0 | 0 | 8 | 10 | 0 |

Review of results

We reviewed the highest and lowest scoring rows:

- the most common review outcome was that the aggregated scores gave accurate results against all 21 learning outcomes
- There were a small number where the reviewer disagreed with at least one of the 21 scores
- The others category contains those with some inconsistency in the text relating to the OER, or that the reviewer felt unable to reach a conclusion.

| <i>Name of learning resource</i> | <i>Higher ranking</i> | <i>Lower ranking</i> |
|----------------------------------|-----------------------|----------------------|
| Agree with ChatGPT result | 4 | 4 |
| Disagree with ChatGPT result | 2 | 1 |
| Other | 3 | 3 |
| Total | 9 | 8 |

Findings

From this small scale study, the approach is sufficiently encouraging for us to plan to use it again.

Potential benefits:

1. This process can assist in simplifying mapping similarities between texts
2. As the LLM was requested to identify semantic similarities between existing texts. No new text has been generated. We have used the technology's ability to perform natural language processing (NLP) functions
3. Currently, using this approach can save time for small mappings cf. note below

Difficulties

1. At this point, we cannot claim a time saving for this particular aggregation because each mapping had to be broken down into segments, the results were not always returned in the same format: Sometimes JSON had to be converted into csv. We expect the technology to develop rapidly to cope with larger amounts of text.

Conclusion

Conclusions

Both the **triangulation** and **aggregation** methods show promise in supporting course production by assisting in the alignment between text and learning outcomes.

They can be used independently or together.

These are respectively, a single and a small-scale trial of the methods and we intend to test them further.

NB: We must not forget that we need to properly cite the source for any words that are not our own.

Acknowledgement

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Thank you

chris.Edwards@open.ac.uk



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