

# Teaching strengths and weaknesses of Generative AI

A Teacher

## Ordering the milk

Consider a  $3 \times 5$  milk crate. Is it possible to put 6 milk bottles in the crate such that each row and each column contains an even number of bottles?

This is a puzzle that forms part of the Fun Maths Roadshow, owned by the Liverpool Mathematical Society (The Liverpool Mathematical Society, 2014), and routinely delivered to schoolchildren and prospective university candidates. It's a fun puzzle and, to avoid spoilers, you won't find the solution here!



Figure 1: Image generated by Dall-E 3

## Open AI's next top model

Training students to use Generative AI critically is essential, given the likely importance of such skills in the future (Bozkurt, 2023; Mhlanga, 2023). But Large Language Models have limitations. They are trained to mimic natural language, and – at the time of writing – perform badly at logical deduction and reasoning (Davis, 2024). There are two issues: the first, helping students to use Generative AI effectively when appropriate to do so, which is a larger discussion. The second, helping students to determine when it is not appropriate to use Generative AI.

## Are you smarter than a 2-year-old LLM?

As part of a first-year mathematics skills modules, students are introduced to Generative AI and are presented with the milk bottle puzzle. The goal is to demonstrate the limitations of Generative AI. Most students are able to eventually solve the milk bottle puzzle – at least, once they remember or are reminded that zero is an even number (Levenson et al., 2007). To add a competitive element, they race against ChatGPT 4o to see who gets the answer first. As an experienced user might anticipate, ChatGPT 4o performs incredibly poorly at this task and far worse than humans. But this is a valuable learning opportunity for new students, who might overestimate the power of Generative AI, and might otherwise depend on it too much throughout their studies.

Did you solve the puzzle?

## References

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