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Geography

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- **Powerful knowledge using geospatial technologies**
- **The UK: international child poverty outlier**
- **The geographies of apple cultivation**

Geographical Association

Geography Editorial Policy and Vision

Geography is the Geographical Association's flagship journal and highlights the thriving and dynamic nature of the discipline. It aims to bridge the gap between higher education institutions, and schools, colleges and academies by profiling current research in geography and geographical education. It seeks to communicate the findings of geographical research in an engaging and accessible way.

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- make meaningful and substantive connections between everyday life, public policy and geographical understanding and so help widen participation and interest in geography
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- explore and develop opportunities to gain geographical insights from and develop synergies with other disciplines and new and unusual resources.

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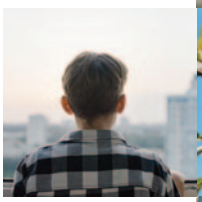
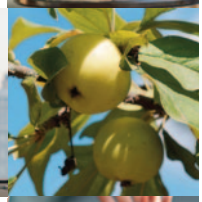




Fiona Tweed

Editorial

Thinking geographically

Fiona Tweed
on behalf of the *Geography* Editorial Collective

This is my first editorial and I am delighted to introduce an exciting and diverse collection of articles. In this issue, three articles focus on aspects of geography education, two articles provide insight into the historically embedded geographies of an everyday object and one article confronts the shocking nature of some UK poverty statistics. The articles clearly deal with different topics, but each of them provides examples of thinking geographically that can help to extend students' knowledge beyond the limits of their everyday experience. Understanding and thinking in ways that are outside what is immediately familiar are central to the concept of 'powerful knowledge' (Maude, 2016) that is explored in the first article in this issue. Fostering powerful knowledge is argued to be the main purpose of education in and beyond geography, with this in turn enabling new ways of thinking about the world, better forms of analysis and explanation and more empowered and informed participation in debate and discussion. The articles in this issue are also characterised by a focus on overlooked or understudied geographies and the diverse and often novel methods used by geographers to derive answers to important questions.

There has been much discussion recently about the nature and cultivation of powerful knowledge in geography, including in this journal (e.g. Winter *et al*., 2024), and this issue begins with an article by Minsung Kim that focuses on **leveraging geospatial technologies to explicitly develop such knowledge**. Their study uses the theoretical framework of the five types of powerful knowledge in a geographical context proposed by Maude (2016, 2018), designing practical learning and teaching strategies to enhance them in the context of modules for secondary school students in South Korea. Using the themes of regional change, civic engagement and population visualisation, these strategies include exploring land-cover change using ESRI *StoryMaps*, mapping emotional geographies with heat maps and representing population density using dasymetric data. Kim also highlights that ensuring students can gain powerful geographical knowledge through their schooling is an aspect of social justice.

Danny Dorling urges British geographers to focus on issues beyond most of their personal everyday experiences in an article designed to raise awareness of **UK child poverty**. The analyses of statistics that he discusses make stark and uncomfortable reading. Economic inequality that began in the UK in the 1980s has been maintained by successive government decisions. The rate of child poverty in the UK is growing faster than any other country measured by UNICEF, child death rates are rising and the UK is now an international outlier. Dorling contends that UK child poverty is 'off our mental maps' and emphasises that most human geography academics in Britain have never experienced poverty as a child. The article calls for more research to understand the geographical differences in child poverty both within the UK and across Europe.

In the first of two articles that focus on an everyday object and unpack the geographical interconnections and interdependencies represented by it, Atiqullah Malik, Mumtaz Yatoo and Rayees Ahmed reveal the origins and dispersal of *Malus sieversii*, the wild apple from which all apples are derived. Using evidence from archaeobotanical excavations and ancient writings, they trace **the geographies of apple domestication, cultivation and distribution**, emphasising the significance of trade routes to the diffusion of apple growing beyond its origins in Central Asia. Not only does their work illuminate the historic and the current economic and cultural significance of

apples, it also highlights the importance of understanding the production, distribution and genetic varieties of crops given changing climatic conditions and the need for sustainable global food production.

Recent international survey results underscore calls for students, educators and activists to provide more justice-focused climate change education. Even though geography is in an ideal position to offer appropriate space for considerations of climate justice, Catherine Walker argues that it has been little explored by geography educators. Drawing on research conducted with migrant-background young people and secondary educators in Manchester, UK, and Melbourne, Australia, designed to explore **intergenerational and cross-cultural responses to climate change**, Walker's article examines how geography can do more to enhance understanding of climate justice. Once again, thinking geographically is emphasised; the geographical concepts of space, place and interconnection are joined by mapping and other critical skills such as interpreting and debating the injustices of climate change and developing future solutions. The article concludes by suggesting that classrooms could be incubators for procedural climate justice.

So, what does it really mean to think geographically? Why is geographical thinking essential? Tomáš Bendl, Miroslav Marada and Lenka Krajňáková contribute to these debates by **deconstructing the concept of geographical thinking**. Geographical thinking should be an essential outcome of being educated in geography, but the term's ambiguity and nuance can make its incorporation into lessons feel challenging. This study used thematic analysis of data derived from interviews with 10 geography education experts from the Netherlands, Finland and Czechia, who provided their perspectives on what geographical thinking means and how it can be developed in school settings. The analysis revealed the importance of factual knowledge as a basis for the interconnected dimensions of procedural, content and affective domains. The study offers advice for incorporating geographical thinking in schools based on the education experts' views and calls for more research.

Gordon Walker and Bronte Crawford use **mahogany as an entry point into the study of colonial enslavement and trading practices** in their 'Challenging Assumptions' article. The mahogany cut by enslaved Africans in colonial Caribbean outposts and used to make fine furniture back in the UK is an enduring product of the slave economy of the 18th century, in contrast to other commodities such as sugar, rum, coffee and tobacco, which were rapidly consumed. Through research focused on the 18th-century port of Lancaster, UK, using shipping, local and business archives, the authors trace the geographies of cargo flows and relationships between people to understand how colonialism shaped the economic and social fabric of a place. They conclude that more could be done to highlight that slave-produced mahogany is still with us and accruing value in both heritage and monetary terms.

With this last issue of 2024, we are pleased to welcome Dr Margaret Kadiri to the *Geography* Editorial Collective. Margaret is Senior Lecturer in Physical Geography Education at King's College London and brings her knowledge of coastal environments and processes to the Collective, strengthening our physical geography expertise. Her research includes the study of nutrient and contaminant cycling in estuarine and saltmarsh environments and the hydro-environmental impacts of tidal renewable energy extraction. Margaret is committed to research-led learning and innovative teaching, particularly the use of technology to enhance learning. We are excited to be working with her.

Finally, *Geography* strives to reflect the breadth and scope of a discipline that essentially presents a mirror to the world. If you have an idea for an article that you would like to write or to see published in the journal, please get in touch with the Editorial Collective.

References

Maude, A. (2016) 'What might powerful geographical knowledge look like?', *Geography*, 101, 2, pp. 70–6. https://doi.org/10.1080/00167487.2016.12093987

Maude, A. (2018) 'Geography and powerful knowledge: a contribution to the debate', *International Research in Geographical and Environmental Education*, 27, 2, pp. 179–90. https://doi.org/10.1080/10382046.2017.1320899

Winter, C., Kasuji, S., Poh, C., Robinson, R. and Whittall, D. (2024) 'Critiquing "powerful knowledge" in school geography through a decolonial lens', *Geography*, 109, 2, pp. 67–78. https://doi.org/10.1080/00167487.2024.2351770

Strategies for cultivating powerful knowledge using geospatial technologies at the secondary education level

Minsung Kim

ABSTRACT: The purpose of this study is to develop geospatial technology-based teaching and learning strategies for cultivating powerful knowledge in geography. Utilising the theoretical framework of the five types of powerful geographical knowledge proposed by Maude (2016; 2018), strategies were designed to enhance each type of knowledge. The learning modules developed for secondary school students in South Korea include exploring land cover change using ESRI StoryMaps*, presenting emotional geographies as heat maps, and visualising population density via dasymetric mapping. This article presents practical teaching and learning tactics for promoting powerful knowledge based on geospatial technologies. In the context of a growing interest in the educational implications of powerful knowledge, this study proposes ways in which geography education can make a substantive contribution and play a significant role in enhancing the relevance of the subject within the curriculum.*

Keywords: powerful knowledge, geospatial technologies, story maps, heat maps, dasymetric mapping

Introduction

There is a growing interest in 'powerful knowledge' in the geography curriculum (Lambert *et al*., 2015; Biddulph *et al*., 2020; Muller, 2023). Powerful knowledge is a disciplinary knowledge that has the power to transform society and it has been subjected to rigorous validation by the academic community (Young, 2008; 2014). By learning powerful knowledge, students can access intellectual traditions and acquire the vocabulary that enables them to think critically and provide reliable explanations; this supports them to engage with a range of issues as competent members of society (Maude, 2016). Ensuring that all students can gain powerful geographical knowledge through their school education should be considered from a perspective of social justice (Firth, 2011; Ro, 2022). An emphasis on the public nature of knowledge is the ultimate goal of the ensuing discussion on powerful knowledge (Young, 2009; Kim, 2021).

What strategies can effectively enhance powerful knowledge? Recently, geographers have given attention to the cultivation of powerful knowledge through the use of geospatial technologies (Fargher, 2018; Healy and Walshe, 2020). 'Geospatial technologies' is an umbrella term that encompasses not only geographic information systems (GIS), but also recent digital advancements (e.g. *Google Earth*, *Google Maps* and ESRI *StoryMaps*), and various webGIS tools (e.g. *ArcGIS Online*). The potential of using geospatial technologies as an effective pedagogical tool has been the subject of ongoing research (see, e.g. Baker *et al*., 2015; Metoyer and Bednarz, 2017; Kim, 2018). Digital-based geospatial technologies are not just a means of storing and representing spatial information, but are also a complex ensemble of social and political execution, and, moreover, a way of understanding and generating knowledge (Elwood, 2009). Except for a few instances (see, e.g. Fargher, 2018; Healy and Walshe, 2020), however, there is a scarcity of specific studies that employ geospatial technologies explicitly as pedagogical strategies to cultivate powerful knowledge. Given the pedagogical implications of powerful knowledge

and the educational potential of geospatial technologies, attempts to combine them can broaden the horizons of geography education.

In South Korea, a revised geography curriculum was announced by the Ministry of Education in 2022 (MoE, 2022). This curriculum has improved the content and methods of geography education at elementary, middle and high school levels, taking into account the learners' ages and cognitive levels, and the evolving societal context. In particular, the 2022 curriculum emphasises the use of diverse technologies in the era of the Fourth Industrial Revolution and digital transformation, and cites environmental issues such as climate change and rapid changes in population structure as the background for the revision. The revised geography curriculum explicitly mandates the incorporation of cutting-edge technologies and artificial intelligence into teaching and assessment. In the context of these curriculum revisions in South Korea, interest in the concept of powerful knowledge has grown significantly. Consequently, it is timely to design digital-based pedagogical strategies for the development of powerful knowledge.

The purpose of this study was to develop geographic teaching and learning strategies that utilise geospatial technologies to promote powerful knowledge. Using the theoretical framework of the five types of powerful knowledge in geographic contexts proposed by Maude (2018), strategies were designed to nurture these types of knowledge. The modules developed explore land cover change using story maps, map emotional geographies with heat maps, and visualise population density using dasymetric mapping. This article serves as a theoretical account of strategies that explicitly connects the utilisation of geospatial technologies with the concept of powerful knowledge within geographical contexts.

The conceptualisation and typology of powerful knowledge

Powerful knowledge is a concept advocated by the social realist Michael Young (2008) and discussions related to it have been expanding (see, e.g. Roberts, 2014; Huckle, 2019; Kim, 2021). Powerful knowledge consists of specialised knowledge generated in institutions such as universities, characterised by its systematic nature for academic formation (Young, 2008; Stoltman *et al*., 2015). Influenced by postmodernism, constructivism emphasises the process of students becoming the agents of learning and creating knowledge on their own. In this paradigm, the intrinsic value of knowledge itself was relatively depreciated. Knowledge created in various contexts by different subjects holds its own significance. Constructivism has educational value in elevating the student as an active agent in creating meaning, but without an adequate content base learners struggled to create substantively meaningful knowledge. Furthermore, there is criticism that overemphasising the 'process' of knowledge production leads to a vacuum curriculum that prioritises 'activity' over the importance of content to be taught (Lambert, 2011).

Powerful knowledge is characterised by 'structural objectivity', which can establish academic systems through rigorous verification processes (Firth, 2011, p. 147). Importantly, the knowledge emphasised in powerful knowledge theory is not a static, elite knowledge, but rather knowledge that is considered the best currently available; one that is open to new truths and embodies a dynamism that encourages students to cross academic boundaries for knowledge creation (Young and Muller, 2010). Powerful knowledge transcends the limitations of knowledge acquired through everyday experience, empowering individuals to drive social change and think transformationally. Providing access to such knowledge through school education is an obligation and an effort to realise social justice (Firth, 2011; Ro, 2022). For students from lower socioeconomic backgrounds, the opportunity to encounter such knowledge is limited outside of school education, which makes the teaching of powerful knowledge a public responsibility of schools (Young, 2009).

The concept of powerful knowledge is not without its critics. White (2018) contends that Young's definition, which associates powerful knowledge with systematic relationships between concepts, is not applicable to many school subjects that claim to offer such knowledge. White (2018) also criticises Young's framework for not sufficiently considering how educational goals and everyday concepts might be integrated, viewing the knowledge that students acquire through everyday life as educationally meaningful. Taking it a step further, White (2019) proposes discarding the term 'powerful knowledge' in favour of terms like 'specialised knowledge', which could facilitate more neutral and productive discussions. Responding flexibly to such criticisms, Roberts (2023) emphasises 'powerful pedagogies' that link students' everyday life knowledge with academic knowledge. Puttick and Murrey (2020) advocate for

the integration of contemporary geographical research and the exploration of themes such as race, pertinent to social justice in daily life, indicating that this approach has significant implications for incorporating powerful knowledge within the geography curriculum. The selection of migration as a major topic by the GeoCapabilities project (which is grounded in powerful knowledge) can also be understood in a similar context (Biddulph *et al.*, 2020).

Maude (2018) elaborates on the types of powerful knowledge in a geographical context (Figure 1). His typification is crucial because it extends beyond theoretical conceptualisation, providing a concrete list of powerful geographical knowledge. Maude (2018) asserts that powerful geographical knowledge equips students with the ability to view the world in new ways, thereby empowering them to analyse, explain and generalise. It also allows for the validation of their knowledge and provides a foundation for students to engage with issues at various scales. This power is fundamentally based on knowledge of the world. This typology provides insights for developing teaching and learning strategies to cultivate powerful knowledge (Béneker and Palings, 2017; Virranmäki *et al.*, 2019).

Figure 1: *Typology of powerful geographical knowledge. Source: Fargher (2018); Maude (2018).*

Type of powerful knowledge	In geography
Type 1: Knowledge that enables new ways of thinking about the world	• Utilising geography's big concepts: place, space, environment, interconnections, etc. • Meta-concepts distinguished from substantive concepts such as cities and climate.
Type 2: Knowledge that enables analysis, explanation and understanding of the world	• Analysing: place, spatial distribution, etc. • Explaining: hierarchy, agglomeration, etc. • Generalising: models such as population change models.
Type 3: Knowledge that empowers one's own knowledge	• Understanding how knowledge is developed and validated in academia. • Answering how we know.
Type 4: Knowledge that enables discussion and participation in local, national and global issues	• Combining natural sciences, social sciences and humanities, crucial in school geography. • Exploring various issues such as food, water, energy, climate change and development.
Type 5: Knowledge about the world	• Exploring diversity beyond personal experience in environment, culture, society, etc. • Knowledge that aligns with the public's general image of geography. • Contributing to students' general knowledge.

However, research in this area is limited, thus this study explores concrete strategies for enhancing powerful knowledge in the context of geography education.

Leveraging geospatial technologies to promote powerful knowledge

The use of geospatial technologies for spatial analysis and visualisation effectively supports the cultivation of powerful knowledge in geography (Fargher, 2018; Healy and Walshe, 2020). In geography education, there has been a sustained interest in using geospatial technologies as tools to facilitate the understanding of spatial concepts and for meaningful problem-solving (Marsh *et al.*, 2007; Metoyer and Bednarz, 2017). Interactive geospatial technologies allow students to collect, process and analyse data, and create maps through visualisation, offering strategies to understand various geographical concepts (including space and place) within the context of multi-layered scales (Harris *et al.*, 2010). Public participatory GIS (PPGIS) – using geospatial technologies to engage in real-world community issues – can provide a foundation for students to grasp the world from their own perspective, participate in visualisation and analysis and contribute to the creation of spatial narratives, thereby generating local knowledge (Fargher, 2018). The enhanced critical spatial thinking through GIS learning shares many similarities with Maude's concept of powerful knowledge (Kim and Bednarz, 2013), emphasising the logical application of geographical concepts and the importance of assessing the validity of problem-solving and arguments.

Research connecting geospatial technologies and powerful knowledge has begun to emerge. For example, Healy and Walshe (2020) report on the specific ways that powerful knowledge is cultivated through collaboration between professionals in the geospatial sector and students engaged in geospatial technology classes. The students carried out projects to investigate and map real-world locations, including Mill Road in Cambridge, UK, where learning based on geospatial technologies was effective in fostering powerful knowledge. However, Healy and Walshe (2020) observe that the level of enquiry among students can be superficial, suggesting that continuous efforts are needed to cultivate powerful knowledge. Fargher (2018) focuses on the development of online geospatial technologies (including smart mapping with *ArcGIS Online*, open-source data and

mobile applications), and stresses the importance of using these tools effectively to develop powerful geographical knowledge. Fargher (2018) created learning modules focusing on the 2004 Indian Ocean earthquake and tsunami as a case study and analyses the strategies of the modules in relation to powerful knowledge. However, beyond these studies, few examples of research directly connect geospatial technologies with powerful knowledge.

The use of geospatial technologies can be an effective strategy for cultivating powerful knowledge. It can provide a foundation for developing educationally meaningful learning modules in geography. However, since research in conducted in this context is limited, the next section presents learning strategies for developing powerful knowledge using geospatial technologies.

Cultivating powerful knowledge using geospatial technologies

This study developed educational modules aimed at cultivating powerful knowledge using practical examples on key geography education topics, including regional change, civic engagement and population visualisation. Although these modules are primarily intended for secondary school students, adjustments in content complexity and activity difficulty can allow for their application at various educational levels.

Exploring land cover change using ESRI *StoryMaps*

Land cover change is a significant topic that allows geographic examination of regional changes (Jensen, 2005; Kim, 2016). The impact of humans on the environment has become greater than ever, and analysing land cover change is a powerful method of visibly examining the interactions between humans and the environment. Learning about land cover change can encompass a variety of geographical enquiries, making it educationally meaningful in geography (Kerski, 2015). In this study, a teaching and learning strategy was developed based on the ESRI *StoryMaps* platform, utilising aerial imagery to visualise and analyse land cover changes (Figure 2).

The temporal changes in land cover of a specific area relate to the spatial changes and place characteristics of that area (Type 1). An example from this study allows students to compare two periods during which land cover changed rapidly in Dongtan, South Korea, as it began to be developed into a new city. The 'swipe' feature of *StoryMaps* provides a way for students to explore and compare land use in the two periods (Figures 3 and 4). It allows for a visual verification of land cover changes by interactively and dynamically altering the imagery. For instance, an area that was previously forested may have been largely converted to bare land, a change that can be understood in relation to urbanisation processes. The spatial structural change is the result of the combination of how Dongtan interconnects with the Seoul metropolitan area and Dongtan's unique place characteristics, which were previously established based on a manufacturing economy. This spatial understanding offers students a powerful strategy for comprehending the world through geographical concepts and perspectives.

Type of powerful knowledge*	Application in exploring land cover change using ESRI *StoryMaps*
1	• Utilise concepts of place, space and interconnection to explore land use situations and change, and the causes behind them.
2	• Analyse and explain the spatial variations in land use. • Generalise patterns of land use and change.
3	• Understand the different land cover maps that can be created depending on the classification system used. • Grasp that the mapping process can be visualised differently depending on the size of the cells. • Comprehend the issues of generalisation in the process of assigning a single attribute to a cell.
4	• Discuss the changes in landscapes in the process of regional development. • Suggest strategies for sustainable development.
5	• Acquire knowledge about the region being analysed. • Expand regional knowledge in various contexts.

Figure 2: *Types of powerful geographical knowledge in exploring land cover change using ESRI* StoryMaps. ** See Figure 1 for descriptions of the different types of knowledge.*

Figure 3: *This map allowed students to detect land cover changes in the Dongtan area over two periods. Note: Images from the two periods are displayed on either side of a central line. By moving the arrow left or right ('swipe' function), the split ratio of the images changes, allowing for a broader/narrower view of each image and an interactive observation of the transition between the two periods.*

Figure 4: *This story map (showing the same area as Figure 3) was created in ESRI* StoryMaps *using a post-classification change detection technique (see text for explanation).*

Here, geography provides an important foundation for analysing and explaining the spatial distribution of residential accumulation, the status and role of the area according to the hierarchy of the urban system and patterns of urbanisation (Type 2).

Using aerial photographs to analyse and map land cover change provides an opportunity to critically examine the validity of knowledge (Type 3). For example, the creation of a classification system and its analysis can be reflectively explored. In this study, the land in the example area shown in Figure 3 was classified into forest, farmland, water bodies, bare land and urban areas, then students investigated spatial changes between two periods through cell count changes. Learning materials were designed to include classification maps from both periods, created according to the classification system, with the 'swipe' function allowing students to explore changes. Specifically, an increase in the number of cells for bare land from Period A to Period B provides empirical evidence of an increase in bare land in the area.

This strategy for scientifically validating visual exploration is known as 'post-classification change detection', and is a widely-used remote-sensing technique in land cover change analysis (Jensen, 2005). However, such scientific analysis can lead to different results depending on the classification system used and changes in cell size. Additionally, there is a challenge in generalising to a single attribute for a cell that contains multiple attributes (e.g. a cell with both fields and roads) (Kim, 2016). Recognising these limitations in knowledge generated through scientific spatial analysis and critically examining the validity of this knowledge is an important aspect of powerful knowledge.

The changes in the example area of Dongtan relate to spatial policies that consider various social, economic and cultural factors. Therefore, through this learning strategy (using ESRI *StoryMaps*), students can systematically and comprehensively understand the situation of the area (Type 5) and, based on this understanding, develop the capacity

to effectively and meaningfully participate in various policy issues (Type 4). In the process of regional development, where the interests of various stakeholders collide, students as citizens need to understand these issues and act wisely. A citizen with the knowledge of type 3 can recognise the limitations of the analysis and visualisation used by others to present their views and participate effectively in discussions. Moreover, students may be able to propose development strategies for sustainable regional growth from their own perspective.

Mapping emotional geographies with heat maps

Interest in emotional geographies, which suggest that emotions can be a crucial factor for understanding regions or places, is increasing (see, e.g. Anderson and Smith, 2001; Bondi *et al*., 2005; Kim, 2023). Emotional geographies focus on the interactions between emotions and places, highlighting that emotions are not just subjective reactions to phenomena, but are linked with social, economic and cultural contexts (Kwan, 2008; Kenway and Youdell, 2011). The strategy of generating spatial narratives to aid understanding of the issues affecting a region and assist in spatial policy decisions through the emotions of individuals living and experiencing that area includes elements of powerful geographical knowledge (Figure 5). A teaching and learning strategy based on emotional geographies was developed using *Google Earth* and an online platform (Spatial Kernel Density Estimation) that facilitates the creation of heat maps for emotional geographies (Kim, 2023).

Investigating and mapping the emotional responses to various locations in a region of interest closely relates to the geographical concept of place (Type 1). The concept of place allows us to view and think about the world from the perspective of humanistic geography, where empty space transforms into a place characterised by personal experiences, meanings and images. The emotions felt at the same location can differ depending on factors including age and gender, and perceptions of a place can change depending on the time of day. These multifaceted aspects of place provide a perspective for seeing and

Type of powerful knowledge*	Application in understanding and engaging with regional and place issues through emotional geographies
1	• Utilise the concept of place to recognise various responses to different local issues.
2	• Analyse patterns of emotional responses based on the problem and the subject. • Explain the spatial patterns and causes of emotional responses.
3	• Reflect on the process of mapping qualitative phenomena (e.g. emotions) into quantitative data. • Understand the arbitrariness of spatial representation.
4	• Create spatial narratives based on the emotions felt by local residents. • Propose effective policies that recognise the limitations of existing policies.
5	• Acquire knowledge about the place being analysed. • Expand regional knowledge into various contexts.

Figure 5: *Types of powerful geographical knowledge related to understanding and engaging with regional and place issues through emotional geographies. * See Figure 1 for descriptions of the different types of knowledge.*

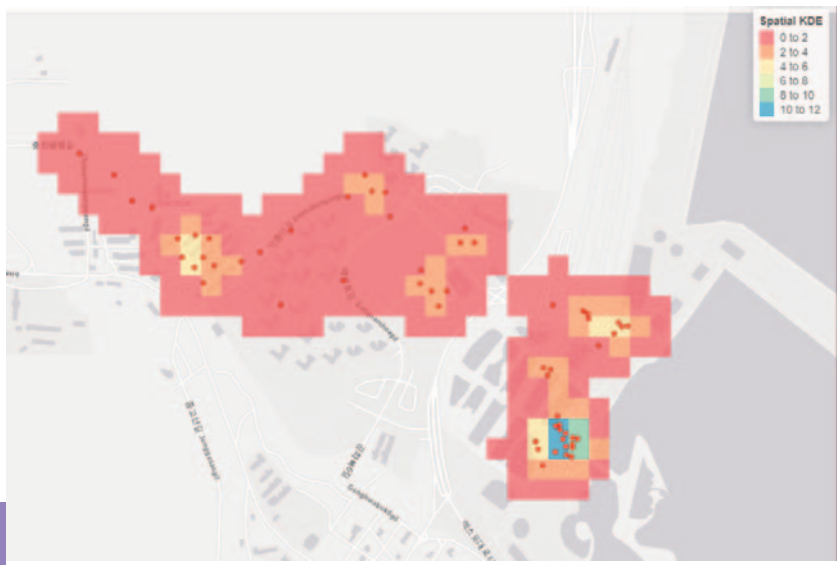
Figure 6: *An extract from an emotional geography* Google Earth *mashup, which includes images, video and text.*

understanding the world anew. Collecting data such as text, photos and video from multiple locations and integrating them with *Google Earth* can be an effective strategy for interactively visualising and exploring emotional responses (Figure 6). Through this process, it becomes possible to recognise the diverse aspects of a place depending on the issue and the responding subjects. Analysing these diverse response patterns and explaining the reasons behind them becomes a meaningful learning experience and promotes powerful knowledge (Type 2).

The process of analysing and explaining the patterns of and reasons for a phenomenon through emotional mapping can lead to critical reflection on the strategy of mapping emotions (Type 3). This study emphasises the strategy of collecting data from various points, as illustrated in Figure 6, and visualising them as a heat map. In this strategy, representing point data as a heat map involves a critical decision-making process regarding how knowledge is expressed and generated (Figure 7). Moreover, reflecting on the mapping of emotions, which are transient and invisible traits rather than fixed and static features, necessitates a critical understanding of the process of producing knowledge from qualitative to quantitative representation. It provides an opportunity to comprehend the arbitrariness of maps – often perceived as scientific and objective spatial representations – and to critically assess the process and validity of the knowledge produced from them.

Meanwhile, identifying issues based on emotional geographies and proposing policies represents the expression of spatial citizenship, corresponding to Type 4 powerful knowledge, through the substantive spatial narratives of the agent (Kim, 2017; Deitz *et al*., 2018). Engaging in social issues based on emotional geographies can be an opportunity to recognise the limitations of existing policies founded on mechanical and engineering worldviews, and enables an understanding of real-world problems through the complex interactions of various elements. Learning this aspect empowers students to participate in discussions that derive meaningful policies. Research based on emotional geographies, such as proposing walkable city policies for improved urban welfare (Pánek, 2019) and presenting plans for safe, emotionally-fulfilling bicycle routes (Pánek and Benediktsson, 2017), has significant implications. Lastly, acquiring multifaceted knowledge about a region or place through the lens of emotion constitutes powerful geographical knowledge that expands a deep understanding of the world (Type 5).

Figure 7: *An example of emotional geographies visualised as a heat map. Points indicate locations near Yeosu Expo Station, South Korea, where tourists reported feeling joy. The higher density of the points is represented as a blue 'hot spot'. Note: This heat map visualises the distribution of point data similar to that presented in Figure 6..*



Representation of population density using dasymetric mapping

Dasymetric mapping is a method of map representation that uses auxiliary information as well as the statistical data studied to depict the pattern of the variable more finely and accurately than other traditional forms of mapping (Eicher and Brewer, 2001). For example, dividing the population of a specific area by its area calculates the general view of population density, and mapping this results in a population density map. However, in reality, not every mapped area is inhabited. If the entire area is assumed to be residential, uninhabited places, such as mountains, water bodies and roads, are also included in the population density calculation, leading to a limited reflection of the real world. By extracting residential areas from land-use classification maps or by using building registers to include only buildings, dasymetric mapping can more realistically represent population density maps (Lee and Kim, 2007; Lee *et al*., 2014). This study focuses on the potential of dasymetric mapping to aid in developing powerful knowledge (Figure 8).

Regional differences in population density are related to various social, economic, cultural and natural factors, including employment, housing, transport accessibility, living convenience, cultural facilities and topography. Therefore, systematic understanding of population density differences is possible when based on various geographical concepts such as place, space and interconnection (Type 1). Choropleth mapping is frequently used for visualising population density. However, choropleth maps have limitations in accurately representing reality. Understanding these limitations and using

Type of powerful knowledge*	Application in conducting dasymetric mapping
1	• Utilise concepts of place, space and interconnection to explore regional differences in population density.
2	• Compare and analyse population density maps represented in various ways. • Explain the reasons for different population patterns based on various mapping methods.
3	• Recognise the limitations of population density expressed through choropleth maps. • Understand the differences in dasymetric mapping that can occur based on the auxiliary data used.
4	• Participate in various population-related discussions. • Propose policies using dasymetric visualisation strategies.
5	• Acquire knowledge about the region being analysed. • Expand regional knowledge into various contexts.

dasymetric mapping to address them demonstrates the process of validating and improving knowledge creation (Type 3). In this context, the choropleth map of Seoul's population density can be compared with dasymetric mapping. As seen in Figure 9, using dasymetric mapping allows for mapping the population density of only those areas where people actually live, providing students with the opportunity to consider specific representational issues according to the mapping method used.

For more refined analysis, the research by Lee *et al*. (2014) is noteworthy. They conducted dasymetric mapping on Seoul to verify the accuracy of population density maps by adding various auxiliary information and reported the effects. Starting with the general method of choropleth mapping, they refined their model by using building registers as auxiliary data to allocate population only where buildings exist, considering housing types, the number of floors and, finally, incorporating characteristics of districts. Understanding the logic of dasymetric mapping and generating and verifying knowledge from various perspectives enables students to employ the powerful ability to critically

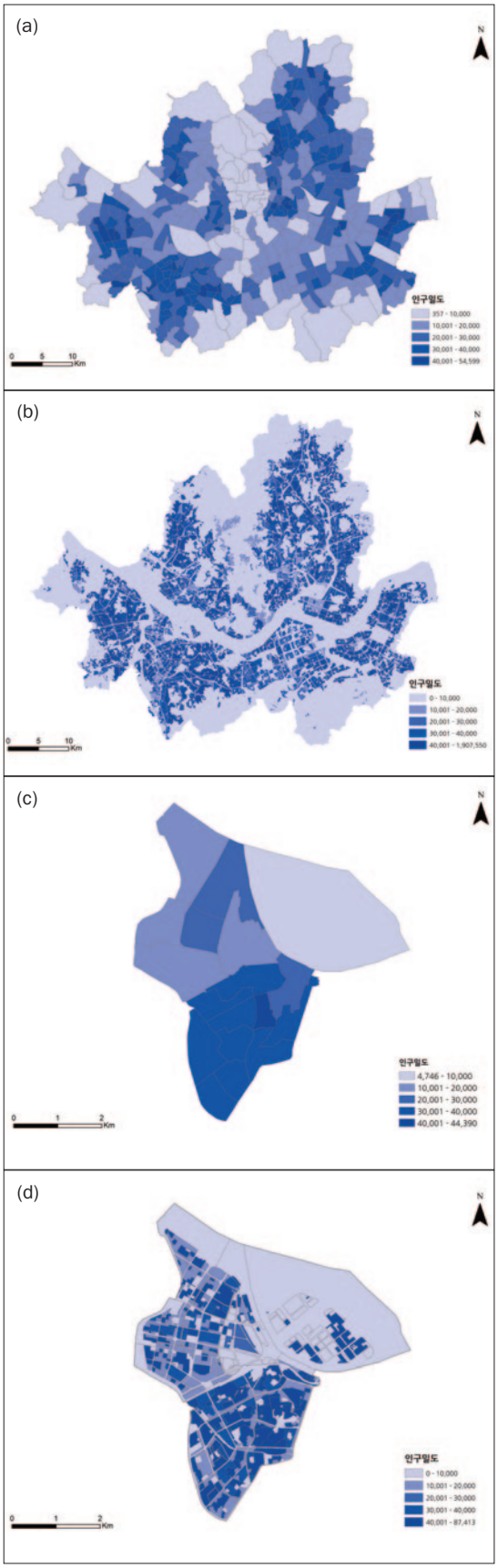


Figure 8 (left): *Types of powerful geographical knowledge employed in conducting dasymetric mapping of population data. * See Figure 1 for descriptions of the different types of knowledge.*

Figure 9: *Comparison of Seoul population density as (a) a choropleth map, and (b) a dasymetric map; and Yeongdeungpo-gu, Seoul, population density as (c) a choropleth map, and (d) a dasymetric map. Notes: For dasymetric mapping, administrative district maps were used as input data, and urban ecological status maps as auxiliary data, with weights assigned to land categories as follows: residential areas 0.5, mixed-use areas 0.3, commercial and business facilities 0.1 and industrial areas 0.1. All data 2010.*

assess knowledge claims. Furthermore, through such processes, it is possible for students to expand their knowledge by comparing and explaining the patterns on their maps, or by analysing the advantages of using detailed residential information to improve the accuracy of population density maps (Type 2).

Lee *et al*. (2014) argue that their research results could serve as a basis for various studies and policy-making, including disaster management, emergency preparedness and crime analysis. This indicates that knowledge related to dasymetric mapping can be usefully applied in discussions of various spatial policies. Students can competently participate in important issue discussions using knowledge of dasymetric mapping (Type 4). Finally, the process of meticulously surveying and meaningfully representing the population situation of an area can lead to increased knowledge about the world (Type 5).

Discussion and conclusion

This study developed teaching and learning strategies using geospatial technologies to cultivate the five types of powerful geographical knowledge proposed by Maude (2016; 2018). The modules focused on exploring land cover change using ESRI *StoryMaps*, mapping emotional geographies using heat maps, and visualising population density via dasymetric mapping. The land cover change module examined the rapid transformations in the new city of Dongtan, while the emotional mapping module concentrated on strategies to explore places through the lens of emotions using *Google Earth* and a heat map generation platform (Spatial Kernel Density Estimation). The dasymetric mapping module emphasised understanding the implications of creating more realistic population density maps by using auxiliary information.

While interest in powerful geographical knowledge is growing, specific development of teaching and learning strategies has been limited. This article describes geospatial technology-based strategies for enhancing powerful knowledge in the context of geography education. Further discussion can be advanced on the following aspects.

First, additional studies are required to empirically demonstrate the educational effectiveness of the teaching and learning strategies described here. The strategies for each module in this study have been verified as meaningful interventions in different research contexts (e.g. Lee and Kim, 2007; Kim, 2016; 2023). This research was based on such rationales, strategically integrating these ideas with types of powerful geographical knowledge. Although the modules have a solid theoretical foundation, ongoing efforts to further validate and refine their effectiveness in varied practical settings are necessary.

Second, researchers can consider strategies for adapting the digital technology approaches proposed in this study to low-tech methods depending on the context. For land cover change strategies, Kim (2016) reports positive educational effects from activities using paper and coloured pencils. This study attempted to implement Kim's idea through digital story maps and link it with powerful knowledge. Emotional mapping activities can also be conducted using stickers or pins of various colours. Dasymetric mapping can be modified to allow students to calculate population density and draw maps by hand, maintaining the basic concepts and logic. Through these modifications, meaningful activities can be carried out in more restricted learning environments. While low-tech strategies have limitations relative to the interactive exploration and dynamic visualisation possible in digital environments, they have the advantage of being relatively easy to introduce into the classroom. Therefore, a consideration of how to adapt and apply these strategies appropriately depending on the educational environment and objectives should also be explored.

Third, there is a need to expand the development of teaching and learning strategies that utilise geospatial technologies within the theoretical framework of powerful knowledge across various topics. The themes utilised in this study, such as regional changes, civic engagement and population issues, are prominently addressed in South Korea's new curriculum. However, there are various other elements that can be considered from the perspective of powerful knowledge. Therefore, it is necessary to develop strategies that incorporate a variety of new topics reflecting the changes and demands of the era. In addition, while the module themes of this study are emphasised within the context of South Korea's educational curriculum, it is important to highlight that these topics are of interest in the geography education of many countries, and thus have a wide-reaching impact in multiple contexts.

Demonstrating how geography education can contribute to learners' growth is a critical issue directly linked to the purpose of geography education. Through learning powerful knowledge,

students can enter intellectual traditions and become citizens who engage fully with various societal issues. Moreover, powerful geographical knowledge provides the foundation for students to fulfil their potential (Solem *et al*., 2013; Lambert *et al*., 2015; Bustin *et al*., 2020). Therefore, cultivating powerful knowledge is an educationally significant task, and the ability of geography education to contribute to this highlights the importance of geography's role within the curriculum. In discussing specific teaching and learning strategies for promoting powerful knowledge in geography education, this article serves as a catalyst for expanding research in this area.

References

Anderson, K. and Smith, S.J. (2001) 'Editorial: Emotional geographies', *Transactions of the Institute of British Geographers*, 26, 1, pp. 7–10. https://doi.org/10.1111/1475-5661.00002

Baker, T.R., Battersby, S., Bednarz, S.W., Bodzin, A.M., Kolvoord, B., Moore, S., Sinton, D. and Uttal, D. (2015) 'A research agenda for geospatial technologies and learning', *Journal of Geography*, 114, 3, pp. 118–30. https://doi.org/10.1080/00221341.2014.950684

Béneker, T. and Palings, H. (2017) 'Student teachers' ideas on (powerful) knowledge in geography education', *Geography*, 102, 2, pp. 79–85. https://doi.org/10.1080/00167487.2017.12094013

Biddulph, M., Béneker, T., Mitchell, D., Hanus, M., Leininger-Frézal, C., Zwartjes, L. and Donert, K. (2020) 'Teaching powerful geographical knowledge – a matter of social justice: initial findings from the GeoCapabilities 3 project', *International Research in Geographical and Environmental Education*, 29, 3, pp. 260–74. https://doi.org/10.1080/10382046.2020.1749756

Bondi, L., Davidson, J. and Smith, M. (2005) 'Introduction: Geography's "emotional turn"' in Davidson, J., Bondi, L. and Smith, M. (eds) *Emotional Geographies*. Aldershot: Ashgate, pp. 1–18.

Bustin, R., Lambert, D. and Tani, S. (2020) 'The development of GeoCapabilities: reflections, and the spread of an idea', *International Research in Geographical and Environmental Education*, 29, 3, pp. 201–5. https://doi.org/10.1080/10382046.2020.1749773

Deitz, M., Notley, T., Catanzaro, M., Third, A. and Sandbach, K. (2018) 'Emotion mapping: using participatory media to support young people's participation in urban design', *Emotion, Space and Society*, 28, pp. 9–17. https://doi.org/10.1016/j.emospa.2018.05.009

Eicher, C.L. and Brewer, C.A. (2001) 'Dasymetric mapping and areal interpolation: implementation and evaluation', *Cartography and Geographic Information Science*, 28, 2, pp. 125–38. https://doi.org/10.1559/152304001782173727

Elwood, S. (2009) 'Geographic information science: new geovisualization technologies – emerging questions and linkages with GIScience research', *Progress in Human Geography*, 33, 2, pp. 256–63. https://doi.org/10.1177/0309132508094076

Fargher, M. (2018) 'WebGIS for geography education: towards a GeoCapabilities approach', *ISPRS International Journal of Geo-Information*, 7, 3, 111. https://doi.org/10.3390/ijgi7030111

Firth, R. (2011) 'Debates about knowledge and the curriculum: some implications for geography education' in Butt, G. (ed) *Geography, Education and the Future*. New York, NY: Continuum, pp. 141–64.

Harris, T.M., Rouse, L.J. and Bergeron, S.J. (2010) 'The geospatial web and local geographic education', *International Research in Geographical and Environmental Education*, 19, 1, pp. 63–6. https://doi.org/10.1080/10382041003602944

Healy, G. and Walshe, N. (2020) 'Real-world geographers and geography students using GIS: relevance, everyday applications and the development of geographical knowledge', *International Research in Geographical and Environmental Education*, 29, 2, pp. 178–96. https://doi.org/10.1080/10382046.2019.1661125

Huckle, J. (2019) 'Powerful geographical knowledge is critical knowledge underpinned by critical realism', *International Research in Geographical and Environmental Education*, 28, 1, pp. 70–84. https://doi.org/10.1080/10382046.2017.1366203

Jensen, J.R. (2005) *Introductory Digital Image Processing: A remote sensing perspective* (3rd edition). Upper Saddle River, NJ: Prentice Hall.

Kenway, J. and Youdell, D. (2011) 'The emotional geographies of education: beginning a conversation', *Emotion, Space and Society*, 4, 3, pp. 131–6. https://doi.org/10.1016/j.emospa.2011.07.001

Kerski, J.J. (2015) 'Geo-awareness, geo-enablement, geotechnologies, citizen science, and storytelling: geography on the world stage', *Geography Compass*, 9, 1, pp. 14–26. https://doi.org/10.1111/gec3.12193

Kim, M. (2016) 'The pedagogical benefits of a low-tech remote sensing: focusing on critical spatial thinking', *Journal of the Korean Association of Geographic and Environmental Education*, 24, 4, pp. 115–30. https://doi.org/10.17279/jkagee.2016.24.4.115

Kim, M. (2017) 'Conceptualization and application of spatial citizenship: understanding the Daegu Modern Street from the perspective of the disabled', *Journal of the Association of Korean Geographers*, 6, 3, pp. 339–54. https://doi.org/10.25202/JAKG.6.3.3

Kim, M. (2018) 'Project-based community participatory action research using geographic information technologies', *Journal of Geography in Higher Education*, 42, 1, pp. 61–79. https://doi.org/10.1080/03098265.2017.1335294

Kim, M. (2021) 'The meaning of powerful knowledge and geography learning strategies', *Journal of the Association of Korean Geographers*, 10, 1, pp. 1–17.

Kim, M. (2023) 'Promoting civic engagement competence through emotional geography-based spatial story making in community participation projects', *Journal of Geography*, 122, 2, pp. 43–53. https://doi.org/10.1080/00221341.2023.2196522

Kim, M. and Bednarz, R. (2013) 'Development of critical spatial thinking through GIS learning', *Journal of Geography in Higher Education*, 37, 3, pp. 350–66. https://doi.org/10.1080/03098265.2013.769091

Kwan, M.-P. (2008) 'From oral histories to visual narratives: re-presenting the post-September 11 experiences of the Muslim women in the USA', *Social and Cultural Geography*, 9, 6, pp. 653–69. https://doi.org/10.1080/14649360802292462

Lambert, D. (2011) 'Reviewing the case for geography, and the "knowledge turn" in the English National Curriculum', *The Curriculum Journal*, 22, 2, pp. 243–64.

https://doi.org/10.1080/09585176.2011.574991
Lambert, D., Solem, M. and Tani, S. (2015) 'Achieving human potential through geography education: a capabilities approach to curriculum making in schools', *Annals of the Association of American Geographers*, 105, 4, pp. 723–35. https://doi.org/10.1080/00045608.2015.1022128
Lee, S. and Kim, K. (2007) 'Representing the population density distribution of Seoul using dasymetric mapping techniques in a GIS Environment', *Journal of the Korean Cartographic Association*, 7, 2, pp. 53–67.
Lee, S., Lee, S., Hong, B., Eom, H., Shin, H. and Kim, K. (2014) 'Representation of population distribution based on residential building types by using the dasymetric mapping in Seoul', *Journal of Korea Spatial Information Society*, 22, 3, pp. 89–99.
Marsh, M., Golledge, R. and Battersby, S.E. (2007) 'Geospatial concept understanding and recognition in G6-college students: a preliminary argument for minimal GIS', *Annals of the Association of American Geographers*, 97, 4, pp. 696–712. https://doi.org/10.1111/j.1467-8306.2007.00578.x
Maude, A. (2016) 'What might powerful geographical knowledge look like?' *Geography*, 101, 2, pp. 70–6. https://doi.org/10.1080/00167487.2016.12093987
Maude, A. (2018) 'Geography and powerful knowledge: a contribution to the debate', *International Research in Geographical and Environmental Education*, 27, 2, pp. 179–90. https://doi.org/10.1080/10382046.2017.1320899
Metoyer, S. and Bednarz, R. (2017) 'Spatial thinking assists geographic thinking: evidence from a study exploring the effects of geospatial technology', *Journal of Geography*, 116, 1, pp. 20–33. https://doi.org/10.1080/00221341.2016.1175495
Ministry of Education (2022) *Notification No. 2022-33, Supplementary Volume 7: Social studies curriculum*. Sejong, RoK: Ministry of Education.
Muller, J. (2023) 'Powerful knowledge, disciplinary knowledge, curriculum knowledge: educational knowledge in question', *International Research in Geographical and Environmental Education*, 32, 1, pp. 20–34. https://doi.org/10.1080/10382046.2022.2058349
Pánek, J. (2019) 'Mapping citizens' emotions: participatory planning support system in Olomouc, Czech Republic', *Journal of Maps*, 15, 1, pp. 8–12. https://doi.org/10.1080/17445647.2018.1546624
Pánek, J. and Benediktsson, K. (2017) 'Emotional mapping and its participatory potential: opinions about cycling conditions in Reykjavík, Iceland', *Cities*, 61, pp. 65–73. https://doi.org/10.1016/j.cities.2016.11.005
Puttick, S. and Murrey, A. (2020) 'Confronting the deafening silence on race in geography education in England: learning from anti-racist, decolonial and Black geographies', *Geography*, 105, 3, pp. 126–34. https://doi.org/10.1080/00167487.2020.12106474
Ro, J. (2022) 'How to achieve a justice-oriented curriculum? The potentials and limitations of powerful knowledge', *The Journal of Curriculum Studies*, 40, 1, pp. 55–78.
Roberts, M. (2014) 'Powerful knowledge and geographical education', *The Curriculum Journal*, 25, 2, pp. 187–209. https://doi.org/10.1080/09585176.2014.894481
Roberts, M. (2023) 'Powerful pedagogies for the school geography curriculum', *International Research in Geographical and Environmental Education*, 32, 1, pp. 69–84. https://doi.org/10.1080/10382046.2022.2146840
Solem, M., Lambert, D. and Tani, S. (2013) 'Geocapabilities: toward an international framework for researching the purposes and values of geography education', *Review of International Geographical Education Online*, 3, 3, pp. 214–29. Available at https://rigeo.org/menu-script/index.php/rigeo/article/view/204
Stoltman, J., Lidstone, J. and Kidman, G. (2015) 'Powerful knowledge in geography: IRGEE editors interview Professor David Lambert, London Institute of Education, October 2014', *International Research in Geographical and Environmental Education*, 24, 1, pp. 1–5. https://doi.org/10.1080/10382046.2015.987435
Virranmäki, E., Valta-Hulkkonen, K. and Rusanen, J. (2019) 'Powerful knowledge and the significance of teaching geography for in-service upper secondary teachers: a case study from Northern Finland', *International Research in Geographical and Environmental Education*, 28, 2, pp. 103–17. https://doi.org/10.1080/10382046.2018.1561637
White, J. (2018) 'The weakness of "powerful knowledge"', *London Review of Education*, 16, 2, pp. 325–35. https://doi.org/10.18546/LRE.16.2.11
White, J. (2019) 'The end of powerful knowledge?', *London Review of Education*, 17, 3, pp. 429–38. https://doi.org/10.18546/lre.17.3.15
Young, M. (2008) *Bringing Knowledge Back In: From social constructivism to social realism in the sociology of education*. Abingdon: Routledge.
Young, M. (2009) 'What are schools for?' in Daniels, H., Lauder, H. and Porter, J. (eds) *Knowledge, Values and Educational Policy*. London: Routledge, pp. 10–18.
Young, M. (2014) 'Powerful knowledge as a curriculum principle' in Young, M., Lambert, D. with Roberts, C. and Roberts, M. (eds) *Knowledge and the Future School: Curriculum and social justice*. London: Bloomsbury Academic, pp. 65–88.
Young, M. and Muller, J. (2010) 'Three educational scenarios for the future: lessons from the sociology of knowledge', *European Journal of Education*, 45, 1, pp. 11–27. https://doi.org/10.1111/j.1465-3435.2009.01413.x

All URLs last accessed 30/7/2024.

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The UK: international child poverty outlier

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ABSTRACT: The UK has not only one of the highest rates of child poverty in the rich world, but also the most rapidly rising rate in this grouping. Within the UK, a higher proportion of children are poor in the South East of England than in Scotland. The huge rise in economic inequality in the 1980s caused the UK to become an international outlier in terms of child poverty. All subsequent UK governments have maintained inequality at high levels – by choice. The results are telling: children in England are, on average, becoming shorter in height and child death rates in England are rising, almost certainly due to rising poverty and destitution. As inequality rises poverty rises, but so too does ignorance of each other. Those who study human geography in the UK, if they went to university in recent years, are the least likely graduates to have ever been poor. Child poverty remains off our mental maps and largely outside of our geographical imaginations. That has to change.

Keywords: child, poverty, inequality, destitution, health, UK

Thirty years ago a group of geographers wrote a book about many things, including why human geographers in Britain tended to ignore poverty (Philo, 1995). The book did not result in any 'geographical turn' towards looking more closely at the stark reality of poverty for British people. British geographical journals are not places where poverty is much discussed, except when it occurs 'overseas'. This is in stark contrast to sociology and social policy, where concerns about inequality and poverty have risen in tandem with the rises in the issues themselves. In this article I argue that the situation in the UK is now so acute, that British geographers in particular cannot continue to see these issues as ones better delt with and discussed elsewhere.

The UK currently has one of the highest rates of child poverty in the rich world. In December 2023, UNICEF (the United Nations Children's Emergency Fund charity) published an analysis showing that the rate of child poverty was growing faster within the UK than in any other country that they measured in the world (UNICEF Innocenti, 2023). In January 2024, the UK's Child Poverty Action Group (CPAG) reported how the UK government was increasing the proportion of children who were poor faster through its choices and actions. The charity Action for Children revealed data showing how a higher proportion of children are now poor in the South East of England than in Scotland. The geography of child poverty has been changing both internationally and within the UK. In this article these statistics are described and contextualised in an attempt to raise awareness among colleagues and students. The geography of poverty and inequality has changed and this has changed the human geography of the UK more than any other trend in recent years.

The huge rise in economic inequality in the 1980s that has caused the UK to become such an outlier is charted below and an argument made for how UK governments maintaining inequality at such high levels since then has helped to both sustain the very high poverty rates and to increase them. Data released during 2023, which shows how children in England are now (on average) becoming shorter in height, is also presented – suggesting

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that nutrition is worsening for the majority of British children. There are several geographers who have studied foodbanks and similar issues recently (Garthwaite, 2016a, 2016b; Lambie-Mumford, 2016; Lambie-Mumford and Green, 2017), and before them there was a trend to study 'food deserts' (see e.g. Wrigley, 2002) – areas under-served by shops selling affordable, nutritious food. However, the underlying reasons for why some residential areas were deserted by retailers, and why there has been a rise in the need for foodbanks (and where that need is best and worst met), are less considered in contemporary British human geography.

The rise in child death rates in England 2022 and 2023 is a further statistic reported below. That more children are now dying between ages one and four is almost certainly due to increasing poverty and destitution. This article concludes with a discussion of how the death of two-year-old Bronson Battersby from starvation in England in the first few weeks of 2024 was reported and how the geography of his home town was used, by some, to try to explain his death. Human geographers are well placed to explore how places become stigmatised, how spaces of segregation are normalised, and to begin to contribute to the work currently being done by epidemiologists and in social medicine on the growing emergency in the UK today.

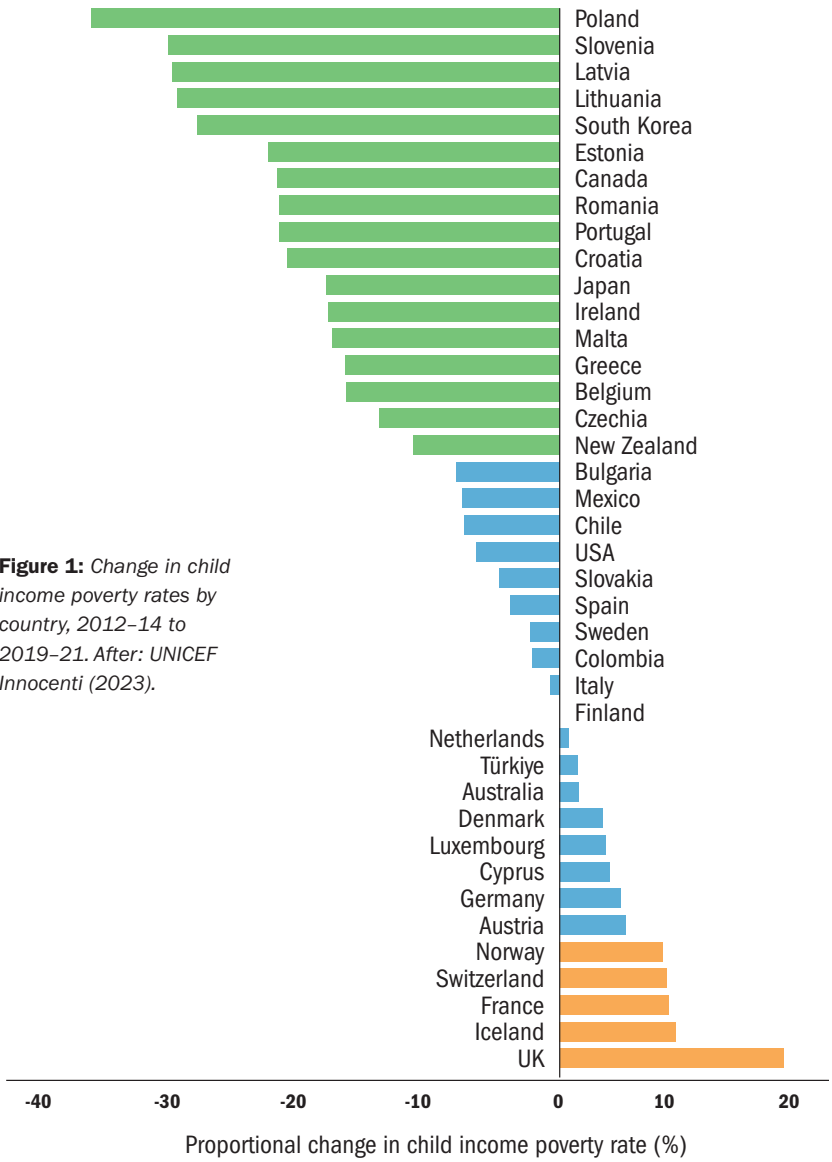

Figure 1: *Change in child income poverty rates by country, 2012–14 to 2019–21. After: UNICEF Innocenti (2023).*

Because this is a geography journal, and because the rise in inequality may be part of the explanation for the current lacunae in our curricula, the discussion of the UK as an international outlier of child poverty ends with a few comments on those who study human geography in the UK and how, if they went to university to do so in recent years, they are the people least likely to have ever been poor of anyone studying for any degree in Britain. Once a country becomes an outlier in one way, it can become one in so many others, and the academic subject of geography itself in the UK, as it is constituted today, is partly a product of that great rise in inequality. This need not be a reason to look away and be more concerned about the climate, places overseas and the environment in general, than with what is now happening to people living within a stone's throw of all UK university geography departments.

The United Nations reports

In December 2023, the UN released its periodic Report Card (UNICEF Innocenti, 2023) on the changing state of child of child poverty across the countries of the world that it monitors in the most detail (those countries for which the most consistent statistics are available). Researchers often argue about child poverty statistics, and governments are even more prone to quibble with particular definitions. There are many ways in which child poverty can be measured. UNICEF, the agency of the United Nations responsible for providing humanitarian and developmental aid to children worldwide, tried to seek a compromise by considering more universal measures. As they explained just before Christmas 2023:

> '*Poverty is often defined by income. But for most children, poverty is about more than just money. It is about growing up in a home without enough heat or nutritious food. Poverty means no new clothes, no telephone and no money for a birthday celebration*' (UNICEF Innocenti, 2023, p. 2).

The headline measure UNICEF uses is an income measure: the proportion of children that live in households that fall below 60% of the median household income within each country. Equivalised income is used to take account of variations in household size, as larger households can make economies and get by with a little less money per person (by, for example, cooking for everyone at the same time). Concepts such a median and equivalised incomes need to be better understood because otherwise the statistics can appear obscure. The need for social statistics also often needs to be explained. By the widely accepted UN measure, the UK ranks 28th out of the 39 countries that UNICEF compares, or 37th out of 39 when its direction of travel is also taken into account. A fifth of all children in the UK live in poverty by this measure and the UK has experienced the greatest increase in child poverty of all the countries that UNICEF compares in the most recent time period (between 2012–14 and 2019–21). Figure 1 highlights this and makes it clear just how exceptional the UK has become.

The other countries in Figure 1 that have been doing badly in recent years all have much lower rates of child poverty than the UK. For example, in Iceland only 12.4% of children are poor by the UNICEF headline measure, even though it had the second largest rise in child poverty after the UK in the most recent time period (2012–14 to 2019–21; see Figure 2). In France the rate is lower and the rise smaller. The same is true of Switzerland and Norway. There is now a stark geographical contrast between what is considered normal in different countries in Europe – and in different parts of these countries. This is a further reason for calling for more work by geographers geared towards understanding these growing geographical differences.

There are several countries among the 39 that UNICEF compares that fare worse than the UK in terms of rates of child poverty, although none of them have been experiencing the *rise* in rates that the UK has seen in recent years. For example, while Greece still has a slightly higher rate than the UK according to the latest UNICEF report (UNICEF Innocenti, 2023), its rate dropped by 17.2% during the most recent period (2012–14 to 2019–21) despite the huge austerity experienced there. Similarly, New Zealand and Chile also remain slightly worse, yet saw 11.7% and 7.7% falls respectively in their child poverty rates during the same period. By late 2024, if these trends continue, all these countries will have a lower proportion of their children experiencing severe income deprivation compared with the UK.

Child poverty remains higher in Romania – 29.0% compared to 20.7% in the UK – but fell by 22.5% in the most recent period, the eighth largest fall of all. Bulgaria is similarly improving. Only Türkiye and Colombia are worse and not improving quickly enough to be likely to soon better the UK. The USA also stands out as worse, with a rate of 26.2% of US children living in poverty according to the UNICEF definition, but the USA has been improving and it is possible to imagine this continuing so that the UK and the USA trade places at some point in the future – unless the UK's fall down the ranks is somehow halted.

The UNICEF Innocenti Report Card (2023) gave these figures in cold numeric detail; but often they do not strike home when presented in this way. Of course, one country has to rank bottom of any list of improvements, but it need not be a country where child poverty was already accepted as more normal and tolerated as much; as is the case in the UK – uniquely across Europe. You might say that the proportion of children that UNICEF presents is not especially high at 20.7%, but it is worth remembering that these children are growing up in households that survive on only 60% (and usually less than that) of what the median household in the UK gets by on each year. If you are reading this publication it is very likely that you would consider that median household income a poverty income, were you to ever have to try to survive on that little money, let alone less than three-fifths of that money – each day, each week, each year.

The median average salary in the UK in 2023 was approximately £26,600 a year (TUC, 2023) and for every person receiving a salary of over £40,000 in the UK in 2023 there was another person paying income tax but earning no more than £19,000 (ONS, 2024a). These amounts will be higher when you read this, but the costs of basic foodstuff and other essential have risen faster than salaries, therefore, almost everyone is now worse off than they were in 2023.

The full UNICEF 'league table' of child poverty in selected countries is shown in Figure 2. Countries are ranked overall according to the combined average z-score of columns 3 and 5 in the table. A z-score normalises for variation in each of the variables being combined, thus no single variable dominates the rankings produced. There are many ways in which these numbers can all be estimated, measured, combined and presented, but the message is clear. The UK is doing very badly and getting worse.

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Overall rank	Country	Most recent rate of child poverty (average 2019–21)		Change in child poverty rate (2012–14 to 2019–21)	
		%	Rank	%	Rank
1	Slovenia	10.0	2	-31.4	2
2	Poland	14.1	8	-37.6	1
3	Latvia	16.3	16	-31.0	3
4	South Korea	15.7	15	-29.0	5
5	Estonia	14.8	9	-23.4	6
6	Lithuania	18.3	22	-30.6	4
7	Czechia	11.6	4	-14.5	16
8	Japan	14.8	11	-18.7	11
9	Ireland	14.8	10	-18.5	12
10	Croatia	16.6	17	-21.8	10
11	Canada	17.2	19	-22.7	7
12	Belgium	14.9	12	-17.0	15
13	Portugal	19.3	25	-22.5	9
14	Finland	10.1	3	0	26
15	Denmark	9.9	1	+3.5	30
16	Malta	19.8	26	-18.2	13
17	Netherlands	13.5	7	+0.7	27
18	Greece	22.3	31	-17.2	14
19	New Zealand	21.1	29	-11.7	17
20	Norway	12.0	5	+10.1	35
21	Slovakia	18.9	23	-4.9	21
22	Sweden	18.0	20	-2.4	23
23	Iceland	12.4	6	+11.0	38
24	Cyprus	15.6	14	+4.0	32
25	Germany	15.5	13	+5.0	33
26	Australia	17.1	18	+1.7	29
27	Chile	21.6	30	-7.7	19
28	Romania	29.0	37	-22.5	8
29	Austria	19.2	24	+5.3	34
30	Switzerland	18.0	21	+10.3	36
31	Bulgaria	26.1	34	-8.3	18
32	USA	26.2	35	-6.7	20
33	France	19.9	27	+10.4	37
34	Italy	25.5	33	-0.8	25
35	Luxembourg	24.5	32	+3.7	31
36	Spain	28.0	36	-4.0	22
37	UK	20.7	28	+19.6	39
38	Türkiye	33.8	38	+1.5	28
39	Colombia	35.8	39	-2.1	24

Figure 2: *The UNICEF Innocenti 'league table' of child poverty in selected countries. Notes: Countries are ranked on their most recent income poverty rate and their success in reducing child poverty in a period of prosperity. The overall rank is based on a statistical average of these two indicators. After: UNICEF Innocenti (2023).*

Within the UK

Different measures are used within the UK by the government, which paint an even worse picture of the current situation. In March 2023, the UK charity the Child Poverty Action Group (CPAG) reported that the official government statistics showed that 350,000 more children fell into poverty in the 12 months to March 2022 before explaining why those numbers were about to rise throughout 2023 and into 2024 (Hirsch, 2023). The CPAG also presented an analysis demonstrating that accepting this level of child poverty was costing the state £39.5 billion a year in terms of the effects of the impacts of poverty. They explained that the official annual poverty statistics showed: 'an estimated 350,000 more children were pulled into poverty last year, largely because the Government cut the £20 universal credit (UC) uplift half-way through the year' (CPAG, 2023). The official Department for Work and Pensions (DWP) figures reported that '4.2 million children were in poverty in the year April 2021 to April 2022' (DWP, 2023); the most recent year

available and the year after UNICEF's reporting ended. The CPAG then explained in detail why this figure will rise in future as the full effect of new government cuts to social security (universal credit) are felt, as the austerity that began in the UK in 2010 was continued into its 14th year and as family income inequality was allowed to remain at what was very likely to be the highest levels seen across all of Europe (CPAG, 2023). High levels of inflation in the UK, especially of the cost of food following Brexit, were also exacerbating the crisis.

On 1 January 2024, the charity Action for Children (AFC) released data – again using the official UK measures – on the local geography of child poverty in the UK. Figure 3 shows what AFC found when analysing the DWP data (Corcoran, 2024). They used the official UK definition that a child is considered to be 'growing up in poverty if they live in a household whose income is below 60% of the average (median) income for that year' (Corcoran, 2024). The AFC then showed the results after housing costs are taken into account, because families with children have no choice other than to pay for housing: they cannot live on the streets or in a tent because social workers would then take their children into care. Including this measure increases the proportion of children living in poverty in the UK to 29% (Corcoran, 2024). That is almost three out of every ten children. And if we consider that many families have just a few pounds over the 60% threshold, so are almost as poor as those who officially count as poor, the rate becomes even higher.

Housing costs in the AFC report 'include rent, water rates, mortgage interest payments, buildings insurance payments, and any ground rent or services charges'; but for poorer children this is almost always rent costs that matter most (Corcoran, 2024). A third of younger children in England live in private rented accommodation, which is the costliest form of accommodation. Almost half of all children in the UK now begin their childhood in a rental property, the large majority with private landlords, and 'a third of millennials face renting their entire lives' (Coughlan, 2019). Private landlords make a lot of money, both from these children's families and from the UK government (which often pays a proportion of their rent to the landlords). All these housing costs are unavoidable to families. However, note that contents insurance is not included in the list, and the proportion of families that can afford to pay to insure their contents in case of fire, theft, or flood has been falling in the UK in recent years.

The proportion of parents of the poorest children in Britain who say that they cannot consider home contents insurance rose from 25% to 27% between March 2022 and March 2023 according to the most recent DWP statistics (released in March 2023). In contrast, only 4% of the best-off children's parents said this (down from 6% as inequalities between these groups in the UK increase). Many poorer UK families had already given up insuring their possessions before 2019. This was happening even though the rationale for insuring was rising. Thus, the situation was worsening even while some of the statistics were not changing, such as the overall income inequality measure, because it would cost more in future (due to inflation) to replace items lost in a fire or flood, or due to theft. By 2024 many people in the UK, and especially parents, simply could not afford to insure against these risks any more (Dorling, 2024a).

The AFC report (Corcoran, 2024) explained that the 'after housing costs' data allows us to compare incomes for households in different parts of the country where housing costs vary. The result of their analysis is show in Figure 3. What is remarkable about this is how much the geography of child poverty has changed compared with 20, 40 or 60 years ago. In 2021/22 Northern Ireland had the lowest official rate of child poverty at 22%. (Although the UK government 'sanctioned' that Province during 2023 to try to force the devolved government back into office, therefore this proportion is likely to no longer represent the current likely rate of child poverty there.) Scotland, by 2021/22, already had the second lowest official child poverty rate in the UK at 24%. At the same time, the South East of England, which excludes London, had a higher proportion of children living in poverty (and it is still rising according to recent reports – see Dorling (2024c)). The success of Scotland is almost entirely due to the recent actions of the Scottish Government to reduce child poverty by giving more money to the families with the poorest children (Dorling, 2023; Kidner, 2024).

Every line in Figure 3 illustrates how the English now tolerate between one-fifth and, in some cases, over one-third of our children growing up in poverty. This is poverty according to the official definition. If other definitions are used, such as whether a family has enough to live on above a minimum income standard, the proportions are all higher. The other countries of the UK appear to be slightly less tolerant of high rates of poverty given their generally lower positions on Figure 3, but other than Scotland's recent fall (which now looks as if it will be permanent), this is a graph of shame.

The UK: international child poverty outlier

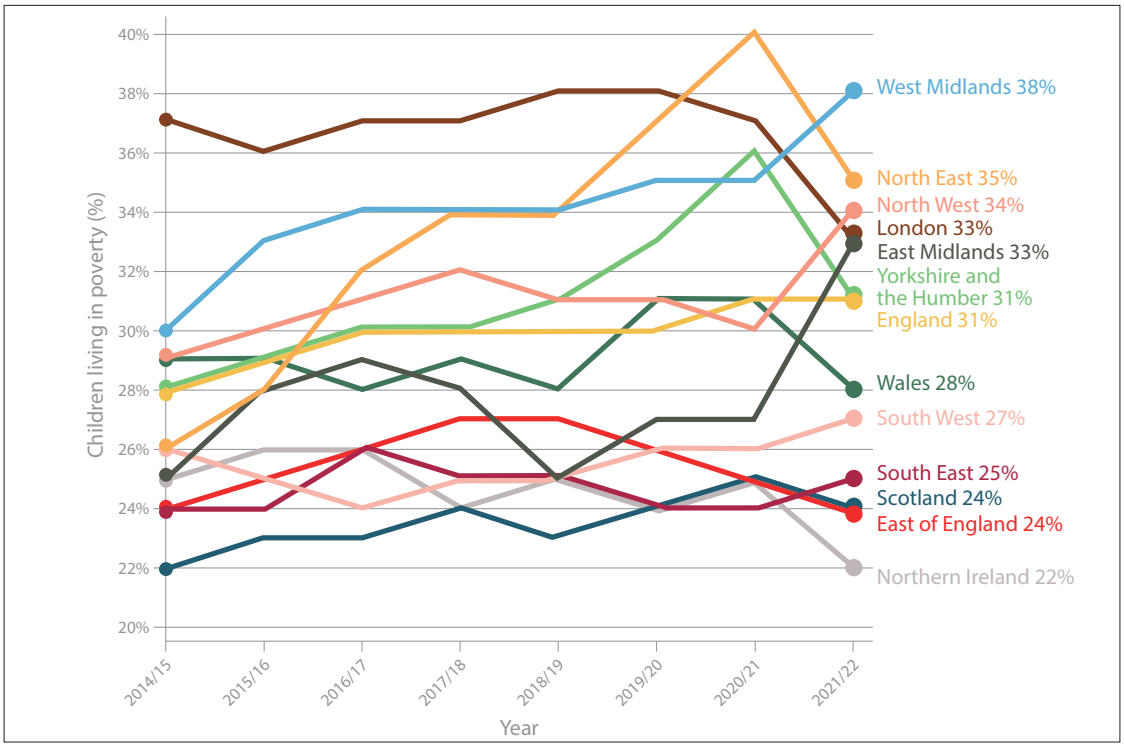
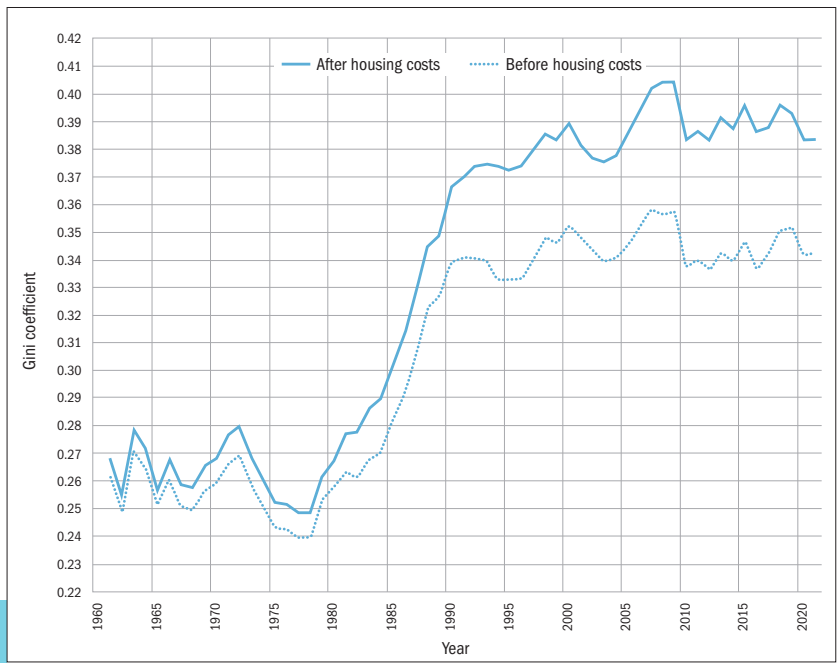


Figure 3: *Child poverty across the nations and regions of the UK, 2014/15 to 2021/22. After: Corcoran (2024).*

Figure 4: *The long-term trend in income inequality in Britain (Gini coefficient): from equitable to very unequal. Note: Years refer to financial years for data from 1993 onwards (e.g. 1993 refers to 1993/94). Data: Institute for Fiscal Studies (IFS) (2024).*

It should also be noted that other lines fall in the year 2021/22 because of temporary COVID-19 pandemic social security measures and random fluctuation in the sample used to measure them, which was badly taken due to the pandemic and the UK Government deliberately reducing the sample size. Obscuration was not the reason for this; the survey was cut in size to save money (Dorling, 2024c). No UK Government minster since 2010 has shown much interest in what the survey reveals. Before then it was of more interest because of UK-wide child poverty targets. The only part of the UK where child poverty is still a target being taken seriously is Scotland. The Child Poverty (Scotland) Act 2017 required Scottish ministers to ensure that less than 18% of children in Scotland were living in poverty by the official measure in 2023/24, and that less than 10% of children will be living in poverty by 2030 (Kidner, 2024). So far the target has not been hit. However, having a target and associated measures in place is now clearly having an effect, as Figure 3 illustrates.



The origins of the great rise in child poverty

Figure 3 shows permanent extremely high rates of child poverty but how has this situation come to pass? Figure 4 shows how income inequality was forced up across Great Britain from lows in the 1960s and 1970s to quickly reach a high plateau by the year 2000 that has never decreased (Institute for Fiscal Studies (IFS), 2024). During this period the UK as a whole moved from being one of the most equitable countries in Europe to being the most inequitable. Child poverty soared as a result. Families with children were worse hit than most families (people do not need to be living with children to be counted as a family), especially after housing costs were included (see Figure 4).

The final uptick in Figure 4 indicates inequality rising slightly in the most recent period measured. This occurred because the short-term measures to relieve extreme poverty during the COVID-19 pandemic were removed (outside of Scotland).

However, there is a limit to how much graphs and tables of data can have an impact, so I will end this article with the story of one child's slow death in England in early 2024, following the death of his father.

How little we understand each other

On 16 January 2024, *The Sun* broke the story of two-year-old Bronson Battersby who had been found starved to death curled up next to his father, Kenneth (Pattinson and Dale, 2024). Kenneth had died of a heart attack at the age of 60. The two had last been seen by a neighbour 14 days earlier. Five days after the initial media reports, the BBC reported the local police and crime commissioner as suggesting that any speculation over their demise was at that point 'unhelpful' (Iredale, 2024). A week on and other media reports suggested that in places like the town in which Bronson and his father died – a place of much poverty and where more than usual people lived 'chaotic lives' – often it is only the local social services who might 'pick up the pieces' (*The Week*, 2024). These reports point out that, nationally, there is only one social worker for every 12 children known to be very vulnerable and that those social workers have a great deal more to do than just keep an eye on that dozen children. The reports also explain that social work is becoming harder to do as other services, such as General Practitioners (GPs) withdraw, as deprivation rises, and because the starting salary for social work is only £24,000. No one asked why the pieces were falling apart for Bronson and Kenneth. Instead, an inquiry was begun to ascertain whether any failings and 'missed opportunities' could be ascribed to individual professionals (Social Work Today, 2024). All such inquiries are limited in their scope. The death of a 60-year-old man, in this case Bronson's father Kenneth, was treated as commonplace. However, there was a time in the UK when health was improving, when poverty was falling, when people's lives were less 'chaotic' and when fewer children and adults died each week. More people now die of destitution in England than previously, and many are only found much later, their bodies putrefied (Hiam *et al.*, 2023).

I am English and I am writing this article in a small city in the heart of England. You may be English too, but if not you have a better chance of understanding a part of what is wrong. We, the English, are a people that do not know themselves. Nowhere is this more the case than in our study of the human geography of Britain. We cannot know ourselves because we have become so very divided. We can try to understand others – as geographical explorers once tried to understand those whose lands they crossed – but our experiences of life now differ so much. Indeed, in the case of academic geographers in Britain, 98% of us have never experienced poverty as a child.

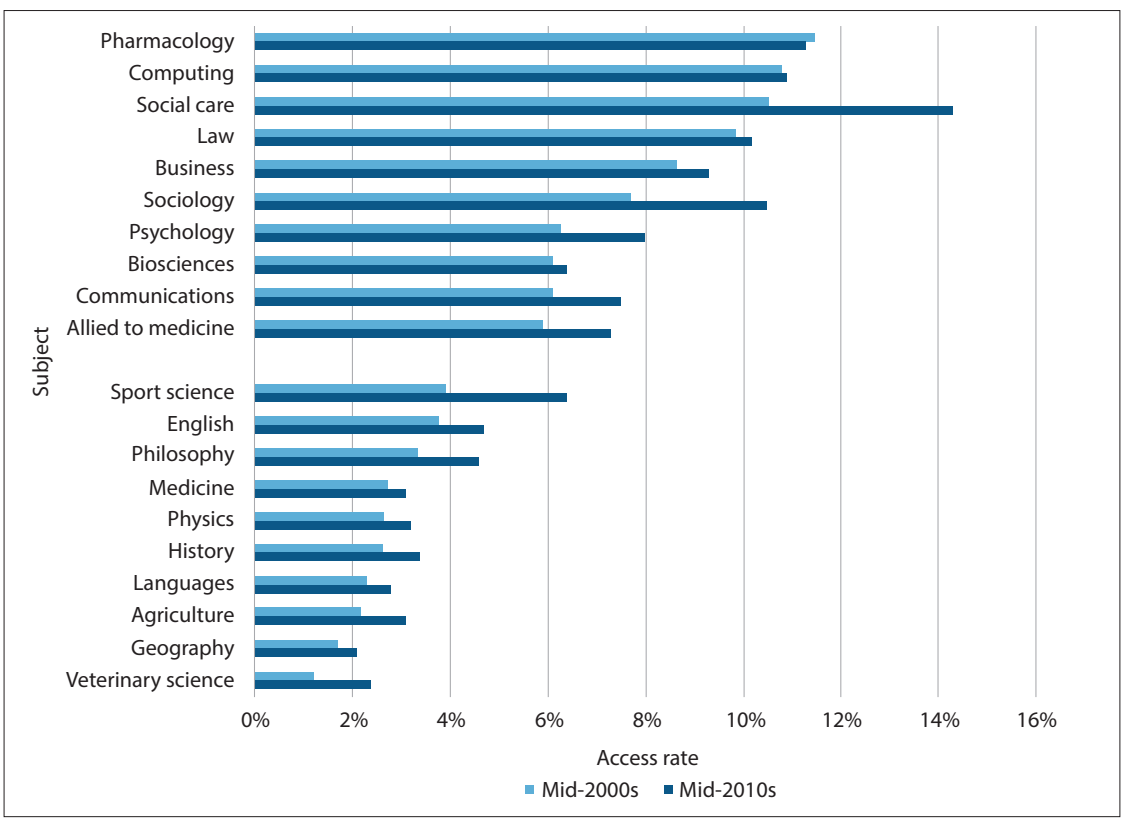


Figure 5: *Proportion of university students who had accessed free school meals while in compulsory education, by university subject studied, top and bottom 10 subjects. After: Britton* et al. *(2021).*

The UK: international child poverty outlier

Figure 5 graphs university students' access rates to the free school meals scheme (offered by the UK Government to 'disadvantaged pupils' - DfE (2024)) when they were in compulsory education. In the 2000s geography undergraduates were the second least likely to have accessed free school meals (Britton *et al*., 2021). By the 2010s they were the least likely of all. Of all 86 subjects studied in UK universities by more than 500 students, the subject studied most by the rich and least by the poor is human geography (Dorling, 2022).

Two months before Bronson Battersby's death, the President of the Royal College of Paediatrics and Child Health, Dr Camilla Kingdon, raised concerns about the latest release of the National Child Mortality Database (NCMD), which showed a dramatic increase in deaths among children aged one to four (NCMD, 2023). She said: 'Behind this awful data published today, is a whole raft of deteriorating child health outcomes *and the clear driver is rising child poverty in the UK*' (Royal College of Paediatrics and Child Health, 2024; emphasis added).

Dr Kingdon was speaking, in effect, to an empty room. This was not an issue deemed of much importance, at least not in England. Interestingly, statements Dr Kingdon made on other issues *were* reported in the media (Hallows and Sawer, 2023), but not her warning on the deaths of children in the UK. This perhaps helps illustrate why it matters if academic subjects such as geography do not see poverty and inequality as a priority. That view can then pervade more widely. I am not arguing that geographer matters that much, but more that the general lack of interest among those who are materially better-off matters greatly.

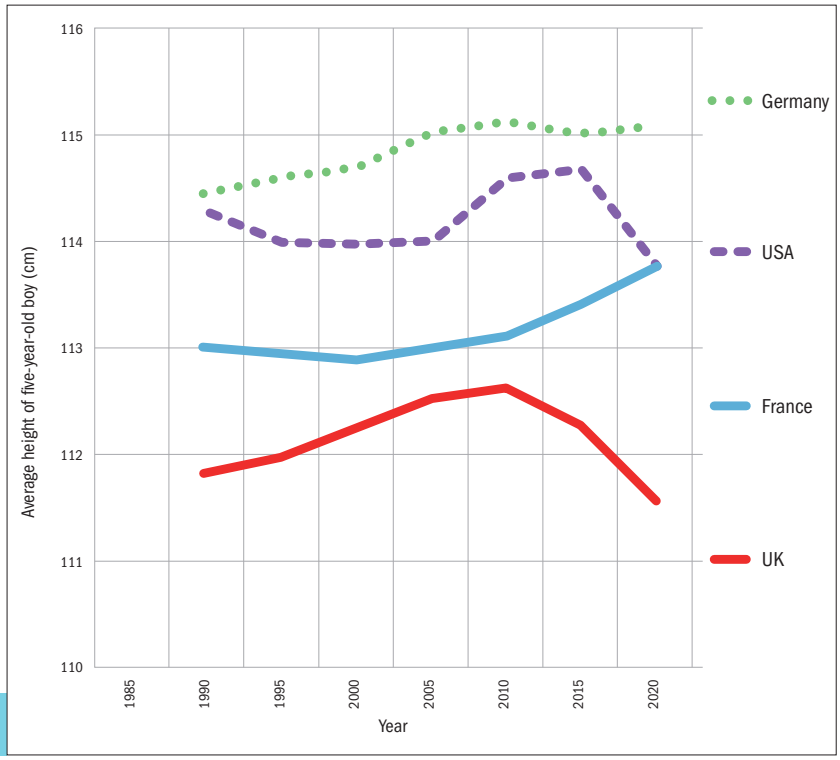


Figure 6: *Another indicator of child poverty in the media? Changes in the average heights of boys in Germany, USA, France and the UK, 1990–2020. Data: ITV (2023)*

Child death rates have risen in England for all ages and all social classes, but most of all for those who are living in poor areas, and especially for the youngest children like Bronson. The greatest rise occurred in the 12 months between 2022 and 2023. But, so what? We are used to these stories now. Many of us cannot remember a time when there was good news. 'Tragic but inevitable' appears to be the response, and at least (we may secretly think to ourselves) it is mostly only occurring in the poorest of areas – even when, as noted, child mortality is now rising everywhere in all social groups.

In times like these people tend to keep their children close. Few poor children take the academic subject of geography at school once there is the option to drop it. Geography is sold as one of the ten academic subjects most likely to get you a high paid job if you study it, but that is only because of who goes on to study geography at university, not because of what they learn there (Dorling, 2022). When inequality is high, getting a well-paid job becomes even more of a desperate priority for the already well-off because being normal becomes terrifying and poverty is unimaginable. There is a temptation not to stay friends with people who are beginning to lead more chaotic lives. You aim upwards, choose 'better' friends, and worry about climate change.

When we tolerate this

The National Life Tables for the UK were released five days before Bronson and his father were found (ONS, 2024b). This was the first revision since 2021, but, again, we don't look any more – it is no longer news. Life expectancy in the three years to 2022 was 78.6 for men and 82.6 for women; falling from 78.7 and 82.7. This drop was partly because the period before included a COVID-19 pandemic-free year. A decade earlier though (2012–14) men lived to over 79 years and women to 82.8.

The deaths of two-year-old boys make a tiny contribution to the national figures. By 2020–22 the national UK mortality rates of two-year-old boys, like Bronson, according to the new National Life Tables had risen to 15 per 100,000; its highest level since 2015–17 (ONS, 2024b). In all of recorded British mortality history it has never risen by as much as it was reported to have risen most

recently. The National Child Mortality Database figures are even more up to date (2023). They are worse. This means we already know that when the National Life Tables are next updated, probably two years from now, they will rise yet again.

Despite this, we don't ask the most important questions. We don't ask the geographical questions. We ask about the competence of professionals, or the supposedly fecklessness of individuals, but we do not ask why more children are now dying so very young. We don't ask why the average heights of our five-year-old children have been falling; why boys born in 2005 were hardly any taller than those born five years before them (Figure 6) when British children's height had been rising for more than a century. We don't ask why this can be when children's heights are still rising in France and only briefly stalled for a short time in Germany due to that country accepting hundreds of thousands of children from war-torn Syria (ITV, 2023). And we don't ask why the UK is copying the USA when they have they the same issues. (Internationally, the study of geography is dominated by the USA and the UK. Is it any wonder we have such a warped view?). We don't ask why the two largest political parties in England continue to support the two-child policy on benefits – condemning the majority of English children (56%) with two or more siblings to go hungry several times a month in 2023 (Dorling, 2023). In England we do not know that in Scotland this is not done; or that the Scottish child payment was increased in November 2022 so that no children north of the border need go cold or hungry – or be stunted in height for lack of nutritious food.

To be honest, I can see why we don't ask these questions. I am using colloquial rather than academic language here as I want to get my point across and academic language is often not the best way to do that. There comes a time when you feel you might as well just give up; throw the towel in and accept that our children will be worse fed, shorter in stature, and most will live lives a little more desperate than before. Why not accept that hope is dead and all we can do is to try to look after just ourselves and our families because we killed our society, our social empathy, our soul? Alternatively, you can pick yourself up and say this far and no further. That we do still have a society. That people did knock on Bronson's door to try to help. That there are millions who care, deeply; but who also know that the situation could get much worse. And neither of the two main political parties is committed to reducing child poverty any more, or abandoning the cruel two-child benefits policy. If you want to look for hope in the UK you do not have to look far: Scotland now makes extra payments to families with children in addition to all the benefits they received before. The English try to pretend that is not happening. Geographers can help in rectifying this problem greatly, both by learning more about what is happening and then by teaching about the growth in poverty and inequality, starting with children.

Disclosure statement

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References

Britton, J., Drayton, E. and Van der Erve, L. (2021) *Universities and Social Mobility*. London: The Sutton Trust. Available at https://www.suttontrust.com/our-research/universities-and-social-mobility

Child Poverty Action Group (CPAG) (2023) 'Official child poverty statistics: 350,000 more children in poverty and numbers will rise', *CPAG News*, 23 March. Available at https://cpag.org.uk/news/official-child-poverty-statistics-350000-more-children-poverty-and-numbers-will-rise

Corcoran, K. (2024) 'Where is child poverty increasing across the UK?', *AFC Blog post*, 22 March. Available at https://www.actionforchildren.org.uk/blog/where-is-child-poverty-increasing-in-the-uk/

Coughlan, S. (2019) 'Half of babies born to families renting', *BBC News*, 28 March. Available at https://www.bbc.co.uk/news/education-47723672

Department for Work and Pensions (DWP) (2023) *Households Below Average Income: An analysis of the UK income distribution: fye 1995 to fye 2022*. Available at https://www.gov.uk/government/statistics/households-below-average-income-for-financial-years-ending-1995-to-2022/Dorling, D. (2022) 'Where are we heading? The example of generational change in British academic geography', *Environment and Planning F*, 1, 1, pp. 125–42. https://doi.org/10.1177/26349825221082155

Dorling, D. (2023) *Shattered Nation: Inequality and the geography of a failing state*. London: Verso.

Dorling, D. (2024a) *Peak Injustice: Solving Britain's inequality crisis*. Bristol: Policy Press.

Dorling, D. (2024b) 'From the cradle to the grave: the abandonment of our social contract', *Byline Times,* 6 March. Available at https://bylinetimes.com/2024/03/06/from-the-cradle-to-the-grave-the-abandonment-of-our-social-contract

Dorling, D. (2024c) *Seven Children: Inequality and Britain's next generation*. London: Hurst.

Garthwaite, K. (2016a) 'Stigma, shame and "people like us": an ethnographic study of foodbank use in the UK', *Journal of Poverty and Social Justice*, 24, 3, pp. 277–89. https://doi.org/10.1332/175982716x14721954314922

Garthwaite, K. (2016b) *Hunger Pains: Life inside foodbank Britain*. Bristol: Policy Press.

Hallows, R. and Sawer P. (2023) 'Colleagues left "appalled" by top doctor's comments on Israeli response to Hamas attacks: Dr Camilla Kingdon also

failed to mention child hostages when writing about conflict and hospital strike in Gaza', *The Telegraph*, 21 October. Available at https://www.telegraph.co.uk/news/2023/10/21/royal-college-president-dr-camila-kingdon-israel-hamas-war

Hiam, L., Estrin-Serlui, T., Dorling, D., McKee, M. and Minton, J. (2023) 'A deathly silence: why has the number of people found decomposed in England and Wales been rising?', *Journal of the Royal Society of Medicine*, OnlineFirst. https://doi.org/10.1177/01410768231209001

Hirsch, D. (2023) *The Cost of Child Poverty in the UK*. London: CPAG. Available at https://cpag.org.uk/sites/default/files/2023-08/The%20cost%20of%20child%20poverty%20in%202023.pdf

IFS (2024) *Living Standards, Poverty and Inequality in the UK*. Available at https://ifs.org.uk/living-standards-poverty-and-inequality-uk

Iredale, T. (2024) 'Speculation over Bronson Battersby death "unhelpful"', *BBC News*, 21 January. Available at https://www.bbc.co.uk/news/uk-england-lincolnshire-68035493

ITV (2023) 'British children shorter than other five-year-olds in Europe, study finds' *ITVX News*, 21 June. Available at https://www.itv.com/news/2023-06-21/british-children-shorter-than-other-five-year-olds-in-europe

Kidner, C. (2024) 'Scottish Child Payment: evidence presented to the Social Justice and Social Security Committee 16th Meeting, 2024 (Session 6)', 23 May, *Scottish Parliament Information Centre.* Available at https://www.parliament.scot/~/media/committ/8361

Lambie-Mumford, H. (2016) 'The rise of food charity: issues and challenges', *Geography*, 101, 1, pp. 11–16. https://doi.org/10.1080/00167487.2016.12093978

Lambie-Mumford, H. and Green, M.A. (2017) 'Austerity, welfare reform and the rising use of food banks by children in England and Wales', *Area*, 49, 3, pp. 273–9. https://doi.org/10.1111/area.12233

National Child Mortality Database (2023) Available at https://www.ncmd.info

Ray-Chaudhuri, S., Waters, T., Wernham, T. and Xu, X. (2023) *Living Standards, Poverty and Inequality in the UK: 202,* IFS, 13 July. Available at https://ifs.org.uk/publications/living-standards-poverty-and-inequality-uk-2023

Royal College of Paediatrics and Child Health (2024) 'RCPCH responds to latest National Child Mortality Database figures', *RCPCH Press Release*, 10 November. Available at https://www.rcpch.ac.uk/news-events/news/rcpch-responds-latest-national-child-mortality-database-figures

ONS (2024a) *Percentile Points from 1 to 99 for Total Income Before and After Tax*. ONS, 29 February. Available at https://www.gov.uk/government/statistics/percentile-points-from-1-to-99-for-total-income-before-and-after-tax

ONS (2024b) *National Life Tables: UK*. ONS, 11 January. Available at https://cy.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/datasets/nationallifetablesunitedkingdomreferencetables

Pattinson R. and Dale, R. (2024) 'Horror as "gorgeous" Bronson Battersby, 2, in pyjamas left to die alone next to his dead dad – why did no one save him?', *The Sun*, 16 January. Available at https://www.thesun.co.uk/news/25386865/bronson-battersby-died-alone-dead-dad

Philo, C. (ed) (1995) *Off the Map: Social geography of poverty*. London: Child Poverty Action Group.

Social Work Today (2024) 'Baby Bronson: social services did what they could within the powers that they had', *Social Work Today*, 19 January. Available at https://www.socialworktoday.co.uk/News/baby-bronson%3A-social-services-did-what-they-could-within-the-powers-that-they-had

The Week (2024) 'Bronson Battersby: a toddler's tragic death', *The Week*, 27 January. Available at https://theweek.com/crime/bronson-battersby-a-toddlers-tragic-death

TUC (2023) 'UK workers will miss out on £3,600 in pay this year as a result of wages not keeping pace with the OECD', *Trades Union Congress News*, 10 July. Available at https://www.tuc.org.uk/news/uk-workers-will-miss-out-ps3600-pay-year-result-wages-not-keeping-pace-oecd

UNICEF Innocenti (2023) *Report Card 18: Child poverty in the midst of wealth*. Florence: Global Office of Research and Foresight. Available at https://www.unicef.org/globalinsight/media/3291/file/UNICEF-Innocenti-Report-Card-18-Child-Poverty-Amidst-Wealth-2023.pdf

Wrigley, N. (2002) '"Food deserts" in British cities: policy context and research priorities', *Urban Studies*, 39, 11, pp. 2029–40. https://doi.org/10.1080/0042098022000011344

All URLs last visited 16/8/2024.

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The geographies of apple cultivation: tracing the origins and dispersal of the wild apple *Malus sieversii* via the Silk Road to the Kashmir Valley

Atiqullah Malik, Mumtaz A. Yatoo and Rayees Ahmed

ABSTRACT: The production and distribution of food is an important aspect of agricultural geography. Tracing the origin of crops is vital to ensuring future food security, especially in the context of geopolitical and climate change. Drawing on a case study of Kashmir, this article demonstrates how evidence from archaeobotany and ancient writings can be used to trace the geographies of apple domestication, cultivation and distribution. In doing so, it draws attention to the significance of trade networks; in this case those historically supported by the Silk Road.

Keywords: Silk Road, wild apple, domestication, archaeobotany, Central Asia, agricultural geography

Introduction

The production and distribution of crops is an important aspect of agricultural geography. Given changing climatic conditions, genetic variety in crops and livestock is becoming increasingly important. Genetic diversity allows farmers to adapt to changing conditions by, for example, choosing to grow a different strain of fruit that is better suited to warmer, drier environments. This does not necessarily mean developing new strains but, instead, returning to strains that have been resilient in the past.

An appreciation of the origin and distribution of different types of produce is therefore important to understandings of food security, especially in the context of global climate change (for more on future consequences, see Diamond, 2002; on the effects of flooding, see Malik, 2022). This article uses the example of wild apples to outline the changing histories and geographies of agricultural production and diffusion (Hussain, 1996; Yarwood *et al*., 2010).

Economically and culturally, apples are one of the most significant fruits in the world. All apples originated from the wild apple, *Malus sieversii,* of Central Asia (Ponomarenko, 1987; 1992; Way *et al*., 1990; Morgan and Richards, 1993; Juniper *et al*., 1998; Cornille *et al*., 2012). This wild apple, and other fruits (including almond, cherry and peach), were originally domesticated in Central Asia before reaching the West in antiquity (Janick, 2005). From its origins in the Tien Shan mountains of Kazakhstan (Dzhangaliev, 2003), *M. sieversii* was widely dispersed, and its spread from Central Asia to Iran is widely attributed to the presence of the Silk Road (Brite, 2021). Today, many varieties of apples that all originate from *M. sieversii* are grown in temperate climatic zones (Juniper and Mabberley, 2006; Spengler, 2019).

This article has two purposes. First, it traces the historical geographies of apple cultivation and, in doing so, emphasises the significance of trade routes, in this case the Silk Road, to the diffusion and domestication of apples. Drawing on a case study of Kashmir, we show how these historic

The geographies of apple cultivation: tracing the origins and dispersal of the wild apple *Malus sieversii* via the Silk Road to the Kashmir Valley

Malus sieversii *apples. Photo: MacBen/ Shutterstock.com*

processes continue to have significance today. Second, we draw attention to the value of using different data sources to undertake research: here we draw on the science of archaeobotany and the art of ancient writings. This not only helps us to piece together the geographies of apple domestication but also illustrates the multidisciplinary nature of the geography.

Central Asia, the Silk Road and apples

In this article, Central Asia is recognised as the region stretching from the western highlands of China to the coastline of the Caspian Sea. Its eastern borders, marked by towering mountains, divide the region from China. It borders Russia to the north; Iran and Afghanistan to the south; and China to the south and east. The region includes Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Using a broader definition, Central Eurasia also includes Armenia, Azerbaijan and Georgia (Duarte, 2014). Central Asia is the centre of origin of many temperate fruit crops including *M. Sieversii*. Despite high mountain ranges (e.g. Tien Shan, Hindu Kush, Pamirs), huge deserts (Kyzylkum, Karakum, etc.) and extensive grasslands (known as the Steppes), the trade of fruits and other crops was possible due to the Silk Road (Haidar, 2006).

Despite its name, the 'Silk Road' was not a single road and nor was silk its main commodity. Rather, the Silk Road was a vast web of trading routes that formed the largest commercial network of the ancient world (Spengler, 2020). The Silk Route (as it is also known) connected the markets of Eurasia to different parts of Asia and North Africa; from Asia to the Mediterranean, it crossed China, India, Persia (now Iran), Arabia, Greece and Italy. The Silk Road was also essential to the transformation of the cultural, economic and political life of societies located both within Central Eurasia and between the East and the West from the 2nd century BCE (Before Common Era) until the mid-15th century CE (Current Era). In addition to silk, the routes facilitated the trade of other fabrics, spices, grains, vegetables and fruit crops, including apples (see Figure 1).

Yet, while much is known about the distribution of apples from Central Asia to Europe along the Silk Road (see, e.g. Janick *et al*., 1996; Spengler, 2020), their spread to regions immediately to the east, south and south-east of Central Asia, including neighbouring Kashmir, is less clear. Both Iran (Persia) and Kashmir were significant stopping points along the Silk Road, suggesting that it played an important role in the domestication and dispersal of apple culture from Central Asia to the West as well as to neighbouring regions. The genetic and geographic proximity of Iranian

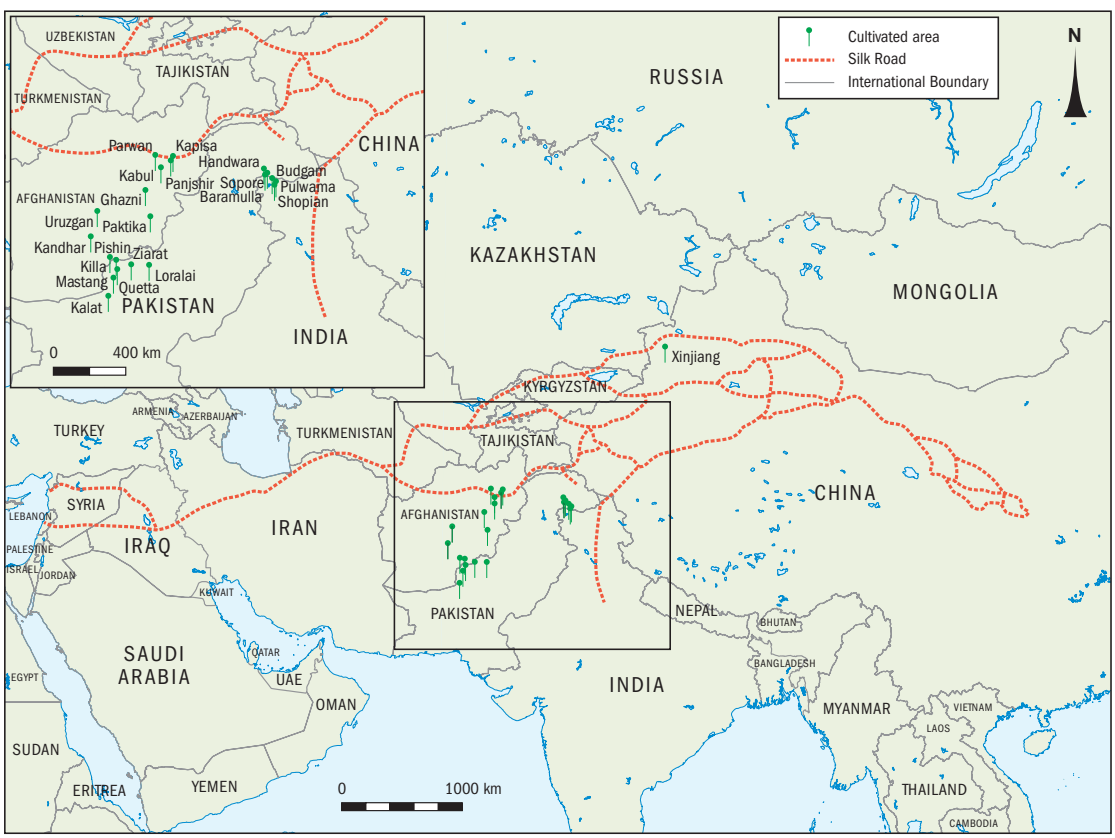

Figure 1: *Locations along the Silk Road where different* Malus *species are cultivated.*

germplasm to *M. sieversii*, combined with their locations along the Silk Road, suggests that Iran (Persia) played an important role in the domestication and dispersal of apples from Central Asia to the West via this ancient trade route (Gharghani *et al*., 2010). The trade via the Silk Road suggests that diffusion was important to the transfer of grafting technology and Iran has been a significant intermediary stop along the Silk Road, (Gharghani *et al*., 2010).

Based on archaeological evidence it seems that in the late Neolithic period travellers on the Silk Road carried the seeds of the central Asian wild apple to surrounding countries and neighbouring territories located on these routes (Harris *et al*., 2002). Studies also suggest that peaches and apricots had reached the Indus Valley and Kashmir Valley from Central Asia by the late Harappan period, after 2000 BCE (Lone *et al*., 1993; Fuller and Madella, 2001; Stevens *et al*., 2016; Spengler, 2019). Yatoo *et al*. (2020) have found that West and East Asian crops moved and mixed substantially earlier than their origination centres, showing early interactions between South, West, East and Central Asia. With the development of horse transport along the east–west trade routes (Juniper, 2007), the apple moved through the Persians and Greeks to Romans, and from the last 2000 years the domesticated apple has diversified and flourished worldwide (Harris *et al*., 2002). After Western Europe and Ferghana Valley, Kashmir was one of the first areas where domestication of apples was practised due to its strategically and commercially important geographical location on the Silk Road. The evidence indicates that the Silk Road is directly responsible for the dispersion, diversity and wide geographical distribution of cultivated apples. Research based on excavated apple remains (Figure 2) indicates that the cultivated apple was domesticated from the wild apple *M. sieversii* in Central Asia, then transported far and wide (Cornille *et al*., 2019) (Figure 3).

Evidence from these excavations have revealed fascinating details about the farming techniques and dietary habits of ancient civilisations. (For further details, see Spengler, 2020.) These archaeological findings help us to understand the historical relationship between populations and fruit cultivation and trade across a variety of landscapes. For example, the Cliff Market at Bazar-Dara located along Tajikistan's Ak-Dzhilga river (Figure 2), may have acted as a major hub, facilitating the exchange of produce between neighbouring tribes, while the discovery of preserved apples in Kadesh Barnea, Israel (Figure 3), may indicate the transport of fruit over long distances.

However, because so few apple remains have been found along the Silk Road, or are unavailable due to unfavourable preservation conditions (Cornille *et al*., 2019; Spengler, 2019), it is difficult to accurately trace the geography of apple domestication by this method. Many questions about trade networks and the exchange of cultivation practices remain for future research.

To answer these questions geographers and historians can instead turn to ancient writings to seek evidence for the diffusion of apples. For example, in his *Baburnama* (literally 'The Memoirs of Babur'), the founder of the Mughal Empire, Zahir ud-din Muhammad Babur (known as Babur, 1483–1530 CE) observed that, alongside fruits such as pomegranates and watermelons, apples were 'famous in Samarkand' (a city in Uzbekistan). Babur also praised the fruit culture of Central Asia

Archaeological site	Location	Type of apple remains (plus other fruit) found
1 Tashbulak	Pamir Mountains, Uzbekistan	Carbonised and preserved apple seed (plus peach and apricot pit, grape and melon seed)
2 Bazar-Dara	Banks of the Ak-Dzhilga River, south-eastern Tajikistan	Apple remains (plus pear seed, apricot pit, barberry seed, cherry pit and grape pip)
3 Karaspan-Tobe	Tributary of Syr-Darya River, southern Kazakhstan	Apple seed (plus grape pip)
4 Djuvan-Tobe		
5 Tuzusai	Tien Shan mountains, eastern Kazakhstan	Apple seed
6 Kadesh Barnea	Israel	Remains of small preserved apple
7 Gonur Depe	Turkmenistan	Apple seed

Figure 2: *The location of archaeological sites across Central Asia and the Middle East where the seeds or material remains of apples and other fruits have been found (see Figure 3). Source: Spengler (2019).*

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Figure 3: *The location of the archaeological sites of Central Asia and the Middle East where the material remains or seeds of apples have been found (see Figure 2 for detail).*

and the varieties of apples therein. In later writings, his great-grandson – Nur-ud-din Muhammad Salim (known as Jahangir, 1569–1627 CE) – mentioned apples from Kashmir and many kinds of fruits from Samarkand, Kabul and Jalalabad. Many travellers and historians have mentioned Samarkand as a city with beautiful gardens and orchards all around (Spengler, 2019).

Kashmir Valley apples: a case study

Surrounded by some of the highest mountains in the world, the Kashmir Valley covers roughly 15,220km^2 and is an intermontane basin. The combination of high-quality soils and favourable climatic conditions in Kashmir produce an ideal setting for temperate fruit growing (Sharma *et al*., 2012). The region is well-known for the cultivation and production of various crops including walnuts, almonds and saffron (Malik *et al*., 2018; Wani *et al*., 2018; Malik and Hashmi, 2022), but the apple is the dominant fruit crop (Darzi, 2016; Taufique and Khursheed, 2018).

In the Safakadal area of Srinagar city, the *Yarkhand Sarai* (buildings) were used to host trading caravans arriving from Central Asia due to the region acting as a transit point. Even today, the *sarai*'s bear witness to the trade between Kashmir and Central Asia, as well as the production of accessions of apples made possible by the favourable conditions in the valley (Hassan *et al*., 2017).

A number of historical writers and travellers praised the fruit culture of Kashmir. For example, in his travel memoirs on the region (written 629–31 CE), the Chinese pilgrim, Hiuen Tsang (602–64 CE), listed apples as one of the fruits he saw during his visit to the valley. The *Rajatarangini* (or 'River of Kings' – an account of the history of Kashmir) written in the 12th century by the Brahman (priest) Kalhana is one of the oldest documents in Kashmiri history to specifically mention apples. Writers and travellers of different ages have also praised the stunning beauty and temperate fruit culture of Kashmir. During the reign of Sultan Zain-ul-Abidin (popularly known as 'Budshah of Kashmir', 1395–1470), who, having imported the necessary knowledge on the art of grafting fruit trees from Central Asia and overseen the import of many fruit grafts from the same region, established the cultivation of apples in Kashmir. Discussing the market bazaars of Kashmir in 1597, Abul Fazl ibn Mubarak clearly describes the thriving trade in fruits including apple, pears, peaches and apricots between modern-day Uzbekistan and Central India to markets in Kashmir (Spengler, 2019).

During the 16th century, at the time of the Mughal Empire, gardens and orchards were laid out at

different places in the Kashmir Valley, and Mughal recipes from this time list the apple as an ingredient. Finally, in the 19th century, in *The Valley of Kashmir,* the historian Walter R. Lawrence describes the trees and orchards of the valley:

> '*The trees of the valley form one of its greatest charms. The delightful plane trees, the magnificent walnuts; the endless willows, the poplars and the elms, the countless orchards of apples, pears, and apricots give the valley the appearance of a well-wooded park. There is a curious mixture of the East and West*' (Lawrence, 1895).

Relevant archaeobotanical investigations also evidence close links between Kashmir and Central Asia, northern Iran, Pakistan, Afghanistan and China from prehistoric times (Shali, 1999). They indicate that the fruits and nuts consumed in Kashmir and different regions of Central Asia over generations have a close similarity, especially those in modern-day Iran and Kashmir. A series of radiocarbon (carbon-14) dating experiments indicate that Kashmir became part of the network of grain trade in South and Central Asia as early as the 5th/4th millennium BP (Before Present) (Spate *et al.*, 2017).

Similar cultivars of grain have been discovered at archaeological sites in Kashmir (including Burzahom, Gufkral and Semthan), dating back between 2800 and 2300 BCE. In addition, endocarps of walnut, recovered from Kanispur (an archaeological site in the Baramulla district of Kashmir), indicate evidence of early cultivation in the valley (Pokharia *et al.,* 2018). These findings point to a strong historical relationship in agricultural techniques between Central Asia and Kashmir during this period. The evidence suggests that the trade in apples along the Silk Road began between 206 BCE and 220 CE.

However, as mentioned earlier, in recent excavations at archaeological sites in the Kashmir Valley, no apple remains have been identified, which may be due either to unfavourable preservation conditions or issues with identification. One result of the lack of evidence from excavations is that many questions about trade networks and the exchange of cultivation practises remain for future research (Spengler, 2019; Cornille *et al.*, 2019) and further excavation and archaeobotanical research in the Kashmir Valley may provide the necessary evidence. Nevertheless, the combination of archaeological evidence with historical writings illustrate the diversity of economic trade and exchange of goods and crops across regions located along the Silk Road. It is possible to assert that certain crops were dispersed via the Silk Road from Central Asia to the Far East and the West, and that this dispersal included the neighbouring Kashmir Valley too.

Apple production in Kashmir today

Although Kashmir may not have been the birthplace of apple cultivation, the expansion of this sector over time has equalled, or perhaps even surpassed those of other regions due to its favourable growing conditions and a population that has acquired and fully exploited the specialist knowledge necessary to successful plant breeding of different cultivars (grafting techniques, for instance) imported from elsewhere.

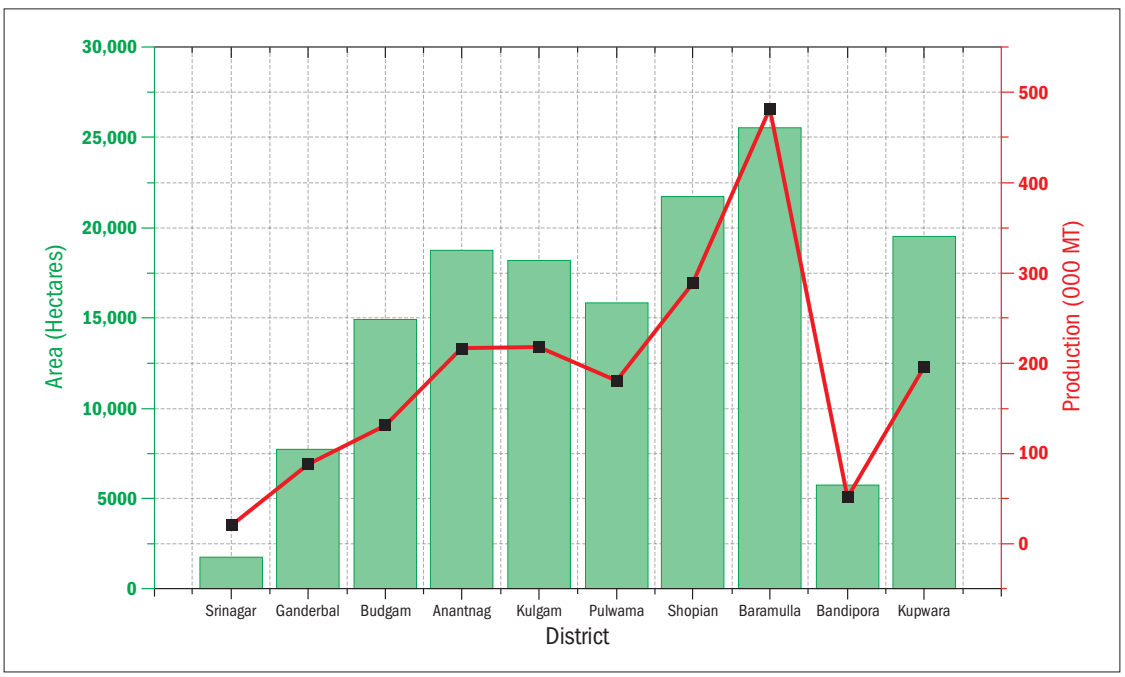

Figure 4: *Apple cultivation by hectare, and production by thousand metric tonnes in the districts of the Kashmir Valley, 2021–22. Source: Government of Jammu and Kashmir (2022).*

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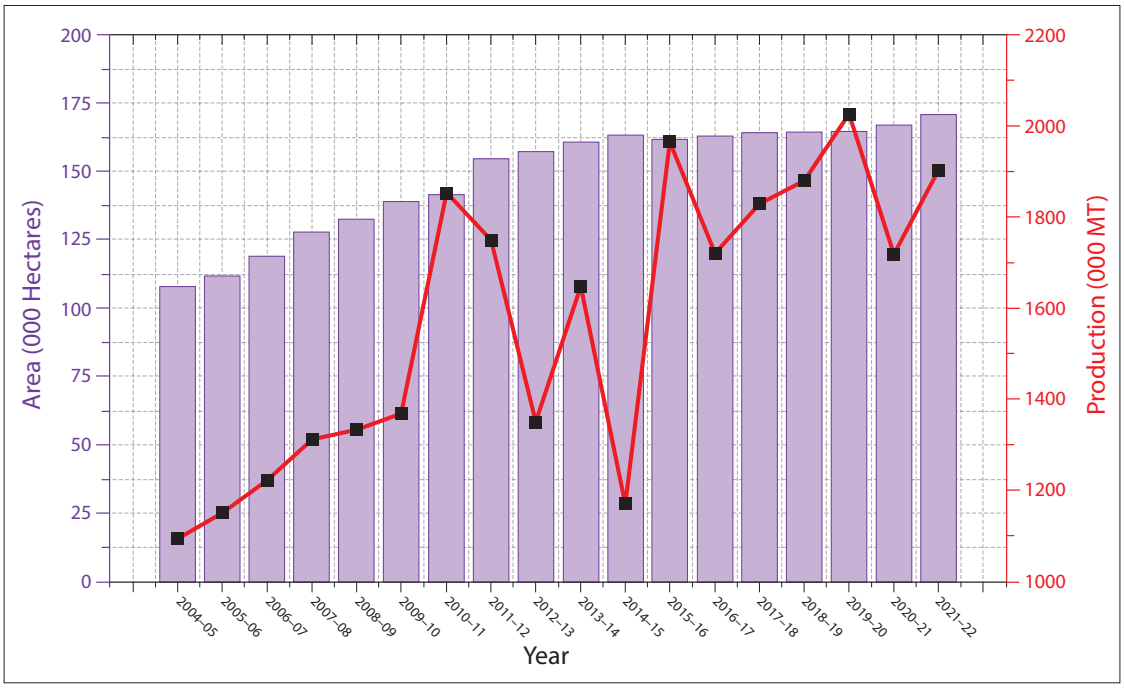

Figure 5: *The area covered (thousand ha) and amount (thousand mt) of apples produced in Jammu and Kashmir by district, by year, 2004–5 to 2021–22. Source: Government of Jammu and Kashmir (2022).*

The strategic and commercial importance of the location of Kashmir on the Silk Road led to it becoming one of the first areas after Western Europe and Ferghana Valley where the domestication of apples was practised. These historical geographies continue to influence the varieties of apples and other fruits grown in the region. Today, apples are grown throughout Kashmir and the fruits mentioned by Babur and Jahangir almost half a millennium ago are still sold. Moreover, a distinct mix of heirloom and modern varieties are offered in markets in Kashmir. While the majority of agro-products are consumed domestically, the increase in production in the recent years and the establishment of high-density orchards is contributing to the increase in exports to different parts of India and the neighbouring Bangladesh. Thus, the horticulture sector, dominated by apple production, has emerged as a major contributor to Kashmir both in terms of its GDP and employment.

As Figure 4 indicates, the Baramulla area is the leading contributor to apple fruit output in Kashmir, producing 482,000 mt/pa. Baramulla also has the largest cultivated area spanning over 25,566 ha. The cumulative productivity for the entire Kashmir Valley amounts to 1,873,000 mt/pa, generated from a total cultivation area of 149,831 ha.

Figure 5 presents data on yearly apple production and the extent of cultivated areas from 2004–5 to 2021–22. Over this 18-year period, there are noticeable fluctuations in both the amounts and extent of cultivation. Apple production increased steadily from around one million mt in 2004–5 to a peak of over two million mt in 2019–20. A significant drop in 2014–15 was followed by a rebound in production in 2015–16. In addition, there has been a gradual expansion in the cultivated area: by 2021–22 it reached a high of around 170,000 ha. The data suggests that despite annual fluctuations in both production and the area cultivated, apple crops have expanded in Kashmir.

Conclusion

In the last 2000 years, the domesticated apple has diversified and flourished worldwide (Harris *et al.*, 2002). The influence of the historic trade route connecting Eurasia to Asia and North Africa played a major role in the dispersion of crops, and their cultivation and production. For example, the development of trade along the Silk Road led to the seeds of the wild apple (*M. sieversii*) being dispersed from its origins to neighbouring regions and more distant places, which gave rise to the apple's domestication. The artifacts from archaeological excavations have allowed geographers, historians geneticists and archaeobotanists to piece together the complicated tapestry of trade, cultural exchange and cultivation of different crops. Although evidence is limited, this will also have shaped the evolution of the modern apple from its wild origins in the Tien Shan mountains of Kazakhstan (see Vavilov, 1926; 1930a,b).

Of the many places where apples are now grown worldwide, the geographical location of Kashmir on the Silk Road, its favourable climate and rich agro-ecology have provided the ideal conditions for

domesticating the apple. Although no seeds or material remains of apples have been found on archaeological sites in the Kashmir Valley, historical documents provide evidence of the introduction of apple grafts from various parts of Central Asia. We would argue that, because there are many similarities between varieties of apples presently grown and consumed in both Kashmir and elsewhere in Central Asia, the spread of apples would benefit from further research.

The future production and distribution of food based on tracing the origin of crops is vital to ensuring food security (Diamond, 2002). Given its historical and geographical significance to the production of apples, together with increases in the frequency of extreme of flooding in the Kashmir Valley (Malik, 2022; Malik and Hashmi, 2022), further research is needed on the future of apple crops in the region. More widely, it is important to appreciate the significance of different strains of crops and livestock to the future of global food production and distribution.

References

Brite, E.B. (2021) 'The origins of the apple in Central Asia', *Journal of World Prehistory,* 34, pp. 159–93. https://doi.org/10.1007/s10963-021-09154-8.

Cornille, A., Gladieux, P., Smulders, M.J.M., Roldán-Ruiz, I., Laurens, F., Le Cam, B., Nersesyan, A., Clavel, J., Olonova, M., Feugey, L., Gabrielyan, I., Zhang, X.-G., Tenaillon, M.I. and Giraud, T. (2012) 'New insight into the history of domesticated apple: secondary contribution of the European wild apple to the genome of cultivated varieties', *PLoS Genetics,* 8, 5, e1002703. https://doi.org/10.1371/journal.pgen.1002703

Cornille, A., Ferran, A., García, E., Vernesi, C., Fietta, A., Brinkkemper, O., Kirleis, W., Schlumbaum, A. and Roldán-Ruiz, I. (2019) 'A multifaceted overview of apple tree domestication', *Trends in Plant Science*, 24, 8, pp. 770–82. https://doi.org/10.1016/j.tplants.2019.05.007

Darzi, M.I. (2016) 'Horticulture sector towards economic development of Jammu and Kashmir', *International Journal of Multidisciplinary Research and Development,* 3, 4, pp. 238–40. Available at https://www.allsubjectjournal.com/assets/archives/2016/vol3issue4/3-4-108-292.pdf

Diamond, J. (2002) 'Evolution, consequences and future of plant and animal domestication', *Nature,* 418, pp. 700–7. https://doi.org/10.1038/nature01019

Duarte, P. (2014) 'Central Asia: the highlights of its history and geography?', *Revista de Relaciones Internacionales, Estrategia y Seguridad*, 9, 1, https://doi.org/10.18359/ries.48.

Dzhangaliev, A.D. (2003) 'The wild apple tree of Kazakhstan', *Horticultural Reviews*, 29, pp. 63–303. https://doi.org/10.1002/9780470650868.ch2

Fuller, D.Q. and Madella, M. (2001) 'Issues in Harappan archaeobotany: retrospect and prospect' in Settar, S. and Korisettar, R. (eds) *Indian Archaeology in Retrospect. Volume 2: Protohistory.* New Delhi: Manohar, pp. 317–90.

Gharghani, A., Zamani, Z., Talaie, A., Fattahi, R., Hajnajari, H., Oraguzie, N.C., Wiedow, C. and Gardiner, S.E. (2010) 'The role of Iran (Persia) in apple (*Malus*× *domestica* Borkh.) domestication, evolution and migration via the Silk Trade Route', *Acta Horticulturae,* 859, pp. 229–36. https://doi.org/10.17660/ActaHortic.2010.859.26

Government of Jammu and Kashmir (2022) *Digest of Statistics (47th edition): 2021–22.* Jaipur: Government of Jammu and Kashmir. Available at https://jkplanning.gov.in/pdf/Digest%20of%20Statistics%202021-22.pdf

Haidar, M. (2006) 'Silk Route and the surroundings regions' in Kaw, M.A. and Banday, A.A. (eds) *Central Asia: Introspection*. Srinagar: Centre of Central Asian Studies, University of Kashmir, pp. 29–46.

Harris, S.A., Robinson, J.P. and Juniper, B.E. (2002) 'Genetic clues to the origin of the apple', *Trends in Genetics,* 18, 8, pp. 426–30. https://doi.org/10.1016/s0168-9525(02)02689-6

Hassan, S., Bhat, K.M., Dar, Z.A., Mir, M.A., Pandith, A.H., Wani, W.M. and Jan, A. (2017) 'Morphological characterization of apple accessions in Kashmir region', *Plant Archives*, 17, 2, pp. 1071–7. Available at https://plantarchives.org/17-2/1071-1077%20(3899).pdf

Hussain, M. (1996) *Systemic Agricultural Geography*. Jaipur: Rawat Publications.

Janick, J. (2005) 'The origins of fruits, fruit growing, and fruit breeding', *Plant Breeding Reviews,* 25, pp. 255–320. https://doi.org/10.1002/9780470650301.ch8

Janick, J., Cummins, J.N., Brown, S.K. and Hemmat, M. (1996) 'Apples' in Janick, J. and Moore, J.N. (eds) *Fruit Breeding Volume 1: Tree and tropical fruits*. New York, NY: Wiley & Sons, pp. 1–77.

Juniper, B.E. (2007) 'The mysterious origin of the sweet apple', *American Scientist*, 95, p. 44. https://doi.org/10.1511/2007.63.44

Juniper, B. and Mabberley, D. (2006) *The Story of the Apple*. New York, NY: Timber Press.

Juniper, B.E., Watkins, R. and Harris, S.R. (1998) 'The origin of the apple', *Acta Horticulturae,* 484, pp. 27–34. https://doi.org/10.17660/ActaHortic.1998.484.1

Lawrence, W.R. (1895) *The Valley of Kashmir*. Oxford: H. Frowde/Oxford University Press.

Lone, F.A., Khan, M. and Buth, G.M. (1993) *Palaeoethnobotany Plants and Ancient Man in Kashmir.* New Delhi: Oxford and IBH.

Malik, A., Malik, A.I. and Wani, F.A. (2018) 'Production trends and spatio-temporal characteristics of walnut cultivation in Jammu and Kashmir state', *National Journal of Multidisciplinary Research Development*, 3, 1, pp. 164–9. Available at https://www.multidisciplinaryjournal.org/assets/archives/2018/vol3issue1/3-1-32-699.pdf

Malik, I.H. (2022) 'Spatial dimension of impact, relief, and rescue of the 2014 flood in Kashmir Valley', *Natural Hazards,* 110, pp. 1911–29. https://doi.org/10.1007/s11069-021-05018-8

Malik, I.H. and Hashmi, S.N.I. (2022) 'Ethnographic account of flooding in North-Western Himalayas: a study of Kashmir Valley', *GeoJournal*, 87, pp. 1265–83. https://doi.org/10.1007/s10708-020-10304-2

Morgan, J. and Richards, A. (1993) *The Book of Apples*. London: Ebury Press.

Pokharia, A.K., Mani, B.R., Spate, M., Betts, A. and Srivastava, A. (2018) 'Early Neolithic agriculture (2700–2000 BC) and Kushan period developments (AD 100–300): macrobotanical evidence from Kanispur in Kashmir, India', *Vegetation History and Archaeobotany*, 27, pp. 477–91. https://doi.org/10.1007/s00334-

The geographies of apple cultivation: tracing the origins and dispersal of the wild apple *Malus sieversii* via the Silk Road to the Kashmir Valley

017-0645-8
Ponomarenko, V. (1987) 'History of *Malus domestica* Borkh., origin and evolution' [in Russian], *Botany Journal of the USSR*, 176, pp. 10–18.
Ponomarenko, V. (1992) 'Critical review of the system of the genus Malus mill (Rosaceae) species', *Bulletin of Applied Botany, Genetics and Plant Breeding, Russian Academy of Agricultural Science*, 146, pp. 1–10.
Shali, S.L. (1999) 'History and culture of Central Asia and Kashmir: some salient features' in Kaw, S.J. (ed) *Central Asia: Continuity and change*. Srinagar: Centre of Central Asian Studies, University of Kashmir, pp. 165–82.
Sharma, R., Sharma, V. and Singh, I. (2012) 'Impact of peace and disturbances on tourism and horticulture in Jammu and Kashmir', *International Journal of Scientific and Research Publications*, 2, 6, pp. 1–7. Available at https://www.ijsrp.org/research_paper_jun2012/rp96.html
Spate, M., Zhang, G., Yatoo, M. and Betts, A. (2017) 'New evidence for early 4th millennium BP agriculture in the Western Himalayas: Qasim Bagh, Kashmir', *Journal of Archaeological Science: Reports,* 11, pp. 568–77. http://dx.doi.org/10.1016/j.jasrep.2016.12.038_
Spengler, R.N. (2019) 'Origins of the apple: the role of megafaunal mutualism in the domestication of *Malus* and Rosaceous trees', *Frontiers of Plant Science,* 10. https://doi.org/10.3389/fpls.2019.00617
Spengler III, R.N. (2020) *Fruit from the Sands: The Silk Route origins of the foods we eat.* Berkeley, CA: University of California Press.
Stevens, C.J., Murphy, C., Roberts, R., Lucas, L., Silva, F. and Fuller, D.Q. (2016) 'Between China and South Asia: a Middle Asian corridor of crop dispersal and agricultural innovation in the Bronze Age', *The Holocene,* 26, 10, pp. 1541–55. https://doi.org/10.1177/0959683616650268
Taufique, M. and Khursheed, V. (2018) 'Status of horticulture in Jammu and Kashmir: an overview', *The Geographer*, 65, 2, pp. 78–87. Available at https://www.indianjournals.com/ijor.aspx?target=ijor:tgr&volume=65&issue=2&article=009&type=pdf
Vavilov, N.I. (1926) 'Studies on the origin of cultivated plants', *Bulletin of Applied Botany and Plant Breeding*, 16 pp. 139–245.
Vavilov. N.I. (1930a) *Five Continents* (trans. by Love, D., (1997). Rome: IPGRI/VIR.
Vavilov, N.I. (1930b) 'Wild progenitors of the fruit trees of Turkistan and the Caucasus and the problem of the origin of fruit trees', *Proceedings of the 9th International Horticultural Congress Group B, London,* pp. 271–86.
Wani, F.A., Malik, A. and Malik, I. (2018) 'Dry fruit horticulture and production patterns in highland ecosystems: a case of almond and walnut cultivation in Jammu and Kashmir, India', *International Journal of African and Asian Studies*, 41, pp. 33–40. Available at https://core.ac.uk/download/pdf/234690403.pdf
Way, R.D., Aldwinckle, H.S., Lamb, R.C., Rejman, A., Sansavini, S.S., Shen,Y., Watkins, R., Westwood, M.N. and Yoshida, Y. (1990) 'Apples (*Malus*)', *Acta Horticulturae,* 290, pp. 3–46. https://doi.org/10.17660/ActaHortic.1991.290.1
Yarwood, R., Tonts, M. and Jones, R. (2010) 'The historical geographies of showing livestock: a case study of the Perth Royal Show, Western Australia', *Geographical Research,* 48, 3, pp. 235–48. https://doi.org/10.1111/j.1745-5871.2009.00623.x
Yatoo, M., Spate, M., Betts, A., Pokharia, A.K. and Shah, M.A. (2020) 'New evidence from the Kashmir Valley indicates the adoption of East and West Asian crops in the western Himalayas by 4400 years ago', *Quaternary Science Advances,* 2, October, 100011. https://doi.org/10.1016/j.qsa.2020.100011

All URLs last accessed 6/8/2024.

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What role for geography in justice-focused climate change education?

Catherine Walker

ABSTRACT: As the effects of climate change are felt around the world, the stakes for what climate change education (CCE) is and what it can achieve have never been higher. Young people's climate concerns are widely known, and students around the world have expressed wishes for action- and justice-oriented CCE. This article draws from research conducted with migrant-background young people and secondary educators (including geography educators) in Manchester, UK, and Melbourne, Australia, which explored intergenerational and cross-cultural responses to climate change. The article reflects on students' and educators' accounts of CCE and considers how geography – in conjunction with other disciplines – can sharpen students' understandings of climate justice. It argues that geography's key concepts and curricular foci provide a strong foundation for teaching climate justice, but that learning about distributive justice must be accompanied by greater application of recognitional and procedural justice to better support students to respond to climate change.

Keywords: climate change education, climate justice, theories of justice, critical pedagogy

Introduction

In a survey about climate change education (CCE) with more than 17,500 students from across the world, 91% of respondents said that they would like to have more teaching on climate change, and one in five said they didn't feel prepared to respond to climate change based on school-based learning (UNESCO, 2022). Importantly, the survey found that students felt that CCE was covered 'in a generic way and not connected to specific action' and that they 'expressed interest in knowing more about historical responsibilities for climate change, climate justice, and what climate change means in their own national and regional context' (UNESCO, 2022, pp. 6 and 8). These findings reinforce calls from students, educators and scholar-activists for more action- and justice-focused CCE in response to the emotions reported by young people in the face of climate change (Stevenson *et al*., 2017; Mayes and Holdsworth, 2020; Howard-Jones *et al*., 2021; Jones *et al*., 2021; Verlie, 2022; Trott, 2024).

A recent systematic review argues that 'if CCE is to make good on its oft-touted promise of being a force for societal transformation, considerations of justice are critical' (Trott *et al*., 2023, p. 1536). While such considerations must be consolidated across subjects, geography teaching can offer a particularly rich space for such 'considerations of justice', both in terms of its core concepts and its curricular dimensions. As a subject that encompasses knowledge from the sciences and the humanities, geography has unrivalled potential to make critical connections between climate data and diverse lived experiences. Moreover, geography can help students to situate, spatialise and interpret their climate concerns by providing the conceptual tools to 'think about the world, their actions in it, and the futures they want to co-create' (Hammond *et al*., 2022, p. 7).

The theoretical arguments presented in this article for geography's role in progressing justice-oriented CCE are illustrated by Young People at a Crossroads, a research project that explored intergenerational and cross-cultural responses to climate change with migrant-background young people and secondary educators (including

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High school and university students in Brussels, Belgium, stage a protest against the climate policies of the Belgian government, February 2019. Photo: Alexandros Michailidis/ Shutterstock.com

geography educators) in Manchester, UK, and Melbourne, Australia (see Walker *et al*., 2022). Conducted in two cities with ambitious climate mitigation plans and diverse populations, this work continued an area of enquiry concerned with the ways that the environmental knowledge of Global South migrants living in Global North cities are overlooked in climate adaptation policies and planning (Head *et al*., 2019; 2021; MacGregor *et al*., 2019; 2024). Young People at a Crossroads built on this enquiry by considering the possibilities for diverse environmental knowledge to be recognised and valued in secondary classrooms. This research was conducted primarily with 40 migrant-background young people aged 14–18 in Manchester and Melbourne, some of whom also interviewed their parents. It also involved interviews with 14 educators, nine of whom were geography educators.

The sections that follow present an overview of the recognised possibilities for justice-focused CCE, as well as theories of climate justice and their relation to CCE. Following this, the article provides methodological and contextual details about the Young People at a Crossroads project. The article then presents empirical data: first, to illustrate how geographical concepts and case studies can visualise the distributive aspects of climate justice and, second, to highlight students' understandings of climate justice as an agenda for inclusive, responsive action. It concludes with brief reflections on the potential for justice-focused CCE in (and beyond) geography classrooms.

Climate justice and education

The term 'climate justice' has been circulating in activist settings for at least four decades (Schlosberg and Collins, 2014), and, in 2002, was recognised on a global scale through the Bali Principles of Climate Justice, which assert that 'The biggest injustice of climate change is that the hardest hit [by climate change] are the least responsible for contributing to the problem' (CorpWatch, 2002). Theories of climate justice have emerged subsequently as 'an academic field of normative theory belonging to and drawing from the broader scholarship of environmental justice' (Svarstad, 2021, p. 219). Recent years have seen critical education scholars theorise climate justice education (for example, Kagawa and Selby, 2009; Mochizuki and Bryan, 2015; McGregor and Christie, 2021; Svarstad, 2021; Trott *et al*., 2023), but climate justice has been little explored by geography educators.

Indeed, research suggests that justice is minimally employed as a framing concept for CCE in schools (McGregor and Christie, 2021; Walker *et al*., 2022; Neas, 2023; Trott *et al*., 2023; Trott, 2024). In many contexts, this reflects a curriculum approach that presents climate change as a scientific problem to be addressed by technologies and infrastructures, and that marginalises climate change in arts, social science and humanities subjects (Stevenson *et al*., 2017; Roussel and Cutter-Mackenzie-Knowles, 2020; Beasy *et al*., 2022). It has been argued that 'the National Curriculum in England does not currently require children to understand the broader impacts of climate change on the environment, economy and society, or to consider issues of social justice in relation to climate change' (Howard Jones *et al*., 2022, p. 1661). Similar arguments have been made with reference to curricula in the USA (Neas, 2023; Trott, 2024) and Australia (White *et al*., 2022; Beasy *et al*., 2023).

Theories of climate justice draw together three interrelated principles of justice, as detailed in a report by Working Group II of the Intergovernmental Panel on Climate Change (IPCC):

> '***distributive justice*** *which refers to the allocation of burdens and benefits among individuals, nations and generations;* ***procedural justice*** *which refers to who decides and participates in decision-making; and* ***recognition*** *which entails basic respect and robust engagement with and fair consideration of diverse cultures and perspectives*' (2022, p. 7; emphasis in original).

This framework builds on the work of David Schlosberg, Lisette Collins, Nancy Fraser and others who have theorised environmental and climate justice using principles drawn from the moral philosophy of John Rawls (see Schlosberg and Collins, 2014). Schlosberg writes that 'part of the reason for unjust distribution [of climate burdens and benefits] is a lack of recognition of group difference … demonstrated by various forms of insults, degradation and devaluation at both the individual and cultural level' (2004, p. 519). While such a lack of recognition is 'the foundation of distributive injustice', Schlosberg argues that it can be challenged by inclusive civil society participation, which would constitute procedural justice (2004, p. 519). The progression from describing to addressing distributional inequalities moves climate justice from being an explanatory framework into an action orientation that 'envisions not only a world in which climate change no longer exacerbates social inequity, but one in which societal responses … offer an opportunity to build a more equitable and sustainable world' (Mikulewicz *et al*., 2023, p. 3).

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In educational contexts, the tripartite approach to climate justice first requires establishing 'the underlying political and economic ideologies and structures' that maintain climate and other forms of injustice (Roberts, 2023, p. 121). Svarstad, who has proposed a critical pedagogy framework for climate education, observes that 'for citizens to gain knowledge to make informed choices … they have to learn how to critically examine why the climate situation has become as it is' (2021, pp. 215–16). Only through this critical understanding of the reasons for inequalities will students be able to 'imagine alternatives to existing political-economic arrangements and ideologies which promote unjust global relations and practices', including in climate governance (Mochizuki and Bryan, 2015, p. 15). As further explored below, key geographical concepts of space, place, environment and interconnection offer opportunities for mapping, exploring and interpreting the distributive injustices of climate change and debating what forms of climate governance might achieve fairer distribution.

In terms of climate justice as recognition, Bali Principle 25 states that 'Climate Justice calls for the education of present and future generations … basing itself on real-life experiences and an appreciation of diverse cultural perspectives' (Corpwatch, 2002). In many contexts, teachers are already pursuing climate justice by diversifying the case studies used to teach aspects of climate change, including, where appropriate, the experiences of extended family members living overseas (Walker and Vance, 2023). It is important that case studies do not reinforce (and, where appropriate, that they challenge) Eurocentric assumptions about agency, skills and knowledge (Ideland and Malmberg, 2014). By challenging assumptions and building students' critical understandings of climate vulnerabilities, justice-focused CCE can contribute to decolonising geography education (Puttick, 2023; Winter *et al*., 2024).

Finally, the procedural aspects of climate justice mean diverse perspectives should not only be recognised, but also (where appropriate) that they should be translated into remedial action; that is, building the conditions for inclusive societal participation in addressing climate change. In this regard, justice-focused CCE is not only about building critical understandings, but also supporting student-led or intergenerational responsive action. A recent survey of almost 7000 teachers in England notes an overall picture of a workforce that is 'ready and willing to move forward with radical, action-oriented CCE programmes that can help drive change rather than just respond to it' (Howard-Jones *et al*., 2021, p. 1674). However, the authors also note that teachers are 'in need of greater resourcing and support to achieve this vision' (Howard-Jones *et al*., 2021, p. 1674). The student-led 'Teach the Future' campaign in England is an example of procedural justice as students have lobbied for better quality CCE, including specialist training for teachers (Teach the Future, n.d.). However, this need, combined with what Winter *et al*. describe as 'the absence of politically critical professional training programmes and curriculum priorities' (2024, p. 71), means that procedural justice is perhaps the least developed aspect of climate justice education, in the UK at least. The implications of this are returned to in the conclusion to this article.

About Young People at a Crossroads

Young People at a Crossroads, a research project funded by the UK Economic and Social Research Council, explored how migrant-background young people (aged 14–18) and their families learn and talk about climate change in Manchester, UK, and Melbourne, Australia. It also explored how educators can themselves learn from the intergenerational and cross-cultural conversations about climate change taking place in multi-generation migrant families. (For more detail see Walker *et al*., 2022.)

There were three phases to the research:

- Phase 1: Individual interviews with educators in both cities, including current geography and science teachers, teacher trainers and those engaged in subject development or community education. Fourteen educators (eight in Manchester, six in Melbourne) responded to invitations to take part in interviews, nine of whom were geography educators.
- Phase 2: Paired interviews and focus groups with migrant-background young people aged 14–18 about their experiences of CCE, ideas about climate justice and conversations with family members about environmental concerns. Forty young people (23 in Manchester, 17 in Melbourne) attending state schools, academies, private schools and sixth-form colleges took part. Geography educators, including some of those interviewed for Phase 1, played a key gatekeeping role in inviting young participants.
- Phase 3: Intergenerational research with a self-selecting sample of 13 young people who had taken part in Phase 2 and who were trained to interview older family members.

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The research did not aim to directly compare climate education pedagogies or curricula in the two cities (or England and Australia more broadly), but, by conducting interviews in two cities, the researchers (based in Manchester and Melbourne) sought to expand understandings of how the everyday experiential knowledge of first-generation migrants was being continued, challenged or recontextualised in different settings.

Students and educators in both England and Australia were undergoing changing policy expectations and curricular framings for CCE at the time of the research. A new national curriculum with substantially more references to climate change was released in Australia in May 2022, coinciding with – although not ordered by – the election of a Labor government (Beasy *et al*., 2022). Around the same time, the UK Department for Education's (DfE) published its Climate Change and Sustainability Education Strategy with a bold vision for the UK to be 'the world-leading education sector in sustainability and climate change by 2030' (DfE, 2022). Despite high-level changes in both countries there is much work to be done to progress CCE on the ground. In such contexts, the perspectives of educators and students in this research have valuable learning points to offer.

Geographic concepts and distributive justice

Recent years have seen lively discussions of the key concepts that make geography distinctive as a discipline (Maude, 2020; Davidson *et al*., 2023; Roberts, 2023). This article thinks through the concepts proposed by Maude (2020): place, space, environment and interconnection (see discussion by Davidson *et al*., 2023, p. 441; Roberts, 2023, p. 80). Summarising Maude's (2020) argument of what makes such geographical concepts 'key', Davidson and colleagues write that:

> *'they are hierarchically ordered, can be widely applied, and have several functions such as to formulate questions and theories, organise information, suggest methods of analysis, form generalisations, and identify possible explanations … [T]he concept of interconnection is an especially powerful form of geographical knowledge in an era of multiple, cross-cutting global challenges [including climate change]'* (Davidson *et al*., 2023, pp. 441–2).

The key concepts of place, space, environment and interconnection can be seen in how students observed and described the effects of climate change on the human and non-human world. When asked to define climate justice, many students pointed out unequal interconnections, for example, how one group of people were benefitting at the expense of other people or other species in particular places and with wider environmental consequences:

> '*It's like the idea of winners and losers, so people like big energy companies, because they are like multi-millionaires, they obviously know the effects of what they're doing and it will affect people in Bangladesh, where people are losing land. But right now, they're making more money and won't have to deal with their own consequences*' (Hafsa[1], 17, Manchester).

> '*We're affecting the world. If we're increasing climate change, then it also affects other species like animals and their habitats. As we learnt in geography, some birds have to migrate somewhere else because it's too hot for them in a certain region*' (Masudul, 15, Manchester).

These students' observations underscore why justice is foundational to CCE in a world of unequal and often exploitative interconnections. The comment by Hafsa in particular demonstrates an understanding of climate change as 'a problem of skewed vulnerabilities because it disproportionately affects people and countries who have actually contributed least to the problem and who are least well-equipped to deal with it' (Mochizuki and Bryan, 2015, p. 14).

The principle of interconnection came to the fore again as educators explained what they understood by climate justice and applied this to their teaching on climate change:

> '*In high income countries we have contributed more to climate change, and therefore we are more responsible for many of the impacts that poorer countries are experiencing … I mean that sounds like something that we should get into our curriculum. So, I think that that additional element of the justice element of it will be really interesting – and essential really, to get into the curriculum as well*' (secondary geography teacher, Manchester).

> '*Australia is one of – or* is *the biggest emitter of greenhouse gases, and we are privileged to be in a place geographically where we are experiencing impacts of climate change, yet we still have enough of the resources and the wealth to actually buffer that a bit. [But] people who live in Kiribati aren't actually able to do anything except relocate … I'm aware as well that some of those nations have been successful in trying to get financial*

compensation, but that obviously doesn't fix the fact that their home is going underwater' (secondary geography teacher, Melbourne).

'*We teach about Bangladesh, that they're suffering terrible flooding because of what's going on in other countries … You [also] see this a lot in the desertification throughout the Sahel as well because of, you know, changing climate patterns and people losing their farmland. So, my reading of climate justice is people are losing money for one, losing their lives for another, and they're not to blame for any of it*' (secondary geography teacher, Manchester).

Although none of the teachers were using the phrase 'climate justice' in their classroom teaching, all were able to identify points in the curriculum where they felt it was relevant and useful. Moreover, as with the students quoted above, they explained this using geographical concepts such as unequal interconnections and place-based environmental vulnerabilities. This highlights the strength of geography's conceptual foundations to teach the distributive injustices of climate change.

It is important to remember, however, young people's desire to take action on climate change (UNESCO, 2022). To support and enable this, teaching on the distributive injustice of climate change must be accompanied by the recognitional and procedural aspects of achieving climate justice.

Recognition and participation: pedagogies to support the enactment of climate justice

The image in Figure 1 was one of seven images used during a focus group activity with young people. Other images included people on a small boat, a youth strike for climate, a wildfire, a visualisation of greenhouse gas emissions emanating from Global North countries, a poster encouraging recycling and a solitary polar bear. Young people were invited to share which of the images were the most and least familiar, and the focus group ended with discussion of how the images had developed young people's understandings of climate justice.

The 'People's Climate Strategy' image seemed to clarify for many young people a sense of what climate justice might mean when put into practice. Although recognition and participation as aspects of climate justice were not evoked as terms in the focus group discussion, both are in evidence in how young people made connections between the inclusivity of the 'People's Climate Strategy' image and the action that might result from diverse people discussing solutions together:

'*Usually when you hear of like COP26 or something, you see them having a big conference with formal wear, like suits and everything, which makes them seem big and powerful, but when you look at that photo, you see people in, like, casual clothes. Like, clothes that you wear yourself. And it shows that you don't have to be big and powerful to make changes. You can do it yourself*' (Rebecca, 14, Manchester).

'*There are like different types of people, there are elderly, there are people who are disabled, there are different ethnicities and there's like a root at the bottom. [It's like] they are showing [how] they all came from the bottom*' (Saher, 15, Manchester).

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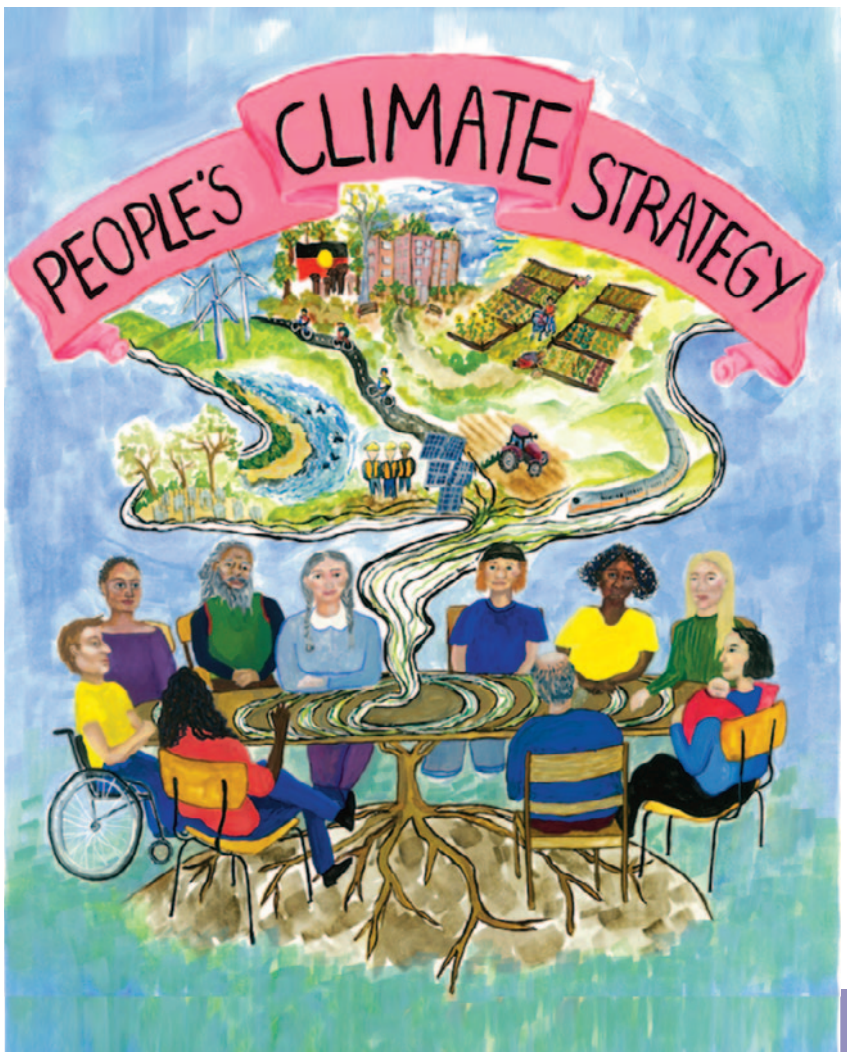

Figure 1: *The 'People's Climate Strategy' image shown in a focus group activity with young people. Image: Gemma Romiti for Friends of the Earth Melbourne. Reproduced with permission.*

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Other young people related the image back to distributive justice, but extended this into the procedural act of justice, describing the act of coming together to discuss strategies as a just response:

> '*Some countries are much more affected by climate change than other countries are. Um, so I think climate justice has something to do with, like, countries helping other countries. So, not just thinking, oh, "it's not my country, not my problem" kind of thing [but] coming together as a united world, to help others, even though it may not be as bad in our own homes*' (Haripriya, 16, Melbourne).

> '*I think that [the images] all connect to climate justice in some way. I mean, in some of the images, there's like, solutions, which show what could be done if you take action against climate change in the situations, like the bushfires and people protesting. And the 90%, that's also part of climate justice, saying that it hasn't happened yet, but you can do something just by talking about it*' (Yasmin, 16, Melbourne).

Young people's responses to the images were congruent with how they described climate justice as an agenda informed by their awareness of the unequal causes and impacts of climate change. They understood climate change as more than simply a school topic, but an issue of urgent concern that they desired to join with others in addressing. This sense of urgency may have been compounded by having family members in countries experiencing climate change more immediately. For example, as Haripriya articulated:

> '*When I think about climate change, I think about a lot of just in general low-lying islands and people that have to live on those kinds of places where they're prone to um, tsunamis and floods and – but also places that are prone to extremely hot weather. So that's kind of like where our parents were from, Sri Lanka, India, the Asian countries*'.

This speaks again to recognition as an aspect of climate justice. It is important not to single out migrant-background young people as more knowledgeable about climate change simply by merit of their background. However, central to the project aim of researching with migrant-background young people was to explore the knowledge that students have access to through family and community connections, and how this might bring the teaching of climate change to life in different ways through highlighting aspects of climate justice.

This was recognised by a number of educators, for example:

> '*We were talking about how that affects countries like Bangladesh, so they've got potential sea level rise in the coastal areas, but then the rivers are going to be – in the short term – overwhelmed by meltwater. There are students who are saying "well, I've got family who live there and they already experience flooding". So, I think it's making use of* their *understandings*' (secondary geography teacher, Manchester).

Sharing family experiences of living with climate change in different contexts in the classroom has the potential to contribute to representational justice, as different adaptive responses to climate change (or the structural limitations to these) are foregrounded. Young people who interviewed their parents recognised this as they reflected on what they had learned through their interviews (see Walker *et al.*, 2024). The process of intergenerational learning relates to how Verlie describes learning to live with climate change 'not as a dispassionate practice of knowing about climate change, but of witnessing it [through] diverse climate knowledges' (2022, p. 69).

Conclusion: foregrounding climate justice in (and beyond) geography

Engaging scholarship on the interrelated aspects of climate justice as distributional, recognitional and procedural, this article has considered how geography teaching can encompass and sharpen students' understandings of climate justice. In many contexts, teachers are already pursuing climate justice by diversifying the case studies they use to teach about the unequal burdens that climate change is placing on communities, and the impacts of historic inequalities on differential climate resilience. As has been argued elsewhere, a critical pedagogy approach can support learners' sense of agency to collaborate in building just climate futures while nurturing critical understandings of the reasons for prevailing inequalities in societal participation (Huckle, 2020; Svarstad, 2021; Roberts, 2023; Trott, 2024). This article builds on this work by arguing that the focus on distributive justice that already exists in much classroom geography teaching and learning must be accompanied by greater application of recognitional and procedural justice to better support students in responding to the challenges of climate change.

As Winter has noted, 'the role of the teacher is a significant one since the geography curriculum can be seen as a mode of engagement with the "other" of the world' (2011, p. 258). This is a helpful reminder of the agency of both teachers and students: curricula do not exist as static objects, but instead they are enlivened by teachers' and students' co-participation in learning. Nonetheless, the possibilities for teachers to support procedural climate justice through formal education are rendered more challenging in political contexts that are resistant to the radical societal and pedagogic changes that achieving climate justice will require (Verlie, 2022; White *et al*., 2022; Neas, 2023). As noted above, a recent survey of almost 7000 teachers in England presents an overall picture of a workforce that is 'ready and willing to move forward with radical, action-oriented CCE programmes that can help drive change' (Howard-Jones *et al*., 2021, p. 1674), suggesting that classrooms *could* be incubators for procedural justice. While this is no easy or straightforward task, it is one in which geography students and educators have a key role to play and are well established to contribute to through geography's foundational concepts, curricular links to climate change and moves towards decolonising knowledge.

Note

1. According to the terms of the ethics agreement for the research, young participants in the research made their own decision about whether they wished to have their own name or a pseudonym included in research outputs. This article follows their preferences.

References

Beasy, K., Jones, C., Kelly, R., Lucas, C., Mocatta, G., Pecl, G. and Yildiz, D. (2023) 'The burden of bad news: educators' experiences of navigating climate change education', *Environmental Education Research*, 29, 11, pp. 1678–91. https://doi.org/10.1080/13504622.2023.2238136

Beasy, K., Lucas, C., Mocatta, G., Pecl, G. and Kelly, R. (2022) 'How well does the new Australian curriculum prepare young people for climate change?', *The Conversation*, 23 May. Available at https://theconversation.com/how-well-does-the-new-australian-curriculum-prepare-young-people-for-climate-change-183356

CorpWatch (2002) *Bali Principles of Climate Justice*. Available at https://www.corpwatch.org/article/bali-principles-climate-justice

Davidson, J., Jones, C., Johnson, M., Yildiz, D. and Prahalad, V. (2023) 'Renewing the purpose of geography education: eco-anxiety, powerful knowledge, and pathways for transformation', *Geographical Research*, 61, 4, pp. 429–42. https://doi.org/10.1111/1745-5871.12603

Department for Education (DfE) (2022) *Sustainability and Climate Change: A strategy for the education and children's service systems*. Available at https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems

Hammond, L., Biddulph, M., Catling, S. and McKendrick, J. (2022) 'Introduction: the child and their (geographical) education' in Hammond, L., Biddulph, M., Catling, S. and McKendrick, J. (eds) *Children, Education and Geography: Rethinking intersections*. Abingdon: Routledge, pp. 3–18.

Head, L., Klocker, N. and Aguirre-Bielschowsky, I. (2019) 'Environmental values, knowledge and behaviour: contributions of an emergent literature on the role of ethnicity and migration', *Progress in Human Geography*, 43, 3, pp. 397–415. https://doi.org/10.1177/0309132518768407

Head, L., Klocker, N., Dun, O., Waitt, G., Goodall, H., Aguirre-Bielschowsky, I., Gopal, A., Kerr, S.-M., Nowroozipour, F., Spaven, T. and Toole, S. (2021) 'Barriers to and enablers of sustainable practices: insights from ethnic minority migrants', *Local Environment*, 26, 5, pp. 595–614. https://doi.org/10.1080/13549839.2021.1904856

Howard-Jones, P., Sands, D., Dillon, J. and Fenton-Jones, F. (2021) 'The views of teachers in England on an action-oriented climate change curriculum', *Environmental Education Research*, 27, 11, pp. 1660–80. https://doi.org/10.1080/13504622.2021.1937576

Huckle, J. (2020) 'Spotlight on… Critical school geography', *Geography*, 105, 3, pp. 157–60. https://doi.org/10.1080/00167487.2020.12106477

Ideland, M. and Malmberg, C. (2014) '"Our common world" belongs to "Us": constructions of otherness in education for sustainable development', *Critical Studies in Education*, 55, 3, pp. 369–86. https://doi.org/10.1080/17508487.2014.936890

Intergovernmental Panel on Climate Change (IPCC) (2022) 'Summary for Policymakers' in Pörtner, H.-O., Roberts, D.C., Tignor, M., *et al.* (eds) *Climate Change 2022: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the IPCC*. Cambridge, UK and New York, NY: Cambridge University Press, pp. 3–33. https://doi.org/10.1017/9781009325844.001

Jones, L., Halstead, F., Parsons, K.J., Le, H., Bui, L.T.H., Hackney, C.R. and Parsons, D.R. (2021) '2020-vision: understanding climate (in)action through the emotional lens of loss', *Journal of the British Academy*, 9, 5, pp. 29–68. https://doi.org/10.5871/jba/009s5.029

Kagawa, F. and Selby, D. (2009) *Education and Climate Change: Living and learning in interesting times.* New York, NY: Routledge.

Maude, A. (2020) 'The role of geography's concepts and powerful knowledge in a Future 3 curriculum', *International Research in Geographical and Environmental Education*, 29, 3, pp. 232–43. https://doi.org/10.1080/10382046.2020.1749771

Mayes, E. and Holdsworth, R. (2020) 'Learning from contemporary student activism: towards a curriculum of fervent concern and critical hope', *Curriculum Perspectives*, 40, pp. 99–103. https://doi.org/10.1007/s41297-019-00094-0

MacGregor, S., Walker, C. and Katz-Gerro, T. (2019) '"It's what I've always done": continuity and change in the household sustainability practices of Somali immigrants in the UK', *Geoforum*, 107, pp. 143–53.

https://doi.org/10.1016/j.geoforum.2019.09.013
MacGregor, S., Ali, N., Katz-Gerro, T., Walker, C. and Ahmad, Z. (2024) 'Holding up a mirror: researching symmetrically to explore exclusion, othering and whiteness in local environmental governance', *Local Environment*, 29, 5, pp. 617–30. https://doi.org/10.1080/13549839.2023.2297684
McGregor, C. and Christie, B. (2021) 'Towards climate justice education: views from activists and educators in Scotland', *Environmental Education Research*, 27, 5, pp. 652–68. https://doi.org/10.1080/13504622.2020.1865881
Mikulewicz, M., Caretta, M.A., Sultana, F. and Crawford, N.J.W. (2023) 'Intersectionality and climate justice: a call for synergy in climate change scholarship', *Environmental Politics*, 32, 7, pp. 1275–86. https://doi.org/10.1080/09644016.2023.2172869
Mochizuki, Y. and Bryan, A. (2015) 'Climate change education in the context of education for sustainable development: rationale and principles', *Journal of Education for Sustainable Development*, 9, 1, pp. 4–26. https://doi.org/10.1177/0973408215569109
Neas, S. (2023) 'Narratives and impacts of formal climate education experienced by young climate activists', *Environmental Education Research*, 29, 12, pp. 1832–48. https://doi.org/10.1080/13504622.2023.2193684
Puttick, S. (2023) 'Geographical education II: anti-racist, decolonial futures', *Progress in Human Geography*, 47, 6, pp. 850–8. https://doi.org/10.1177/03091325231202248
Roberts, M. (2023) *Geography Through Enquiry: Approaches to teaching and learning in the secondary school* (2nd edition). Sheffield: Geographical Association.
Rousell, D. and Cutter-Mackenzie-Knowles, A. (2020) 'A systematic review of climate change education: giving children and young people a "voice" and a "hand" in redressing climate change', *Children's Geographies*, 18, 2, pp. 191–208. https://doi.org/10.1080/14733285.2019.1614532
Schlosberg, D. (2004) 'Reconceiving environmental justice: global movements and political theories', *Environmental Politics*, 13, 3, pp. 517–40. https://doi.org/10.1080/0964401042000229025
Schlosberg, D. and Collins, L.B. (2014) 'From environmental to climate justice: climate change and the discourse of environmental justice', *WIREs Climate Change*, 5, 3, pp. 359–74. https://doi.org/10.1002/wcc.275
Stevenson, R.B., Nicholls, J. and Whitehouse, H. (2017) 'What is climate change education?', *Curriculum Perspectives*, 37, pp. 67–71. https://doi.org/10.1007/s41297-017-0015-9
Svarstad, H. (2021) 'Critical climate education: studying climate justice in time and space', *International Studies in Sociology of Education*, 30, 1–2, pp. 214–32. https://doi.org/10.1080/09620214.2020.1855463
Teach the Future (no date) *What We Want*. Available at https://www.teachthefuture.uk/vision
Trott, C.D. (2024) 'Envisioning action-oriented and justice-driven climate change education: insights from youth climate justice activists', *Children & Society*, Online First. https://doi.org/10.1111/chso.12846
Trott, C.D., Lam, S., Roncker, J., Gray, E.S., Courtney, R.H. and Even, T.L. (2023) 'Justice in climate change education: a systematic review', *Environmental Education Research*, 29, 11, pp. 1535–72. https://doi.org/10.1080/13504622.2023.2181265
United Nations Education, Science and Culture Organisation (UNESCO) (2022) *Youth Demands for Quality Climate Education*. Paris: UNESCO. Available at https://unesdoc.unesco.org/ark:/48223/pf0000383615
Verlie, B. (2022) *Learning to Live with Climate Change: From anxiety to transformation*. Abingdon: Routledge. https://doi.org/10.4324/9780367441265
Walker, C., van Holstein, E. and Klocker, N. (2024) 'Young people at a crossroads: climate solidarity through intergenerational storytelling', *Geographical Research*, Online First. https://doi.org/10.1111/1745-5871.12668
Walker, C. and Vance, A. (2023) 'Teaching climate change through an attention to place' in Rawlings Smith, E. and Pike, S. (eds) *Encountering Ideas of Place in Education*. Routledge: Abingdon, pp. 240–52.
Walker, C., Rackley, K.M., Thompson, N., Summer, M. and Young Researchers (2022) *Young People at a Crossroads: Stories of climate education, adaptation and action from around the world*. Available at https://www.ncl.ac.uk/gps/research/research-groups/ypx
White, P., Ferguson, J.P., O'Connor Smith, N. and O'Shea Carre, H. (2022) 'School strikers enacting politics for climate justice: daring to think differently about education', *Australian Journal of Environmental Education*, 38, 1, pp. 26–39. https://doi.org/10.1017/aee.2021.24
Winter, C. (2011) 'Curriculum knowledge and justice: content, competency and concept', *The Curriculum Journal*, 22, 3, pp. 337–64. https://doi.org/10.1080/09585176.2011.601627
Winter, C., Kasuji, S., Poh, C., Robinson, R. and Whittall, D. (2024) 'Critiquing "powerful knowledge" in school geography through a decolonial lens', *Geography*, 109, 2, pp. 67–78. https://doi.org/10.1080/00167487.2024.2351770

All URLs last accessed 6/8/2024.

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Breaking down the complexity of geographical thinking: a European perspective

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ABSTRACT: The development of geographical thinking is often considered an essential outcome of geography education, yet its application within various school settings often falls short. This article addresses this discrepancy by deconstructing the concept of geographical thinking, aiming to facilitate its comprehension for educators in lower and upper secondary schools. The study applies thematic analysis to data collected from semi-structured interviews with European geography education experts. The findings reveal the interconnected dimensions of geographical thinking – content, procedural and affective – and the importance of factual knowledge as its basis. Moreover, the article offers various strategies and examples for fostering its development in schools based on the perspectives of the interviewed experts.

Keywords: geographical thinking, key concepts, high-order thinking skills, affective domain, factual knowledge

Why is geographical thinking essential?

The geography education research community widely recognises geographical thinking as one of the fundamental outcomes of geography education (see, e.g. Geographical Association (GA), 2009; Brooks *et al*., 2017). As such, geographical thinking is often referred to as a powerful way of thinking (Jackson, 2006; Lambert *et al*., 2015). Jackson (2006) suggests that the power of geographical thinking lies in seeing the connections between places and scales that others frequently miss. Therefore, it has the potential to foster students' intellectual development and help them view whole systems and structures. Expanding on this, the GA (2009) highlights that geographical thinking is an essential educational outcome of learning geography and that it means being able to apply knowledge and conceptual understanding to new settings. Further analysis of the various definitions of and approaches to geographical thinking is offered by Bendl *et al*. (2024), who claim that geographical thinking not only helps us to make sense of the overwhelming complexity of our world but also paves the way toward a meaningful understanding of its vast interconnectedness across different scales.

The importance of geographical thinking for the contemporary world is emphasised by Lambert (2023). Take, for instance, the COVID-19 pandemic. Unravelling the intricacies of the pandemic – encompassing the spread of the virus, the conditions that encouraged its transmission and the efficacy of the measures implemented – involves asking inherently geographical questions. The spatially diverse occurrence and ramifications of the disease can be explained only by a nuanced interplay of environmental, social, economic, political and cultural factors; they require thinking across different scales, in vast and complex relations and within some spatial patterns – that is, geographical thinking (see also van der Schee, 2020; Bissell, 2021). The case for geographical thinking becomes even more convincing in the current human-driven epoch (often referred to as the Anthropocene – see, e.g. Lambert, 2023) as geographical thinking empowers us to foster a more sustainable and resilient future.

Even though geographical thinking plays an integral part of our daily lives (Roberts, 2011), it should not be confused with everyday thinking. Unlike everyday thinking, geographical thinking not only equips students to find their own place in the world but also focuses on future-oriented solutions, empowering their willingness to actively shape their futures and make a difference (Lambert, 2017; 2023; German Geographical Society, 2021). As Roberts claims, 'the world is changing, and thus what seems important and relevant now might seem less important in the future' (2011, p. 249). Thus it is crucial to give students access to ways of geographical thinking, to enable them to see the world in different ways.

Geographical thinking in academia and schools: challenges in bridging the gap

Many specific examples and definitions of geographical thinking exist (see Bendl *et al*., 2024), and this volume and extensive diversity contributes to the overall ambiguity of the term. As the naming suggests, 'geographical thinking' can be defined by primarily focusing on the word 'geographical' or by paying attention mainly to the 'thinking'; alternatively, it can be defined by trying to give equal weight to both words and linking them appropriately. As a consequence, some authors (see, e.g. Jackson, 2006; GA, 2009; van der Schee, 2020) are focused mostly on the content dimension and frequently associate geographical thinking with fundamental geographical concepts, while others (e.g. Leat, 1998; Nagel, 2008; Balciogullari, 2017) emphasise the procedural dimension, often focusing on specific high-order thinking skills or linking geographical thinking to spatial, geospatial, relational, systems or critical thinking, enquiry and much more (Bendl *et al*., 2024).

Therefore, the challenges become apparent when considering the integration of geographical thinking within a school setting. The academic nuances of geographical thinking – marked by its complexity and, at times, vagueness – make its incorporation into geography lessons challenging. While all these definitions are crucial for the development and understanding of geographical thinking within the research field, their abstract and diverse nature poses difficulties for the teachers who play a crucial role in interpreting, adapting and integrating geographical thinking into their teaching practices and, consequently, developing students' geographical thinking (Levin *et al*., 2009; Hooghuis *et al*., 2014). Therefore, it is important to properly communicate the meaning of geographical thinking. If teachers do not acknowledge what it means and what it is good for, and if they do not know how to efficiently develop and evaluate it, they are unlikely to integrate it into their lessons. For that reason, this article addresses this gap by deconstructing geographical thinking into small, specific and graspable components, and suggests different ways in which geographical thinking can be developed in the classroom.

Methodology

In this study, the deconstruction of geographical thinking is based on semi-structured interviews with geography education experts who have specific theoretical knowledge of geographical thinking and who train future geography teachers. These experts, a total of 10, are geography education academics from universities in the Netherlands, Finland and Czechia. These countries were chosen based on a systematic literature review (Bendl *et al*., 2024) to increase the likelihood of different perspectives on geographical thinking being represented (in terms of the attention paid to the content and the procedural dimension of geographical thinking). Semi-structured interviews were chosen due to their flexibility, allowing for an in-depth exploration of the experts' perspectives on and theoretical backgrounds in geographical thinking while also enabling their comparison and synthesis (Brinkmann, 2013).

The geography education experts were asked to provide their perspectives on what geographical thinking means and how geographical thinking can be developed within school settings. The main emphasis during the interviews was on specific examples and tangible explanations applicable to school settings. The choice of experts was guided by the intention to cover a wide range of theoretical approaches towards geographical thinking while also gaining a deeper understanding of them (for further advantages and limitations of expert interviews, see Meuser and Nagel, 2009). Given that the primary focus was the integration of geographical thinking in school settings, the interviews were mainly conducted with academics with extensive teaching experience (see Figure 1). By choosing these experts as respondents we hoped to bridge the gap between geographical thinking in academia and school practice.

Prior to the interviews, the participants were provided with informed consent forms that outlined the study's purpose and ensured the confidentiality

Expert	Further information
1	Expert on geography education from the Netherlands who has been actively involved in the field as a researcher and teacher trainer for more than 10 years and who has two years of teaching experience in a secondary school
2	Expert on geography education from the Netherlands who has been actively involved in the field as a researcher and teacher trainer for 10 years and who has two years of teaching experience in a secondary school
3	Expert on geography education from the Netherlands who has been actively involved in the field as a researcher and teacher trainer for more than 20 years and who also used to teach at a secondary school
4	Expert on geography education currently working in the Netherlands who has been actively involved in the field as a researcher and teacher trainer for more than 15 years and who has more than 10 years of teaching experience in a secondary school
5	Expert on geography education from Finland who has been actively involved in the field as a researcher and teacher trainer for more than 20 years and who has two years of teaching experience in a secondary school
6	Expert on geography education from Finland who has been actively involved in the field as a researcher and teacher trainer for more than 15 years
7	Expert on geography education from Finland who has been actively involved in the field as a researcher and teacher trainer for more than 20 years and who has nine years of teaching experience in lower and upper-secondary schools
8	Expert on geography education from Czechia who has been actively involved in the field as a researcher and teacher trainer for more than 15 years and who has more than 10 years of teaching experience in a secondary school
9	Expert on geography education from Czechia who has been actively involved in the field as a researcher and teacher trainer for more than 20 years
10	Expert on geography education from Czechia who has been actively involved in the field as a researcher and teacher trainer for more than 15 years

Figure 1: *Background information on the experts interviewed as part of the study.*

of their responses. The study adhered to the ethical guidelines provided by the ethical committee of the university with which the authors are affiliated. The anonymity of the acquired data was guaranteed and the participants were informed that their involvement in the study was voluntary, with the option to withdraw at any time. The interviews were conducted from March to October 2023. Recognising the importance of participants' comfort and preparedness, the participants were given the core interview questions in advance to allow ample time for reflection and to reduce stress during the interview process. The interviews were conducted by the first author and audio-recorded with the participants' consent. Subsequently, the data was transcribed verbatim and all identifying information was removed to maintain confidentiality during analysis.

Given the dynamic of the interviewer (a PhD candidate) engaging with expert participants who were older and more experienced, the interviewer and the participants made mutual efforts to establish a collaborative and respectful atmosphere during the interviews. The interviewer did not acknowledge any potential power differentials during the interviews and the participants openly shared their perspectives. While the interviews were conducted in English, this was not the first language for either the interviewer or the participants so steps were taken to ensure effective communication and comprehension throughout the process, with the interviewer paying particular attention to ensuring the clarity of the interview questions and checking their understanding of the participants' responses, thereby upholding ethical standards of communication and mutual understanding.

The study's deconstruction of geographical thinking was based on thematic analysis, a qualitative method suitable for identifying and analysing the patterns (themes) within the data and for interpreting various aspects of the research topic (Braun and Clarke, 2006). A deductive, analyst-driven thematic analysis was carried out as the

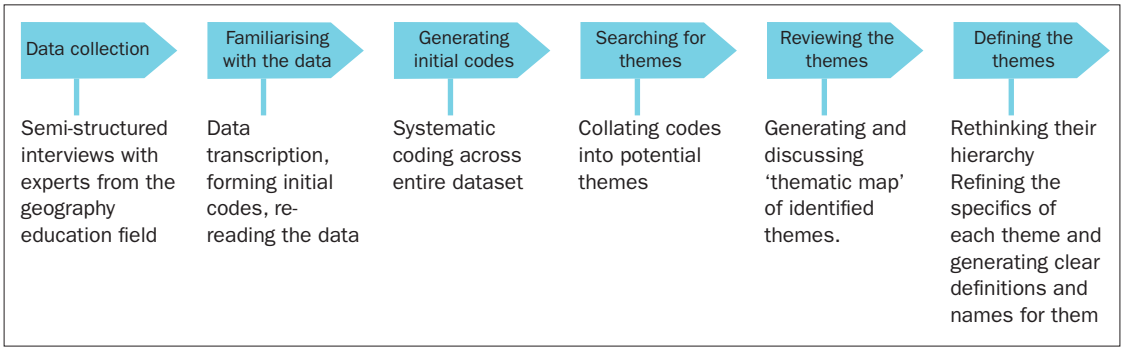


Figure 2: *Phases of the thematic analysis. After: Braun and Clarke (2006).*

data-coding process was not completely free of the researchers' prior theoretical and epistemological knowledge and existing analytic preconceptions within the research field (for further explanation, see Braun and Clarke, 2006). However, several aspects of an inductive, data-driven approach were also employed, allowing for a more in-depth exploration of the data. This mixed approach provides a rich description of the data as well as a more detailed analysis of particular aspects of it (in this case, the specific focus is on deconstructing the content and procedural dimensions).

The thematic analysis and its visualisations were performed using Atlas.ti and Gephi software. Using the analytical steps described by Braun and Clarke (2006)[1], the first and second authors familiarised themselves with the data, generated initial codes, searched for core themes, reviewed them and then defined them (see Figure 2). To establish the reliability and validity of the procedure, the researchers first analysed the data independently before discussing the differences and determining the final themes together.

Findings

The thematic analysis generated two major topics: deconstructing geographical thinking and fostering geographical thinking.

Deconstructing geographical thinking

The expert interviews revealed four primary aspects of geographical thinking: the content dimension (usually perceived through key concepts), the procedural dimension (usually perceived through a specific set of thinking skills), the role of factual knowledge, and the engagement of the affective domain (see Figure 3). The definitions of these key aspects are provided in Figure 4.

Before explaining each of these aspects in more detail, it is crucial to comment on how the expert participants perceived the relevance of these aspects. A notable trend emerged: eight out of the 10 experts highlighted the pivotal role of key concepts, often initiating discussions with a focus on the content dimension. Even when the conversation veered towards the procedural dimension (e.g. specific thinking skills), key concepts remained central. Six experts emphasised the impact of attitudes and values within geographical thinking, and seven stressed the indispensability of factual knowledge, which supposedly forms the bedrock of geographical thinking as a whole. Furthermore, not every expert understood geographical thinking through all of these dimensions; some experts mentioned only two or three of these four aspects (Figure 3). The following subsections elaborate on each of these identified aspects.

The content and procedural dimensions

The initial findings highlight two primary dimensions inherent in geographical thinking: the content dimension and the procedural dimension. These dimensions are intricately connected, with each relying on the other for geographical thinking. The content dimension refers to the different ways of approaching the subject of geography itself, while the procedural dimension is often associated with certain high-order thinking skills (see Figure 5). Expert 2 described this relationship as follows:

> '*To think geographically, you need to combine factual knowledge with conceptual understanding, enabling its application across diverse contexts or topics, while also employing high-order thinking skills*'.

The analysis identified several distinct codes within these two overarching dimensions. This process revealed deeper insights into the nuanced aspects of geographical thinking as perceived by the expert participants. While the majority believed that the content dimension of geographical thinking consists of the key geographical concepts, other suggestions included specific generalisations, various perspectives and complex geographical issues. The participants emphasised that the

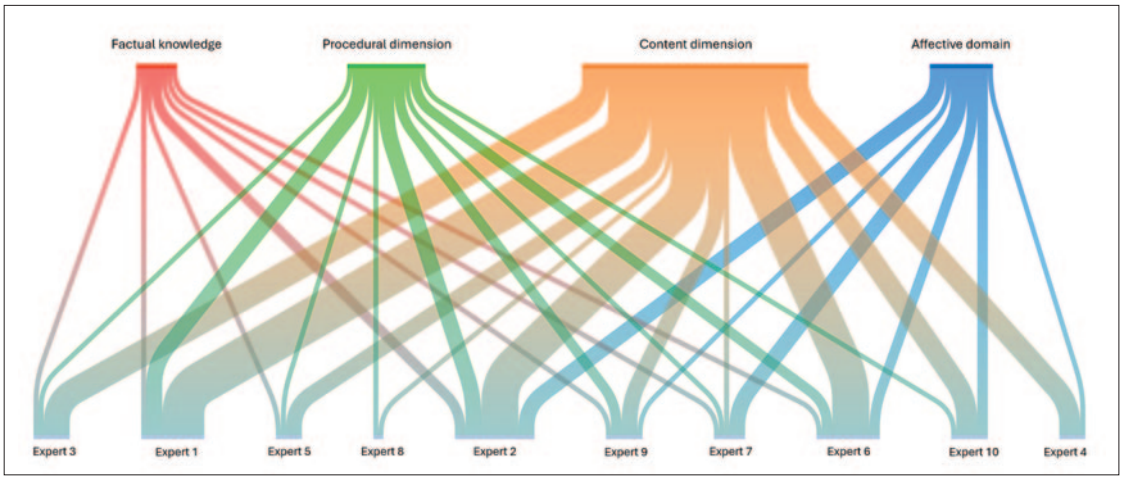


Figure 3: *The four key aspects of geographical thinking as identified by the expert participants.*

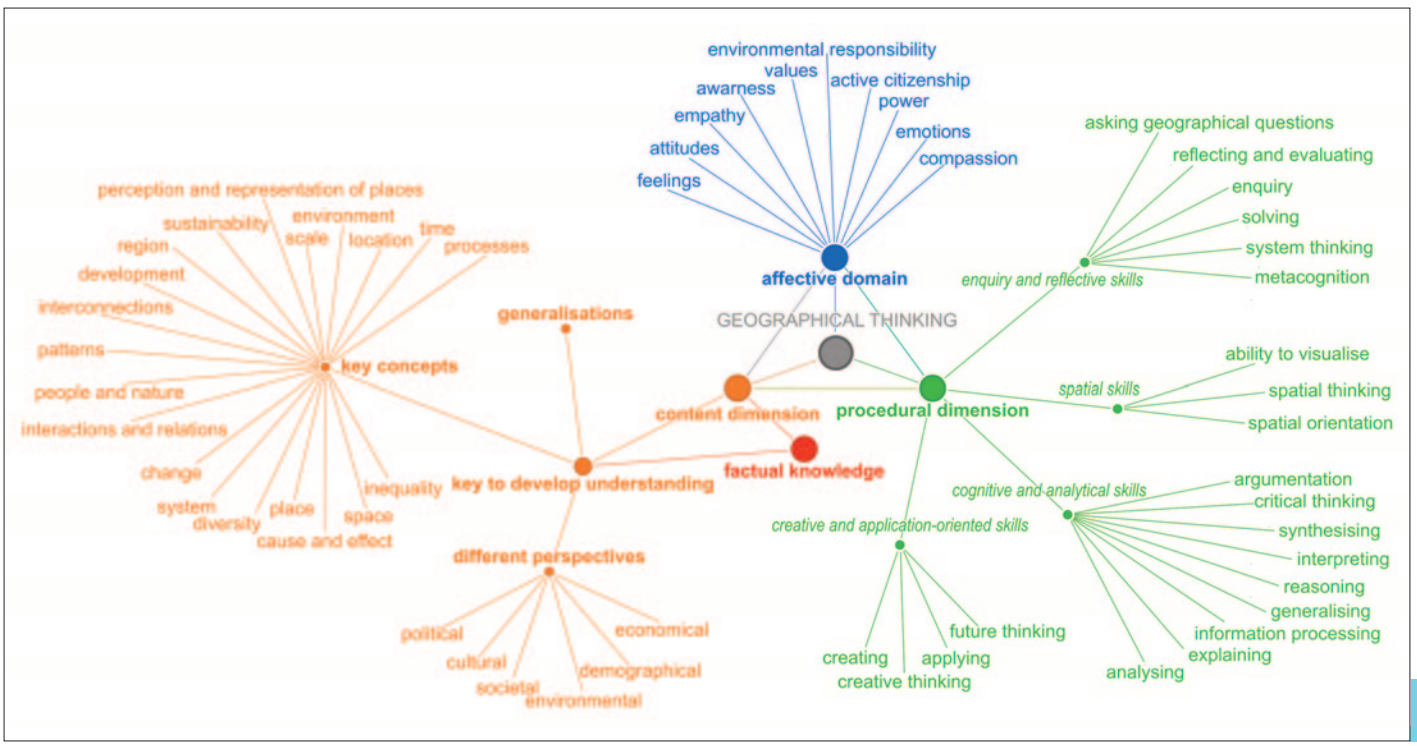
Dimension	Definition
Content dimension	Specific subject matter, generalisations, perspectives and concepts related to geography
Procedural dimension	Cognitive processes and skills involved in reasoning, problem-solving and decision-making about geographical data and information
Factual knowledge	Basic, concrete information and facts necessary to enable geographical thinking
Affective domain	Attitudes, values and emotional responses towards geography and its subject matter

Figure 4: *Brief definitions of the identified key aspects of geographical thinking.*

biggest advantage of the key concepts is their ability to promote a complex process of understanding geographical phenomena rather than simply memorising facts. In this way, key concepts can be interpreted as a crucial doorway to geographical thinking. The key concepts mentioned most frequently were place, space and interconnections, but the participants also perceived several other key concepts or content-related codes as important components of the content dimension (see Figure 5).

Meanwhile, the procedural dimension was typically understood through various generic or high-order thinking skills applied to geographical content, most often on specific geographical issues. Many of these skills were linked to enquiry to some extent, e.g. asking geographical questions, analysing and evaluating data and answering

Figure 5: *Model of geographical thinking deconstruction based on experts' interview responses.*



geographical questions. The findings also indicated that participants perceived geographical thinking to share similarities with critical thinking. Skills such as assessing the reliability and relevance of information/data, evaluating evidence and engaging in reasoning were frequently mentioned in this regard. Three participants (Experts 1, 3 and 10) referred to the skills mentioned by Leat (1998): information processing, reasoning, enquiry, creative thinking and evaluation. The participants also mentioned other skills, including spatial thinking, visualising, forming generalisations, using metacognition and applying the skills from Bloom's taxonomy to geographical content.

The analysis thus demonstrated the vast complexity of different perceptions of geographical thinking. The model in Figure 5 synthesises these diverse viewpoints. Based on the thematic analysis of the interviews, the model offers a deconstruction of geographical thinking into smaller, more comprehensible and highly varied components, presenting their unification under a common framework. It is also important to note that three participants (Experts 1, 4 and 5) viewed geographical thinking as part of broader concepts such as geographical or relational understanding, geographical reasoning and systems thinking. These broader concepts are not explicitly represented in the model as it aims to deconstruct geographical thinking into small, specific and graspable components, and not to describe its relations to other concepts.

The role of factual knowledge

During the interviews, almost all the participants reflected to some extent on the role of factual knowledge within the process of geographical thinking. The responses were usually guided by the premise that in order to think, one first needs to have something to think about, as noted by Expert 5:

> '*I've come to a simple realisation that whether students engage in the thinking process depends on what they already have in their long-term memory. If we want their geographical thinking to be meaningful, we should not let them flounder in it without relevant facts.*'

This approach might find support in the field of cognitive psychology as the idea is common to other types of domain-specific thinking. For example, to think scientifically (for more about this term, see Hsieh *et al*., 2023), one needs to know the facts, theories, concepts and procedures that a scientist knows. The same applies to geography. The role of factual knowledge was thus perceived as a basis of not only the content dimension of geographical thinking but also the procedural dimension.

To explain the relationship between factual knowledge, conceptual knowledge and procedural knowledge, the participants often referred to the widely known analogy of geography and language (e.g. GA, 2009, where 'vocabulary' refers to core geographical knowledge and 'grammar' to the key concepts). This means that to develop geographical thinking it is helpful to first operate on a certain level of factual knowledge (i.e. to have a sufficient vocabulary), which simplifies the road towards further understanding and thinking processes.

The engagement of the affective domain

The findings also indicated growing interest in the engagement of the affective domain and its role within geographical thinking (see Figure 5). However, no consensus was found among the participants regarding this category. Some participants perceived the affective dimension to be unrelated to geographical thinking. For example, Expert 2 noted:

> '*We need more than just knowledge and thinking, we also need to address the values, emotions, feelings and attitudes students have towards certain topics and issues. Focusing only on knowledge and thinking and not working with the affective dimension could mean fostering educated, geographical thinkers who utilise their knowledge and intellect solely for their own benefit.*'

However, others felt that values and attitudes are inherently interlinked with geographical thinking, such as Expert 7 who commented:

> '*I feel that geographical thinking is a necessary predisposition of fostering certain values and attitudes of our students. For example, in the context of current environmental issues, you behave towards the environment in certain way. In the context of current societal and cultural issues, you behave towards people in a certain way, and that has something to do with geographical thinking. In fact, you could say that by thinking geographically, they [students] become aware, active citizens responsible for their own actions.*'

The difference in understanding the relationship between the affective domain of learning and geographical thinking has proven to be important in perceiving geographical thinking as the main outcome of geographical education. The

participants who perceived the affective domain as part of geographical thinking typically identified geographical thinking as the main outcome of geographical education, while those who distinguished between geographical thinking and the development of affective educational goals only partially agreed and had a tendency to emphasise more value-oriented outcomes.

Fostering geographical thinking

To bridge the gap between academic and school geography it is necessary not only to deconstruct geographical thinking but also to identify specific strategies and examples for fostering it. The majority of the participants correlated geographical thinking with key concepts (often referring specifically to Taylor, 2008 and Maude, 2016), asserting that learning geography through these concepts is one of the most effective methods for developing geographical thinking. For example, Expert 6 commented:

> '*Just take an example. In our country [Finland], there is a lot of discussion at the moment about a steel company from India located near the beach here. Since it is quite close to our capital, a lot of people are going to this beach. But you can imagine the air and water pollution there. A few studies were carried out, and they found that the children in that neighbourhood died earlier than in others. Now you can ask the questions: Why is the plant located there? Is there a correlation between the death rate and the plant? What other factors are involved? Should we stop the plant? What would be the consequences and how would they differ for different actors and places? Discussing this will help you realise that geography is not so much a mosaic of different things, but an interconnected system. It will help to realise some general concepts that can be applied elsewhere and, consequently, these concepts will open various ways of geographical thinking.*'

Several participants highlighted the importance of addressing specific geographical issues and providing tangible examples in order to foster geographical thinking. They advocated for geographical assignments and projects that are open-ended, encouraging students to analyse and compare different regions and places while commenting on their interrelationships. These recommendations emphasised incorporating enquiry-based learning into the examination of specific geographical topics and issues.

To enhance the procedural dimension of geographical thinking, the participants recommended several techniques. Many highlighted the effectiveness of providing relevant examples or case studies along with using visualisations. As already mentioned, three participants referred to Leat's (1998) 'thinking through geography' strategies. For example, Expert 10 emphasised the importance of activities that do not have one simple solution but rather require reasoning and argumentation (e.g. 'odd one out' in Leat, 1998). Other examples the participants mentioned included using causal or flow diagrams, posing relevant geographical questions, formulating generalisations and conducting questionnaires and interviews on geographical topics.

The majority of participants associated the development of geographical thinking with active involvement from students. They suggested scenarios in which the teacher acts as a facilitator, guiding and motivating students in their tasks. Such strategies were deemed most conducive to the development of geographical thinking, as outlined by Expert 6:

> '*I support learning by doing and ideally using multiple senses. For example, if you want to think geographically about the environment, go to the forest. Put your hands to the soil, feel it, smell it, maybe even taste it. You can bring the samples to the classroom, analyse it, compare it by looking at relevant maps, etc.*'

However, two participants also highlighted the value of passive development of geographical thinking. For example, Expert 9 noted:

> '*I myself am a product of a traditional schooling system based solely on memorising and yet I dare to claim that I learned to think geographically. I have been influenced by two teachers. The first one was simply thinking out loud. He explained the complex geographical ways in which he was thinking, and, at the end, he finished with some key generalisation. The other one always managed to cause certain unease in our minds by asking certain chains of questions. He was simply provoking our geographical thinking by raising relevant questions. Even though we just passively sat there and listened to them, in both cases it taught me to think geographically.*'

Concerning the passive development of geographical thinking, Expert 8 mentioned the importance of relevant videos, schemes, maps, pictures and visualisations in general. They pointed out that simply looking at such resources might lead students to develop their geographical thinking.

Discussion

Implications and future outlook

This study underlines the interdependence of the content and procedural dimensions of geographical thinking and the role of factual knowledge and the affective domain within it (Figure 6). By emphasising this interconnectedness, teachers can cultivate meaningful learning experiences that foster students' holistic understanding of geographical concepts and issues.

The results confirm that each of these dimensions contains many different inner aspects and components. Thus, it is crucial to acknowledge that, for teachers, it is entirely acceptable to apply only certain aspects of geographical thinking rather than attempting to incorporate all elements simultaneously. Recognising the diverse nature of geographical thinking, it becomes evident that embracing it in its entirety poses many challenges. Therefore, teachers should feel empowered to adopt the aspects of geographical thinking that align with their teaching contexts and their students' needs. By embracing a flexible approach, teachers can gradually integrate geographical thinking into their teaching practice, focusing on the most relevant and feasible aspects within their classroom settings. This gradual approach will allow teachers to build confidence in developing geographical thinking while also fostering continuous professional growth.

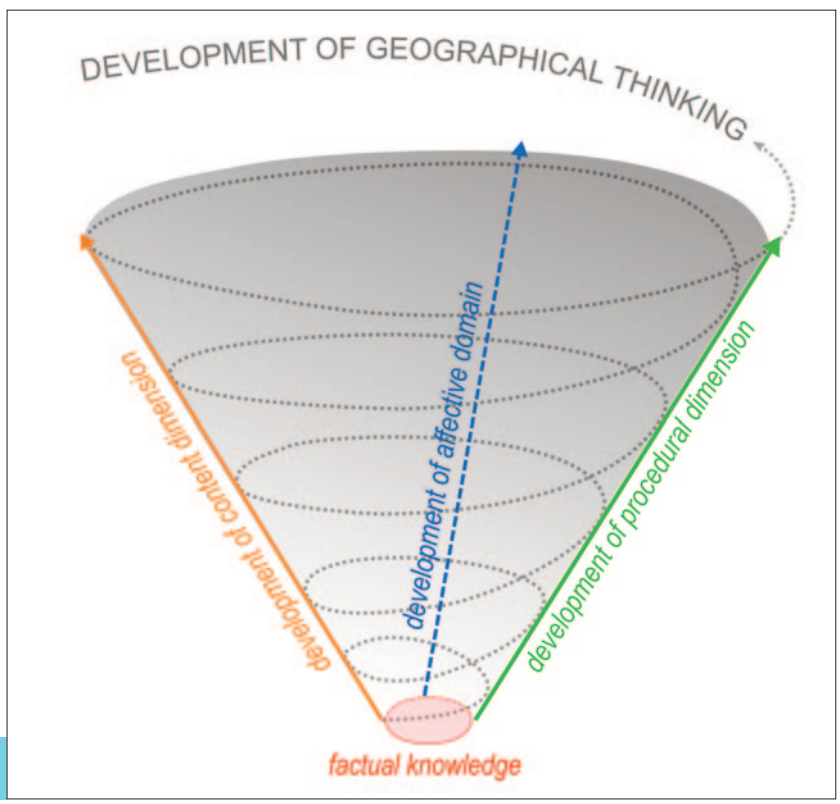


Figure 6: *Schema of geographical thinking development.*

Nonetheless, a crucial challenge arises from the absence of standardised methods to evaluate geographical thinking and its specific aspects. The lack of complex geographical thinking assessment tools (in terms of both formative and standardised assessment), strategies, methods and examples (compared, for example, with Cox *et al*., 2017) represents a significant gap in the current research field, and may inhibit the application of geographical thinking in school settings. Furthermore, this gap prevents the possibility of comprehensively evaluating the effectiveness of educational interventions aimed at enhancing geographical thinking and tailoring instructional approaches accordingly. Therefore, addressing this issue is crucial for advancing both research and practice in geographical thinking.

The second challenge that warrants attention in future research on geographical thinking concerns the unclear role of the affective domain within it. While some of the participants of this study excluded the affective domain from geographical thinking, others recognised its significance. Values, emotions and feelings are inherently intertwined with specific geographical content and teaching strategies (see Figure 6); engaging with geographical content and methods often automatically involves delving into the affective dimension. For instance, using enquiry-based learning to address global inequality, or contrasting diverse sources of information depicting people living in different regions and examining the reasons for and effects of these distinctions, inherently involve the affective domain. The extent of engagement with the affective domain in geographical thinking is therefore dependent on the choice of topic and instructional methods employed by the teacher.

Limitations of the study

While this study offered several insights into the topic of geographical thinking, it is also important to acknowledge its limitations. First, the methodological reliance on semi-structured interviews with a sample of 10 European geography education experts might restrict the generalisability of the findings. While Europe provides a diverse landscape of geography education practices and theoretical perspectives, even from the specific standpoint of geographical thinking (see Bendl *et al*., 2024), this geographic focus may limit the generalisability and broader applicability of the findings beyond the European context. Upon closer examination of the specifics within each nation, it appears that the national context proved to be insignificant, as experts from

the same country often presented completely different conceptions of geographical thinking. A more significant influence seems to be their individual research backgrounds. This underscores the importance of considering individual academic perspectives when interpreting findings, rather than focusing solely on the national origins of respondents.

While face-to-face interviews were used to facilitate deeper engagement and rapport with the participants, this approach did impose constraints on the selection and number of interviews due to financial considerations. Therefore, the authors acknowledge the need for future studies to explore geographical thinking in other regions and with larger and more diverse samples to enhance the robustness and applicability of the findings. These studies might also uncover other specific components of geographical thinking depicted in Figure 5 or further refine the main four dimensions of geographical thinking (Figure 6).

Additionally, while this study focused on deconstructing geographical thinking and underlining some of the strategies and examples contributing to its development, it did not discuss the effectiveness and impact of these suggestions. Moreover, the strict focus on fostering geographical thinking may overlook other crucial factors influencing its development, such as age and individual differences in learning styles. Therefore, addressing these methodological limitations through larger sample sizes, rigorous evaluation frameworks and a comprehensive exploration of the influencing factors might enhance the validity and applicability of future research on developing geographical thinking.

Conclusion

This article offers a deconstruction of geographical thinking and provides a series of examples illustrating what it entails and how it can be nurtured from the perspectives of experts on geographical education. While it does not prescribe a singular approach or definitively resolve the meaning of geographical thinking, its findings may help to bridge the gap between the academic understanding of geographical thinking and its practical application and integration by teachers in schools. The article's primary contributions lie in identifying and linking the four dimensions of geographical thinking, and in breaking them down into specific aspects. We believe that this will allow geography teachers to develop a more easily understandable framework for cultivating geographical thinking in their own teaching practices.

Note

1. Given that it was the first and second author analysing and interpreting the data, it is crucial to briefly reflect on their positionality in the field of geography education. The first author is a PhD candidate in geography education and also a part-time geography teacher at an upper-secondary school (for more than five years). The second author is an expert on geography education, who has been conducting research within this field and training future geography teachers for more than 15 years.

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References

Balciogullari, A. (2017) 'Geographical thinking approach in geography education' in Pehlivan, M. and Wu, W. (eds) *Research Highlights in Education and Science*. Alanya: ISRES.

Bendl, T., Krajňáková, L., Marada, M. and Řezníčková, D. (2024) 'Geographical thinking in geography education: a systematic review', *International Research in Geographical and Environmental Education*, Online First. https://doi.org/10.1080/10382046.2024.2354097

Bissell, D. (2021) 'A changing sense of place: geography and COVID-19', *Geographical Research*, 59, 2, pp. 150–9. https://doi.org/10.1111/1745-5871.12465

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3, 2, pp. 77–101. https://doi.org/10.1191/1478088706qp063oa

Brinkmann, S. (2013) *Qualitative Interviewing*. New York, NY: Oxford University Press.

Brooks, C., Butt, G. and Fargher, M. (eds) (2017) *The Power of Geographical Thinking*. Cham: Springer.

Cox, M., Elen, J. and Steegen, A. (2017) 'Systems thinking in geography: can high school students do it?', *International Research in Geographical and Environmental Education*, 28, 1, pp. 37–52. https://doi.org/10.1080/10382046.2017.1386413

Geographical Association (GA) (2009) *A Different View: A manifesto from the Geographical Association*. Available at https://geography.org.uk/about-us/ga-advocacy-for-geography/ga-manifesto-for-geography

German Geographical Society (2021) *Geography: Key to the future. A road map of strengthening geography education in schools*. Available at

Breaking down the complexity of geographical thinking: a European perspective

https://geographiedidaktik.org/geography-keytothefuture

Hooghuis, F., van der Schee, J., van der Velde, M., Imants, J. and Volman, M. (2014) 'The adoption of *Thinking Through Geography* strategies and their impact on teaching geographical reasoning in Dutch secondary schools', *International Research in Geographical and Environmental Education*, 23, 3, pp. 242–58. https://doi.org/10.1080/10382046.2014.927168

Hsieh, F.-P., Chen, Y.-A., Wu, H.-J. and Tsai, C.-Y. (2023) 'Promoting first graders' scientific thinking through picture books with the 5E model', *The Journal of Educational Research*, 116, 3, pp. 147–58. https://doi.org/10.1080/00220671.2023.2219635

Jackson, P. (2006) 'Thinking geographically', *Geography*, 91, 3, pp. 199–204. https://doi.org/10.1080/00167487.2006.12094167

Lambert, D. (2017) 'Thinking geographically' in Jones, M. (ed) *The Handbook of Secondary Geography*. Sheffield: Geographical Association, pp. 20–9.

Lambert, D. (2023) *Teaching in the Human Epoch: The geography of it all*. Available at https://www.gereco.org/2023/01/30/teaching-in-the-human-epoch-the-geography-of-it-all

Lambert, D., Solem, M. and Tani, S. (2015) 'Achieving human potential through geography education: a capabilities approach to curriculum making in schools', *Annals of the Association of American Geographers*, 105, 4, pp. 723–35. https://doi.org/10.1080/00045608.2015.1022128

Leat, D. (1998) *Thinking Through Geography*. Cambridge: Chris Kington Publishing.

Levin, D.M., Hammer, D. and Coffey, J.E. (2009) 'Novice teachers' attention to student thinking', *Journal of Teacher Education*, 60, 2, pp. 142–54. https://doi.org/10.1177/0022487108330245

Maude, A. (2016) 'What might powerful geographical knowledge look like?', *Geography*, 101, 2, pp. 70–6. https://doi.org/10.1080/00167487.2016.12093987

Meuser, M. and Nagel, U. (2009) 'The expert interview and changes in knowledge production' in Bogner, A., Littig, B. and Menz, W. (eds) *Interviewing Experts*. Basingstoke and New York, NY: Palgrave Macmillan, pp. 17–42.

Nagel, P. (2008) 'Geography: the *essential* skill for the 21st century', *Social Education*, 72, 7, pp. 354–8. Available at https://www.socialstudies.org/system/files/publications/articles/se_7207354.pdf

Roberts, M. (2011) 'Conclusion' in Butt, G. (ed) *Geography, Education and the Future*. London and New York, NY: Continuum, pp. 244–54.

Taylor, L. (2008) 'Key concepts and medium-term planning', *Teaching Geography*, 33, 2 (Summer), pp. 50–4. Available at https://portal.geography.org.uk/journal/view/J002633

van der Schee, J. (2020) 'Thinking though geography in times of the COVID-19 pandemic', *Journal of Research and Didactics in Geography*, 2, pp. 21–30. Available at http://www.j-reading.org/index.php/geography/article/view/259

All URLs last accessed 12/8/2024.

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Challenging Assumptions

Mahogany: a historical geography of a lasting commodity of 18th-century enslavement

Gordon Walker and Bronte Crawford

ABSTRACT: It might be assumed that the commodities produced by enslaved labour in the British colonies in the 18th century were consumed long ago. Mahogany wood, however, endures and challenges this assumption. Slave labour was used to cut mahogany trees and prepare the timber for transporting to European and North American markets. When made into fine furniture and fittings this same mahogany has been admired and preserved through to the present day. We explore how mahogany was part of the geography of colonial trade and wealth-making by drawing on research focused on Lancaster in north-west England, the UK's fourth largest slave trading port. We trace the extended geographies and lines of connection that were produced by the interlinked trades in enslaved African people and mahogany wood, and, through this focus on Lancaster, we provide an example of how colonialism shaped the economy and narrative of places in Britain. Contemporary responses within heritage settings and the implications for the continuing trade in antique mahogany furniture are also considered.

Keywords: enslavement, mahogany, trade, Lancaster, heritage

Introduction

While there are many legacies from the history of colonialism and slavery for geographers to engage with, including as part of decolonisation initiatives (Puttick and Murrey, 2020), we might assume that the commodities that enslaved people were labouring to produce are long gone. For the British colonies in the West Indies the principal commodity was sugar, which, along with other plantation crops (tobacco, coffee and cotton), was not intended to last for any length of time, its value being secured through its consumption. While there is, therefore, much attention being paid to the wealth made from slavery and passed on through families and institutions (Hall *et al*., 2014; Church Commissioners for England, 2023), and to the deep and ongoing economic and cultural harm inflected on enslaved and colonised communities (Mathews, 2017; Beckles, 2019), the commodities that were central to slave economies do not seem to demand our attention in any direct and material way.

Mahogany, however, challenges this assumption. Wood was among the cargoes of ships plying their trade between colonising countries and colonised territories, with mahogany in particular becoming highly valued during the 18th century when enslavement was at its height (Anderson, 2015). Slave labour was used to cut mahogany trees and prepare the timber for transporting and selling. When transformed from raw timber into the panelling, doors and ornate fittings of public buildings and grand houses, or into fine tables, chairs and writing desks, this same mahogany has been admired and preserved through to the present day (Walvin, 2017). Popular stately homes and museums proudly display the craftsmanship and heritage of famous cabinet makers of the period (Osborne, 2021), while antique dealers

Mahogany: a historical geography of a lasting commodity of 18th-century enslavement

Photo: Chronicle/Alamy Stock Photo

continue to buy and sell furniture made from colonial mahogany, sometimes for tens of thousands of pounds, with little to no acknowledgement of their material provenance in the slave economy. Therefore, as a commodity of enslavement, mahogany is still with us, bringing it directly and materially into contemporary practices and experiences and providing a distinctive entry point into the study of the geography of colonial enslavement and trading practices.

To explore how mahogany was part of colonial trade and wealth-making and discuss the issues this raises, we draw on research focused on a particular place in the UK caught up in that trade. In the 18th century, Lancaster in north-west England was the UK's fourth largest slave trading port (Elder, 1992) after London, Liverpool and Bristol. It was also home to one of the country's high-quality furniture makers, meaning that mahogany figured notably in cargoes returning to the port. We drew from various shipping, local and business archives, using focused strategies of concentrating on particular ship journeys or specific periods of time, in order to exemplify different aspects of the interconnections between mahogany and slavery and to trace the geography of flows of cargo, and of the relationships between the people involved directly and indirectly in this trade. This research was carried out in collaboration with a broader programme of community research, communication and education by the Lancaster Black History Group (LBHG), established in 2020 as part of a local response to the Black Lives Matter movement (LBHG, 2024).

We begin by outlining how mahogany as a commodity was part of the slave economy, before focusing on Lancaster and the geography of the city's involvement in the making and selling of mahogany end-products.

Mahogany and slavery

In the 18th century mahogany from the West Indies became much sought after as an 'exotic' hardwood – in a so-called 'mahogany mania' of the period (Anderson, 2015). Jamaica was the primary source of Britain's mahogany supply and the most profitable British colony, matched only by the brutality of the colonisers' use of imported enslaved labour, with more than 90% of the Jamaican population living in bondage from 1750 through to the end of that century (Burnard, 2015). In the first half of the 18th century, the island was rapidly deforested both to clear land for plantations and to harvest timber from its mahogany forests. Ecologically rich landscapes and traditional ways of living with the forests were radically disrupted and destroyed (Anderson, 2004). Once cut down, the very slow rate of growth of the vast trees – up to 30.5m (100 feet) tall and 3.7m (12 feet) thick – meant that mahogany had to be sourced from other places nearby including British Honduras (now Belize), but Jamaica remained at the centre of mahogany transhipment. The labour of locating and cutting the trees was carried out by teams of enslaved labourers (mainly African, but also some indigenous). The enslaved labourers were sent out to find a good specimen, fell it using axes, then trim and cut it into sections and planks (see Figure 1),

Figure 1: *'Cutting and Trucking Mahogany in Honduras' by Day and Son, in Chaloner and Fleming (1850)* The Mahogany Tree. *Liverpool: Rockliff and Son.*

clear a path for transportation and move the tree, ideally via the nearest waterway, to the coast (Finamore, 2008; Anderson, 2015). The prepared mahogany was then loaded onto ships, often along with other commodities. This work was skilled, but hard and dangerous, and part of the brutal system of owning and treating enslaved people as property while controlling them with fear of violence that was integral to the running of colonial society.

Ships carrying mahogany cargoes were part of bilateral trade going directly backward and forward to European or North American markets. However, a significant number were undertaking 'triangular' slave trading journeys, which also involved a 'middle passage' from Africa to the West Indies. An example is the *Norfolk*, a ship registered at Lancaster in 1763 and owned by William Butterfield, part of a well-known family of Lancaster merchants and slave traders (Elder, 1992). On its first slave trade journey (see Figure 2), the *Norfolk* left Lancaster in September 1763, carrying a 'guinea cargo' of goods (such as wool, silk products, gunpowder, lead and iron bars) to be traded for enslaved people. The *Norfolk* first sailed to the Îles de Los, a small island group off the west coast of Africa, where Miles Barber (a merchant born in Lancaster) had a major role in establishing a set of trading posts, dockyards and 'bulking centres' for holding enslaved African people, which became known as 'slave factories' (Mouser, 1996). At this point, 236 African people were forced onto the *Norfolk* (Slave Voyages, 2024); of these, an estimated 34 did not survive the long journey to Jamaica.

On arrival at Kingston, Jamaica, in October 1764, the cargo of the *Norfolk* was recorded in the Naval Office Shipping Lists (National Archives, 2016) as '202 negroes', who would have been sorted by age, gender and health status and then sold on by factors (local slave merchants) into working for their owners on plantations, or into other forms of forced labour including mahogany cutting. Figure 3 shows the standard categories of cargo used in the Naval Office records, with the row for recording 'negroes' positioned between 'mules and cattle' and 'pipes of madeira wine'. The mundane administrative status of enslaved humans as cargo is made strikingly clear.

On leaving Jamaica, the *Norfolk*'s new cargo, replacing the human cargo of its previous voyage, is listed as 413 planks of mahogany (a large shipment compared to others), along with sugar and rum. The ship arrived back into the port of Lancaster on 12 April 1765, 18 months after it set out. This voyage is just one example; many other

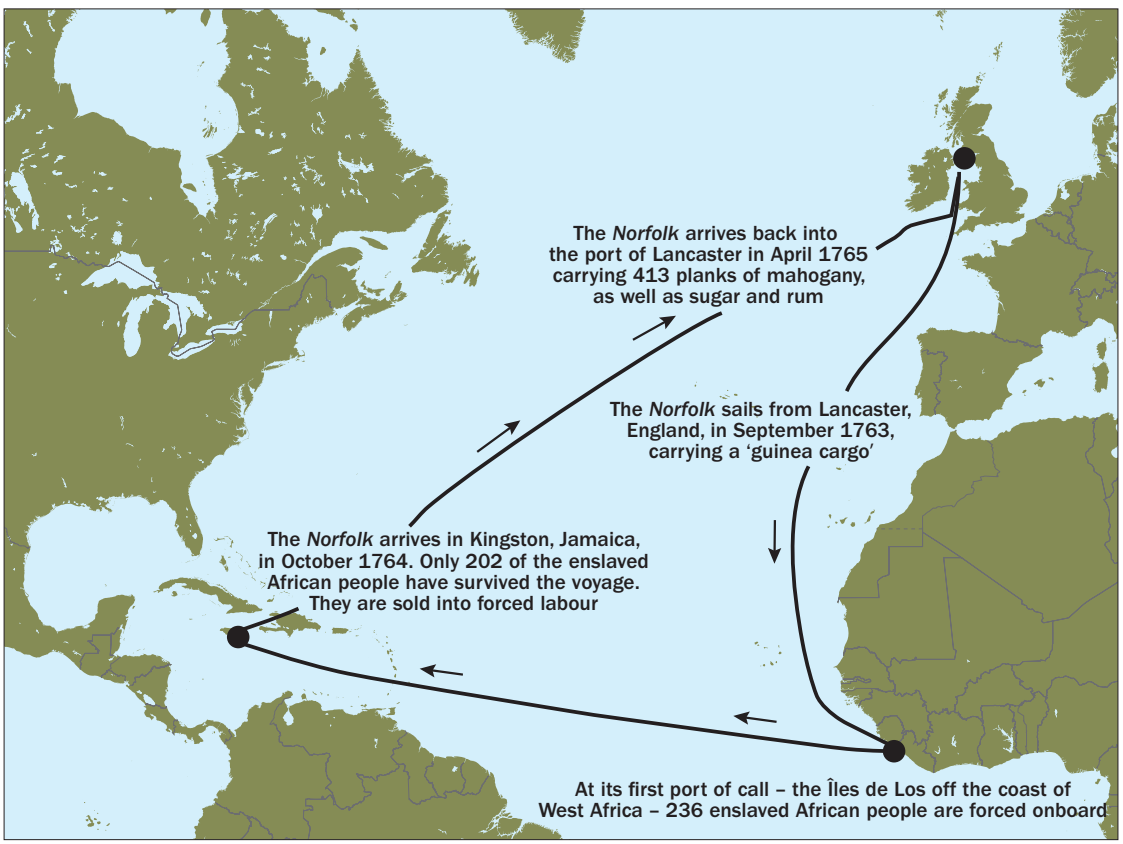

Figure 2: *The triangular transatlantic journey (from Lancaster, England, to Kingston, Jamaica, via the Îles de Los, West Africa, and return) of the* Norfolk *slave ship 1763–5.*

Figure 3: *Categories of cargo used in Naval Office Shipping Lists for Jamaica. Source: National Archives, 2016.*

slave ships sailing on triangular voyages also carried mahogany as cargo back to Lancaster and other trading ports.

Making furniture and money from mahogany in Lancaster

In Lancaster, a town becoming prosperous through a new age of national and international trading relationships, the cabinet makers Gillows were a major customer for mahogany and other forms of timber brought into the port (Bowett, 1998). Established in 1730, Gillows carried on producing fine furniture and fittings (later as Waring and Gillow) into the 20th century (Stuart, 2023). In the 18th century their reputation for producing high-quality mahogany furniture, employing a range of local carpenters and craftsmen, became established among elite society and the company became a successful and growing cabinet-making business and general merchants. Unlike other successful Lancaster families of the time, the Gillows had only a limited involvement directly in the slave trade. Robert Gillow was a part owner of a ship, *The Gambia,* that made two transatlantic slaving trips in 1755 and 1756, but this was not a financially successful or significant investment (Elder and Stuart, 2021). The Gillow family and their business did, however, indirectly and significantly benefit from the prosperity that the town's involvement in the slave trade was generating.

The Gillow archive (Stuart, 2023) provides an extensive record of the activities of the business through nearly 200 years of trading, and we can trace what the company was selling and to whom in some detail. For example, examining the sales records for 1771–2 (Gillow archive 'Waste book' 344/3) shows a number of Lancaster family names repeatedly figuring – Rawlinson, Hinde, Satterthwaite and Lindow – all of whom had family members either directly involved in the slave trade, through owning or captaining ships, and/or acting as merchants, or who owned enslaved people working on colonial plantations (Elder, 1992; LBHG, 2024). These families are detailed in the archive entries as regularly buying furniture and other goods; and the Rawlinsons also shipped Gillows furniture to colonial outposts, while bringing back mahogany and other goods to sell in Lancaster and Liverpool (Walker, 2021). Gillows itself also organised shipments back to colonial officials, plantation owners and merchants in the West Indies. For example, a long entry in the sales records (dated 22 November 1771) covers five pages detailing an extensive cargo for the ship *The Nancy*. The cargo was to be delivered to John Swarbrick, a fellow Lancastrian and one of a number of agents or merchants based in the Caribbean that Gillows worked with. The list of furniture includes chests, chairs, dining tables, wash stands, sideboards and side tables, along with other 'sundry goods' to be packed with the furniture, coming to a total of £267/13s/6d (equivalent to about £46,000 today). This is the biggest single transaction listed in the records during that year. *The Nancy* is just one of 56 ships listed across the archive as transporting goods for Gillows to the West Indies between 1744 and 1796 (Ingram, 1992), thus emphasising the scale and continuity of what was a lucrative trade in returning mahogany in crafted form back to its origins.

Examining the records (Gillow archive 'Day book' 344/21) for the period after the *Norfolk* returned to Lancaster with its cargo of 413 planks of mahogany shows that Gillows was also selling its many and varied products crafted from mahogany to wealthy customers around Britain. Approximately 150 items of mahogany furniture were sold between April and December 1765, ranging from larger articles such as tables and bookcases to smaller ones such as screens and knife trays. The company received orders and commissions throughout north-west England: for example, from wealthy households at Sizergh Castle in Cumbria and Dunham Massey in what is now Greater Manchester. Their trade extended more widely, including the commission of a table for the Blue Bell Inn at Haddington near Edinburgh in Scotland, and a large desk sent to a customer in Salisbury, Wiltshire, in southern England. The fitting out of various houses and public buildings using mahogany wood are also recorded in the Gillow archive.

We cannot directly trace the eventual destination of specific cargos of mahogany carried on slave ships such as the *Norfolk*, and what specifically the timber was crafted into, but we can be clear that all the Caribbean-cut mahogany brought to Lancaster and part of the circulations of wealth in its local economy would have been harvested by enslaved labour. That Lancaster was known for this association between mahogany and slavery is made apparent by Charles Dickens, who wrote in a collaborative novel with Wilkie Collins – *The Lazy Tour of Two Idle Apprentices* (1857) – which was based on their travels in north-west England that:

> '*Mr. Goodchild concedes Lancaster to be a pleasant place … a place possessing staid old houses richly fitted with old Honduras mahogany, which has grown so dark with time that it seems to have got something of a retrospective mirror-*

quality into itself, and to show the visitor, in the depth of its grain, through all its polish, the hue of the wretched slaves who groaned long ago under old Lancaster merchants' (Dickens and Collins, 1857, p. 65).

Conclusions and implications

This short account has made clear the extended geographies and lines of connection that were produced by the interlinked trades in enslaved African people and mahogany wood. These stretched backwards and forwards across the Atlantic and involved the forced transit of enslaved Africans who were brutally exploited to produce mahogany. That timber was shipped to Britain, crafted into fine furniture and other items, sold and then transported onwards to wealthy customers locally, regionally and internationally – including those making their fortunes in the same colonies that the mahogany originated. This international trading network incorporated exploitation, violence and immorality, and implicated many places, people, families and institutions within its reach. The specific focus on the port of Lancaster has made clear that colonialism is not just about what happened in distant territories but also how it shaped the geography of places in Britain (see Devine, 2011; Dresser, 2016; and Richardson, 2005 for other examples) – the wealth that was created, the businesses and livelihoods that were transformed and the narratives about those places that, in time, became those of their history and heritage.

As emphasised earlier, what is distinctive about mahogany as a slave-produced commodity is its endurance and contemporary presence. That lasting material legacy has now begun to demand specific attention. For example, the National Trust for Scotland has recently examined how mahogany furniture from the 18th and 19th centuries made by a host of famous cabinet makers can be found throughout its properties, presenting a 'difficult history' to be faced up to (Osborne, 2021). Within various heritage contexts, the presentation of mahogany furniture to the public is beginning to include at least a line or two about connections to slavery, including in a refurbished gallery devoted to Gillows at the Judges' Lodgings Museum in Lancaster (Friends of Lancaster Judges' Lodgings, 2024). Various slavery-focused events and school education initiatives in Lancaster have also included mahogany as a theme (LBHG, 2024) and brought attention to black voices such as Malika Booker. In a poem commissioned by English Heritage (Matthews, 2022), Booker writes vividly about experiencing the materiality of old 'mahogany doorknobs, banisters and stairs as … worship and annihilation all in one' (2020, p. 65).

These examples provide a start, but there is much more that could be done to make explicit that mahogany produced through enslavement is still with us and still accruing value. Maybe the most acute question to be debated is: what should be happening within the antiques trade where money is being made from items with their roots (both literally and metaphorically) in colonial slave economies? For example, at the time of writing, an online search for Gillows furniture from the Georgian and Regency periods reveals a set of six chairs for sale at £50,000, a bookcase at £68,000 and a desk at £75,000, and other makers command similar prices. Is it enough for this enduring trade to document the craftsmanship and aesthetics of the item for sale along with the presence of a 'makers mark' or some other documented proof of its provenance? Should not the narrative labelling of its history go further to include the conditions of labour and wealth-making embedded in the timber from which it is made?

There have long been calls for mahogany logging in the contemporary world to be made illegal as an unsustainable practice that can be a key driver for wider deforestation, and for consumers to mobilised against its exploitation (Fearnside, 1997). This had some success in 2003 when mahogany became listed as an 'endangered species' to which tight international trade controls would apply (United Nations Environment Programme, 2003). There is, though, a longer and, arguably, darker historical geography of logging practices and ecological devastation to problematise and bring to the attention of consumers as part of facing up to the legacies of British involvement in the transatlantic slave trade.

Acknowledgements

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References

Anderson, J.L. (2004) 'Nature's currency: the Atlantic mahogany trade and the commodification of nature in the eighteenth century', *Early American Studies*, 2, 1, pp. 47–80. https://doi.org/10.1353/eam.2007.0033

Anderson, J.L. (2015) *Mahogany: The costs of luxury in early America*. Cambridge, MA: Harvard University Press.

Beckles, H.M. (2019) 'The reparation movement: greatest political tide of the twenty-first century', *Social and Economic Studies*, 68, 3/4, pp. 11–30. Available at http://www.jstor.org/stable/45299238

Booker, M. (2020) 'Songs of Mahogany' in English Heritage *Untold Stories: Poetry at English Heritage*, pp. 65–7. Available at https://www.yumpu.com/en/document/read/65669301/untold-stories-poetry-at-english-heritage/65

Bowett, A. (1998) 'The Jamaica trade: Gillow and the use of mahogany in the eighteenth century', *Regional Furniture*, 12, pp. 14–57. Available at https://regionalfurnituresociety.org/wp-content/uploads/2013/03/the-jamaica-trade-gillow-and-the-use-of-mahogany-in-the-eighteenth-century-adam-bowett.pdf

Burnard, T. (2015) *Planters, Merchants, and Slaves: Plantation societies in British America, 1650–1820*. Chicago, IL: University of Chicago Press.

Church Commissioners for England (2023) *Church Commissioners' Research into Historic Links to Transatlantic Chattel Slavery*. Available at https://www.churchofengland.org/sites/default/files/2023-01/church-commissioners-for-england-research-into-historic-links-to-transatlantic-chattel-slavery-report.pdf

Dickens, C. and Collins, W. (1857) *The Lazy Tour of Two Idle Apprentices*. London: Alma Books.

Devine, T.M. (2011) 'Did slavery make Scotia great?', *Britain and the World*, 4, 1, pp. 40–64. https://doi.org/10.3366/brw.2011.0004

Dresser, M. (2016) *Slavery Obscured: The social history of the slave trade in an English provincial port*. London: Bloomsbury Press.

Elder, M. (1992) *Slave Trade and the Economic Development of 18th-Century Lancaster*. Edinburgh: Edinburgh University Press.

Elder, M. and Stuart, S. (2021) 'Were the Gillows of Lancaster slave traders?', *Contrebis*, 39. Available at https://lahs.archaeologyuk.org/Contrebis/elderstuartgillow.pdf

Fearnside, P.M. (1997) 'Protection of mahogany: a catalytic species in the destruction of rain forests in the American tropics', *Environmental Conservation*, 24, 4, pp. 303–6. https://doi.org/10.1017/S0376892997000404

Finamore, D. (2008) 'Furnishing the craftsman: slaves and sailors in the mahogany trade', *American Furniture*. Milwaukee, WI: Chipstone. Available at https://www.chipstone.org/article.php/582/

Friends of Lancaster Judges' Lodgings (2024) *Gillows of Lancaster – A global story*. Available at https://lancasterjudgeslodgings.org.uk/area/gillow

Hall, C., Draper, N., McClelland, K., Donington, K. and Lang, R. (2014) *Legacies of British Slave-Ownership: Colonial slavery and the formation of Victorian Britain*. Cambridge: Cambridge University Press.

Ingram, K.E. (1992) 'Furniture and the plantation: further light on the West Indian trade of an English furniture firm in the eighteenth century', *Furniture History*, 28, pp. 42–97. Available at http://www.jstor.org/stable/23407165

Lancaster Black History Group (LHBG) (2024) *Facing the Past, Transforming the Future*. Available at https://lancasterblackhistorygroup.com

Matthews, E. (2022) 'Empty plinths and in/visible stories: interpreting Brodsworth Hall and the transatlantic slave trade', *Social History in Museums*, 46, pp. 53–64. Available at https://www.shcg.org.uk/domains/shcg.org.uk/local/media/downloads/Volume_46__2022_.pdf

Matthews, G. (2017) 'The Caribbean reparation movement and British slavery apologies: an appraisal', *Journal of Caribbean History*, 51, 1, pp. 80–104. https://doi.org/10.1353/jch.2017.0003

Mouser, B.J. (1996) 'Îles de Los as bulking center in the slave trade, 1750–1800', *Revue française d'histoire d'outre-mer*, 313, pp. 77–91. https://doi.org/10.3406/outre.1996.3483

National Archives (2016) *Naval Office Shipping Lists for Jamaica (1752–69) Part 2, CO 142/18.* British Online Archives. Available at https://microform.digital/boa/collections/68/power-and-profit-british-colonial-trade-in-america-and-the-caribbean-1678-1825

Osborne, D.A. (2021) 'Facing our past: the difficult history of mahogany', *National Trust for Scotland*, 6 October. Available at https://www.nts.org.uk/stories/facing-our-past-the-difficult-history-of-mahogany

Puttick, S. and Murrey, A. (2020) 'Confronting the deafening silence on race in geography education in England: learning from anti-racist, decolonial and Black geographies', *Geography*, 105, 3, pp. 126–34. https://doi.org/10.1080/00167487.2020.12106474

Richardson, D. (2005) 'Slavery and Bristol's "golden age"', *Slavery and Abolition*, 26, 1, pp. 35–54. https://doi.org/10.1080/01440390500058830

Slave Voyages (2024) *Transatlantic Slave Trade Database*. Available at https://www.slavevoyages.org/voyage/database

Stuart, S. (2023) 'Gillow (1730–1840)' in *Dictionary of British and Irish Furniture Makers Online*. Available at https://bifmo.history.ac.uk/entry/gillow-1730-1840

United Nations Environment Programme (UNEP) (2003) *CITES Trade Controls to Take Effect for Mahogany.* Press Release UNEP/181, 11 November. Available at https://press.un.org/en/2003/unep181.doc.htm

Walker, G. (2021) 'Finding wealth from the slave economy in the Gillow archive', *Lancaster Black History Group*. Available at https://lancasterblackhistorygroup.com/2021/02/01/finding-wealth-from-the-slave-economy-in-the-gillow-archive-professor-gordon-walker

Walvin, J. (2017) *Slavery in Small Things: Slavery and modern cultural habits*. Chichester: Wiley-Blackwell.

All URLs last accessed 12/8/2024.

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https://doi.org/10.1080/00167487.2024.2386894 **Geography** Vol 109 Part 3 Autumn 2024

Correction

Article title: Critiquing 'powerful knowledge' in school geography through a decolonial lens
Authors: Christine Winter, Shaakirah Kasuji, Catriona Poh, Rachael Robinson and Daniel Whittall
Journal: *Geography*
Bibliometrics: Volume 109, Number 2, pages 67–78
DOI: https://doi.org/10.1080/00167487.2024.2351770

The following sentence on p. 71 of the article was incorrectly published online as below:

> Although contributing to an assessment of the analytical rigour of the concept of 'powerful knowledge' in geography education, our broad critique above does not address directly social justice issues of 'race' and coloniality in the school geography curriculum.

This has been corrected to read:

> Although contributing to an assessment of the analytical rigour of the concept of 'powerful knowledge' in geography education, our broad critique above does not address directly social justice issues of 'race' and coloniality in the school geography curriculum (Sammar, 2024).

Also, the following reference has been added to page 78:

> Sammar, I. (2024) 'Decolonial and anti-racist pedagogy through personal geographies', *Teaching Geography*, 49, 1 (Spring), pp. 22–5. Available at https://portal.geography.org.uk/journal/view/J9781899086250

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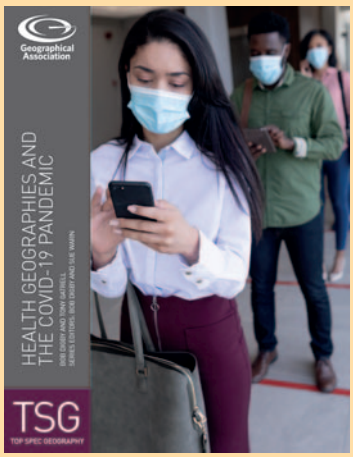
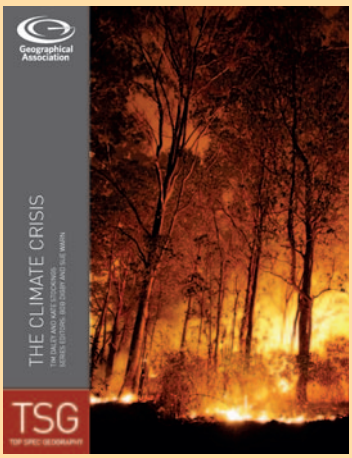


Health Geographies and the COVID-19 Pandemic

Bob Digby and Tony Gatrell

This book explores the development and spread of the virus (SARS-CoV-2) and the accompanying disease (COVID-19). It discusses the impacts of the disease globally and in specific countries such as Brazil, the USA and the UK, and investigates access to vaccination in different parts of the world. The final chapter helps to identify themes by which students might investigate COVID-related topics in their coursework.



The Climate Crisis

Tim Daley and Kate Stockings

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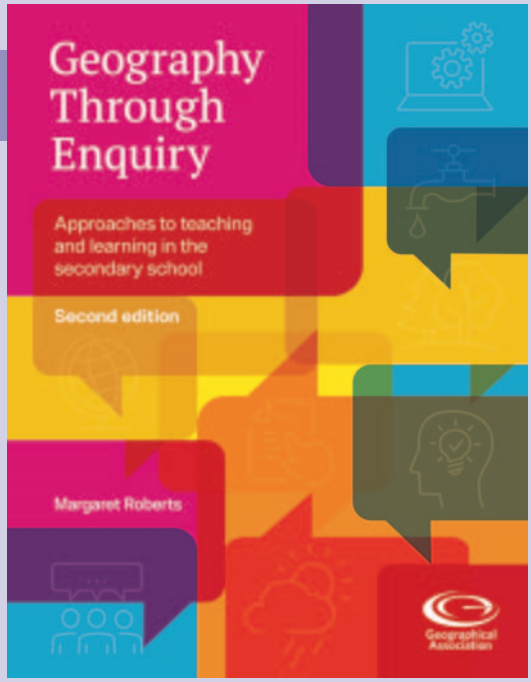

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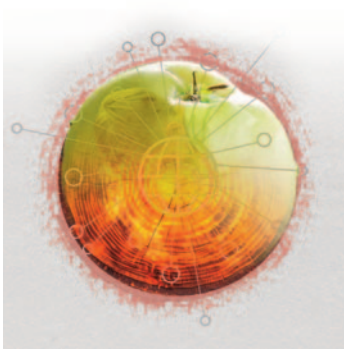

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