

Teaching Geography

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Writing for *Teaching Geography*

Teaching Geography provides a forum for sharing:

- practical strategies for teaching geography
- critical reflection on geography teaching and learning
- curriculum innovation and change in geography.

If you have a teaching strategy, practical idea, resource to share or particular view on educational practice, we would like to hear from you.

Teaching Geography welcomes articles from PGCE students, ECTs, practising teachers, academics and teacher trainers. If you have an idea but have never submitted an article before and would like some advice, please contact **Richard Bustin** (rbustin@gmail.com), the Editor of *Teaching Geography*, who will be happy to discuss it with you.

We welcome the submission of these types of article:

1. **■ Geographical concepts (2500 words)** articles critically discuss and illustrate approaches to teaching geography or current educational views and how they impact on geography.
2. **■ The G-Factor (2000 words)** articles (supported by online resources) are based around a practical idea for teaching one or a sequence of lessons.
3. **■ How to... (750 words)** articles provide practical advice and strategies for geography departments.
4. **■ Spotlight (2000 words)** articles provide specialist subject information and propose approaches for teaching these topics.
5. **■ Raising issues (1200 words)** articles aim to be thought-provoking and spark debate about controversial or contentious topics.

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- Climate change – causes and effects

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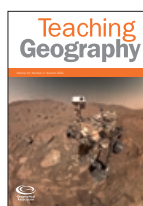
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Cover image: NASA's Perseverance Mars rover took this selfie, made up of 62 individual images, on 23 July 2024. A rock nicknamed 'Cheyava Falls', which has features that may bear on the question of whether the Red Planet was long ago home to microscopic life, is to the left of the rover near the centre of the image. **Source:** © NASA/JPL-Caltech/MSSS



Accompanying online materials

For articles with this symbol, go to <http://www.geography.org.uk/journals> and click on *Teaching Geography*. Select Autumn 2024 from the dropdown menu and you will find the additional resources for these articles.

Teaching Geography

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Final project
You are an A-level geography teacher, preparing a topic on 'unsustainable' areas to 14 that follow Bustin's learning. The tasks should be based on the following learning of the topic of decline and the associated characteristics of less successful areas using it. Students will have an hour to complete the task and will have access to the internet to present a written document as a final product. From all instructions are given.

ChatGPT's response
Geography assignment: The American Rust Belt and the speed of decline
Learning objectives: By the end of this task, you will understand the causes of the speed characteristics of less successful areas, using the American Rust Belt as an example.
Duration: 1 hour
Instructions: You will be exploring the concept of the 'speed of decline' through the lens of the American Rust Belt. Your findings will be presented in a structured word document. Follow the steps outlined below, adhering to Bustin's learning, to guide your research and analysis.
1. Remembering (15 minutes)
• Task: List the states traditionally
• Task: Examine the impact of
Three major factors that led to the Rust Belt experiencing decline. How did these factors contribute to the speed of decline?
• Research: Search for economic analysis, scholarly articles, and documentaries that discuss the decline of the Rust Belt.
• Analyzing (10 minutes)
• Task: Examine the impact of

Using AI to transform adaptive teaching (see page 102)



Astrogeography: the coming cosmic curriculum? (see page 112)



My place: Singapore (see page 123)

The code below links to *Teaching Geography* online.



Key to articles

- Geographical concepts
- The G-Factor
- How to...
- Spotlight



The Geographical Association is the leading subject association for all teachers of geography. Our charitable mission is to further geographical knowledge and understanding through education. Our journals, publications, professional events, website and local and online networks support teachers and share their ideas and practice. The GA represents the views of geography teachers and plays a leading role in public debate relating to geography and education.

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Annual Conference and Exhibition

Oxford Brookes University, 15-17 April 2025



<https://geography.org.uk/events-cpd>

Editorial

Richard
Bustin

There is a real sense of broadening perspectives in this issue of *Teaching Geography*. Our articles are inspired by astrogeography, big curriculum core concepts and advances in AI, and our authorship is international with writers from Germany, Australia and Singapore. Our cover image is quite literally out of this world! At first glance the landscape seems strangely familiar with rocky desert features, but this is the surface of Mars in a photograph taken this year by NASA's Perseverance Mars Rover. The image is inspired by Joshua Peake's article 'Astrogeography – the coming cosmic curriculum' in which he outlines the ways in which space and the planets are increasingly being used as inspiration for geography lessons. Existing topics can be given an interplanetary spin, such as the physical geography of Martian volcanism, space tourism or superpower discussions of the new space race.

Two articles explore the increasing ways in which AI is being used creatively by geography teachers. Ruth Harding asks 'How can I use Generative AI to support the creation of model answers at A level?' and she outlines some ways in which AI can create exemplar exam answers that can be used with students. Her article contains a stage-by-stage guide alongside some potential pitfalls. In their article 'Using AI to transform adaptive teaching at A level', Jack Downs and Thomas Campbell use AI to create resources for different students – a job that would take a long time by hand can now be done in seconds. Together these articles showcase how new technology is being harnessed in the geography classroom.

Geography's core concepts in the curriculum are explored in a number of articles. In 'Applying geography's key concepts at A level' Alaric Maude looks at how we might be able to unpick concepts such as place and scale in the A level classroom. His article poses some interesting questions for us to consider about the nature of what we teach. His article is inspired in part by his new book, which is reviewed later in this issue. In a similar vein Fiona Sheriff, in her article 'Our "golden threads" curriculum', shows how she weaved a set of geography's key concepts throughout her teaching, providing coherence for teachers and students. The teaching of sustainability is often a key consideration of geography teachers and Marvin Scott Schlamelcher and Neli Heidari,

in their article 'From "original" to "sustainable" – fostering sustainability at A level' take inspiration from John Rawls' 'original position' to inspire their teaching.

Teaching Geography has often published articles about how contemporary events can be used to encourage geographical learning, so after a summer of sport with the Paris Olympic and Paralympic Games it is timely that Fred Martin has delved into the *Teaching Geography* archive for his article 'From the archive: Olympics, sport and topical geography'. He shows how Olympic Games and sports competitions in general have been a catalyst for learning in the classroom.

Teaching strategies are a key part of *Teaching Geography* and many of our articles have a practical element that can be taken straight into the classroom. In that vein Margaret Roberts identifies that students seem unwilling to ask questions in class. Her article 'Encouraging students' questions in the geography classroom' explores this problem and offers practical advice to get students questioning.

The 'my place' feature has long been used to offer a new and inspiring view of a location from the perspective of a local resident and as such Kah Mun Yuen shares the geography of his place, Singapore. We are also fortunate to have two new books for geography teachers reviewed in this issue too.

There is a renewed sense of ambition too in *Teaching Geography* journal itself. As the journal approaches its 50th anniversary in 2025 my own article outlines a few thoughts about the benefits of subscribing to the journal in 'How to get the most out of *Teaching Geography*', showcasing the online resources and article archive that is available. After a rigorous process earlier in the year we welcome Daryl Sinclair and Katie Richardson to the Editorial Board. They will both be valued members of the team.

With the journal reaching its milestone anniversary next year, now is a great time to consider writing for us. Offering a review of a new teaching resource is a good way to get started, as is offering a response to any of the articles outlined here. If you want to write an article but are not sure how, please do get in touch – contact details are on the inside the front cover of every issue. | **TG**

Editor Richard Bustin introduces this issue of Teaching Geography.



Dr Richard Bustin is Head of Geography, and Director of Pedagogy, Innovation and Staff Development at Lancing College.

Applying geography's key concepts at A level – examples from England and Australia

Alaric discusses how teachers might respond to the requirement in England and Australia to develop students' ability to apply key concepts.

The ability to apply geography's key concepts is a specified learning outcome in the school curriculums for England and Australia. The Geography: GCE AS and A Level subject content (Department for Education, 2014), for example, requires that AS and A level specifications produced by the examination boards must enable students to:

... develop their understanding of, and ability to apply, the concepts of place, space, scale and environment, that underpin both the national curriculum and GCSE, including developing a more nuanced understanding of these concepts. (DfE, 2014, p. 2)

A similar statement is in the secondary school curriculum for Australia. Neither of these curriculums, however, provide any guidance on what 'to apply' means.

Question for teachers: At present, how do you develop your students' ability to apply the concepts specified in your curriculum or examination specification?

Judging from the A level specifications produced by organisations such as AQA and Edexcel, or textbooks for secondary school geography students, application is using one's knowledge of frameworks such as systems and processes to understand an unfamiliar ecosystem or environment, or of models such as the Demographic Transition Model to understand population change in a country, to give just two examples. In these applications students transfer a framework or model that they have learned to new contexts. However, in these examples there is no explanation of how they apply a key concept and they provide a very limited view of what 'to apply' could mean.

This article will argue that the potential applications of geography's key concepts go beyond the use of these frameworks and models. They ask students to also **formulate questions, analyse data, explain observations, evaluate situations, and design policies** to respond to environmental, economic and social problems; each of which will be explained and illustrated in the rest of the article. The concepts discussed are those specified in the curriculums for England and/or Australia—place, space, environment, interconnection, scale, change and sustainability. Their range of applications differ, however, as place, space, environment and interconnection are more complex concepts and can be applied in a wide variety of ways, while scale and change are mainly applied in analysis, and sustainability is mainly applied in evaluation.

First, however, some comment is needed on the nature of the concepts, particularly place, space, environment and interconnection. These are very big ideas that can be described as meta-concepts, or concepts about concepts, and are at the top of a hierarchy of increasingly abstract ideas. They generally need to be unpacked into these subsidiary ideas for students to understand and apply them. Figure 1 shows a sequence of concepts that are part of the meta-concept of space, and all of them can have applications. For example, the concept of absolute location can be applied to ask questions about and explain the characteristics of a climate; the concept of relative location can be applied to explain the economic and demographic characteristics of a place; the concept of proximity can be used to analyse the reasons for the location of an economic activity; the concept of agglomeration can be applied to understand the growth of cities, and to identify policies to encourage the growth of alternative centres. Agglomerations are also a type of spatial distribution, which is one of the concepts that form the meta-concept of space.

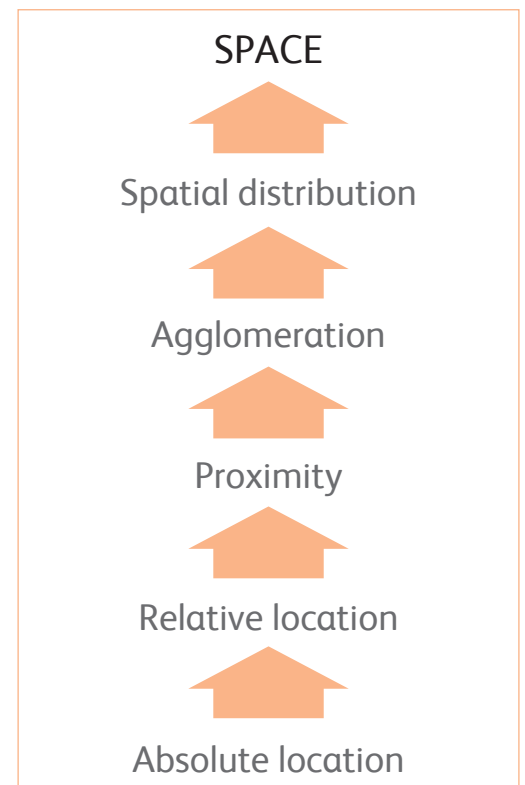


Figure 1: A hierarchy of spatial concepts.

Question for teachers: How would you unpack a meta-concept other than space?

Questioning

The key concepts identify distinctively geographical questions. If students are studying why a place is like it is, they might ask the following questions:

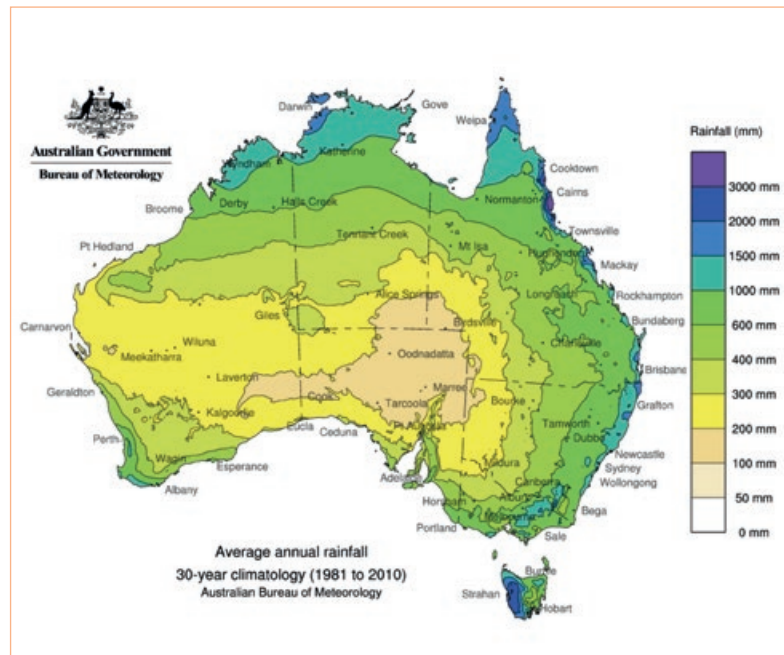
- 'Are the characteristics of this place influenced by its relative location?' Relative location is a subsidiary of the key concept of space.
- 'Are the characteristics of this place influenced by its relationships with other places?' Relationships between places are part of the key concept of interconnection.
- 'Are the characteristics of this place influenced by its biophysical environment?' The influence of the biophysical environment on the environmental and human characteristics of places is part of the key concept of environment.
- 'How are the decisions and actions of people and organisations changing this place?' This is part of the key concept of place.
- 'How has this place changed over time?' This applies the concept of change.

Analysing data

The concepts of scale and time can be applied to analyse information in ways that will be familiar to geography teachers, either to investigate patterns and relationships at different scales, or to understand phenomena by investigating how they have developed over time. Two other particularly geographical methods of data analysis are based on the concept of space, and should also be familiar. These are:

1. Interpreting the spatial distributions of specific phenomena, such as rainfall, land degradation, life expectancy, housing rents or outmigration, to identify patterns that suggest possible causes of the phenomenon for further investigation. This method is based on the concept of space.

An example is shown in Figure 2, a map of the distribution of rainfall in Australia. The essential features of the pattern revealed by the map are that rainfall decreases with distance from the coast. However, it extends further inland in the north than in the south, and in the east compared with the west, and higher rainfall areas are a narrow band along the east coast of the continent and the west coast of Tasmania, and a broader band across the north. The identification of each of these elements of the pattern points to the different determinants of rainfall in Australia, which are distance from the coast and sources of atmospheric moisture, elevation (the effects of the Great Dividing Range along the east coast), the tropical monsoon that brings rain to the north of the continent, the location of the subtropical high pressure belt that brings dry weather to the centre, and the mid-latitude frontal systems that bring rain to the south and to Tasmania.



Question for teachers: How would you construct an exercise to develop students' ability to analyse a spatial distribution for ideas on the causes of the phenomenon portrayed?

2. Comparing the spatial distributions of different phenomena to identify spatial associations between them, which may indicate possible causal relationships for further investigation. A common example is the spatial association between climate and vegetation at a global scale, while a less common one might be the spatial association between the value of agricultural output per hectare and population density. This method is also based on the concept of space.
3. The analytical method of place comparison, based on the concept of place, may be less familiar. This is a way of investigating the relationships between variables by comparing their values or attributes across several places.

An example that illustrates this method is a study I undertook many years ago of migration from villages in West Sumatra, Indonesia (Maude, 1979). The people of the region, the Minangkabau, have a long history of migration to other parts of Indonesia, and I wanted to explore the reasons for this movement. I hypothesised that economic factors and education levels might be explanatory factors, so selected 11 villages across the province to represent the main variations in population density, agricultural economy and educational attainment. I collected information from sample households in each village, and constructed measures of the following variables:

- The dependent variable (the one to be explained) was the rate of migration from the village, measured by the percentage of all adult present and former males in the sample households who were migrants at the time, or had been in the past. This rate varied from 22% to 72%, so there were considerable differences to be explained.

Figure 2: Average annual rainfall, Australia. **Source:** Australian Bureau of Meteorology (http://www.bom.gov.au/jsp/ncc/climate_averages/rainfall/index.jsp) Reproduction licensed under the Creative Commons Attribution Australia Licence.

- The independent variables (the possible explanatory factors) were:
 - a. The percentage of households who sold part of their agricultural produce. This was a measure of the extent to which income from cash crops could be earned in each village.
 - b. The average number of months in a year that households were able to subsist from their own food production.
 - c. The educational level of migrants, measured as the percentage of migrants who had reached upper secondary school level or higher.

Statistical analysis showed that the lower the average ability of households to subsist and/or earn income from agriculture in their own village, the higher the rate of migration, whereas educational levels were unrelated to migration. The analysis therefore supported the hypothesis that migration was influenced by economic factors but rejected the role of education, although the full story of Minangkabau migration is more complex than can be explained here.

The method of place comparison illustrated here is analytical because it enables the researcher to identify associations between variables, and geographical because it is based on data aggregated by place, and not on data for individuals with no reference to the place in which they live.

Question for teachers: How could you use the method of place comparison in what you teach?

Explaining

The key concepts provide ways of explaining observations, as foreshadowed in the section above on questioning. Place, for example, is included by the physical geographer Jonathan Phillips as one of three sets of factors that influence earth surface systems, such as landforms. The place factors he identifies are the environmental characteristics of the place in which the landform being investigated is located, such as geology, climate, vegetation, soils and land use. The other two sets of factors are laws, such as the laws of physics and chemistry and the principles of geology, hydrology, geomorphology and other sciences that are independent of context; and history, the past evolution or development of a geomorphic system (Phillips, 2017).

An example of an explanation based on the key concept of space is the influence of **agglomeration** – when activities cluster together because of the advantages of proximity – on the growth of cities. The advantages of large agglomerations for businesses are:

- access to a large pool of labour, increasingly subdivided into specialisms
- access to specialised equipment
- suppliers of intermediate goods and buyers of finished products

- sharing of infrastructure (transport, energy, buildings, etc.)
- access to information.

The fact that these cities throw people and firms together in close proximity is thought to create fertile social conditions for experimentation, learning and innovation ... [because] ... [g]eographic concentration facilitates the ready circulation and exploitation of both codified and 'tacit' knowledge. (Barnes and Christophers, 2018, p. 244)

Explanations based on environmental influences (from the concept of environment) are another application of conceptual thinking, but they can be contentious because of the past excesses of environmental determinism.

The concept of scale also has an influence on explanation, because 'It has long been known that generalizations made at one level do not necessarily hold at another, and that conclusions derived at one scale may be invalid at another' (Burt, 2009, p. 201).

Evaluation

Evaluation is here used to mean determining whether what is observed or found out has sufficiently negative consequences to require a response. The key concept of sustainability can be applied to answer this question, and geographers use it in two different ways. The main one is to evaluate the consequences of environmental changes, such as land degradation, climate change, vegetation clearance and coastal erosion. These changes can be evaluated for their effects on the maintenance of the environmental functions that sustain human life and welfare. The concept of sustainability is also applied by geographers to evaluate the demographic, economic and social viability of places under threat – from the closure of industries, environmental disasters, or out-migration.

Policy responses

Geography's key concepts underpin a variety of public policies. The concept of place, for example, informs a wide range of initiatives designed to improve social, economic and environmental conditions in particular places. Place-based strategies 'target the specific circumstances of a place and engage the community and a broad range of local organisations from different sectors as active participants in their development and implementation' (Government of Victoria, 2020). They are claimed to have a number of advantages over centrally-driven economic policies (i.e. those initiated by national governments). These include the ability to:

- adapt to the needs of each region
- identify and build on the specific economic potential and advantages of the region
- utilise the knowledge, leadership, innovativeness and enthusiasm of local people

- use local factors of production such as labour, capital and infrastructure that may otherwise be underutilised
- produce a coordinated approach to local social and economic issues
- generate more sustainable development because the economic activities they encourage are dependent on the specific economic conditions and advantages of the region.

In this they involve two ideas from the key concept of place: the uniqueness of each place, which means that strategies need to be designed to suit individual places, and people's attachment to their place, which can provide the local social capital for effective local development.

Some strategies implemented by governments at several levels illustrate the application of the concept of space. For example, the zoning of urban areas to regulate the economic activities and types of buildings permitted in each zone uses the concept of space, as does the demarcation of vegetation reserves or marine protected areas to protect biodiversity or fish stocks. Spatial thinking is also used by consultancy firms to advise on the location of schools and health services, or a business or activity. For an example from a consulting firm founded by a geography graduate in Melbourne, Australia, see their case study of the location of a training ground for a football club (<https://home.id.com.au/case-studies/how-demography-helped-richmond-football-club>).

Nature-based strategies implemented to manage environmental issues are applications of the concept of environment, as that concept includes an understanding of environments and environmental processes. Examples are programs that restore degraded mangrove forests or marshlands to protect coastal areas from storms and flooding, rather than using engineering solutions such as seawalls. (Temmerman *et al.*, 2013)

The examples in this section, and others like them, can be used to show students that

geography's key concepts can inform practical ways of addressing a range of environmental, social and economic issues. They can also prompt them to think of alternative ways of addressing a problem, by asking if it is a spatial one, or a place one, or an interconnection one. These are perhaps the most important applications of the key concepts, but not ones commonly included in school curricula and textbooks.

Note that sustainability is a concept that can be used to decide if action is needed to manage environmental change or degradation. The strategies adopted will aim to achieve sustainability, but they will be based on the concepts of environment, space, place or interconnection, or be economic, regulatory and other types of responses.

Question for teachers: for a topic you are teaching, how could you apply the key concepts in the ways described in this article?

Conclusion

This article has argued that applying geography's key concepts involves using the ideas contained within them in a wide range of increasingly complex cognitive tasks, from asking questions to evaluating environmental, social and economic problems, and formulating responses to them. In these ways the concepts have functions that make them more than abstract ideas – they also contain useful ways of thinking that can help students to better understand their world and ways to improve it. This should give them some sense of coherence of the subject, because these applications make geography 'geographical' by producing geographical types of questions, methods of analysis, explanations and responses based on its key concepts.

Question for teachers: Has this article changed your ideas about the meaning of 'to apply a concept'? If so, what has changed? | **TG**

Useful reading

Maude, A. (2024) *Thinking geographically: A guide to the core concepts for teachers*. Abingdon: Routledge.

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How can I use Generative AI to support the creation of model answers at A level?

Ruth Harding takes us through the process of helping geography students create model answers using Generative AI.

Lots of different AI tools can be useful for teachers. There is Gamma, which creates PowerPoints; ClaudeAL, which can pick out key details from PDFs and images; and ChatGPT, which has been rapidly evolving to cover a wide range of tasks, and I have found that ChatGPT saves time and gives me new ideas. I have used ChatGPT to support my A level teaching about places; firstly in creating model answers, and secondly in using these answers as a stimulus for teaching, particularly in writing model answers for the synoptic section of the course.

Research conducted in 2023 by RM Technology found that of the 500 secondary teachers surveyed 'half (56 per cent) think that education professionals need proper training on AI to get a full understanding of what it can do, so much so that 36 per cent say their students know more about it than them' (RM Technology, 2023). Griffiths (2023, p. 71) argues 'As geography teachers, we ignore AI at our peril'. Hickman and Ghosh (2024) include lots of excellent suggestions in their article 'ChatGPT: Are geography teachers redundant?'. Griffiths (2023) also provides some brilliant thoughts about how to use ChatGPT with students when teaching about climate change. This article is going to focus on how to use it to support A level teaching of 'place'.

Model answers

Hickman and Ghosh (2024) also trialled using ChatGPT to create model answers and had similar findings to me. They found that the more commands you give it, the better answers become. You have to tweak the suggested answer to improve it, as it is often not developed enough for a full marks answer.

As we all do, I use the specification to help students anticipate future questions. For the Changing Spaces, Making Places topic for OCR A level geography (OCR 2018) I presented this question to the class: 'Using a place that has undergone rebranding, assess the success of the rebranding (16 marks)', and then gave them this 'sample' paragraph about the redevelopment of Park Hill, Sheffield created from ChatGPT (Figure 1).

As a class, we unpicked how this could be improved. To model how they could start to improve this answer, I typed their suggestions (shown in red) as they shared their ideas (Figure 2).

This is a useful skill for the students to develop and it felt less personal than unpicking the work of a previous or current student.

Urban Splash's approach to social regeneration has been somewhat successful but with challenges. The company has sought to create a mixed community within Park Hill, attracting a diverse range of residents from different socio-economic backgrounds. However, there have been criticisms regarding the affordability of the housing units post-renovation, with concerns raised about the potential gentrification of the area. While efforts have been made to provide social housing, the overall demographic shift has led to some degree of displacement of the original residents. Nonetheless, community engagement initiatives and the provision of social amenities within the estate have fostered a sense of belonging among residents, contributing to the social regeneration of Park Hill to some extent.

Figure 1: A sample paragraph created by ChatGPT.

How could this paragraph be improved?

Urban Splash's approach to social regeneration has been somewhat successful but with challenges. The company has sought to create a mixed community within Park Hill, attracting a diverse range of residents from different socio-economic backgrounds. However, there have been criticisms regarding the affordability of the housing units post-renovation (ADD examples of house prices), with concerns raised about the potential gentrification of the area (EVIDENCE?? – Link back to how to maintain and manage the community). While efforts have been made to provide social housing, the overall demographic shift has led to some degree of displacement of the original residents (What happened to the residents – was it successful for them?). Nonetheless, community engagement initiatives and the provision of social amenities within the estate have fostered a sense of belonging among residents (Add in about the Residents' association), contributing to the social regeneration of Park Hill to some extent. Link back to original question.

Figure 2: The improved paragraph.

To help them develop this work, I presented them with a second paragraph (again created by ChatGPT) (Figure 3). I asked them to improve this paragraph for home learning and send me back their improved version.

Figure 3: Second paragraph created by ChatGPT.

How could this paragraph be improved?

Urban Splash's redevelopment of Park Hill has had a positive impact on the local economy. The transformation of a derelict housing estate into a vibrant mixed-use development has attracted businesses, investors, and visitors to the area. The introduction of commercial spaces, such as cafes, restaurants, and offices, has created employment opportunities and stimulated economic activity. Additionally, the increased property values within Park Hill and its surrounding areas have contributed to the regeneration of the local housing market. However, questions remain about the inclusivity of this economic regeneration, as some argue that the benefits have primarily accrued to wealthier residents and businesses, exacerbating socio-economic inequalities in the area.

What AO1 could we use to support this paragraph?

Edit this paragraph to make it top (level 3) quality

I was pleased with the quality of answers that I received. They managed to pose a clear argument that was backed up with evidence and most of them managed to critique the evidence, providing a counter-argument. However, the literacy of the ChatGPT answer was generally better than the students' answers. Presenting the students with

answers from ChatGPT regularly will hopefully improve their literacy over time, as they will be exposed to a wide range of appropriate academic vocabulary. These students were from a range of different abilities but they had all been able to use the ChatGPT answer to create their own paragraphs (Figure 4 shows two examples).

Argument outlined from the beginning (A02)	Urban Splash's redevelopment of Park Hill has had a genuinely positive impact on the local economy. The transformation of a derelict housing estate into a vibrant mixed-use area has attracted both small- and large-scale businesses, e.g. South Street Kitchen, investors and visitors. The kitchen has provided both a communal area for people to socialise at, but has also stimulated economic activity through providing job opportunities for a diverse range of people, such as new residents to Park Hill as well as more elderly residents that aren't looking to travel for work. Additionally, the increased property values within Park Hill and the surrounding areas have contributed to the regeneration of the local housing market. House/apartment prices in Park Hill in 2010 for a 1-bedroom home were £135,000 and a 2 bedroom for £160 000. Now, in 2024, this has increased by around £60 000. This has not only provided more money for the corporate bodies Urban Splash who bought Park Hill for £1, as well as reimbursing the local council of Sheffield. However, questions remain about the inclusivity of this economic regeneration, as some argue that the benefits such as high-quality housing in a redeveloped area, only appeal to wealthier residents exacerbating socio-economic inequalities in the area, as many residents lived here due to the high proportion of council housing.
Clear, specific place specific detail (much better than ChatGPT) (A01)	
Critiquing their argument at the end (A02)	
Argument outlined from the beginning (A02)	Urban Splash's redevelopment of Park Hill has had positive impacts on Sheffield's economy. Before, Park Hill was a derelict housing estate full of so much crime it was seen as a no-go area. However, now it's been regenerated and given a new lease of life. It has both 2- and 3-bedroom flats aimed at families and single bedrooms with eight shared flats for students. This has attracted a wide range of businesses into the area, from the vegan café South Side Kitchen to commercial offices and even Grace Owen nursery school. This brings lots more investment into the area and allows people to work more hours. These have all also increased the employment opportunities in the local area. Additionally, the increased property values in Park Hill and the surrounding areas have contributed to the regeneration of the local housing market. However, not everyone has been able to benefit from this. While wealthy residents have been able to stay in the area these price increases will undoubtedly force lower income families out of the area completely. This exacerbates the socio-economic inequality in the area as left are the extremely poor council house tenants and very well-off residents who can buy flats from Urban Splash.
Clear, specific place specific detail (much better than ChatGPT) (A01)	
Good evaluation posing a counter argument to the argument presented at the beginning of the paragraph (A02)	

Figure 4: Two samples of students' work. **Orange text:** A01 (Place specific detail). **Blue text:** A02 (Evidence of a clear argument and evaluation).

A further way I may use this in the future is for scaffolding answers for my weaker students. For example, ChatGPT could provide one of their paragraphs for an essay: then they could either continue the essay or start with a paragraph to improve, rather than a blank slate. Although this is nothing new and how I would have used model answers before, the difference will be that the 'model' paragraphs will be created in seconds, helping to reduce workload while still providing good scaffolding to students.

I have also used ChatGPT in class to complete model answers where I have done the edits – useful as a starting point to create good quality model answers. I would estimate that this reduces the time it takes to create a model answer from around 30 minutes to 10: a significant benefit, when you are producing many model answers throughout the year. In future, I plan to give the class the answer from ChatGPT alongside my edited answer from ChatGPT. Students must mark the different answers and work out how an answer moves through the levels. This is not particularly different from how we worked before with past answers from students; however, ChatGPT means we can work with questions that have not come up yet, which previously would have taken a lot of teacher time.

Synoptic questions

A level geography requires students to think synoptically. In the OCR A level paper 3 students encounter questions like 'Assess how impacts of volcanic eruptions can affect place identity' (12 marks) (OCR, 2020). Students must draw ideas from across topics, demonstrating their ability to make synoptic links. Synoptic questions can take a lot of time to prepare, especially if you share the teaching between the topics. I have found Chat GPT a useful starting point: it may come up with links you have not thought of yet, and you can use it to build up a bank of model answers for future questions. We share the answers from previous years with the students, which is very useful, but ChatGPT enables you to create a wide variety of answers to potential future questions.

What are the pitfalls?

One key pitfall is that errors are repeated (Griffiths, 2023). AI draws on material that has been created by humans and then reproduces it; and humans make errors. However, the model answers are never ready to go when produced by ChatGPT: they are starting points that as educators we can tweak to improve. If we are doing this, we should be skilled enough to spot any errors and correct them. I would strongly recommend against non-specialist geography teachers creating model answers and relying on them without running them by a geography teacher.

So if you want the most up-to-date case studies you will need to add in the A01 (knowledge) yourself; although this is often the case, even with case studies from before 2021, when there is a

specific piece of information you need to support your argument. This is where it can be helpful to load the information you want it to include into ChatGPT to create the best-quality answers. It works really well for essay-based questions such as the 12-, 16- and 33-mark answers on the OCR A level paper. However, when asked to create an answer to this question: 'Explain how people's perception of place can vary according to their age (6 marks)' (OCR, 2019), it created a rather vague bullet-point response. You can 'command' it to condense this information into two or three paragraphs; but at this point, you need a subject specialist to review the information and tweak it to make a 'model' answer.

This was some of ChatGPT's response:

People's perception of place can vary significantly according to their age due to differing priorities, experiences, and social contexts. Here are some key points to consider:

1. Children and young people:

- **Play and safety:** Young children often perceive places based on their play potential and safety. Parks, playgrounds, and open spaces are highly valued.
- **Educational facilities:** For school-aged children, the proximity and quality of schools can shape their perception of a place.
- **Social opportunities:** Teenagers and young adults might value places for socializing, such as cafes, shopping centres, and entertainment venues. They often seek places that offer freedom and independence.

2. Adults:

- **Employment opportunities:** Adults typically assess places based on job availability and career prospects. Areas with a robust job market are often perceived more favourably.
- **Housing and amenities:** The availability of affordable housing, healthcare facilities, and other amenities is crucial for adults, especially those raising families.

Figure 5: A ChatGPT answer to the question 'Explain how people's perception of place can vary according to their age (6 marks)' (2019).

Hore and Palôt summarize the common pitfalls students face doing A level geography exams:

Another failing is the over-enthusiastic writing on short answer questions. The number of lines on the question paper is a guide to how long the answer should be, and candidates often gained the full marks for a question before the end of the answer. (Hore and Palôt, 2019, p. 34)

The risk with ChatGPT is that you just copy the answer provided and don't edit it to the appropriate length. It can be unhelpful for students if we provide 'perfect' answers that are far longer than they could write in the time.

Will it encourage cheating?

There will be many risks and issues associated with students using this technology. I have not shared with the students that these answers are from ChatGPT as I have not wanted to flag up what the technology can do (although they may well already know). I just refer to them as model answers. It would be an interesting topic for another article looking at how students can best engage with ChatGPT without losing their knowledge recall and evaluative skills. At present, I insist that my A level students must submit work that is written by hand and in exam conditions.

How to do it?

Many of the barriers that I encounter with geography teachers using ChatGPT to support their teaching originate in a lack of understanding of where to find it and what to do. So, for those of you who, like me, didn't even know how to access ChatGPT a few months or years ago, this is what to do:

1. Go to <https://chat.openai.com>
2. Set up an account,
3. Type in a command, e.g. 'Write a model answer for Geography OCR A level question "To what extent has Urban Splash been successful in rebranding Park Hill (16 marks)"'.

I have found the best way to get place-specific detail into the answer is by inserting case studies into the question.

4. If the answer is not good enough (as they are often not outstanding) you can add further commands, such as add in more place-specific detail or more evaluation.
5. You can also copy and paste case study information you already have into ChatGPT and ask it to use the information to formulate your answer. This is especially useful when ChatGPT may be out-of-date. For example, I have recently created a model answer for Human Rights in Honduras (OCR A level, 2018) and the information was out of date, so I copied my own information into ChatGPT and it wrote the answer with that information.
6. Copy and paste the answer or specific paragraphs (as suggested earlier) and use them to aid your teaching.
7. It is also worth noting that you can direct the structure of the answer, e.g. 'Create a model answer on X with an introduction, conclusion and three paragraphs.'

Final thoughts

I would encourage you to experiment with it! The more you explore ChatGPT, the more you find new ways to refine your commands to get the best-quality answers with least amount of tweaking needed. I hope you enjoy exploring it as much as I have and it can save you time and assist in preparing good quality model answers that help students progress. | **TG**

Useful website

Chat GPT. Available at <https://chat.openai.com> (last accessed 15/05/2024).

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Using AI to transform adaptive teaching at A level

Jack and Thomas describe the benefits of 'promptcraft' when using ChatGPT, showing how a detailed prompting strategy can provide adapted learning resources to maximise the learning potential of all students.

The impact Artificial Intelligence (AI) will have upon education is one of the most important issues facing educators, but this has not been fully reflected in the wider public debate. At the moment education risks being the 'Cinderella' of the AI story, present but not seen (Seldon and Abidoye, 2018), but this is something we must change, and quickly. The AI revolution has only increased in momentum since Seldon and Abidoye wrote of this challenge, with Large Language Models such as ChatGPT becoming more popular and powerful in the last 18 months.

Building on the articles of Alice Griffiths (2023) and James Hickman and Rajeev Ghosh (2024), we wanted to investigate whether we could use AI to improve the quality of our adaptive teaching. While the term 'differentiation' has declined in popularity in recent years (Eaton, 2022), we would argue it is still a core element of good teaching (Battersby, 2002) which should be at the heart of effective adaptive learning. We have adopted Lambert and Balderstone's definition of differentiation, which sees it as a 'planned process of intervention in the classroom designed to maximise learning potential based on individual needs' (Lambert and Balderstone, 2012, p. 205). We wanted to see if rather than making geography teachers redundant, AI could transform our teaching – without the need for a fairy godmother! This article focuses on methods we have developed for using AI to aid the process of 'planned intervention'.

You only get what you give

When using ChatGPT and other AI platforms, it is important to realise the quality of the response you receive will only ever be as good as the prompt you give. In this regard, the future of teaching may not rely just upon good pedagogical understanding but also one's skills at 'promptcraft' – the ability to ask AI the correct questions to stimulate the response you want (Fitzpatrick *et al.*, 2023). From our experience there are two fundamentals you should bear in mind when developing your 'promptcraft'. Firstly, it is advisable to be as specific as possible when prompting ChatGPT. As you will see from the examples we provide later, we include the following information when prompting:

1. Give ChatGPT information regarding the subject and topic being studied, along with the age of the students you are teaching. We also include the specific awarding body and qualification if appropriate.
2. Explain to ChatGPT the task to be created. The more information you provide the better the response will be. Tasks should include the subject-specific content to be covered, the

length of time students are expected to take for the task, the resources available to them, and the style the work should be presented as – PowerPoint presentation, written report, etc.

3. The final component of our prompt is to ask the AI to target their responses at the students and to adapt the tone appropriately, creating either a formal task or a more light-hearted one – such as a pirate-inspired treasure hunt.

Our second fundamental is relevant once the prompt has been entered and the response has been carefully read. Hopefully the response is exactly as desired, but often this will not be the case straight away. Ask the AI to make changes to the task and use the chatbot to develop an 'editing conversation'. This may take time, but it is worth it because once the desired outcome has been achieved, the AI on that chat thread will be conditioned to replicate the process over and over again.

Creating differentiated tasks

We used Bloom's taxonomy because it develops both low-order cognitive skills (LOCS) – remembering, understanding, applying – and high-order cognitive skills (HOCS) – analysing, evaluating and creating (Anderson and Bloom, 2014). This approach is not without its critics, and we accept that learning is not the implied linear path from LOCS to HOCS (Agarwal, 2019). However, it still provides a useful framework for adaptive teaching.

Using the 'promptcraft' technique, we asked ChatGPT to create a range of tasks based on the taxonomy (Figure 1). The suggested tasks provide an excellent starting point for preparing a lesson, but are far from flawless. The main issue was that the timings provided for each activity would not allow students, especially at A level, to tackle the topic in any real depth. The pace expected by the timings would be too demanding and could prove to be self-defeating. Subsequently we adapted the suggested assignment, focusing on three tasks instead of attempting all six, with the remaining three being set for homework. Alternatively, we could have started an editing conversation, asking it to make modifications so that it better suited our needs. We have found this method to be particularly useful.

This example supports the conclusions made by Hickman and Ghosh, namely that AI should be treated as an important part of a teacher's resources but is no substitute for our personal knowledge of students' learning needs (Hickman and Ghosh, 2024). However, it is important not to let the pursuit of the perfect be the enemy of the good, and appreciate that the tasks provided a solid foundation within a matter of seconds.

Input prompt

You are an A level geography teacher, preparing a topic on 'unsuccessful' areas to 16-year-old students. Create a set of tasks that follow Bloom's taxonomy. The tasks should be based on the following learning objective: 'Understand the causes of the spiral of decline and the associated characteristics of less successful areas using the American Rust Belt as an example.' Students will have an hour to complete the task and will have access to the internet for research. Their work should be presented as a written document on a word processor. Ensure all instructions are aimed at the students and are formal in tone.

ChatGPT's response

Geography assignment: The American Rust Belt and the spiral of decline

Learning objective: By the end of this task, you will understand the causes of the spiral of decline and the associated characteristics of less successful areas, using the American Rust Belt as an example.

Duration: 1 hour

Instructions

You will be exploring the concept of the 'spiral of decline' through the lens of the American Rust Belt. Your findings will be presented as a structured word document. Follow the steps outlined below, adhering to Bloom's taxonomy, to guide your research and analysis.

1. Remembering (10 minutes)

- Task: List the states traditionally considered part of the American Rust Belt. Find out what the term 'Rust Belt' refers to and why this region earned its name.
- Resources: Use the internet to search for basic information about the Rust Belt, including its geographical boundaries and the origin of its name.

2. Understanding (10 minutes)

- Task: Summarize the historical significance of the Rust Belt in the context of the American economy. Explain in your own words why this area was once prosperous and what industries were most prominent.
- Resources: Look for historical data and articles that detail the economic boom in the Rust Belt and its role in American industrial history.

3. Applying (10 minutes)

- Task: Identify and describe at least three major factors that led to the Rust Belt experiencing decline. How did these factors contribute to the spiral of decline?
- Resources: Search for economic analyses, scholarly articles, and documentaries that discuss the decline of the Rust Belt.

4. Analysing (10 minutes)

- Task: Examine the impact of the Rust Belt's decline on its cities and populations. Consider the social, economic, and environmental consequences. Provide examples of at least two cities within the Rust Belt that have been affected.
- Resources: Use case studies, census data, and news reports to gather information on the current state of Rust Belt cities.

5. Evaluating (10 minutes)

- Task: Critically evaluate the efforts made to revitalize the Rust Belt. What strategies have been employed, and how successful have they been? Discuss any ongoing challenges these areas face.
- Resources: Look for articles, government reports, and academic papers on

regeneration projects in the Rust Belt, their outcomes, and any criticisms.

6. Creating (10 minutes)

- Task: Propose your own solution(s) for addressing the challenges faced by the Rust Belt. Your solutions should aim at stopping or reversing the spiral of decline. Be creative and consider the feasibility of your proposals.
- Resources: Reflect on the information you've gathered and use your understanding of economic and social revitalization strategies to inform your proposals.

Presentation of work

- Compile your findings and analyses into a well-structured document. Include a brief introduction and conclusion, and organize your content according to the tasks above.
- Ensure your document is clear, concise and free of spelling and grammatical errors. Use headings for each section corresponding to the tasks outlined.
- Cite any sources you refer to or quote directly to support your analysis.

Submission

Submit your completed document via the designated platform, or by email, as instructed by your teacher, no later than the end of the designated hour.

Using ChatGPT to improve student access to higher level resources

Developing students' academic skills and resilience has become a central theme in the delivery of contemporary geography curriculums, taking on increasing emphasis after the COVID-19 pandemic and more recently the emergence of consumable AI. In our experience, students are reluctant to engage with more challenging academic literature, which can have a negative impact on their ability to develop effective synoptic capabilities and prevents higher level contextual understanding of geographical concepts.

With effective 'promptcraft', AI can enable teachers to make resources, ranging from newspaper articles to high level academic articles, far more accessible to students. For example, we copied an article from the *Guardian* (Stratton and Travis, 2011) analysing the content of David Cameron's 2011 'Broken

Britain' speech into ChatGPT with an instruction to provide an appropriate synopsis. While the outcome provided a useful generic overview of the article (in itself an effective adaptive teaching tool), it needed further modification to make it more relevant to our geographic focus. An 'editing conversation' based on determined criteria between the teacher and ChatGPT can train the AI to produce variations on the outcome. This provides a great opportunity to ask the AI to adapt the summary to fit the particular learning objective.

Similarly, ChatGPT can be used to differentiate vertically within the curriculum. Similarly, ChatGPT can help support the spiral curriculum model, which requires revisiting complex geographical issues in an accessible manner (Ireland and Mouthaan, 2020), by modifying language and making core content accessible to students, and in turn, building confidence in their ability to engage with academic literature.

Figure 1: Prompt and response entered into ChatGPT.

AI is a powerful tool for teachers to engage with to help students develop confidence with academic literature. Yet the role of the teacher as facilitator, interpreter and critic remains pertinent. While AI can provide a useful synopsis, a critical analysis and an evaluation of the provided information, the role of the teacher still remains key. For example, it is the teacher who facilitates and encourages student interpretation of the subtleties of an article's genesis, motives and agendas, while simultaneously developing students' ability to provide a contextual appreciation of the article's true aims.

Differentiated questions

Having facilitated improved access to academic literature, an effectively 'conditioned' AI can be used to provide differentiated questions. Again, the quality of the prompting strategies becomes paramount in shaping the AI's response into one where the questions it poses are appropriate for the students' learning. Whatever method is chosen, perseverance through 'editing conversations' is crucial in getting to the desired outcome. Utilising the same article about 'Broken Britain' (Stratton, 2011), ChatGPT provided a series of questions which enabled students to

draw out the key information from the article and engage with it on a range of levels, stretching and challenging accordingly (Figure 2).

The questions in Figure 2 outline the pivotal role of the teacher in the application of such resources. With students who find HOCS challenging it may be unwise to present questions over-emphasising analytical and evaluative skills relating to a complex article. Equally, with AI's limited awareness of classroom logistics, the teacher must ensure that the tasks can be completed within specific time frames. ChatGPT's results are a starting point and often require the nuanced interpretation of a teacher to make them effective for the intended audience.

Conclusion

AI is not going to suddenly disappear. As Hickman and Ghosh (2024) infer, geography teachers will not become redundant, but they need to 'buy-in' to integrating AI into their planning and teaching – to cultivate promptcraft. When considering just the narrow topic of AI and adaptive teaching, we have found that the potential benefits for both students and teachers are too large to ignore. | **TG**

Figure 2: Input and ChatGPT responses to the Stratton article.

Input prompt

You are a teacher of A level geography, teaching the Edexcel A level geography (2016) course to a group of 16-year-old students. The lesson is entitled 'Broken Britain and the 2011 London riots'. Students have read the following article:

Insert article – *The Guardian*, 16 August 2011, by Alan Travis and Allegra Stratton – *David Cameron on riots: broken society is top of my political agenda*. (Available online at <https://www.theguardian.com/uk/2011/aug/15/david-cameron-broken-britain-policing>).

Create five questions based on the article.

Questions must prompt students to identify the following:

- The causes of the London 2011 riots.
- What is meant by 'Broken Britain'?
- The suggested response to the riots.
- There must also be a progression in thinking skills (as outlined by Bloom's Taxonomy) in the questions.

ChatGPT response

1. Knowledge: what event triggered David Cameron's speech about 'Broken Britain' and the London 2011 riots?
2. Comprehension: According to Cameron, what are some of the

underlying societal issues he attributes to the London 2011 riots?

3. Analysis: What specific policies or initiatives does Cameron mention as part of his response to the riots, and how do they aim to tackle the root causes?
4. Synthesis: Can you identify any patterns or commonalities among Cameron's proposed solutions to the issues he identifies as contributing to 'Broken Britain'?
5. Evaluation: Do you agree with Cameron's assertion that the London 2011 riots were not about race, government cuts or poverty? Why, or why not?

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Encouraging students' questions in the geography classroom

Margaret Roberts

Introduction

In both primary and secondary classrooms very few questions are asked by students. Why is this so? Does it matter? In this article, after looking at the research findings, I suggest why it is important for students to ask questions. I then present a range of strategies and activities that can be used in geography to encourage students' questioning.

What are the research findings?

There is an extensive body of research into classroom talk dating back to the 1960s, including by Barnes *et al.* (1969), Dillon (1988), Mercer (2000), and Alexander (2020). Researchers have observed and recorded lessons, analysed transcripts of classroom talk and identified ways in which talk supports both teaching and learning. The findings have been consistent: most classroom talk is by teachers, much of it in asking questions. The transcripts reveal that in whole-class situations, across the curriculum, few questions are asked by students.

For example, Dillon (1988) reported a study carried out in 27 social studies lessons in which 721 upper secondary school students were engaged in discussion – the kind of lessons when it might be expected that they would ask questions. He found that in these lessons 11 questions were asked by students, by only 8 students; 713 students did not ask a single question. Dillon commented that this was 'normal'. Chin and Osborne (2008), in an extensive review of research investigating students' questions in science lessons, wrote 'Despite the capacity of students' questions for enhancing learning, much of this potential still remains untapped.' (p. 1)

Researchers have suggested three reasons why so few students ask questions. Firstly, certain norms of classroom practice have persisted for decades. Dillon found that 'students' questions are 'fairly excluded by the cycles, rules and norms of classroom discourse' (Dillon, 1988, p. 12). The so-called 'rules' are unspoken and include what is expected of students in terms of participation. Students learn these rules quickly; teachers control classroom talk and students are expected to answer rather than ask questions. Chin and Osborne (2008, p. 35) reported that the 'default pedagogy of most science lessons across the globe is still one of transmission' and that it did not exploit the potential value of students' questions.

Second, teachers did not encourage student questions. They tended to answer the rare questions that were asked very briefly, or by

deferring them, saying: 'We'll get to that later', or just saying 'Good point', but without answering them. Teachers did not allocate time in their lesson plans to make room for student questions. Chin and Osborne pointed out that science teachers faced pressure to complete a given curriculum in a set time and to prepare students for high-stakes examinations. Student questions were seen as a distraction to the smooth implementation of lesson plans.

Third, students were influenced by peer group pressure. Dillon (1988) wrote that 'it is anti-normative to display ignorance in school or to show perplexity, incomprehension or need' (p. 17). Students did not want to appear stupid in front of their peers and be open to ridicule.

Dillon's research was carried out several decades ago, but the norms of classroom interaction he described are reinforced by the current frameworks for Early Career Teachers (DfE, 2019a) and the ITT Core Content Framework (DfE, 2019b) both of which set out what teachers 'need to learn'. Both frameworks contain 12 references to questions in the classroom. Only one of these refers to students, but in the context of them 'working independently':

Teachers should model effectively by: Narrating thought processes when modelling to make explicit how experts think, e.g. asking questions aloud that pupils should consider when working independently' (DfE, 2019b, p. 18).

The frameworks do not suggest that teachers should encourage students' questions in discussion.

Why is it important for students to ask questions?

There are several reasons why it is important for students to ask questions in the geography classroom.

First, it is a statutory requirement. In England, as in other countries, (e.g. in Australia, Ireland, and Singapore), current geography curriculum documents require students to ask questions.

In England, it is an implicit requirement for geography at key stages 1, 2 and 3. The geography National Curriculum states, under the heading 'The purpose of study', that:

- 'A high-quality geography education should inspire in pupils a curiosity and fascination about the world and its people that will remain with them for the rest of their lives. (DfE, 2013)

It is an explicit requirement for geography at GCSE and AS and A level.

Research has shown that extremely few questions are asked in classrooms by secondary school students. Margaret explains why it is important for students to ask questions in geography, and suggests a range of strategies and activities that can be used to encourage them.

- 'GCSE geography specifications "should require pupils to develop and demonstrate" a range of skills'. These include 'Formulating enquiry and argument. The ability to identify questions and sequences of enquiry ...' (DfE, 2014a, pp. 5–6).
- 'AS and A level specifications must require students to: undertake informed and critical questioning of data sources, analytical methodologies, data reporting and presentation, including the ability to identify sources of error in data and to identify the misuse of data ...' (DfE, 2014b, p. 12).

Second, research has provided substantial evidence that engaging in classroom talk supports students' learning. Alexander (2020) has identified categories of desirable learning talk and what each category includes (Figure 1). Much of what is included in these categories involves asking questions. For example, when students suggest, speculate and hypothesise they are asking themselves questions such as 'I wonder if ...', 'Could this be the reason for...?', 'Is there a general pattern?'. When they probe and challenge, they are asking critical questions about what they hear in discussion or encounter in what they are studying. Chin and Osborne, from their research into classroom science, found that students' questions could direct their learning, foster discussion, help them monitor their own learning and increase their motivation.

- Interrogatory: **ask**, answer
- Exploratory: suggest, **speculate**, **hypothesise**, **probe**, **clarify**
- Deliberative (arguing the merits of a case); reason, **ask**, argue, **question**, **hypothesise**, **challenge**, defend, justify, analyse, synthesis, persuade, decide
- Imaginative: **speculate**, visualise, describe, envisage
- Expressive: **speculate**, qualify, argue
- Evaluative: estimate, assert, argue, justify

Types of talk that involve asking questions are in bold.

Figure 1: Categories of learning talk. Source: Alexander, 2020, p. 158.

Third, students' questions are valuable for teachers. They let teachers know what students need to know, and want to know, about what they are studying in schools. Some student questions might have their origin in what students have experienced and learnt outside school and are puzzled or curious about. Their questions, whatever their origin, can give teachers an insight into how they are thinking, what they understand, or misunderstand, and what puzzles them. Listening to students' questions contributes to the process of formative assessment.

Fourth, if school education is to prepare students for their future lives in a democratic society, students need to have opportunities to gain confidence in asking questions that probe and challenge the views and ideas of others.

Students learn to do this not simply by being knowledgeable, but by having opportunities to probe and challenge the views of others in discussion.

If it is a government requirement that students are to be inspired to be curious and for students to ask questions throughout GCSE and A level courses in geography, why are students' questions so rare? Is it because success in GCSE and A level geography examinations depends on what students write rather than on their ability to ask questions?

How can teachers encourage students' questions?

I have argued that it is important for students to be given opportunities to ask questions in geography, not only because it is a statutory requirement but also because it supports their learning and their development as citizens and gives teachers insight into their thinking. Individual teachers and geography departments are unlikely to be able to change the 'rules and norms' of classroom practice within a school, but research across the curriculum and accounts of classroom practice in geography have shown several pedagogic strategies that can be used to encourage students' questions.

1. Allocating time for questions

Units of work could include at least one activity in which students are required to ask questions. Alternatively, units of work could include a short period of 'question time', during which students ask questions.

2. Valuing questions

Teachers could show that they value students' questions, both when they are asked in front of the whole class or when they hear them during small-group discussion. They can do this by welcoming them, listening to them carefully and responding to them. Questions could also be valued by putting some of them on display. For example, Dixon (1996) described the use of a 'question board' in science lessons to display students' questions relating to the topic being taught, and described how these questions could be used as starting points for scientific investigations.

3. Group work

Research has shown that students are more likely to ask questions when they are working collaboratively in small groups. If the questions are generated in collaborative group discussion and then shared with the whole class, students do not feel so personally at risk of peer group ridicule. All the activities listed in the last section of this article can involve some group work.

4. Written questions

Students who feel reluctant to ask questions out loud can be encouraged to write them down. If this is done individually, for the attention only of the teacher, then students are free of peer group pressure.

Who decides? – These are questions about power, who makes choices and decides what is to happen, who benefits and loses as a result of these decisions and at what cost.

Social – These are questions about people, their relationships, their traditions, culture and the way they live. They include questions about how, for example, gender, race, disability, class and age affect social relationships.



Natural – These are questions about the environment – energy, air, water, soil, living things and their relationships to each other. These questions are also about the built as well as the 'natural' environment.

Economic – These are questions about money, trading, aid, ownership, buying and selling.

TIDE~ global learning toolkit
www.tidegloballearning.net

5. Providing frameworks to help students formulate questions

Students can be guided on the range of questions relevant to geography by being introduced, during their geography courses, to the following frameworks that provide starter words or categories of questions as a form of scaffolding.

- The 7Ws and an H: What? Where? Why? Who? What might? What ought? How?

These starter words seek basic information and explanation but also consider future impacts and ethical issues.

- The Development Compass Rose, using the initials of the four points of the compass, encourages questions on different aspects of an issue (Figure 2).
- Socratic questions (Figure 3) encourage critical questioning to probe and challenge what is presented in resources and discussion.

Figure 2: Development Compass Rose. **Source:** The Development Compass Rose: a framework for asking questions. Accessible at Tide~Development Compass Rose: tool for raising questions.pdf (tidegloballearning.net).

Questions that seek clarification: trying to understand what others are saying	Questions about viewpoints and perspectives
What do you mean by ...? What is the main point you are making? Is your main point ...? Could you put it another way? Could you give me an example of ...? How does it relate to what we have been talking about? Could you explain that a bit more?	Whose points of view are represented? What different ways are there of looking at it? Who benefits from this? Who loses? Why is it better than ...? What are the strengths and weaknesses of ...? Is there another point of view we should consider? What is the counter-argument?
Questions that probe assumptions	Questions that probe implications and consequences
Are you assuming that ...? Is that always the case? Does your reasoning depend on the idea that ...? Are you taking for granted ...? What else could we assume? Why might someone make that assumption?	When you say ..., are you implying ...? But, if that happened, what else would happen as a result? Why? What effect would that have? Would that necessarily happen or only probably/possibly happen? What would be the consequences of that? What are the implications of that?
Questions that probe reasons and evidence	Questions about the question
How can we find out if it is true/accurate? Why do you think that is true? What evidence are you basing that on? Do you have any evidence for ...? What are your reasons for saying ...? Are these reasons enough? Why do you say that? Is there any reason to doubt the evidence? Why is that happening? Are these reasons a good enough explanation? Can you explain your reasoning? Could there be another explanation?	Why is this issue important? How can we find out? Are there other questions we need to ask? Can we break the question down a bit? How far have we got? Are we any nearer to answering the question?

Figure 3: Categories of Socratic questions. **Source:** Roberts, 2023, p. 108.

- The argumentation framework (Figure 4) provides questions designed to probe evidence for knowledge claims.

The Route for Enquiry (Figure 5), devised for the Schools Council's 16–19 geography project, provided a sequence of questions under headings to be used in investigating an issue.

- **What is the claim?** What is the geographical statement or generalisation that you are investigating?
- **What evidence is there for this claim?** How does the data support the claim?
- **How can the claim be explained?** i.e. What additional evidence is there? e.g. from knowledge of processes and from other contexts?
- **Is there any counter-evidence?** Is there any evidence that the claim is not true in every case or situation?
- **How can this counter-evidence be explained?** e.g. Are there processes which impact on places in different ways?
- **Does the claim need to be qualified?** To what extent is the claim true?

Figure 4: Questions in the argumentation framework.

Figure 5: Questions listed in The Route for Enquiry (to be applied to more objective and to more subjective data). **Source:** Rawling, E. (2007) *Planning your Key Stage 3 Curriculum*, Sheffield: Geographical Association.

	Route for enquiry	Key questions
1	Observation and perception	What?
2	Definition and description	What? Where?
3	Analysis and explanation	How? Why?
4	Prediction and evaluation	What might? What will? With what impact?
5	Decision making	What decision? With what impact?
6	Personal evaluation and judgement	What do I think? Why?
7	Personal response	What next? What shall I do?

The framework is unique in giving equal attention to the factual (more objective) dimension and the values (more subjective) dimension of the issue being investigated. It also encourages students to make and justify their own judgements.

6. Teacher modelling

It is beneficial for students to hear their teacher explicitly modelling the use of different kinds of questions, such as those in the frameworks above, using them to introduce new information and ideas and procedures, explaining why they are useful in helping us construct geographical knowledge and think geographically and critically.

Activities that require students to ask questions

The following activities, referred to in Roberts (2023), all require students to ask questions:

- Fertile question and written sub-questions
- Speculation
- Intelligent guesswork
- Interviewing people (teachers, people in local area)
- Layers of inference
- Directed Activities Related to Text (devising questions to head each paragraph)
- Public Meeting Role Play lessons
- Dialogic learning diaries (instructions could encourage questions)

Concluding comment

Although this article focuses on students' questions, it is not sufficient simply to adopt the strategies above and use activities that require students to ask questions. They are only one component of interactive dialogic teaching, through which students deepen their understanding of geography through discussion. They contribute to a classroom culture in which students' participation, inquisitiveness, criticality and collaboration are valued as important for their learning. | **TG**

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Our 'golden threads' curriculum

Fiona Sheriff

Like us, you may have been working on your departmental vision, trying to design a coherent, powerful and relevant curriculum 11–18 curriculum. This article explores how we have built a clear vision and developed our curriculum.

Our vision

After listening to David Gardner at the Geographical Association Annual Conference in 2022, I was inspired to take his idea of our units being the building blocks for enacting our vision of the geographical curriculum. We had to consider how everything we taught, and the experiences we delivered, would enable us to bring our vision to life. Could we look at our year 13s and say that they embody our vision, and if they didn't, what would we need to do to make the vision a reality? Would our students understand the purpose of the geography they had been taught, or would they just believe it's about 'Everything, saving the planet or making a difference' (Standish, 2017, p. 88)?

Our seven-year journey can be seen in Figure 1. We combined ideas from our schools' vision for our students (emboldened words) with our own vision for our geography students. Then we had to decide how we would enact this vision. What would the impact of our intent be?

Geographical concepts and 'golden threads'

'A framework for the school geography curriculum' (GA, 2022) suggests a range of geographical concepts – place, space, scale and environment – that should run through our curricula. These are so intertwined as core concepts that we

don't explicitly mention them. Space is explored through our locational knowledge – knowing where things are before we understand what they are. Giving students the opportunity to explore the space of a location gives them a chance to challenge their geographical understanding of it. For example, if they discover a location is near the Equator, they can use their propositional and geographical knowledge to consider its climate, biome, topography and people: this also enables us to spot and correct any misconceptions before we explore each place. As these were intrinsic to our curriculum and to our work as geographers, instead we chose to focus on a different range of curriculum concepts – the ones that were going to run through the curriculum like 'golden threads'. Lambert and Morgan (2010) and Gardner (2021) refer to these concepts as the 'grammar' of geography: the big ideas on to which everything else is organised. Maude (2020) suggests that concepts 'can be applied to a great variety of topics, and across different fields of the subject' (p. 234). We wanted to use these golden threads to show progression through our curriculum, as well as being the key ideas which bring each aspect of our curriculum together. These, taken from the wider core concepts that run through the A level specifications, are:

- sustainability
- systems and processes
- development
- interdependence
- inequality
- globalisation
- biodiversity
- resilience.

Fiona describes how her school developed their 11–18 curriculum around eight 'golden threads' (Gardner, 2021) based on core geographical concepts.



Accompanying online materials

The beginnings of a seven-year journey Our vision



Through our rich and varied geographical journey we hope that as many students as possible continue their study of Geography into Key Stages 4 and 5.

We will explore culture, be creative and inspire curiosity through our studies of the world, its landforms and its people. Our curriculum is **broad, balanced and inclusive** paving the way for students to be **confident** in their own voice as well as understanding the voices of others.

Our geography curriculum provides opportunities for students to further their experiences of the world through extra and super curricular activities, providing them with character and currency alongside developing their leadership and employability skills.

By teaching through a de-colonising and anti-racist lens we want students to understand their world and not only relate to their local community but to our national and global communities. Students will be exposed to more than the single story and understand the danger of only seeing one view of a location.

Through our golden threads of sustainability, systems and processes, development, interdependence, inequality, globalisation, biodiversity and resilience students will be exposed to a **rich, diverse and challenging** curriculum which underpins their knowledge of other areas of the curriculum. After all, without Geography you are nowhere.

We aim to prepare students for the world of tomorrow, creating global citizens who feel empowered to live sustainably and protect the future as well as to **dream big and aspire** to travel and discover our beautiful planet.

Figure 1: Geography curriculum vision at Kingsthorpe College.

While our golden threads may not completely fit Maude's (2020) three characteristics of what a key concept is (top of the hierarchy of concepts; applied to a great variety of topics; have a number of functions), they epitomised how we saw our students' understanding of geography progressing over their seven-year journey. Gardner (2021) suggests that 'there is no one definitive list of key geographical concepts and no correct categorisation of concepts' (p. 79) and this has encouraged our own thinking around how we organise our knowledge around these threads, not only adding further fluidity to our curriculum design process but also helping us to realise key areas of our vision.

Our golden threads are on display for students to see and they are also on PowerPoint slides. Our definitions of each thread can be seen in Figure 2.

Sustainability	We will try to 'understand how to meet the needs of the present without compromising the needs of future generations to meet their own needs' (Brundtland Commission, 1987).
Systems and processes	How things function, change and move. We will explore a range of systems and processes including fluvial, coastal and glacial. We will understand inputs, outputs and flows.
Development	The process of economic and social advancement. We will explore countries at different levels of development and understand how and why development occurs at different rates.
Interdependence	How two or more things are dependent on each other. We will explore economic, political, social and environmental interdependence.
Inequality	The idea that people experience different standards of living. We will explore socio-economic and political inequalities of people around the globe.
Globalisation	The increasing connections between places and people across the planet. We will explore how links have been established through trade, politics and cultural exchanges.
Biodiversity	The enormous variety of life on Earth. We will explore a range of ecosystems, their uses and management, alongside a variety of flora and fauna.
Resilience	The ability of a system to maintain certain functions, processes or population after experiencing a disturbance. We will explore the resilience of communities around the world and factors that affect resilience.

Figure 2: Curriculum golden threads.

Golden thread progression

These eight golden threads underpin much of what we study. Once they are understood they open the door to wider geographical thinking. In year 7 students are introduced to the themes, and at A level they should have a deep 'mastery': understanding of them. The progression through the themes can be seen below.

Figure 3: Golden thread progression.

Year 7	Year 8	Year 9	GCSE	A level
Introduction to the core concepts, e.g. definitions and examples: e.g. can describe what biodiversity is and give a local example	Can clearly define key concepts and apply them to a wide range of examples: e.g. biodiversity and the threats to it in the tropical rainforests	Links between core concepts Can begin to question key concepts and problems around them, e.g. why development is unequal	Secure understanding of core concepts Can apply them to a wide range of examples Can use key vocabulary confidently Can confidently question key concepts such as sustainability	Mastery of core concepts Synoptic links between them Can confidently question key concepts and be critical of them, e.g. globalisation

While not every topic may have all eight concepts weaving through it – a map skills unit, for example, will show fewer of them – they are covered each year, and progression across each of the threads has been planned so we can see what our students will know as they move through the curriculum to build up their overall geographical confidence and competence.

An example of one of our golden threads and how students progress through this thread can be seen in Figure 4 (page 111).

Through the golden thread of 'development' students will begin to understand what development is, and we look at this through our study of the text *Almighty Dollar* by Dharshini David (2018). Students study countries at differing levels of development and the impact of the dollar and trade. Beginning with a basic understanding enables us to bring students to the same level of confidence with the golden thread of development before adding more complexity to their understanding. However, as geographers we know that development is incredibly complex, and development indicators cannot be used in isolation. Students are challenged to question the surface understanding of the term 'development' and are exposed to a range of sources such as 'Dollar Street' (Gapminder.org, n.d.) to dispel myths around development and to further their understanding of uneven development. We hope that by the end of key stage 3 our students will have a secure understanding of the core concepts, ready for their exploration of geography at key stages 4 and 5. By exposing them to a wide range of sources and locations we hope to build up their understanding of each golden thread over time, revisiting the basics before adding a new layer of complexity. Through this process students also begin to understand the links between each golden thread, with each thread being woven into our beautiful geographical tapestry.

At key stage 3 we wanted to expose our students to a wide range of geographical themes and locations, with some units focusing on a particular country. For example, in year 8 students study Brazil; whereas other units will revolve around a plethora of locations, for example our Conflict unit in year 9. We wanted to be ambitious, and since 2021 our ideas have adapted and progressed from their inception to what our curriculum looks like today. Geography is a dynamic subject, and our curriculum should reflect the changes that we, as geographers, see and experience every day.

Case studies can stagnate: time constraints placed on us by the demands of our job can mean that while there is definitely a place for teaching established case studies, we wanted to ensure that these were interspersed with up-to-date and relevant examples for the students – their ‘lived geography’. ‘Geography speaks directly to young people’s curiosity, wonder and concern for the world around them’ (GA, 2022, p. 3). Through keeping our curriculum up-to-date, and not only aligning it with what our students see every day but also to keep them curious, we hope that this will keep our subject at the forefront of their minds. Roberts (2023) suggests that ‘Making connections between students’ personal everyday knowledge and school geography is particularly important when there are likely to be misconceptions’ (p. 4). Therefore, considering the students’ lived experiences of geography is vitally important when helping them develop as geographers.

At GCSE we study the Eduqas B specification; however, we do not follow the order of the themes given by the awarding body. Instead, we interleave the themes to revise key concepts across the two years of our GCSE course to ensure that students can see the links between the topics, rather than them being standalone units or themes. For example, in year 10 we study weather and climate, and in year 11 we study climate change – this gives a clear opportunity for students to recap their knowledge and consider the links with other topics they have studied, such as rivers, ecosystems, coasts and urbanisation. Students will re-visit our eight golden threads throughout their GCSE journey, building on the understanding gained at key stage 3 and working towards ‘mastery’ of that golden thread.

Conclusion

We are still part way through this journey, and as with all curricular changes they take time to embed and for us to see the overall impact. There have been some challenges in the implementation of our intent, for example an increase in non-specialist teaching for parts of the curriculum which has meant that staff

Example continuum: development

Year 7	Year 8	Year 9
What does the word development mean?	Why is development a complex issue?	Why should we consider development as a continuum?
Are all places as developed as others?	What are development indicators?	How do different development indicators compare across the world?
What are the differing levels of development?	What challenges do developing countries face?	How does development compare within a country?
What is trade?	What can developing countries teach the rest of the world?	Why can conflict arise out of uneven development?
How does trading goods help a country?	Does climate change affect all countries in the same way?	What is the danger of a single story?
Why does the weather impact places differently?	How developed are the Arctic and Antarctic?	How can we close the development gap?
Why do people live near volcanoes?		

and students may miss how some of the golden threads develop over time. We have tried to navigate this by creating a document for the start of each unit which clearly shows which threads are being covered, where ideas have progressed from and where they progress to. Students have these stuck into their books and they are available for all staff to read. We have also added icons and a golden threads slide to our PowerPoint resources to cover what the thread is and how it links to what they are learning, or have learnt, to further embed the threads for all teachers of geography. In spite of the challenges, we are seeing students demonstrate a higher level of understanding for each of the golden threads, particularly sustainability and biodiversity, as we have increased the coverage of both core concepts across our curriculum. Student voice has indicated their increased confidence in the application of geographical knowledge and that students feel that they understand the world better. The result of this is that students taking their GCSE and A level exams have a greater understanding of these important topics; they are also being more synoptic in their approach to essay questions, pulling together the golden threads and weaving them into their own interpretations. | TG

Figure 4: Kingsthorpe College’s curriculum golden thread progression – development.

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Online resources

The downloads that accompany this article can be accessed at <https://portal.geography.org.uk/journal/index/tg>. Select Autumn 2024.

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Astrogeography: the coming cosmic curriculum?

Joshua addresses the important concept of astrogeography, and then outlines two lessons he has taught on the subject at key stages 3 and 5.



Accompanying online materials

'Outer space', 'extra-terrestrial', 'near-Earth orbit', and 'off-Earth' are terms increasingly used in geographical literature. This is partly because 'geography seeks to make sense of all worlds' (Bonnett, 2023, p. 106). Dodds (2024) refers to outer space as a growing area of geographical discussion, acknowledging that it will face scrutiny and challenge as concerns about resources, climate change and strategic competition make themselves felt, highlighting how the planetary commons is expanding. Planetary commons extends the concept of global commons to the critical biophysical systems that regulate Earth's resilience and state, regardless of national boundaries. Such spaces are becoming more contested, as both complementary and rival geographical imaginaries expand (Dodds, 2024, p. 1); so it is time to reimagine what our future curriculum will look like, and consider how we can bridge academic and school geography by teaching astrogeography (Butt, 2019; Bonnett, 2023).

Astrogeography is geography

Geographers understand that 'Geo-graphy' derives from the Greek word 'geographia' literally meaning 'Earth-writing', writing about places, people, and events (Bonnett, 2023; p4). However, it can also be translated to 'land, soil, and country'. Geography is the study of the world; the study of worlds both 'near and far' (Bonnett, 2023 p 106).

As humanity expands beyond Earth's surface and atmosphere, and we continue to want to know more about places, people and events, we need to 'reorient geography from an Earth-centric discipline towards accommodating *astrogeography*' (Bonnett, 2023, p. 99). This term has its roots back in the 1960s, when Varvarov and Fadeyev (1962) suggested there was 'a sweeping program of research in astrogeography': this research is now a growing part of academic geography worldwide. Astrogeography is 'ordinary geography carried over into space and constitutes to a large extent a generalisation from the appropriate terrestrial data to cosmic data' (Kolesnikov, 1957), although some colleagues and academics might be concerned with this extension, as presenting geographers as 'generalists' and the subject being too 'broad' and 'hard to pin down'.

As more information about outer space and opportunities to venture there become available, we will see greater connections being made between geographical processes, landforms, and phenomena in space and those on Earth and elsewhere. We can incorporate 'astro' into our curriculum to promote critical geographical enquiry.

Bridging the disciplinary and curriculum gap

We can ease the transition to university by incorporating astrogeography into our curriculum: important, because the geographers of today are the astrogeographers of tomorrow. Technological advances, innovative practices, and the increasing number of 'spacefaring' nations are having greater impact and influence in outer space. Examples of recent (2020–24) 'off-Earth' developments that have geographical implications are:

- Growing superpower tensions over Lagrange points (points of equilibrium for small-mass objects under the gravitational influence of two massive orbiting bodies) as parking spaces for satellites and rockets.
- In 2021, with Jeff Bezos on board, the first flight of Blue Origin's NS-16 launched. This flight crossed the Kármán line, 100km above sea level, that marks the boundary between Earth's atmosphere and the beginning of space. The mission became the first fully automated flight with civilian passengers.
- OSIRIS-REx satellite in 2023 was the first US mission to collect rock samples from the asteroid Bennu.
- In March 2024 Elon Musk's SpaceX launched from a commercial spaceport. His Starlink satellite internet connection supports telecommunications in remote environments and conflict zones.
- Launching in May 2024, China's Chang'e-6 mission landed on the far side of the moon to study lunar rocks and soil. It successfully returned to Earth.
- The expansive Aurora that was seen across the northern hemisphere in August 2024.

Research by Stannard (2003) and Hill and Jones (2010), which helped inform geography specification reviews, highlighted the opportunities for working closely with universities to bridge the gap between school and academic geography. Many physical geography degrees have incorporated planetary geomorphology into university modules for decades, with an increasing number of human geography courses and literature referring to 'outer space' (Dunnett *et al.*, 2017). Incorporating astrogeography into our curriculum has the potential to close this gap: 'making the subject more, rather than less, relevant to popular concerns' (Stannard, 2003, p. 320).

Pollution Space 'junk' mapping and impacts	Environmental risk Terraforming processes	Superpowers Power relations and the new space race
Tourism Space tourism, attractions and impacts	Climatology Orbital patterns, e.g. Malkovich cycles/Venus atmosphere	Settlements and migration Space stations, movements, and growth
Energy Rocket fuel and solar power on satellites	Economic activity Space TNCs and future trading routes (space highways)	Resource management Water/food sources and conservation off-Earth
Culture Representation (of Earth) in outer space	Cartography Space contours (gravitational hills and valleys)	Plate tectonics Volcanology on Mars, e.g. Olympus Mons
Weather Space weather, e.g. the Aurora and the impacts on connectivity/Jupiter's red eye	Resource extraction (Currently hypothetical, but growing research and industries exploring extraction of resources on asteroids)	Geomorphology Planetary geomorphology, e.g. fluvial and aeolian processes/sand dunes on Mars

Figure 1: Table of geographical themes and the astrogeography themes they could connect with for current and future teachings.

Opportunities to include astrogeography in the curriculum

Inspired by the influential work of Marshall (2023) on the new space race and what it means for us, geographers and teachers are slowly engaging with astrogeography. Work by Dunnett *et al.* (2017, p. 2) has emphasised that geographers' involvement with outer space has mostly been confined to 'critical astropolitics' – e.g. superpower geographies.

However, space travel, exploration, and the potential for human settlement beyond Earth are clear avenues for engagement (Dunnett *et al.*, 2017, p. 10). Contemporary human geography has been slow to explore the myriad connections that tie social life on Earth to the celestial realm (MacDonald, 2007), while physical geography has been complementary to planetary sciences. The famous work of Dolman (2002) suggests that space has 'a distinct and definable geography' (p. 60) and identifies its salient features. His work on gravitational hills and valleys is just one example of how teaching map skills and studying cartography on Earth can evolve to cover outer space.

Research and teachings related to physical geography (and sister disciplines) have been faster at incorporating astrogeography through planetary sciences; for example, landscape processes on the Moon and Mars. Fedynskii and NASA (1968) stressed that:

... geology and geography (and even meteorology) tend to consider their problems more from an extraterrestrial standpoint or as related with cosmic aspects (Fedynskii and NASA, 1968)

This allows us to uncover new facts, leads to a deeper understanding of familiar laws, and a reappraisal of terrestrial geography and geology: opportunities to reimagine and update our curriculum as new knowledge and understanding of concepts, examples, models, and theories present themselves. There are many wellworn lines of geographical critique that have their parallel in space (Sage, 2016, p. 611). Figure 1 and the examples that follow highlight opportunities to teach about astrogeography.

Example 1

Key stage 3 enquiry question 'Can humans flourish in all environments?'

With a unit like this, where students are traditionally taught about hot, cold, and high-altitude environments, there is an opportunity to teach about outer space as an extreme environment. After all, space is described as 'inaccessible' and 'inhospitable', and students are probed to question: 'Is outer space an extreme environment now or in the future?' During this unit the students followed a sequence of learning, from exploring human habitation and survival on the International Space Station to the planetary geomorphology of Mars and the potential for terraforming (making it habitable for humans).

On entry to the first lesson students studied an image of Mars taken from NASA's Perseverance Rover (Figure 2). During the think, pair, share discussions, one student volunteered 'It looks like places I have seen in Arizona, where I grew up.' This inspired other students in the class to think about similarities and differences in landscapes they had previously encountered, reflecting on existing knowledge about physical processes; later, this helped them to question how these landscapes and features were formed.

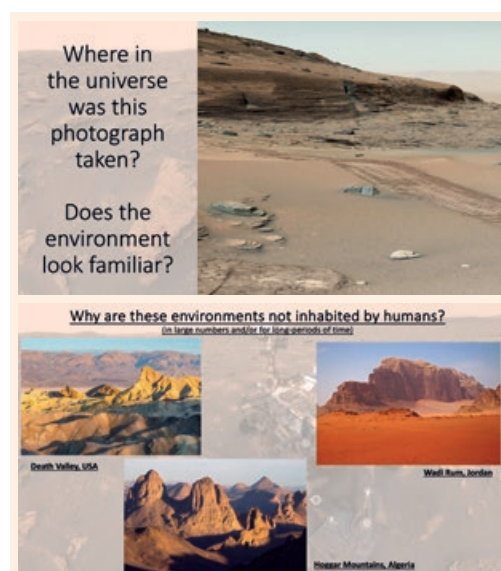


Figure 2: Slides taken from the scheme of learning – entry task (question) and follow up (slides).

The follow-up slide looked at comparing similar landscapes to that on Earth and allowed students to retrieve prior knowledge on hot environments.

Next, students completed a range of activities: Figures 3 and 4 are examples of students' work (for context, my school has a Bring Your Own Device (BYOD) policy and we use OneNote.) Figure 3 shows the student's enquiry, making judgements based on their cartographic skills and understanding of landforms on Earth, and

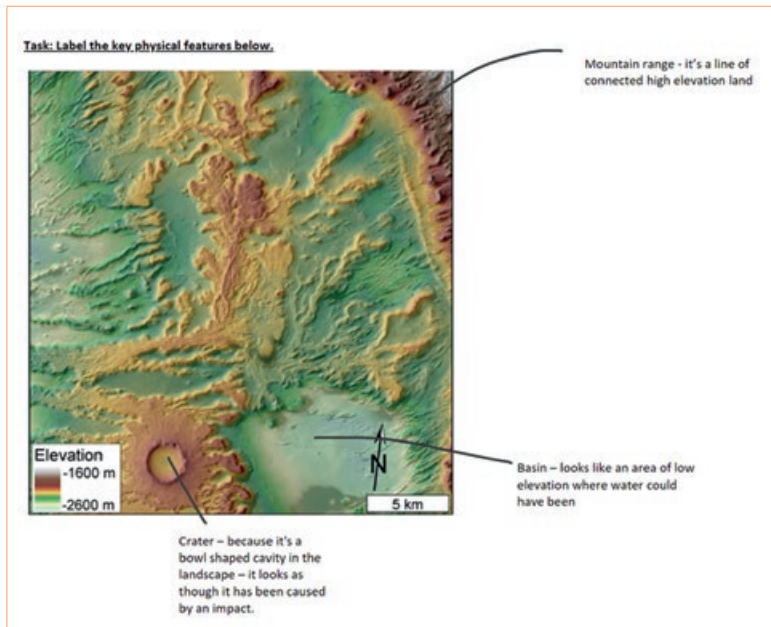


Figure 3: An example of a student's work, exploring the physical geography of Mars and querying the features shown. **Source:** © <https://www.space.com/21984-mars-ocean-ancient-river-delta.html>

Space Reflections

Friday, April 19, 2024 9:19 AM

Complete the following sentences and reflection questions.

Space is an extreme environment humans are trying to survive in...

It is an extreme environment because it was inaccessible to humans, but now some humans can access this environment via a space rocket. Currently, this is costly and uses a lot of fuel. In the future, we might be able to make space more accessible and affordable due to developments in technology. These may further help to combat some of the problems faced in space such as the low temperatures and lack of gravity – factors that make space extreme and stop humans from thriving. An example of this may be the development of a faster form of transport for space such as nuclear fusion rockets which heat hydrogen to produce a greater source of thrust.

Furthermore, space is currently inhospitable. This harsh environment has low temperatures and a lack of moisture. On the ISS, astronauts currently deal with a lack of moisture (water) by recycling urine and sweat to use for drinking water, showering and rehydrating dry food. In the future, scientists are looking to develop technologies in a way that allows humans to thrive. An example of this is the ambitions of many scientists to break down moon rocks into oxygen to allow astronauts to breathe as well as providing drinkable water. This may mean a lower cost of rockets due to them not having the necessities of water and oxygen in tanks from earth.

Reflection questions:

- Are astronauts currently surviving or thriving?

In my opinion, although the development of technologies have allowed astronauts to survive they are not thriving. This is down to the extreme conditions they are exposed to such as a lack of gravity which can have negative effects on the astronaut's bone structure by reducing their density as well as weakening their muscles.

- In the future, how can humans survive and thrive in space?

The developments in technologies such as the ambitions to make a machine that chemically bonds hydrogen and oxygen to make drinkable water of the breakdown of moon rocks to provide necessities for the astronauts could all contribute to making space a more accessible and affordable place.

Figure 4: An example of a student's reflection on the sequence of space lessons.



Figure 5: Responses to the student voice survey (year 8, 2023–24).

describing the noticeable features shown on the topographic map of Mars. In class, the crater example opened up a discussion on whether the feature was a crater or a volcano and what supporting evidence there was. Figure 4 shows one student's reflection on the space lessons, which helped consolidate their ideas to answer the final enquiry question.

Student reflections

Feedback from students during an end of year survey ranked lessons in this unit on outer space more highly than other environments studied (Figure 5). They also enjoyed making connections with other subjects, e.g. science and innovation. Although only a small sample (the survey was not completed by the whole cohort), students rated space lessons as preferred content, and subsequently preferred this unit of study when compared to others. Engagement with astrogeography was high: students appreciated the imagination, enquiry, relevance, and connectivity that went into the planning process and delivery.

Example 2

Key stage 5: Superpower relations and the global commons: Who owns (outer) space?

In lessons, stimulus materials such as infographics are shared with students to question the increasing number of space faring nations and private companies in outer space – the new 'space race'. Students analyse data related to the number of space rockets, satellites (some with potential weapons capabilities), stations, rovers, landings, etc. Discussions then take place to consider possible futures and to illustrate how changes in power statutes, investment, and influence continue over time and space. In future, exploration of the roles and influences of Lagrange points, SpaceX, Starlink, and even China's Chang'e-6 mission could be included, and collaboration with other departments can consolidate this 'astro' knowledge. Enrichment opportunities can add further breadth and depth, using Marshall's (2023) work to highlight the growing issues (political loopholes, and the 1967 Outer Space Treaty). A simple display (Figure 6) can be used to promote awareness of astrogeography and encourage staff and students to make geographical and interdisciplinary connections as well as to ignite discussions.

The Future of geography

The rapidly increasing human activity in outer space is not just a topic for science, engineering, and business considerations. Future developments in space will have increasing geographical connections on Earth, and this is why our curriculum needs to consider astrogeography. We must come to terms with the everyday realities of space exploration and domination as urgent subjects of critical geographical inquiry (Sage, 2016, p. 610). Geographical approaches are needed to understand the social, cultural, political, and environmental meanings of outer



Figure 6: A classroom display to promote the topic of astrogeography, showcase lessons, and encourage interdisciplinary discussions by both staff and students.

space, while considering how outer space relates to Earthly spaces (Dunnett, 2023). The need to consider and engage with astrogeography in our future curriculum is now, but we must teach responsibly. This is because advancing technology, innovation and the need for survival on Earth and in outer space 'is a logical extension of earlier geographies of imperial exploration' (MacDonald, 2007, p. 596).

Conclusion

Geography is *the* world discipline, studying land, soil, and territory near and far. As humanity expands beyond Earth's surface, our geographical imagination and enquiry expand into the cosmos. Increasing use of the terms 'extraterrestrial', 'outer space', 'near-Earth orbit', and 'off-Earth' in geographical literature highlights how 'astro' geography will continue to grow in importance

in the future. Astrogeography is an evolving branch of our diverse and conflicted subject and whether we like it or not, we need to help the next generation explore, extract, and survive responsibly. As Konstantin Tsiolkovsky said in 1911 'The Earth is the cradle of humanity, but mankind cannot stay in the cradle forever' (Ratcliffe, 2016). Astrogeography is here, and in coming years will feature in geography curricula around the world.

Acknowledgements

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Online resources

The downloads that accompany this article can be accessed at <https://portal.geography.org.uk/journal/index/tg>. Select Autumn 2024.

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How to get the most out of *Teaching Geography*

Here Richard describes some of the benefits that accrue from subscribing to *Teaching Geography* as part of a GA membership.

Subscribing to *Teaching Geography* (TG) journal is so much more than simply receiving something glossy in the post three times a year. It is a must-have resource for any geography teacher: used effectively it can provide lesson resources, curriculum materials and thought pieces to provoke and inspire. As TG approaches its 50th anniversary in 2025, this article outlines a few benefits that derive from subscribing to the journal.

Cutting edge ideas

The journal has been publishing ideas at the forefront of teacher thinking for half a century, helping geography teachers remain research-engaged. There are other educational and geographical journals available for teachers, but TG's specific focus enables it to lead the professional thinking of geography teachers. Reading the articles can form part of your professional development, and many can be used in department discussions, in your own research, or be taken straight into the classroom.

The online resources

Many of our articles are written by teachers and outline innovative lesson ideas (such as the article from Katie Richardson (2024), which outlines some ways to teach climate change using poetry). These are often accompanied by the resources themselves, which can be downloaded free from the TG pages of the Geographical Association (GA) website. These will be fully explained and critiqued in the article itself. Once downloaded, you can adapt them as you see fit then take them straight into the classroom.

Article archive

As a subscriber to TG you get instant access to 50 years of past editions of the journal. If you are developing a new scheme of work, using the keyword search facility in the TG pages of the GA website gives you links to a wealth of articles and accompanying resources. If you are doing academic research then this too can be a useful tool. On the GA website you can access all articles

back to 2004, but using the link to the archive hosted by JSTOR takes you back to volume 1, issue 1 from 1975.

Article bundles

If the idea of wading through all the articles that have ever been written about a particular topic seems like too much work, then we have already done the work for you! There are a series of article 'bundles', where a collection of articles have been selected and curated on a particular theme. These can be bought from the GA's online Shop.

'From the archive'

In a similar vein, a series of articles entitled 'From the archive' explores how particular topics have been discussed over the 50 years of the journal's history. The articles offer a commentary on how key debates have changed over time, such as the example from Ian Selmes (2021) in which he explores the evolving nature of computer technologies in geography teaching. These are a good starting point if you are looking to develop understanding about the big ideas that have shaped the teaching of geography.

Reviews

At the end of many issues of TG is a review of a new resource or publication that is directly relevant to geography teachers (such as Reynolds, 2024, who reviewed Steve Puttick's (2023) publication). These will summarise the content, and then explore how it might be useful for teachers.

Write for *Teaching Geography*

Almost all of our writers start off as readers, and so you might discover that you have an idea or resource to share, or perhaps you want to respond to something you have seen published. Please do – the journal is only ever as strong as those who choose to write for us. There is a writing guide available on the GA website (Geographical Association, 2024); alternatively please get in touch with the Editor who will be happy to help. Offering a review of a new resource is a great way to get started. | TG

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From the archive: Olympics, sport and topical geography

Fred Martin

Topical topics

Teachers of geography have long been aware of the need to create a 'hook' with which to engage their students' interest, and connecting to current events has been one way to do this. During the early 1990s, TG ran a series of articles named 'Topical Resources' which gave references to resources on such topics. This function is now provided on the GA's website and in *GA Magazine*. In 1995, Stanfield considered topicality – what was in the news, such as a rugby superleague – suggesting that students kept a scrapbook of these events (Stanfield, 1995, 20, 4). In 2003, Brooks took the idea of topicality further in an article that stressed the importance of identifying the geography in topical events and asking what geography could contribute to students' understanding of them (Brooks, 2003, 28, 2).

Ideas about topicality serve as a backdrop to articles in TG that have been as diverse as COVID-19, Brexit, the 2015 UK General Election and various dramatic events such as forest fires, tsunamis and other 'natural' disasters. In this article, the focus is on articles relating to the summer Olympics. Some mention will also be made of articles about the football World Cup events. Both the summer Olympics and, to a lesser extent, World Cup football, have been the subjects of numerous articles in TG.

Counting medals

In 1980, it was noted in a TG article that 'many children nowadays find it difficult to pay attention or to concentrate for any length of time' (Jones, 1980, 6, 2). One response to this problem was to use sport as a context to study aspects of geography, such as places and transport. Football was the focus for the article, the hope and assumption being that football could capture and maintain the students' interest, though of course, this will not universally be the case. The Moscow Olympics was also mentioned as an opportunity to capitalize on this interest.

In 'Loadsamedals', an aptly named article by Thomas, the 1988 Olympics in Seoul provided a context to carry out a Spearman correlation test to link a country's total population to the number of medals it won (Thomas, 1989, 14, 2). Although some degree of correlation was found, the more important point was that Spearman test provided a platform to consider other factors at play to better understand various anomalies in the link. It was suggested that the UK's relative lack of success at the time could be explained by its traditional emphasis on 'playing the game', rather than on winning. Perhaps times have changed! The idea was adapted by another

teacher who linked medal success with GNP per head (Wilmot, 1989, 14, 2). Thomas returned to the idea, more subtly, following the 1992 Barcelona Olympic Games, linking medal success to a country's economic performance and the status of women in each country (Thomas, 1993, 18, 2).

Identifying the geography

The football World Cup in 2002 was the focus of a 1999 article by Rawding, mentioning that similar ideas could be applied to the upcoming Sydney Olympics in 2000 (Rawding, 1999, 24, 1). Rawding's article extended the scope of geographical interest in a sporting event in several ways, such as by linking it to aspects of globalisation and the effects of weather and climate, in addition to taking the opportunity to study the general geography of the countries and venue locations. The same author followed up on these ideas in an article about the football World Cup at sites in South Korea and Japan in 2002 (Rawding, 2002, 27, 2).

The Sydney Olympics of 2000 gave a context for studying the event from some new perspectives (Chalkley and Essex, 2000, 25, 3). The Sydney event was presented as 'The Green Olympics', a claim open to geographical investigation, which involved urban regeneration and sustainability, with globalisation and international relations also playing key parts. As the authors pointedly concluded, 'there is more to learn than just who has won most gold medals'.

An article by Digby in 2007 consolidated the idea that an Olympics was much more than an interest 'hook' to use as a context to study the general geography of different countries and cities (Digby, 2007, 32, 2). Indeed, the geographical dimension had little to do with medals or the sports themselves. A comprehensive set of criteria were presented against which the sustainability of an Olympics could be assessed. Economic and social gains and losses that were consequences of the events could also be studied, both in short and longer time frames. The same author used the Beijing Olympics in 2008 to expand on these ideas, as well as providing an opportunity to study China, a country that was being neglected in school geography (Digby, 2008, 33, 2).

The 2012 London Olympics

Digby also looked forward to the London Olympics of 2012 with an article that identified the changes that would take place in the area of east London where the games were to be located (Digby, 2008, 33, 3). These games would provide a case study in which ideas about urban

A review of past TG articles, showing how the Olympics offers case studies to illustrate key concepts, processes, skills and values, and how these – and their emphases – have evolved over fifty years.



Accompanying online materials

regeneration and sustainability were paramount (Figure 1). In 2010, ideas about the sustainability and 'greening' of the London Olympics were also the focus of an article (Rodway, 2010, 35, 3). An article in 2011 illustrated how the fast-growing tool of GIS could be used to carry out map research in the area to be directly affected (Martin, 2011, 36, 1).

The importance of the 2012 Olympics to both the local area and the wider UK was such that there was a special edition of TG containing articles on a variety of its geographical aspects. Digby focused on three core principles, i.e. change, impact and sustainability (Digby, 2012, 37, 1). There was also mention of ideas for fieldwork and for what had become known as their 'legacy'. Widdowson outlined ideas for fieldwork in the area (Widdowson, 2012, 37, 1) as did Fisher (Fisher, 2012, 37, 1). An article by Sutton examined the effects of weather, always a good British angle, in particular on sports such as sailing, sprinting and tennis (Sutton, 2012, 37, 1) and asked students to recommend the ideal weather conditions for each. In another article, Amis used the Olympics to ask key geographical questions, such as how to measure social value and health (Amis, 2012, 37, 1). Cooper's article returned to some basics: the links between a country's economic development and performance in the Olympic Games, using online resources such as Gapminder and Worldmapper (Cooper, 2012, 37, 1).

Legacy issues

Unlike previous games, the 2012 Olympics were still being written about a year later. In 2013, Digby focused on the legacy question, one reason being the scrutiny that countries and cities were giving the Olympics because of

its increasing size and the cost of building and running it (Digby, 2013, 38, 3). A positive social and economic outcome had to be ensured to avoid problems that had been experienced, for example in Greece, where Olympics facilities were lying derelict. By contrast, an article on the legacy of the sailing events held at Portland on the Dorset coast illustrated the positive effects on the area, for example, because of its new digital infrastructure, employment opportunities, cultural life and even on introducing the Jurassic Coast's tourist potential to the wider world (Williams, 2013, 38, 3).

Olympic footnotes

By means of some footnotes to this review, it is interesting to note that no articles about the Tokyo Olympics were submitted to TG, perhaps because of the disruption caused by the COVID-19 pandemic. It is also noticeable that the winter Olympics have never been mentioned in TG articles. The rugby union World Cup and other world sporting events have, likewise, received little or no attention in spite of their international dimensions, environmental issues, economic effects and social impacts. The football World Cup has been given some attention: perhaps because the venues are so dispersed, the same geographical questions about land use, the environment and sustainability have not been raised. Or perhaps the sporting calendar is just too extensive to fit more of these events into today's tightly planned, managed and taught geography curriculum. Questions related to racial equality and opportunity have not been explored, other than obliquely through links to economic development. References to politics in relation to the Olympics, while of importance to the event itself, do not seem to have found a geographical dimension.

Figure 1: The London 2012 Olympic and Paralympic Games provided a case study for investigating ideas about urban regeneration, sustainability and legacy of hosting major sporting events.



New directions and planning

Over the course of fifty years, articles about the Olympics have changed their emphasis. From being a 'topicality topic' that focused on medals and the general geography of countries, the Olympics has become recognized as having its own economic and social effects and as a context within which to illustrate wider aspects of geography's content, concepts, processes, skills, and values. This is to recognize that the Olympics has become a major business in many of the same ways as other international and multi-national businesses. As a consequence, the Olympics brings with it opportunities and issues relating to the economic, environmental and social life of the countries and in particular, the cities and sites in which the Games are held.

At the time of writing this review, no articles about the 2024 Paris Olympics and Paralympics (Figure 2) have been sent to TG. Perhaps the key geographical questions have already been asked and the concepts, processes, skills and values have already been identified. This only leaves the details of new places to be inserted. It would be surprising, however, if new geographical ideas could not be explored in relation to this year's Paris games.

It would also be interesting to see examples of how the topic can become part of the wider geographical curriculum in a way that is progressive and integrated, rather than as a stand-alone topicality topic taught to one year group. Identifying a common core of ideas that could be applied to any similar world event could be one way in which this could be done. Of course, unlike some news events, major sporting competitions can be predicted well in advance, making it easier to plan for their inclusion and integration into the curriculum. Examples of



Figure 2: The counting of medals can be retained as part of geographical enquiries rather than lost to a focus on concepts or processes. For example, what links can be made between medal success and socio-economic conditions in that athlete's home country? **Photo:** US Army IMCOM by Stephen Warrns, Public domain, via Wikimedia Commons.

making links with other academic disciplines on what is a potentially rich vein of interesting content, could do much to complete the picture.

A final thought is to reflect on how the counting of medals and a study of countries could be retained, rather than being lost in the focus on concepts and processes that relate to the international, national and especially the local impacts of the events. That, after all, was the original rationale behind using the Olympics 'hook' that was intended to engage the students' interest. | **TG**

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Online resources

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From 'original' to 'sustainable' – fostering sustainability at A level

Marvin and Neli outline how Rawls' thought experiment, the 'original position', can be adapted into a 'sustainable position' to develop sustainable societal models in ESD.



Accompanying
online materials

Whether it's poverty in old age, resource consumption, inflation or extremist political pressure, many societies are currently far from being truly just and sustainable, meaning they are not adequately addressing long-term fairness, environmental health, political integrity, or social and economic stability. Even in the so-called 'industrialised countries', some of these problem areas still characterise social structures. Education for sustainable development (ESD) is intended to teach 'futures literacy' to students, i.e. to enable them to develop sustainable visions of the future (Baumann and Niebert, 2020, p. 241; Bianchi *et al.*, 2022, p. 15, 23f). This entails scrutinising existing social orders and can lead to a modified vision of a sustainable social order. Since the causes and effects of societal developments affect more than one level of sustainability, and can interact with each other (Bahr, 2013, p. 17f.), the political, social, economic, and ecological dimensions must be considered together when designing a sustainable model of society or a framework for a social order to strive for. Taking this into account, the question arises as how students can be encouraged to design a sustainable societal model.

A just model of society

The 'original position' thought experiment, described by the US philosopher John Rawls in his *Theory of Justice* (1971), serves as an initial starting point. This experiment deals with the question of what a just model of society could look like. This model of society is based on the premise that all people are free and equal and that personal attributes – such as ethnicity, socio-economic status, gender, age, psyche, and intelligence – are not recognised in the envisaged society (Freeman, 2008; Rawls, 1990, p. 159f). When developing this model, therefore, one must 'choose principles the consequences of which [one is] prepared to live with' (Rawls, 1999, p. 119). To this end, the thought experiment provides a list of possible principles of justice from which to select the guiding principles of the social order (Freeman, 2008). Example guiding principles that Rawls himself considered to be the most suitable are:

1. **equal freedom:** Ensuring equal rights and freedoms to safeguard fundamental interests and pursue diverse ideas.
2. **a) fair equality of opportunity:** Providing fair educational and employment opportunities to foster skill development and equitable competition.
b) difference principle: Structuring differences in wealth, income, privilege, and power between individuals to maximise benefits for the least advantaged members of society (*ibid.*).

In Rawls' 'original position', the four dimensions of sustainability – namely social, economic, political, and ecological – have already been considered, if implicitly. When applying the thought experiment in geography lessons, therefore, it is important to specify the sustainability dimensions as construction principles for the societal model and to address all spatial effectiveness perspectives equally. In this sense, the adaptation of Rawls' 'original position' into a 'sustainable position' for geography lessons includes four guiding principles:

1. **social:** Ensuring sustainable living conditions and equitable educational opportunities
2. **economic:** Establishing sustainable economic structures and fostering employment opportunities
3. **ecological:** Promoting the sustainable distribution and utilisation of resources while prioritizing environmental protection
4. **political:** Facilitating peaceful social governance and effective regulation.

The adapted thought experiment

This adapted thought experiment can help students develop a vision for a sustainable future, a process which helps them acquire ESD-relevant skills, such as forward thinking (Hoffmann, 2023, p. 60; UNESCO, 2017, p. 10). Building on this vision, A level students can consider how to implement these ideals for a more sustainable future. By engaging in the 'sustainable position', students can actively participate in shaping a sustainable social order, thereby assuming responsibility for co-designing the lesson (see downloads 1–3).

The primary aim of employing this method should be help students become responsible members of society, enabling them to articulate their own interests and to respect the perspectives of others, including the rights of every living creature and the environment (Budke, 2016, p. 16). The concept of the 'sustainable position' offers potential for ESD, empowering students to independently develop models of sustainable societies and to translate an ESD vision into more specific sub-goals, using the 'target pyramid' method (Hoppe and Junker, 2022, p. 35). The goals for realising these visions can then be evaluated in terms of their sustainability. This is important: geography is responsible for ESD and fostering students' visions, as well as practical implementations on different scales. Students then understand that their actions matter on a 'local to global' scale. Figure 1 shows an implementation of the 'sustainable position' that is particularly useful for A level students.

Grade: From grade 11 (age 16)

Time required: Two lessons

Competences promoted: Futures literacy – ‘To envisage alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future’ (Bianchi *et al.*, 2022, p. 15)

Download material:

Worksheet 1: Developing sustainable society models with the ‘sustainable position’

Worksheet 2: Our sustainable society model

Worksheet 3: Goals for realising our sustainable society model

Lesson structure

Aim: For A level students to understand the characteristics of sustainable society models and its means of implementation.

Objectives:

- Students will be able to develop requirements for sustainable society models according to these four dimensions of sustainability, namely social, ecology, economy, politics.
- Students will be able to discuss and determine the most important requirements for their sustainable society model.
- Students will be able to derive concrete goals to implement their vision for a sustainable society model.

Starter:

Begin by explaining to the students that they will be analysing newspaper headlines and images that represent the current societal issues and problems of the respective country, state or municipality. Display several intriguing headlines and images from recent newspapers, ensuring that the four dimensions of sustainability are represented (examples of problem areas could be: poverty in old age (social), resource consumption (ecology), inflation (economy), extremist right or left-wing pressure (politics)). Ask the students to independently examine these stimuli for five minutes, thinking of as many key words as possible to describe the headlines and images. Encourage them to also note any associations or thoughts that these stimuli provoke.

After five minutes of independent work, tell the students to share their key words and associations with a talk buddy. During this time, students should discuss how their observations relate to the four dimensions of sustainability. After a few minutes of discussion in pairs, expand the discussion to the whole class. Ask each pair to share their thoughts and collaboratively organise their key words and associations into the four dimensions of sustainability.

Conclude the activity by instructing the students to engage in a thought experiment. Ask them to envisage a sustainable society, considering the ideas and key words they have just discussed. Encourage them to think about the requirements for such a society from the perspective of each dimension of sustainability and to prepare to share their visions in the next part of the lesson. This activity sets the stage for deeper exploration and discussion of sustainability in the main activities that follow.

Main activities:

Ask students to develop requirements for a sustainable society from the perspective of one of the four dimensions of sustainability: social, ecology, economy, or politics. Each student will focus on one dimension and brainstorm a list of necessary requirements for achieving sustainability in that area (see download 1).

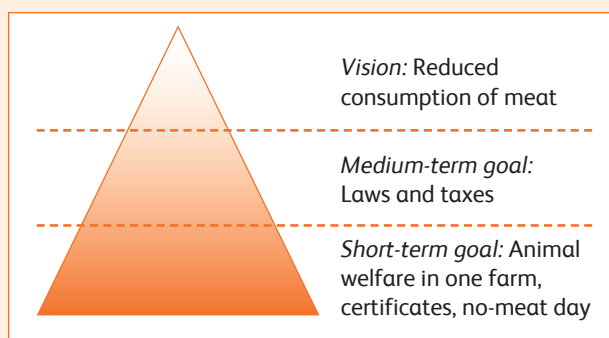
Next, have students create a hierarchy of their developed requirements by prioritising them from most to least important within the placemat (a large sheet of paper divided into sections, with each section representing one dimension of sustainability). This step encourages critical thinking and helps students understand the relative importance of different sustainability factors. Guide students to discuss the importance and relevance of each requirement (download 2).

Once the requirements are prioritised, instruct students to transfer the results. Guide students to identify the main requirements for a sustainable society and place them in the centre of the placemat. Ensure the centre of the placemat is left blank initially. Students will write their prioritised requirements in the appropriate sections of the placemat (download 2).

Facilitate a class discussion where students share their results and discuss the requirements for a sustainable society from all four dimensions. Encourage them to explain why they prioritised certain requirements and how these requirements interconnect across different dimensions of sustainability.

This central list should represent the core elements necessary for achieving sustainability, as agreed upon by the class.

To further cement these main requirements, instruct students to use the ‘target pyramid’ method. Explain that the target pyramid is a tool that organises goals hierarchically, from a broad vision to specific goals, at the base. This will help them clarify the steps needed to achieve their main sustainability requirements for sustainable society (download 3). The example below will give students guidance on how to fill in the pyramid:



Next, have students assess the viability of the goals. Guide them to evaluate which goals are most achievable and impactful, considering current global and local contexts. This assessment will help them understand the transformational thinking involved in implementing a vision of a sustainable society (download 3).

Facilitate a discussion where students present their different approaches to implementing visions of sustainable societal models, taking into account their target pyramids.

Encourage them to debate the strengths and weaknesses of different models and consider how factors influence the implementation of these models.

From these discussions, guide students to derive generalisations about a sustainable social order. Help them reflect on the common themes and principles that emerged from their work, summarising their insights into a coherent vision of a sustainable society.

Consolidation:

Ask students to demonstrate their view on the most important vision for implementing their vision for a sustainable society model. Each student should present a brief reflection of their vision, highlighting the key elements they believe are crucial for achieving a sustainable society. This activity will allow students to synthesise their learning and articulate their personal understanding of sustainability, reinforcing the lesson's objectives.

Plenary:

Ask the students to apply their developed sustainability models to the initial news headlines and images and transfer their models to the real-world examples presented at the beginning of the lesson. They should analyse how their models address the issues and themes highlighted by these stimuli. Encourage them to consider the following points during their reflection:

- Identify how their models provide solutions to the problems or challenges illustrated by the news headlines and images. Discuss the strengths of their models in promoting sustainability across the four dimensions: social, ecological, economic, and political. Highlight any innovative or particularly effective strategies their models incorporate.
- Critically examine any potential weaknesses or gaps in their models when applied to real-world scenarios. Reflect on the practical challenges, including political, economic, or social barriers. Consider any unintended consequences or trade-offs that might arise from their proposed solutions.

- Discuss with them how their models could be adapted or improved to better address the issues presented by the news headlines and images. Explore alternative approaches or additional measures that could enhance the effectiveness of their models. Analyse how successful these real-world examples have been and what lessons can refine their models. An example of student work is shown in Figure 2.

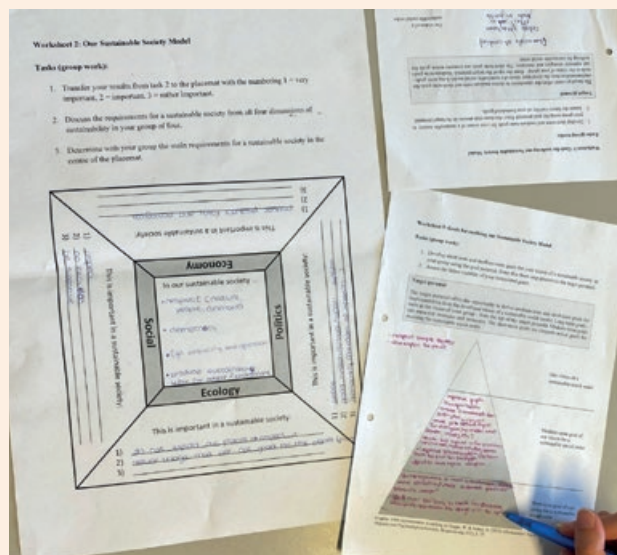


Figure 2: Example of student work – our sustainable society model. **Source:** © Marvin Scott Schlamelcher and Neli Heidari.

After this critical reflection, facilitate a class discussion where students share their insights. Encourage them to provide constructive feedback on each other's models and to collaboratively brainstorm ways to overcome identified limitations. This reflective exercise will deepen their understanding of sustainable society models and enhance their ability to think critically about complex issues. | **TG**

Online resources

The downloads that accompany this article can be accessed at <https://portal.geography.org.uk/journal/index/tg>. Select Autumn 2024.

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My place: Singapore

Kah Mun
Yuen

During the height of the pandemic lock-down in 2020, I transited from commuting daily to work to being a 'Zoom warrior'. I felt cooped up at home and relished the mobility I had once taken for granted. Although my posting to a secondary school in 2021 as a school-based master teacher allowed me to continue commuting to work daily (schools in Singapore were not shut except briefly for eight weeks between April to June 2020), I joined the ranks of many other people who took up sport just to get out of the house for a breath of fresh air at the weekends. I became a COVID-19 cyclist, exploring Singapore on two wheels on not-too-crowded streets, satisfying the natural curiosity that is a trademark of many geography teachers. Exploring my country on a bicycle gives me valuable perspectives at a local and immediate level, compared with zooming around in a car when the scenery simply flies by.

Singapore is by no means a big country. We are sometimes jokingly called the 'Little Red Dot', referencing our minuscule size. One could easily cover the entire island from east to west in an hour's drive (42 km), or 25 km if you are doing the north to south route (Figure 1). When we live life in the 'slower lane' on a bicycle, this little red dot offers me tremendous opportunities to discover and appreciate the geography of our country more deeply.

Historical link to Malaysia – the rail corridor

Singapore's fortunes have been closely linked to her northern neighbour since historical times. These two countries were under British colonial rule from the early 19th to the mid-20th century, so our historical ties are not just limited to political-economic ones, but also social and environmental connections.

At the turn of the 20th century, the federated Malay states operated a railway system from the north near Penang, right through the west coast of Malaya to Singapore, till 2011. Scheduled train services would run from the south of Singapore at the Tanjong Pagar Railway Station through the Causeway at the north, to join up with the railway services that connect Malaya to Thailand. The railway service was finally decommissioned thirteen years ago, and the railway's land was returned to Singapore. This was subsequently turned into the Rail (or Green) Corridor – a narrow strip of parkland for recreational use that not only connects us to its history as a transport link between the two countries, but also offers a wildlife sanctuary in highly urbanised areas that the train service used to run through.

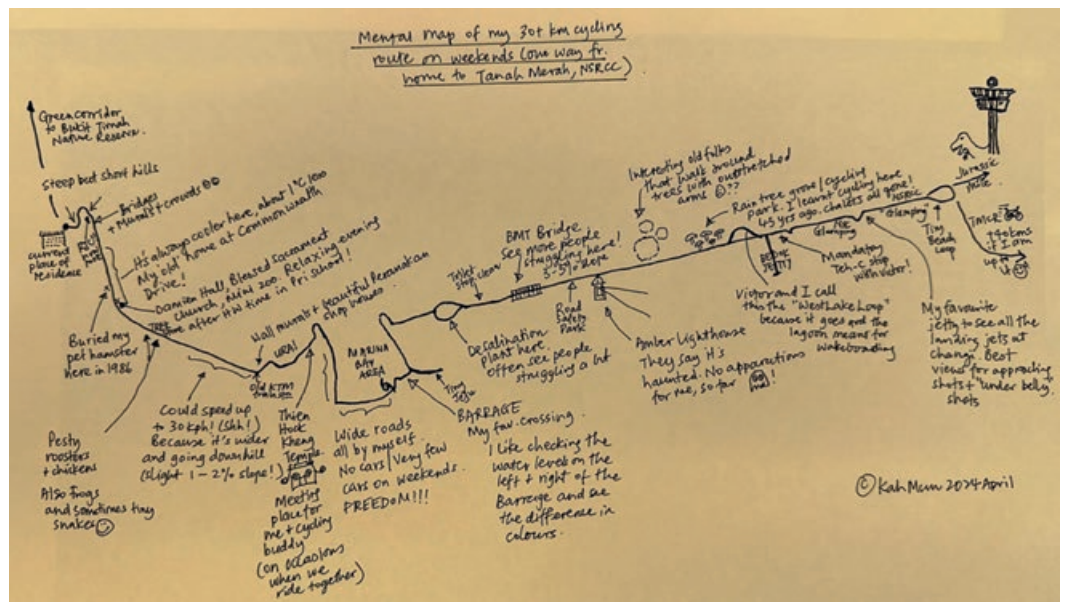
Located along this 24-km stretch of land are historical buildings, secondary forests and tall grasses, abandoned fruit orchards and kampungs (Malay word for villages), quaint religious buildings, interesting underpasses and colonial infrastructure.

As he cycles through newly redeveloped areas of Singapore, Kah Mun describes the changes that have taken place and why he loves this 'little red dot'.



Figure 1: Singapore.

Figure 2: A mental map of my weekly cycling route, showing the Rail Corridor and along the East Coast. **Source:** © Kah Mun Yuen.



Pedalling through this stretch on a weekly basis allows me to take note of interesting nuggets in a mental map of our past alongside the fast pace of development that our country is known for. I sketched from my memory where some of these significant places are, and how they are related to me or to one another (Figure 2). I began with an approximation of the entire cycling route – for example, large tracts of land in Queenstown where I grew up and that the railway used to run through are now being developed for high-rise public housing. Sold to the public as the future of living, being close to nature and history, these are much sought-after public flats. Identity nodes are also being developed at transport interchanges to build a stronger sense of place for community use. For example, a new office building at the Buona Vista area includes gathering places, children's playgrounds and eco-friendly rain gardens to filter rainwater.

Land reclamation – A strategic economic activity

Land is a precious commodity in pin-sized Singapore, hence land reclamation has always been carried out with great intensity. Since the arrival of Stamford Raffles, a British colonial official, in 1819, land reclamation has been key to economic growth and prosperity. The first reclamation project was carried out in 1822 at an area south of Boat Quay, right in the heart of our present financial centre. Some 200-300 Chinese, Malay and Indian labourers were hired to break up a small hill by the south-west bank of the Singapore River to fill up a swampy site for the commercial centre (National Library Board, n.d). This is a relatively unknown fact, but I can attest to the slight incline from the riverbank to the commercial core as I cycle past it.

The largest post-independence reclamation project is at the eastern coast. Since the early 1970s tens of kilometres of beaches were reclaimed, starting from Tanjong Rhu in the south, through the East Coast, and terminating at Changi where the current international airport is located. This project created valuable land for high-rise public and private housing, transport and recreational uses.

The continual development of these parcels of land has generated much economic benefit for Singapore, especially in the relocation of our international airport from Paya Lebar (in the northeast) to Changi (in the far east). The latter location is not hampered by height and noise controls, and offers plenty of space for the future expansion of our international air hub. Currently, we are building Terminal 5 in anticipation of further growth in air traffic in the Asia Pacific region.

Empty tracts of land in the Bayshore area (between Marine Parade and the airport) are being prepared for future public and private housing. These high-rise flats will offer unparalleled sea views while allowing residents to enjoy green spaces in housing that features smart and sustainable living, such as with solar-ready roofs and pneumatic waste conveyance systems. Maximising the use of land in Singapore includes creating living spaces that reach for the sky and constructing utilities and transportation infrastructure that go deep underground. Reading about the plans for this new estate that will comprise 10,000 flats sends a tingle of excitement down my spine! While some may bemoan the loss of existing greenfield sites to housing, bold plans like these inject possibilities of integrating technology and sustainable living and the chance to create a new way of living and identity for future generations of Singaporeans (Figure 3).



Figure 3: Future towns will utilise green urban solutions such as naturalised drains, solar panels, and biophilic designs to create a sustainable living environment. **Source:** Artist's impression of the Bayshore development at HDB Hub.

The level stretches I have described above offer me moments of solitude, as there are relatively few park users this early in the morning and therefore, great opportunities to do sprints in my weekly cycling. Further southeast lies East Coast Park, a perennial favourite of Singaporeans and foreigners. Park users have more than 15 kilometres of beach-front park land for swimming, surfing, cycling and picnicking as they enjoy the cool breezes from the South China Sea. This is where I love cycling most. On my cycling route, I would witness crowds of families and friends bonding over games, barbecue, outdoor camping or simply having a good time.

At other times, I will be amazed by the sights and scents of nature. A burst of pink and white blossom from the Trumpet tree (*Tabebuia* sp.), also known affectionately as the ‘Singapore Sakura’, its flowering is triggered by the dry season (Figure 4). And the unforgettable fragrance of the Pulai tree (*Alostonia angustiloba*) that can be described as green, peppery – yet sweet.

Historic districts – change and continuity

Further back from the shoreline of the East Coast are some of the most popular dining areas in Singapore. Due to an early influx of peranakans (a term for locals who married ethnic Malays and Chinese) into this area, it is not short of authentic peranakan eateries and architecture. Many people have used such streetscapes as backdrops to spice up their social media postings. It is now a hip thing to have at least one post from Joo Chiat (a conservation area) of its food or ‘shophouses’ (a building type serving both as a residence and a commercial business). To many Singaporeans, coming to the east coast is to feel the pulse of Singapore living at its best. In fact, the term ‘Easties’ is a term coined to describe people living there who have developed a unique culture of good living.

Local area cultures are also formally depicted in literature or as art. While Singapore has her fair share of local writers, we also have a group of prolific painters who record our heritage as wall murals. In my cycling routes, I regularly pass areas where wall murals have been painted to portray various aspects of Singapore’s living, past and present. To the millennial tourists, such are ‘instagrammable’ spots to tick off their checklist; to me, these representations remind me of my country’s past captured with an artistic license that I love to decode. In fact, I would always bring friends who are visiting Singapore to some of these sites, to offer them a short narrative of Singapore’s changing landscape.

For example, in Yew Chong Yip’s painting at the wall behind the historic Thian Hock Keng temple (Figure 5), he depicted scenes of traditional trades of Singapore in the early 19th century, traditional



Figure 4: Blossoms of the Trumpet tree carpeting the ground at East Coast Park during a dry period. **Source:** © Kah Mun Yuen.



Figure 5: A mural by Yew Chong Yip adorns the rear wall of the Thian Hock Keng temple in historic Telok Ayer. This scene of the Singapore River and its skyscrapers is a stone’s throw away. **Source:** © Kah Mun Yuen.

festivals and livelihoods. What is interesting about this is that it includes a broad view of the development of our commercial core, where old and new stand in stark contrast. A bonus for tourists is that the real scene is a mere ten-minute walk away from this mural, where one can take in the splendour of the actual landscape. His recent rendition of Singapore’s famous street food at the Lau Pa Sat (Singapore’s oldest cast-iron market, that has been turned into a foodies’ paradise) provides an artistic twist to common hawker fare, such as the Hainanese chicken rice, roti prata (an ethnic Indian flatbread eaten with sugar or curry sauce) and satay (skewed barbecued meat).

Conclusion

With our government’s plans to expand the Park Connector Network – walking/running/cycling paths that connect various parks and green spaces in Singapore – and more on-the-road cycling lanes, I am positive that more people will be encouraged to go ‘car-lite’ and discover the joy of cycling. While I would still dream of bike touring Italy and France one day (taking inspiration from the Giro d’Italia and Tour de France), I am also motivated to cycle around Singapore to discover the geography of this Little Red Dot. The authentic experience of viewing, feeling and even smelling our changing streetscape as I pedal through parklands, historical cores and the Rail Corridor allow me to mentally bookmark these significant places that have played a part and will continue to do so in the development of the Singapore story. | **TG**

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BOOKS

What is Geography? Second Edition

Alastair Bonnett | ISBN 978-1-5381-6079-4
Paperback £19.99 | Rowan and Littlefield

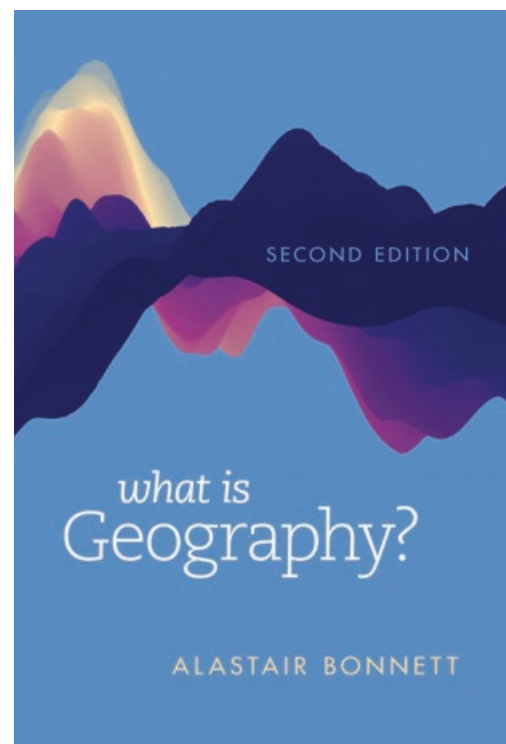
At least twice in a school year, at options evenings, geography teachers around the country rhetorically pose the question, 'What is geography?' to an audience of prospective students and their parents or guardians. While the subject is experiencing a serious uptick in popularity, answering this question has been perennially tricky: how can we, as practitioners at the educational coalface, make this broad, complex and vital discipline make sense to future geographers?

Alastair Bonnett's second edition of *What is Geography?* is here to equip the teacher with much more than a straightforward response to this question. Bonnett offers a range of in-depth answers from the perspective of the discipline's history, the complicated relationship between people and place, the concept of power, the emergency of the urban and the subject's future (an update from the first edition). Each chapter patiently unfolds a narrative that illustrates the beautiful synergies between the human and the physical, and the past, present and future of the subject.

One of Bonnett's main contentions is one that all geographers definitively feel in their bones. Rather than splintering into a mess of sub-disciplines, the subject's multifaceted interdisciplinary nature reads like a rule book of how to navigate challenging times. Indeed, in the preface, Bonnett centres geography in our existentially threatened modern world: '... in 2008, I argued that the ancient bond between geographical knowledge and human survival is not over. I worried, back then, that this might seem like an exaggeration. I'm not worried now.'

Bonnett's love of geography is manifest throughout. However, hyperbole is replaced by a detailed exploration of the temporal development of the subject, its relevance to a diverse range of settings and issues, and how we might use the principles of geography to chart a pathway through an uncertain 21st century and beyond. Nevertheless, he also states some bold contentions that might open up rich debate. For example, at the end of Chapter 4, Urbanisation and Mobility, he cautions how a mostly urban world may '... wrench us away from nature. [causing] more and more of us to live disconnected from an intimate knowledge of place, landscape, and environment.' While there are many who would contend that urbanisation is creating its own unique sense of place, there is no doubt that the most forward-looking cityscapes are more and more working to incorporate the natural world in the day to day.

In sum, *What is Geography?* is a comprehensive guide to the development and future of the discipline. Each chapter provides the reader with a deeper understanding of the importance of the subject in that context. It is repeatedly detailed with beautifully formed responses to the titular question – it is literally overflowing with options evening definitions. The one I'll be using? '... the



geography delivered in schools and universities is the tip of a very large iceberg. The things that matter to students of geography are things that matter to all of us.'

Reviewer: Julian Carrera, Head of Geography,
The John Lyon School, Harrow on the Hill.

Thinking Geographically: A Guide to the Core Concepts for Teachers

Alaric Maude | ISBN 978-1-0324-5373-6
Paperback £34.99 | Routledge

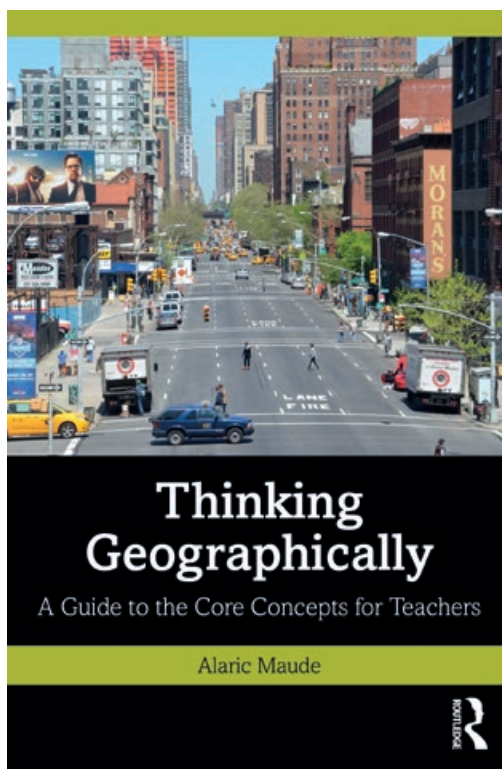
Overall, this book was an enjoyable read that left me with many notes on things to think about both for geography lessons and further improving our curriculum. This book has been an excellent resource when thinking more deeply about the concepts within our curriculum; Maude breaks down each concept while categorising some of them into analytical and evaluative concepts. The book has sparked some ideas around how students are given the opportunity to develop an understanding of these concepts throughout the curriculum, and how the evaluative concepts can be used to challenge our students. Maude also provides a summary and a 'how could you use this chapter in teaching?' box, which has been particularly useful to refer to.

Chapter 1 is more complex than the remainder of the book. I found that making links between the writing and geography within a secondary school classroom and curriculum were difficult here. Chapter 2 has a section on questioning that can be well utilised when thinking about enquiry-based learning. Our lessons all start with an enquiry question, and this section gave some suggestions as to how we can ensure these questions are challenging or allow higher order thinking as Maude describes it in the book. Chapters 3–8 break down each concept into smaller chunks, with the use of examples throughout.

Our A level students often struggle to use the concepts of space and time throughout their essays. Alongside other strategies, pages 96–101 (within the chapter on space) and pages 166 and 173 (within the chapter on scale and time) were used to break down these two concepts into smaller chunks for the students, and to give them some ideas of how they can be applied. Students found this useful; essays are beginning to improve and concepts are woven throughout as a result.

The concept of 'environment' is broken down into different types of environments, something that can be easily missed out of lessons and geography curriculums, so this was a helpful reminder. Pages 140–3 are based on the urban environment and include an urban heat map alongside the causes and responses to the effects of environmental change in urban areas, both of which I am eager to incorporate further into our curriculum. This linked to an article I wrote on careers within the curriculum in 2022, on an urban environment fieldwork opportunity in our local town connected to the careers centred around improving urban environments.

It is worth considering the frequent use of the word 'generalisations' in this book, as this is something we work towards avoiding in our lessons and curriculums. It is suggested in the book that although these cannot be used alone and do not apply to all places and situations, we cannot teach everything about everywhere.



I will be returning to this book and reading some of the suggested articles given at the end of it.

Reviewer: Laura Bytheway is Head of Geography at Ormiston SWB Academy. | **TG**

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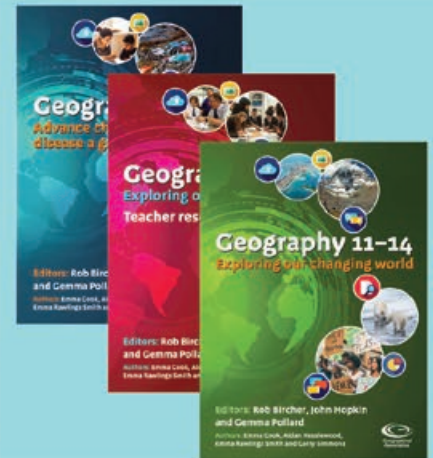
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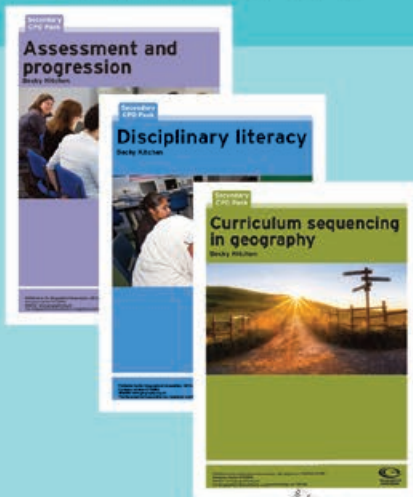
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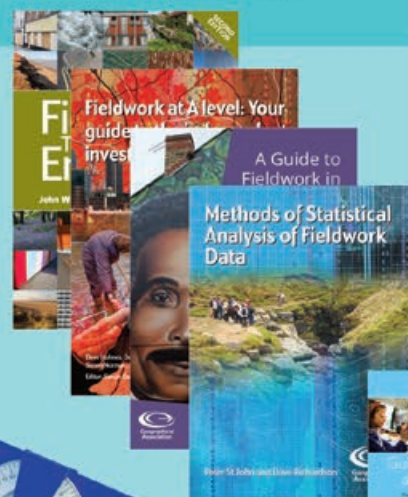
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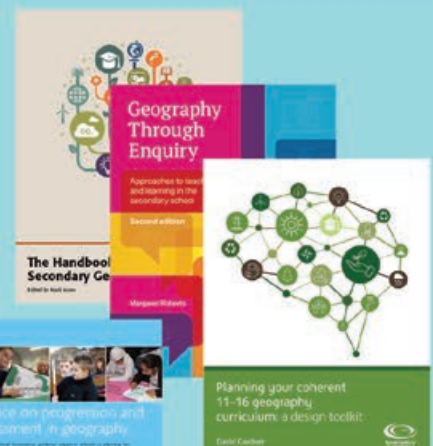
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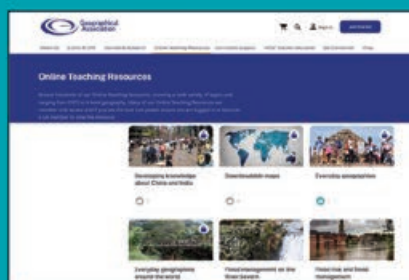
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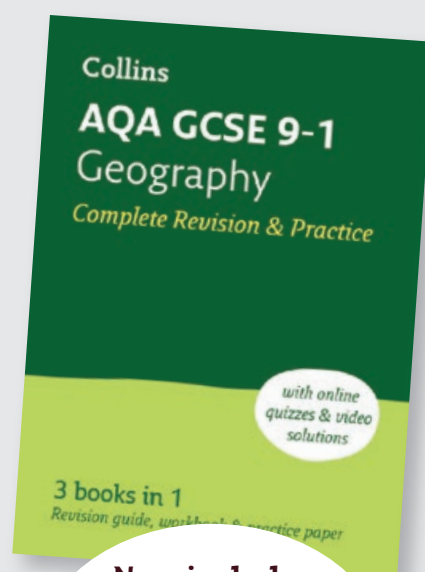
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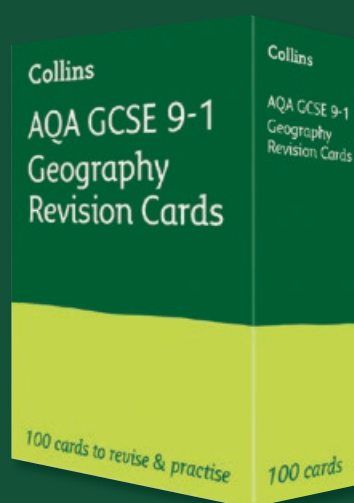
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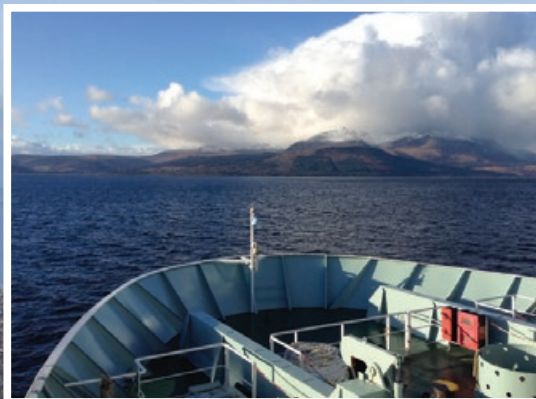
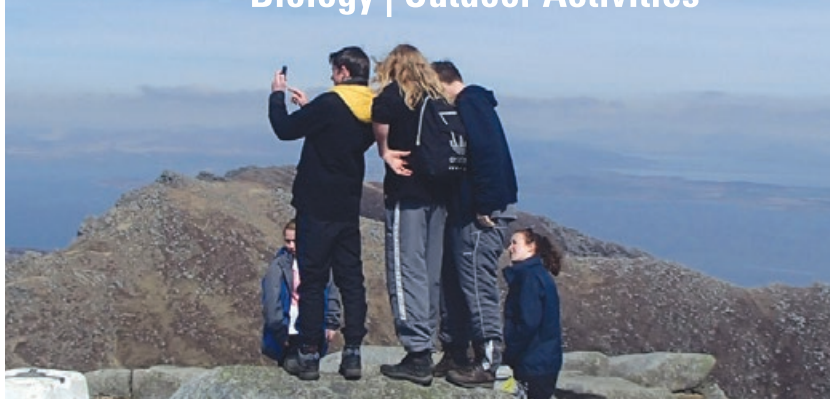
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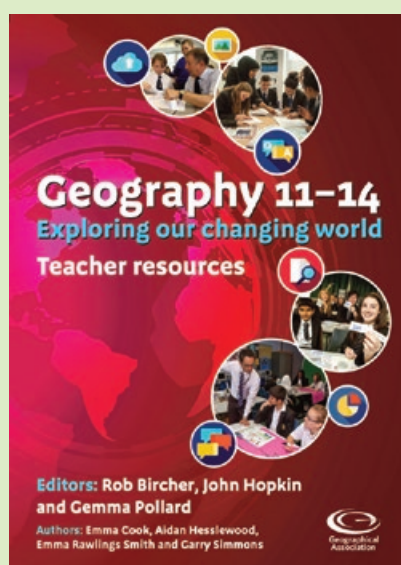
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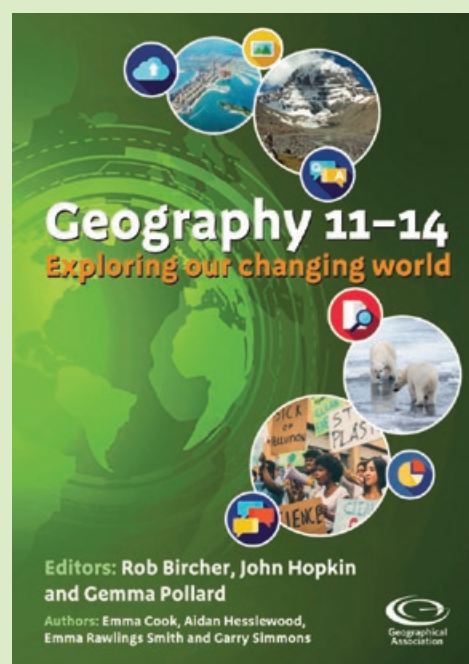
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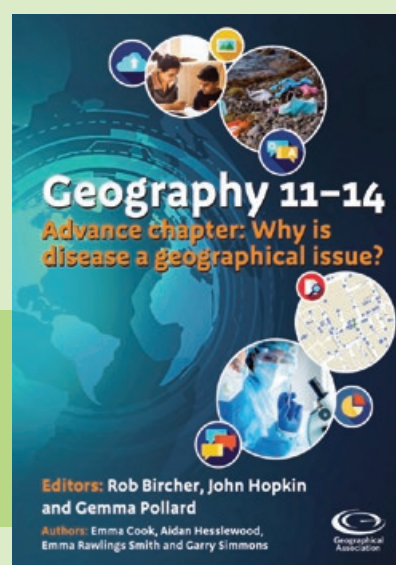
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