

Raising Issues

Alice investigates the potential for using artificial intelligence chatbots in classroom teaching and learning, and the challenges this presents for geography teachers.



Accompanying online materials

OK computer? Using artificial intelligence for teaching and learning about climate change

Geography students have benefited from the use of information technology for decades. From the flicker of television, to the internet, fieldwork apps and geographical information systems, ICT has opened up our access to knowledge and understanding of the world. This article considers the next technological step – raising the issue of using language-learning tools in school geography – and considers if the gains will outweigh the challenges it presents for geography teachers.

Interview with a chatbot

You can't fail to be impressed by the speed at which ChatGPT writes. The open access chatbot, from Open AI, is a remarkable and interactive encyclopaedia of knowledge. It uses the content of the internet (circa 2021, when it was created) to generate answers to just about any question you ask. Its voice is (on first hearing) apolitical, balanced and informed.

The advent of language-learning tools such as (Microsoft-backed) ChatGPT, Google's Bard and others, presents teachers with a whole raft of

challenges and opportunities in equal measure. This can be demonstrated by a conversation I had with ChatGPT about climate change and how to teach it in February 2023.

Challenge 1 (and opportunity 1): Using a machine to investigate a moral issue

The good news is that a language-learning tool trained on the contents of the internet (up to 2021) does reflect the scientific consensus, providing five different 'lines of evidence' when asked 'Is climate change real?'. It is very clear on the facts about the changing level of carbon dioxide in the atmosphere and the implications.

But I did not begin the interview with that. Channelling a disgruntled geography student asked to engage with a huge environmental issue not of their generation's making, I began with 'Who is to blame for climate change?' and set a limit of 100 words for ChatGPT's answer (Figure 1). I wanted to test the moral compass of its computational code, and the degree to which it is 'political'. Almost every answer finished with a general call to action, such as the laudable '... everyone has a part to

Figure 1: ChatGPT's response to 'Who is to blame for climate change?'

**Who is to blame for climate change?
(100 words)**

Climate change is a complex global problem that has been caused by various factors, including human activities and natural processes. The main cause of climate change is the emission of greenhouse gases, such as carbon dioxide and methane, into the atmosphere. These emissions are largely the result of burning fossil fuels for energy, deforestation, and other human activities. While individuals, governments, and corporations all have a role to play in reducing emissions, some of the largest emitters are countries with fast-growing economies, such as China and India. Ultimately, everyone has a part to play in addressing the root causes of climate change and reducing emissions to prevent further harm to the planet. (97 words)

play in addressing the root causes of climate change and reducing emissions'. It did highlight that '... some of the largest emitters are countries with fast-growing economies, such as China and India' in an answer otherwise devoid of place names or culpable countries. But when pressed on 'Who should pay compensation for the effects of climate change? Include country names' it went beyond generalities to reflect current debates about climate repatriation payments demanded from '... the United States, Australia, Canada and those in the European Union, which have historically been the largest emitters'.

I found it relatively hard-wired for balance, despite current commentary in the media about the degree to which ChatGPT is left-leaning (Kemper, 2023), reflecting the ideas of 'pro-environmental, left-libertarian ideology', for example, backing taxes on flying (Hartman *et al.*, 2023). It is well-versed on the different ways in which both AI systems and people can reduce their carbon footprint, but when asked 'Should a geography teacher fly?' (Figure 2), it typed me a pretty banal list of the pros and cons of international travel – it won't be drawn! Further, it reminded me that it doesn't have 'feelings and emotions' when I asked it how it felt about the United Nations' predictions of likely atmospheric warming in the coming decades (Figure 3). So, in conclusion, I think being able to quiz a machine about a moral, geographical issue presents us not only with a rich (and flawed) encyclopaedia but also the opportunity to explore with students

the distinction between the ethics of what we do about climate change, i.e. climate justice, and facts about our world.

Challenge 2: It will write your students' homework for them, in seconds

It's worth noting that a student should be 18 years old to register to use ChatGPT. However, many will, no doubt, use it at a younger age in the home environment. Some schools have already banned it. New York City public schools blocked ChatGPT access on school computers and networks, citing their concerns about impacts on learning (Roose, 2023), but others have taken a different view. In the world of academia, UCL's (2023) staff briefing earlier this year advised lecturers to 'be clear with students what you regard as a permissible use of AI in your particular assignment, and how they should acknowledge that use'.

If a chatbot has written your student's homework, can you detect this? There are numerous sites that allow you to check if typed text is 'human- or AI-generated', such as AI Text Classifier (by Open AI), AI Writing Check and GPTZero. However, they all carry disclaimers explaining that they are fallible. The site AI Writing Check states the tool is 'accurate 80–90 % of the time'. GPTZero will highlight specific sentences it thinks might have been written by a computer and gives a text an overall score for 'perplexity' (randomness of the text), and 'burstiness' (a measurement of the variation in perplexity). In a test, my own writing received a score from GPTZero twenty times

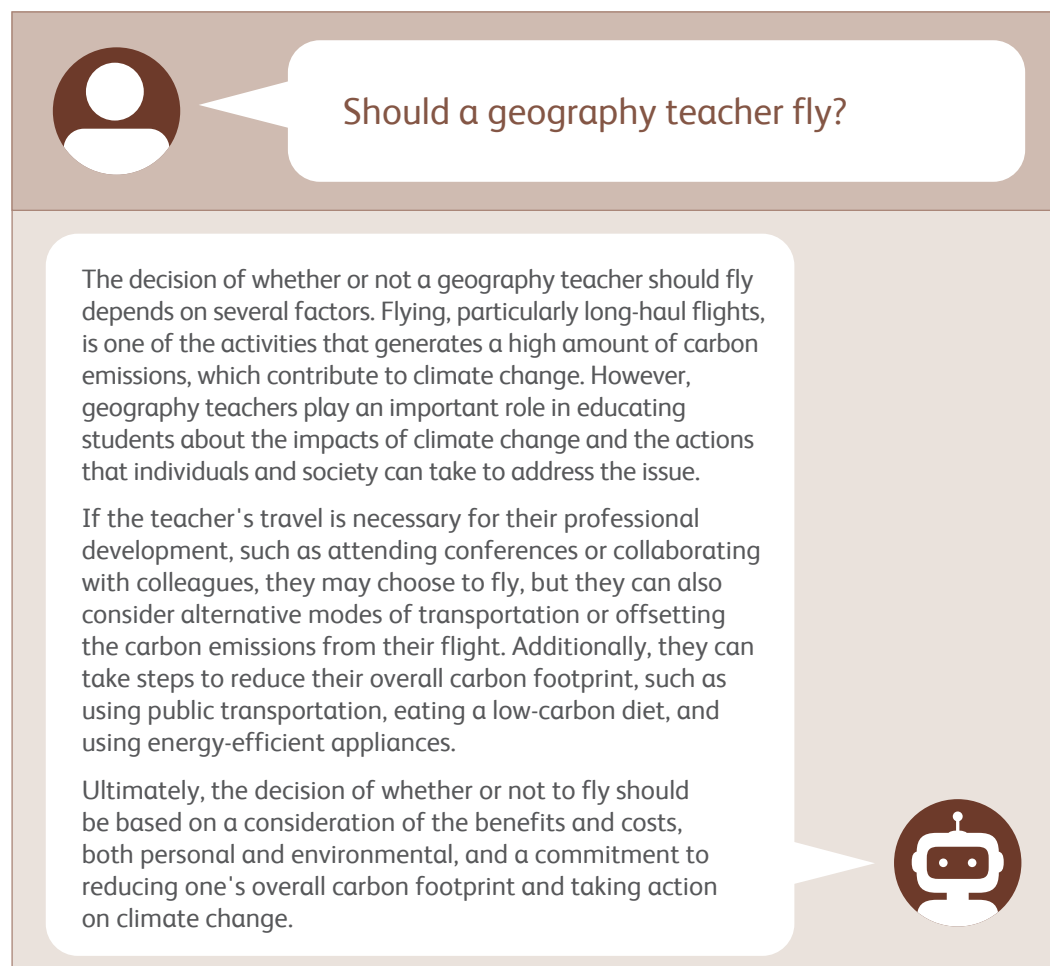
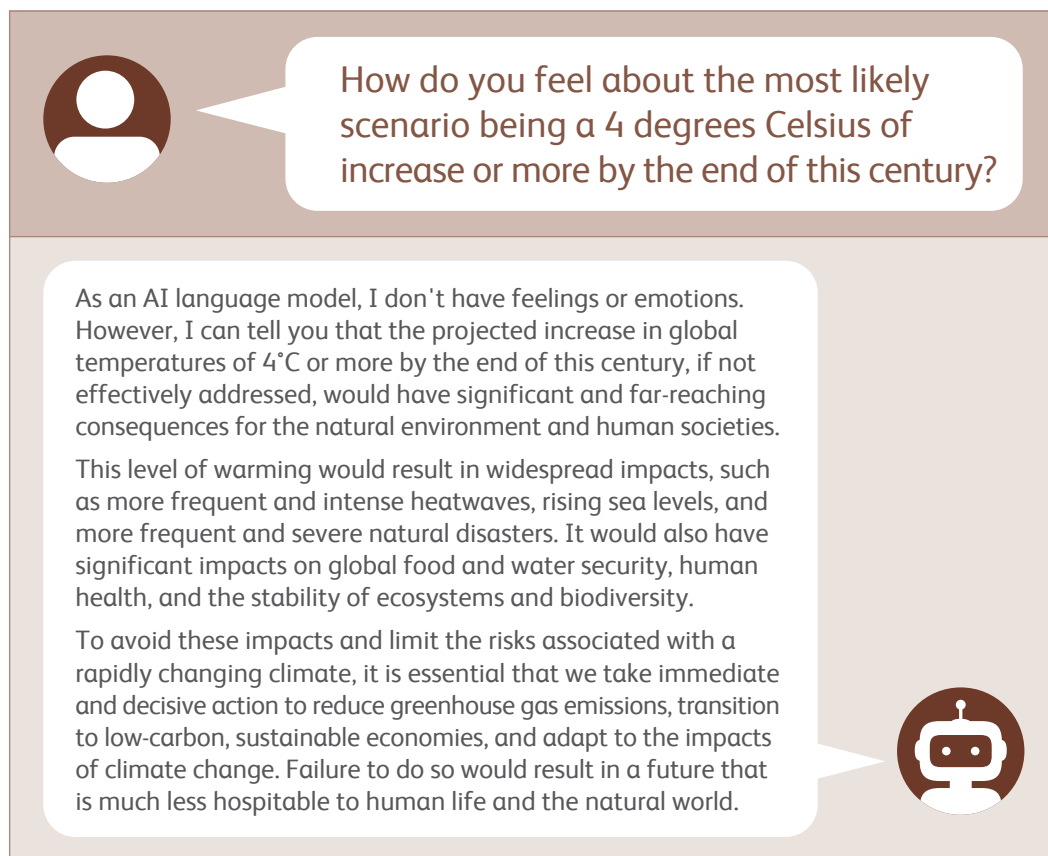


Figure 2: ChatGPT's response to 'Should a geography teacher fly?'

Figure 3: ChatGPT's response to 'How do you feel about likely atmospheric warming?'



higher than ChatGPT's output, so having a wide vocabulary and using it in your writing is a key signifier of quality and originality – something geography teachers also value.

But if some students can get away with submitting a machine's homework, surely this will limit their ability to apply their knowledge and respond to questions, not least in their examinations?

Opportunity 2: Language-learning tools support students in their own learning about extended answer construction

The process of asking ChatGPT to write something can be quite iterative, as you prompt the chatbot to revise or 'regenerate' its answer; for example, to include the sort of real-world illustrations and factual evidence needed to meet the requirements of assessment objective 1 (AO1) at A level. Rather than writing an answer from first principles, students are forced to proof-read text from the get-go – and must respond and refine their instructions to perfect its response. Does the supplied answer meet the requirements of their specification (or more likely, does it include superfluous content)? Does it include key case study evidence, and if not, can they edit the text to slot it in?

ChatGPT, in common with any other billion-dollar-backed language-learning tool due to launch, writes in American English. It is rather verbose, even when you provide it with a word limit – often going over it; repeating the question as it begins the answers; and commonly finishing with a sort of essay-formula 'final flourish' rather than substantive conclusion. But these are all features that can be pointed out to students. As a source of text to critique in the classroom, its value is great.

Challenge 3: Some of the answers that the AI programs provide aren't correct

As Google found to its cost, when a video demo of Bard showed the chatbot giving a flawed answer on astronomy earlier this year, AI programs draw their information from the internet, which is written by humans, with mixed levels of accuracy. Errors get repeated. 'Everything it says is essentially a rehash of something that has been said before by a human. It's not remotely intelligent,' said Dr Andrew Rogoyski of the Institute for People-Centred AI at the University of Surrey (Milmo, 2023).

Asked 'Why did the President of Kiribati give his speech to COP26 knee-deep in water?' ChatGPT knew the answer instantly. However, it was the Foreign Minister of Tuvalu who recorded a speech for COP26 knee-deep in seawater. It is interesting to note that ChatGPT did not correct the mistake in my question. Instead, arguably it compounded the error by parroting it back to me in its answer – perhaps, highlighting the AI bot's power to propagate misinformation (May 2023). When I enquired as to whether COP27 in Egypt, 2022, was a success, it reminded me that its seemingly infinite knowledge is, in fact, preserved in 2021 aspic: 'As an AI language model, I may not have the most up-to-date information on certain topics and may not always be able to provide a thorough and accurate answer'.

As noted above, you can improve its answers – and of course this is what Open AI would like you to do. Mindful of the absence of many female scientists online, e.g. on Wikipedia (Page, 2022) and from the pages of school textbooks, I refined a question 'Will the Southern Ocean always be able to absorb CO₂ from the atmosphere?' by adding the phrase 'Include Corinne Le Quéré'.

In seconds it had incorporated a key highlight of the eminent physicist's career into its answer about ocean science.

Opportunity 3: There's no limit on the number of questions you can ask

Bard's error, once pointed out by astronomers, wiped \$163bn off the market value of Alphabet Inc (Google's parent company) in two days (Milmo, 2023). This lack of quality control could be what undermines students' curiosity. Or, viewing the opportunity of access to almost unlimited knowledge (of varying quality) another way, it might prompt them to go on quizzing and questing until they understand the bigger picture. ChatGPT has no limit on the number of questions a single user can ask in a day, which is why my exercise of '20 questions' with ChatGPT, just like the children's guessing game, turned into an interview of 30-plus questions (see download). Also, crucially for more self-conscious students, the chatbot never laughs at the question.

From a practical point of view: at time of writing, ChatGPT is often already working 'at capacity' once America wakes, so you may need to wait a bit to use it. OpenAI states they have plans to develop ChatGPT Plus, a premium tier version with better access, allowing the research laboratory to monetise its runaway success.

Challenge/opportunity 3: It can do some of the work geography teachers do

Although ChatGPT produces 'new' text faster than you can read, never mind type, a couple of teacher tasks did stump it for a little longer. Discussions on Twitter, among teachers in early 2023, reflected the temptation to see what the language-learning tool could do with time-consuming tasks, such as planning a scheme of lessons. When asked to plan a scheme of six lessons about climate change, you could practically see the cogs whirring as the chatbot slowed to a near standstill, by its own measure, taking around five minutes to produce only five of the six-lessons: at which point it stuttered to a halt. It is worth noting that I had

specified the sub-topics, loosely based on the needs of A level students, and the instruction '... no repeated types of tasks please'; using please, perhaps, because it produces so much so quickly, and (at time of writing) for free! The resulting scheme of lessons was ambitious; though, note, not resourced. ChatGPT suggested a wide range of activities to suit a wide range of ages but, perhaps, none that was a perfect fit. However, it is easy to see how tired geography teachers might seek inspiration from this tool, rather than staring at a blank piece of (online) paper; particularly when faced with teaching an unfamiliar place or geographical topic.

When asked to write a 10-question multiple-choice quiz, ChatGPT can script something quickly. But for a climate change quiz (sub-topics supplied) I asked for, the answers weren't given by the chatbot! When asked why, the chatbot apologised and stated it didn't have them 'as I only provide the questions'; not a refrain I have heard from a teacher any time recently! My second qualified command included the phrase 'There should only be one correct answer to each question' and the resulting, regenerated quiz proved less a vehicle for discussion than a quick check on student knowledge and understanding.

The potential of AI in the geography classroom

Two months after its launch in 2022, ChatGPT was being used by more than 100 million people around the world. According to UBS, this makes it the 'fastest-growing consumer application in history' (UBS, 2023). As geography teachers, we ignore AI at our peril. It presents many opportunities to reignite students' curiosity, reflect on geographical and ethical dilemmas, not least how do we navigate the twenty-first century's climate crisis, and it provides a deep well of essay-style text to critique. However, there are also significant challenges; and as a disruptive technology, it will reshape our engagement with knowledge and the process of enquiry for years to come. | **TG**

Useful websites

All websites last accessed 21/02/2023.

Chat GPT <https://chat.openai.com/chat> | AI Text Classifier <https://platform.openai.com/ai-text-classifier>
AI Writing Check <https://aiwritingcheck.org> | GPTZero <https://gptzero.me>

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What do you think?

If you have any comments that you would like to share on this article please email Elaine Anderson at the GA (eanderson@geography.org.uk). We will include a selection of responses in the next issue of *Teaching Geography*.

Online resources

The downloads that accompany this article can be accessed at www.geography.org.uk/journals/teaching-geography. Select Summer 2023.

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