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Navigating the gap between academic geography and school geography

An examination of recontextualization and the educational potential of geographical knowledge

Yujing He

ACADEMIC DISSERTATION

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Abstract

This study explores the knowledge gap between academic geography and school geography, a long-recognized issue in geography education across various national contexts. Despite its significance, this gap remains underexplored in terms of empirical evidence and theoretical depth. Concurrently, the global shift towards competencies-based curricula is challenging the centrality of disciplinary knowledge in school education, raising critical questions about the role and relevance of geographical knowledge for young people.

The overarching aim of this research is to understand and address the knowledge gap between academic geography and school geography in fostering young people's development. This study situates the knowledge gap issue in a broader theoretical context by drawing on theories of knowledge and curriculum. Grounded in Bernstein's (1990, 2000) theory of *knowledge recontextualization* and the concept of *powerful knowledge* developed by Young and Muller (e.g., Young, 2009a; Young & Muller, 2013; Muller & Young, 2019), this study upholds an educational vision that provides equal access to specialized and systematic disciplinary knowledge for all students. Building on the development of *powerful geographical knowledge* and the *GeoCapabilities* approach (Lambert et al., 2015; Mitchell, 2022), this study links geographical knowledge with student development and highlights the critical role of teachers as *curriculum makers* in fostering the contribution of geographical knowledge to young people's intellectual growth.

Informed by these theoretical perspectives and aiming to explore the gap systematically, this study addresses three fundamental questions – what, why, and how – through three interrelated sub-studies: (1) *What is the gap, and why does it exist?* (2) *(Why) does bridging the gap matter – in what way does geography knowledge foster student development?* (3) *How can geography teachers, as curriculum makers, effectively recontextualize disciplinary knowledge into the classroom?*

Sub-study I investigated the manifestations and causes of the knowledge gap in the Chinese context by collecting data from agents involved at various levels of curriculum making. It included an analysis of the Chinese geography curriculum, a questionnaire survey with 182 participants, and 22 semi-structured in-depth interviews with geographers, pre- and in-service teachers, and teacher educators. Sub-study II explored the power of geographical thinking through the example of climate change. It identified key geographical perspectives from contemporary academic geography and examined their educational potential for teaching climate change in schools through interviews with nine experts involved in the international GeoCapabilities project. Sub-study III explored how teachers recontextualize disciplinary knowledge in the classroom through a qualitative case study. It focused on the teaching of urban geography by four upper secondary school teachers with diverse academic backgrounds in China. Data sources included teacher interviews, classroom recordings, and teaching-related documents. Collectively, these sub-studies provided a

comprehensive understanding of the knowledge gap by analyzing its nature and exploring educational potential and practical strategies for bridging it through teachers' practices.

The findings identify key challenges and opportunities to bridge the gap between academic geography and school geography and provide students with access to powerful geographical knowledge that fosters their long-term development. Sub-study I reveals substantial discrepancies between academic geography and school geography at the institutional and classroom levels of knowledge transformation, despite the continued emphasis on disciplinary knowledge in China's competencies-based curriculum. Insufficient engagement with disciplinary development and a lack of support from the academic community are identified as two major challenges. Sub-study II highlights the importance of four main geographical perspectives for understanding human-environmental relationships, and in turn, climate change. Introducing the plural geographical perspectives in school not only enhances understanding of complex topics but also empowers young people to think critically and develop as knowledge agents. Sub-study III demonstrates that teachers retain agency in recontextualizing their disciplinary knowledge despite the dominant role of official curriculum materials. Variations in teachers' understanding of the discipline influence the extent, content, and quality of knowledge recontextualization. In addition, teachers' intrinsic motivation and their awareness of external challenges, such as assessments and curriculum constraints, play a crucial role in shaping their recontextualization practices.

Overall, this dissertation deepens our understanding of the gap between academic geography and school geography by combining empirical evidence from China with insights from international experts. It offers valuable implications for educational stakeholders involved in knowledge recontextualization to collectively promote powerful knowledge and enhance the educational value of geographical knowledge. This study particularly underscores and validates the critical role of teachers in recontextualization, even within a tightly regulated curriculum context. These insights from Chinese geography education are relevant to broader subject areas and educational contexts, given the shared challenges surrounding the role of knowledge amid the global shift toward competencies-based curricula. Moving forward, future research should further explore teachers' professional knowledge for effective recontextualization and how students engage with and experience powerful knowledge. It is also important to examine how theoretical concepts are interpreted, adapted, and enriched across diverse educational contexts.

Keywords: knowledge recontextualization, powerful knowledge, GeoCapabilities, competencies-based curriculum, teacher

Tiivistelmä

Tämä tutkimus tarkastelee akateemisen ja koulumaantieteen välistä tiedollista kuilua – ilmiötä, joka on tunnistettu maantieteen opetuksen kentällä useissa kansallisissa konteksteissa. Kuilun merkittävyydestä huolimatta sitä on toistaiseksi tarkasteltu niukasti sekä empiirisesti että teoreettisesti. Samaan aikaan globaali siirtymä kohti osaamisperustaisia opetussuunnitelmia haastaa tieteenalakohtaisen tiedon asemaa koulutuksessa ja nostaa esiin kriittisiä kysymyksiä maantieteellisen tiedon roolista ja merkityksestä nuorille.

Tutkimuksen keskeisenä tavoitteena on ymmärtää ja kuroa umpeen akateemisen ja koulumaantieteen välistä kuilua nuorten kehityksen tukemiseksi. Kysymystä lähestytään laajemmassa teoreettisessa viitekehyksessä hyödyntäen tiedon ja opetussuunnitelman teorioita. Tutkimus pohjautuu Bernsteinin (1990, 2000) tiedon rekontekstualisoinnin teoriaan sekä Youngin ja Mullerin (esim. Young, 2009a; Young & Muller, 2013; Muller & Young, 2019) kehittämään merkityksellisen tiedon käsitteeseen. Näiden pohjalta hahmotellaan koulutuksellinen visio, jossa kaikilla oppijoilla on yhdenvertainen pääsy erikoistuneeseen ja systemaattiseen tieteelliseen tietoon. Rakentaen merkityksellisen maantieteellisen tiedon ja GeoCapabilities-lähestymistavan (Lambert ym., 2015; Mitchell, 2022) perustalle tutkimus kytkee maantieteellisen tiedon nuorten kehitykseen ja tuo esiin opettajien keskeisen roolin opetussuunnitelman tekijöinä.

Näistä teoreettisista lähtökohdista käsin tutkimus tarkastelee tiedollista kuilua järjestelmällisesti kolmen toisiinsa kytkeytyvän osatutkimuksen kautta, jotka vastaavat seuraaviin kysymyksiin: (1) Mikä tiedollinen kuilu on ja miksi se on syntynyt? (2) Miksi kuilun kaventaminen on merkityksellistä – millä tavoin maantieteellinen tieto tukee nuoren kehitystä? (3) Miten opettajat voivat opetussuunnitelman tekijöinä tehokkaasti rekontekstualisoida tieteenalakohtaista tietoa opetukseen?

Ensimmäinen osatutkimus tarkasteli tiedollisen kuilun ilmenemismuotoja ja taustatekijöitä Kiinan kontekstissa keräämällä aineistoa opetussuunnitelmatyöhön osallistuvilta toimijoilta eri tasoilla. Aineisto koostui Kiinan maantieteen opetussuunnitelmien analyysistä, 182 vastaajan kyselytutkimuksesta sekä 22 puolistrukturoidusta haastattelusta, joihin osallistui maantieteilijöitä, opettajia (ennen ja jälkeen valmistumisen) ja opettajankouluttajia. Toinen osatutkimus tarkasteli maantieteellisen ajattelun merkitystä ilmastonmuutoksen opetuksessa. Siinä tunnistettiin keskeisiä näkökulmia nykyisestä akateemisesta maantieteestä ja arvioitiin niiden opetuksellista potentiaalia yhdeksän kansainvälisen GeoCapabilities-asiantuntijan haastattelujen perusteella. Kolmas osatutkimus tarkasteli opettajien toimintaa tieteellisen tiedon rekontekstualisoinnissa opetukseen laadullisen tapaustutkimuksen keinoin. Tutkimus kohdistui neljän eri akateemisista taustoista tulevan kiinalaisen lukio-opettajan kaupunkimaantieteen opetukseen. Aineistoina käytettiin opettajahaastatteluja, opetustallenteita ja opetukseen liittyviä dokumentteja.

Yhdessä nämä osatutkimukset tarjoavat kokonaisvaltaisen näkymän tiedollisen kuilun luonteeseen ja koulutuksellisiin mahdollisuuksiin kuroa sitä umpeen opettajien käytäntöjen kautta. Väitöskirjan tulokset osoittavat keskeisiä haasteita ja mahdollisuuksia akateemisen ja koulumaantieteen lähentämisessä siten, että oppijoilla olisi pääsy maantieteen merkitykselliseen tietoon, joka tukee heidän pitkäjänteistä kehitystään. Ensimmäinen osatutkimus paljastaa merkittäviä jännitteitä akateemisen ja koulumaantieteen välillä niin institutionaalisella kuin luokkahuonetason tiedonmuodostuksessa – huolimatta siitä, että Kiinan osaamisperustainen opetussuunnitelma korostaa yhä tieteenalakohtaista tietoa. Akateemisen yhteisön rajallinen osallistuminen opetussuunnitelmatyöhön sekä heikko kytkentä tieteellisen kehityksen ja kouluopetuksen välillä näyttäytyvät keskeisinä haasteina. Toinen osatutkimus nostaa esiin neljä keskeistä maantieteellistä näkökulmaa ihmisen ja ympäristön välisen suhteen – ja ilmastonmuutoksen – ymmärtämiseen. Näiden moninaisten näkökulmien tuominen kouluopetukseen edistää kriittistä ajattelua ja vahvistaa nuorten toimijuutta tiedollisina subjekteina. Kolmas osatutkimus osoittaa, että opettajat säilyttävät toimijuutensa tieteellisen tiedon rekontekstualisoinnissa, vaikka virallisilla opetussuunnitelmamateriaaleilla on keskeinen ohjaava rooli. Opettajien käsitys tieteenalasta vaikuttaa tiedon siirtämisen laajuuteen, sisältöön ja laatuun. Lisäksi opettajien sisäinen motivaatio sekä tietoisuus ulkoisista reunaehdoista – kuten arvioinnista ja opetussuunnitelmavaatimuksista – muovaavat heidän pedagogista toimintaansa.

Kaiken kaikkiaan tämä väitöskirja syventää ymmärrystä akateemisen ja koulumaantieteen välisestä kuilusta yhdistämällä empiiristä aineistoa Kiinasta kansainvälisten asiantuntijoiden näkemyksiin. Se tarjoaa merkittäviä johtopäätöksiä koulutuksen toimijoille, jotka osallistuvat tiedon uudelleen kontekstualisointiin, ja kutsuu yhteiseen pyrkimykseen edistää merkityksellistä tietoa sekä vahvistaa maantieteellisen tiedon koulutuksellista merkitystä. Tutkimus tuo esiin ja vahvistaa erityisesti opettajan keskeistä roolia tiedon uudelleen kontekstualisoinnissa – jopa tiukasti ohjatussa opetussuunnitelmaympäristössä. Kiinan maantieteen opetuksesta esiin nousseet havainnot resonoivat laajasti eri oppiaineiden ja koulutuskontekstien kanssa, erityisesti tilanteessa, jossa tiedon roolia haastetaan globaalin kompetenssipohjaisen opetussuunnitelmasiirtymän keskellä. Jatkossa tutkimuksen tulisi syventyä opettajien ammatilliseen tietämykseen tehokkaan uudelleen kontekstualisoinnin tukemiseksi sekä tarkastella, miten oppilaat omaksuvat ja kokevat voimallista tietoa. Samalla on tärkeää tutkia, miten teoreettisia käsitteitä tulkitaan, mukautetaan ja syvennetään eri koulutuskonteksteissa.

Avainsanat: tiedon rekontekstualisointi, merkityksellinen tieto, GeoCapabilities, osaamisperustainen opetussuunnitelma, opettaja

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The journey from China to Finland was more than spatial mobility – it was a profound crossing of languages, social systems, cultural understandings, and educational philosophies. As someone without prior exposure to education and life in the Western style, I encountered many invisible barriers. I am thankful beyond words to my dearest friends who stood by me both physically and spiritually. Rong Guang – my most heartfelt thanks to you. We share values, philosophies, and passions, forming a deep and invaluable connection. Not only are you my best friend in Finland, but you also act as an academic mentor, a fitness coach, a therapist, and an educational role model who embodies the “powerful knowledge” and the “capabilities” of my study. You have inspired me to reflect on what goodness is and what a meaningful life can be in the face of cultural differences. Taika Nummi – thank you for welcoming me into your beautiful home and treating me as family. Your intelligence, inclusiveness, empathy, creativity, and depth of thought are truly inspiring. You have helped me discover who I am and what I want. Your presence in my life has been healing and transformative. Maija Harju – thank you for your sincere care from the moment I arrived in Finland. Your kindness toward a foreign stranger warmed me in a new and unfamiliar land. Your concern, practical help, and emotional support carried me through many difficult moments. My dearest friends formed my “secret garden” – a place where I felt truly seen and understood. Thank you for filling my time in Finland with joy, warmth, and meaning, instead of coldness and loneliness. Additionally, I am grateful to the big group of Chinese

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List of original publications

This thesis is based on the following publications:

I He, Y., Tani, S., & Yang, Y. (2022). Exploring the gap between academic geography and school geography: Knowledge transformation of the competencies-based curriculum making in China. *Geography*, 107(3), 128–136. https://doi.org/10.1080/00167487.2022.2114162

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III He, Y. (2025). Recontextualising urban geography in Chinese upper secondary schools: The role of teachers' disciplinary knowledge. *The Curriculum Journal*, 00, 1–19. https://doi.org/10.1002/curj.336

The publications are referred to in the text by their roman numerals. The Accepted Manuscript version of article I is deposited under the terms of the Creative Commons Attribution - NonCommercial License (http://creativecommons.org/licenses/by-nc/4.0/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. Article II and Article III are Open Access articles distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

1 Introduction

As I write this PhD dissertation, I mark a decade of study in the field of geography education. My academic and professional path began with a personal interest in geography during my high school years, developed through six years of initial teacher education (ITE) in geography from undergraduate to graduate levels in China, and has now evolved to a commitment as a geography educator and researcher pursuing a PhD in Finland. In high school (2012–2015), I was fascinated by geography's unique ability to explain both natural and human phenomena, offering knowledgeable insights from everyday life to unfamiliar places, and from historical developments to contemporary events. Despite my enthusiasm, I did not choose geography as one of my major subjects for Gaokao (university entrance examination in China). Before 2021, in my province, geography was categorized as a humanities subject and taught primarily through memorization, which did not fully satisfy my curiosity for deeper understanding. Nevertheless, my passion for geography endured, leading me to pursue a major in "Geography Education" at a *Normal* (teacher education) University. This ITE program was designed to train future secondary school geography teachers. For me, it was the only pathway to learn geography systematically, and teaching the subject seemed like an exciting and meaningful career choice.

During my ITE at the Department of Geography, my understanding of geography expanded dramatically. I was introduced to the diverse branches of physical geography and human geography and the vast research possibilities within these fields. Human geography in particular amazed me with its interdisciplinary nature, incorporating methodologies and theoretical perspectives from other fields such as neuroscience, psychology, and sociology. These diverse approaches were grounded in various philosophical traditions and paradigms, offering rich and multifaceted perspectives on geographical phenomena. This exposure significantly deepened my interest in geography, and I participated actively in research projects with geographers, gaining firsthand experience in exploring its academic frontiers.

As part of the ITE program, I also undertook teaching internships in secondary schools during my senior undergraduate and graduate years. These experiences brought me back to the traditional representation of geography that I had encountered in high school – a stark contrast to the dynamic and innovative knowledge I had experienced at university. After discovering the breadth and depth

of "real" geography in university, I found school geography to be outdated and too simplistic to explain the complexities of the real world. This contrast raised a fundamental question for me: *Why is the richness of contemporary academic geographical knowledge largely absent from secondary education?* This curiosity became the foundation for my PhD research.

Furthermore, my observations of the trajectories of my peers from the Department of Geography (including the ITE program and other geography majors) further fueled my interest. Students in Chinese ITE, including myself, had opportunities to participate in research projects at university. Some of the student teachers even contributed new knowledge to the field by publishing research papers together with the geographers in the department. After graduation, they often returned to secondary schools as geography teachers, bringing with them advanced disciplinary knowledge and research skills. At the same time, I noticed a growing trend in China where graduates from non-ITE geography programs – such as GIS, physical geography, and urban geography – were also entering the teaching profession. This shift was driven by curriculum reforms and changes in the job market in China (see details in Section 3.3). These observations raised intriguing questions for me: *How do these teachers perceive and adapt the curriculum? Do they face the same challenges I experienced in reconciling their disciplinary knowledge with the curriculum? Do they integrate their knowledge into classroom practices, and if so, how? Ultimately, how does the gap between geographical knowledge and the curriculum shape teaching and learning in secondary schools?*

These intertwined experiences – from my early fascination with geography, through my academic exploration of the discipline, to my observations as a student teacher in China – have shaped my research interests in "the gap between academic geography and school geography". Now, as a geography education researcher based in Finland – at the same time, moving from a Department of Geography to a Faculty of Educational Sciences – I wish to investigate these questions from an educational perspective. In particular, my engagement with theories of knowledge and curriculum during my studies in Finland has provided fresh insights into how school geography education could better align with the dynamic and evolving discipline of geography and how teachers navigate the challenges of this alignment.

As a self-critical reflection, it is important to acknowledge that although my research interest and empirical foundation (in Sub-studies I and III) are rooted in the Chinese educational context, this doctoral study engages primarily with English-language scholarship and academic traditions, predominantly from the UK and Europe. This strong reliance on English scholarship is driven by two key reasons.

First, from a practical perspective, conducting my doctoral study in Europe (Finland) and publishing in English-language journals necessitates engaging with English-based concepts and frameworks as part of the common academic language

within my academic community in Finland (and Europe). My academic training in a Finnish university has naturally shaped my theoretical and literature engagement, and my scholarly development has taken place primarily in English. In contrast, my previous education in China did not involve in-depth research in educational studies, resulting in a weaker foundation in Chinese literature and theories.

Second, from an academic standpoint, while my research interest in the knowledge gap in geography education stems from observations in China, academic discussions on this issue remain limited in Chinese literature, whereas English-language scholarship has explored similar themes extensively. In particular, UK-based geography education research has established a strong foundation for exploring the gap between academic geography and school geography, incorporating broader educational theories into anglophone traditions. Beyond English-speaking contexts, many European scholars have contributed greatly to these debates, further reinforcing the global reach of English scholarship. As a result, UK-based English literature has become an essential reference point for exploring my research topic. For instance, discussions on the relationship between academic discipline and school subject are deeply connected to theoretical concepts such as "recontextualization", "powerful knowledge", "GeoCapabilities" (within geography education), "curriculum making", among others (see details in Chapter 2). However, I recognize that similar ideas may exist in Chinese educational thought, which have not been substantively engaged with in this thesis due to the practical constraints outlined above. This omission also reflects my commitment to maintaining a coherent academic discussion aligned with the central focus of this study – the gap between academic geography and school geography – which is seen as a common scientific problem rather than a uniquely Chinese issue. This study does not aim to provide an exhaustive review of all relevant theories, nor is it intended to merely address a specifically Chinese problem. Nevertheless, the omission of potential theoretical perspectives from non-English literature represents a significant limitation of this study.

Even so, drawing on English-language literature and theoretical frameworks does not mean rigidly applying "foreign" perspectives to understanding issues observed in Chinese. While they serve as helpful instruments for international academic conversations, I acknowledge that most of these theories and discussions are rooted in educational systems and socio-cultural-political contexts very different from those in China. My research neither disregards these cross-cultural differences nor dismisses the value of the anglophone theories. Instead, it seeks to contribute insights from the Chinese education system, broadening the predominantly English discourse on important curriculum issues. Rather than simply adopting "foreign" theories, this study critically examines, reflects on, and enriches them to enhance their relevance to the Chinese educational context.

The advantages of drawing empirical data from China (in Sub-studies I and III) are twofold. First, from a scientific perspective, China presents a highly relevant case due to its ongoing competencies-based curriculum reform, vast and centralized education system, and limited exploration of this topic (see forthcoming sections and Chapter 3). Second, my experiences as a school student and pre-service teacher in China provide an insider perspective on understanding geography education within its broader educational system, including educational policy, curriculum development, and teacher training structures, which contributes to enhancing the depth and reliability of the research.

1.1 Statement of the problem

1.1.1 A gap between academic geography and school geography

In the field of geography education, a persistent "gap" – also described as a "gulf", "chasm", or "divide" – has been explicitly and widely acknowledged between geography as an academic discipline and geography as a school subject, particularly in European contexts (e.g., Béneker et al., 2007; Bonnett, 2003; Butt, 2019; Castree et al., 2007; Goudie, 1993; Hill & Jones, 2010; Stannard, 2003). The main observation is that school geography fails to reflect the ongoing developments within academic geography, presenting an outdated and irrelevant portrayal of the discipline (Bonnett, 2003; Stannard, 2003; Morgan, 2017). Academic geography continues to evolve through engaging actively with theoretical advancements and paradigmatic shifts, and addressing pressing global challenges such as environmental sustainability, globalization, and inequality (Cresswell, 2024; Rawding, 2010). In contrast, school-level geography remains rooted in rote learning, focusing primarily on descriptive facts and physical features without integrating contemporary academic insights (Rawling, 2018). This disconnection limits the role of school geography in conveying the relevance and significance of the discipline in addressing the complexities of the world.

Given the crucial role of school geography in shaping the public's understanding of the discipline, geographers have called for bridging this divide and strengthening the connection between academic and school geography (Butt, 2019; Hill & Jones, 2010; Kinder & Brace, 2022). Such efforts are seen as essential not only for the strength and sustainability of the discipline, but also for enhancing school curricula with updated knowledge for students to understand global issues (Goudie, 1993; Hill & Jones, 2010; Stannard, 2003). However, while the gap between academic geography and school geography is widely discussed, and many efforts have been made to transfer insights from academic geography to enrich school teaching (Bustin, 2022; Butt & Collins, 2018; Castree et al., 2007; Standish et al., 2016; Puttick & Murrey, 2020), existing studies suffer from two limitations.

First, much of the discussion surrounding the problematic gap and strategies for bridging it relies on scattered observations and anecdotal experiences rather than evidence-based analyses grounded in robust theoretical frameworks and scientific methods. Few studies provide concrete evidence (except Béneker et al., 2007) or systematic understanding about the nature of the gap or the relationship between academic geography and school geography. Key fundamental questions remain unanswered: *How does this gap manifest in practice? Does it matter, and in what ways does it matter, to bridge the gap? What are the possibilities and implications of bridging it?* These questions demand empirical investigation to inform meaningful and effective strategies for reconciling the two sectors and ensuring geography's continued relevance in education.

Second, it is important to recognize that the relationship between academic geography and school geography is dynamic and has changed over time. This connection is influenced by broader perceptions of knowledge production and shifting education paradigms across historical periods (Morgan, 2017). Efforts to understand and address the gap phenomenon in geography must consider the wider context of ongoing educational transformations, including changing perspectives on the purpose and approaches of education, which is grounded in specific conceptions on knowledge. For example, when a society devalues disciplinary knowledge by viewing it as merely representing the interests of the privileged, schools may respond by deprioritizing the teaching of knowledge in favor of general learning skills (Young, 1971). However, discussions of and proposed solutions for the gap issue in geography education often overlook the educational perspectives. In light of global shifts towards competencies-based education, which prioritize generic skills over disciplinary knowledge in school curricula, it is important to consider how these trends influence the gap in geography education.

1.1.2 The diminishing role of disciplinary knowledge in competencies-based curricula

Over the last two decades, a global shift in education has prioritized 21st-century competencies as central educational goals, leading to a diminished focus on knowledge in school curricula. Supra-national organizations such as the Organization for Economic Co-operation and Development (OECD) and the European Union have promoted competency frameworks, significantly influencing education policies and practices worldwide (Deng, 2021; Voogt & Roblin, 2012). This trend is grounded in two key assumptions regarding knowledge and educational goals. First, it reflects a relativist view of knowledge, which considers knowledge to be socially constructed and reflective of the perspectives of its producers (Béneker, 2018; Moore, 2009; Young & Muller, 2010). This challenges the traditional knowledge-based curriculum, often characterized as the rigid

transmission of static, given, absolute knowledge from teachers to passive students (Young & Muller, 2010). Second, competency originates from the tradition of human capital theory (Deng, 2021), which frames education primarily as a means of producing a capable workforce for economic competitiveness (Ball, 2017; Biesta & Priestley, 2013; Deng, 2021; Labaree, 2014; Lingard et al., 2015; Ro, 2024). Consequently, teaching shifts the emphasis from knowledge transmission towards equipping students with generic competencies such as collaboration, communication, critical thinking, digital skills, and problem-solving, which are construed as keys to success in today's knowledge society (Voogt & Roblin, 2012). In addition, the competencies-based approach to curriculum often shifts away from subject-specific teaching towards interdisciplinary, integrated, or phenomenon-based teaching approaches (Niemelä, 2021; Schaffar & Wolff, 2024). This shift has placed considerable pressure on traditional subjects, including geography, regarding the relevance of geography knowledge to the goal of competency development (Béneker, 2018).

Despite its popularity, competencies-based curriculum has drawn significant criticisms, particularly concerning their impact on the aims and focus of education. Critics argue that this view neglects the broader purpose of education: self-formation and the cultivation of human powers (Deng, 2020; see also in Section 2.2, the ideas in *Bildung*-centred *Didaktik* and *Capabilities Approach*, p. 14-15). Another concern lies in the overemphasis on learning processes over content, reducing education to technical practices focused on "how" to teach rather than "why" (purpose) and "what" to teach (content) (Biesta, 2005). This shift risks depriving students of access to deep, systematic knowledge essential for understanding the world. By prioritizing employable skills and fragmented content, competencies-based approach may exacerbate social inequities and stratification, as students from disadvantaged backgrounds are less likely to gain access to the abstract, conceptual knowledge that allows them to think beyond their immediate needs and challenge existing structures (Wheelahan, 2007).

In response to these concerns, a growing body of English scholarship has called for "bringing knowledge back" into the curriculum. Notably, Michael Young and colleagues have introduced the concept of "powerful knowledge" to defend the critical role of disciplinary knowledge in education, grounded in a social realist view of knowledge (Young, 2013a; Young et al., 2014; Young & Muller, 2013). Disciplinary knowledge, produced and validated by specialized communities, is believed to be powerful because it strives to be objective, reliable, fallible, and testable. Instead of depicting knowledge as static or predefined, powerful knowledge is dynamic, evolving, and open to challenge, thus offering a better understanding of the world. Advocates argue that disciplinary knowledge is powerful also because it empowers students to think beyond their everyday experiences, envisage alternatives, and take greater control over their knowledge

(Young, 2013b; Young et al., 2014). Thus, powerful knowledge is held as a curriculum principle, asserting that the central aim of schooling should be to provide all students with access to disciplinary knowledge that they are unlikely to acquire outside of schools (Young, 2009a; Young et al., 2014).

The idea of powerful knowledge has prompted geography educators to rethink the power of geography to contemporary education: *Why is it important to teach and learn geography? What geography knowledge is powerful and worth learning?* Notably, the international GeoCapabilities project, initiated in 2013 by a collaboration of geography educators from England, Finland, and the US, links geographical knowledge with the educational aim of fostering students' capacities for action and agency (Lambert et al., 2015; Solem et al., 2013). This ongoing project has brought together partners from all over the world, aiming to develop a globally relevant approach to geography education (see Section 2.5; see also https://www.geocapabilities.org/about/partners/). Revisiting and articulating the educational value or contribution of disciplinary knowledge offers an important yet overlooked perspective for addressing the gap between academic geography and school geography. Instead of mere knowledge dissemination or the preservation of the discipline itself, this study considers the broader educational purpose of fostering young people's development and the educational potential of geographical knowledge to this purpose as a point of departure. Meanwhile, clarifying the contribution of geographical knowledge to education is a timely topic in the context of the competency turn in education.

1.2 Aims of the study

The overarching aim of this study is to understand and address the gap between academic geography and school geography in the sense of enhancing the educational value of geographical knowledge. The main research question is how academic geography and school geography could be better aligned to foster young people's development.

As will be detailed in Chapter 2, this study situates the knowledge gap issue in a broader theoretical context by drawing on theories of knowledge and curriculum. Grounded in Bernstein's (1990, 2000) *knowledge recontextualization* in the theory of *pedagogic device* and the concept of *powerful knowledge* developed by Young and Muller (e.g., Young, 2009a; Young & Muller, 2013; Muller & Young, 2019), this study upholds an educational vision which provides equal access to specialized and systematic disciplinary knowledge for all students. Building on the development of *powerful geographical knowledge* and the *GeoCapabilities* approach (Lambert et al., 2015; Mitchell, 2022), this study links geographical knowledge with student development and highlights the critical role of teachers as *curriculum makers* in

fostering the contribution of geographical knowledge to young people's intellectual growth.

Informed by these theoretical perspectives and aiming to systematically explore the gap, this study addresses three fundamental questions – what, why, and how – through three interrelated sub-studies: (1) *What is the gap, and why does it exist?* (2) *(Why) does bridging the gap matter – in what way does geography knowledge foster student development?* (3) *How can geography teachers, as curriculum makers, effectively recontextualize disciplinary knowledge into the classroom?*

The first and third sub-studies focus on China, a significantly relevant case given its ongoing competencies-based curriculum reform, vast and centralized education system, and the limited existing literature on this gap. The second sub-study, rather than being tied to a single national context, adopts the internationally established GeoCapabilities approach to examine the broader educational potential of bridging the gap. Together, these sub-studies allow for in-depth, contextualized analysis while offering broader implications for other contexts that face similar gaps between academic and school geography.

The first sub-study aims to examine the nature of the gap within the context of China's competencies-based curriculum. Using the theoretical framework of knowledge transformation (Deng, 2021; Gericke et al., 2018), which identifies the rationales and agents involved in selecting and organizing knowledge across societal, institutional, and classroom levels of the curriculum making process, this sub-study seeks to provide a comprehensive overview of the gap issue in China.

The second sub-study aims to explore the need to bridge the gap in terms of geographical thinking. Using climate change as an example, it first unpacks the multi-perspective geographical thinking of the topic from the academic discipline. It then examines the broader educational potential of these geographical perspectives, drawing on insights from international experts involved in the *GeoCapabilities* project. This sub-study seeks to provide compelling arguments for whether and why bridging the gap is essential for enriching student understanding and development.

The third sub-study focuses on the practice arena – the role of teachers in bridging the gap. Using urban geography and Chinese teachers as a case, it seeks to investigate how teachers with varying levels of disciplinary expertise recontextualize disciplinary knowledge in classroom settings. This sub-study aims to explore teachers' practices in enhancing the educational value of geography in schools.

1.3 Structure of the thesis

The thesis traces a path from the aforementioned backgrounds of the research to the following research process to explore the gap between academic geography and

school geography. The subsequent chapters demonstrate how this knowledge is evolving.

Chapter 2 provides the theoretical foundations of this study. It starts by reviewing the key theories explaining the relationship between academic disciplines and school subjects, especially Bernstein's (1990, 2000) *pedagogic device*. This serves as the rationale for engaging with Young and Muller's (e.g., Young, 2009a; Young & Muller, 2013; Muller & Young, 2019) concept of *powerful knowledge*, the Future 3 curriculum, and their application in geography education. Drawing on Lambert et al.'s (2015) *GeoCapabilities* approach, this chapter highlights the consideration of the power that geography knowledge offers to young people when it is recontextualized into the school subject. In addition, the chapter reviews the existing research on the roles of teachers in the processes of knowledge recontextualization.

Chapter 3 provides contextual information related to the topic of this study, including disciplinary geography, geography as a school subject, geography teacher education, and geography education research in China.

Chapter 4 outlines the research methods employed across three sub-studies, including the data collection and analysis procedure, detailed descriptions of the participants, and sampling strategies.

Chapter 5 presents the main findings of each sub-study using a contiguous structure. It begins with an overview of the "big picture", i.e., an examination of the gap between academic geography and school geography in China, and then delves into specific cases, namely teaching climate change and urban geography. Rather than offering strategies for bridging this gap, the chapter seeks to address how bridging the gap is meaningful and examine how teachers recontextualize geography differently, influenced by their disciplinary backgrounds. These findings ultimately aim to unlock the power (i.e., educational potential) of geographical knowledge in school education.

Chapter 6 synthesizes insights from three interconnected sub-studies and discusses the theoretical and practical implications with reference to prior research on knowledge recontextualization, powerful knowledge, and teachers' role as curriculum makers. These implications extend beyond geography education to inform broader subject-based education and curriculum studies. This chapter also discusses the limitations of the study and suggests directions for further research.

Chapter 7 concludes the thesis by highlighting its main contributions to geography education and its broader relevance to other subjects and curriculum studies across educational contexts.

2 Theoretical frameworks

This chapter introduces the theoretical frameworks for analyzing the gap between academic geography and school geography within the broader context of curriculum thinking. Section 2.1 describes the complex process through which disciplinary knowledge is recontextualized into educational settings by drawing on Bernstein's (1990, 2000) theory of *pedagogic device*. This theory explains the underpinning mechanisms of knowledge selection and organization in school subjects as a result of a struggle for power in the educational systems in order to convey certain values, ideologies, and purposes. Building on this, Section 2.2 focuses on how different aims of schooling affect the selection of knowledge in school education. Section 2.3 displays various perceptions on the nature of disciplinary knowledge and its role in school education by introducing three contrasting curriculum futures categorized by Young and Muller (2010). Section 2.4 introduces the concept of *powerful knowledge* proposed by Young and Muller and explains the important role of specialized and systematic knowledge for young people in transcending limitations imposed by societal constraints and fostering their autonomy, agency, and freedom to envisage alternatives. Section 2.5 reviews the development of powerful geographical knowledge to examine the intellectual power that geography knowledge can offer for young people. Section 2.6 focuses on the role of teachers as curriculum makers and recontextualization agents in actualizing a Future 3 curriculum rich in powerful knowledge. The chapter concludes in Section 2.7 with a synthesis of insights and a critical reflection on the theories introduced and contributions, serving as a guide for the research.

2.1 Knowledge recontextualization as a relay of power relations: Bernstein's theory of pedagogic device

The question of knowledge is fundamental in subject education, which has long been a central organizing principle of school curricula. Undoubtedly, the knowledge of school subjects is never simplified reduction of its "parent" academic disciplines (Stengel, 1997). Instead, the knowledge undergoes some changes when it is moved from academic contexts to educational settings, which is conceptualized as "recontextualization" by Bernstein (1990, 2000). This recontextualization process involves not only selecting certain aspects of knowledge while excluding others, but

also appropriating, refocusing, and relating other discourses to constitute some orders (Bernstein, 1990). In addition to Bernstein's work, there are other theoretical frameworks that explain the recontextualization process from different perspectives, such as Chevallard and Bosch's (2020) concept of *didactic transposition*, which concerns epistemological and cultural aspects, and Gericke et al.'s (2018) theorizing of knowledge *transformations*, which focuses on the educational meanings of knowledge (Deng, 2021). Among these contributions, Bernstein's theory is particularly influential as it sees knowledge recontextualization within a broader social context, exposing the underpinning social power relations and controls, and highlighting the potential of knowledge recontextualization in reproducing and transforming social inequality (Singh, 2002). Understanding Bernstein's ideas serves as an important foundation for engaging with other theoretical perspectives, as issues surrounding education, curriculum, and taught knowledge are always embedded in broader social, political, cultural contexts and influenced by diverse sets of demands, expectations, norms, and beliefs (Deng, 2021).

The complex procedures of knowledge recontextualization are encapsulated in Bernstein's framework of *pedagogic device* (1990, 2000), which depicts how (i.e., the stages and rules) and by whom (i.e., agents) knowledge is transformed. One of its cores is a set of three interrelated fields – *knowledge production*, *recontextualization*, and *reproduction* – each involving different agents. *The field of production* refers to the generation of new knowledge within academic disciplines, typically by universities and research institutions. This knowledge aims to be abstract and applicable across all societies (Singh, 2002). The *field of recontextualization* adapts and reshapes disciplinary knowledge for educational purposes, transforming it into curricula and pedagogic discourse. This field is divided into two subfields, namely the *official recontextualization field (ORF)* and the *pedagogic recontextualization field (PRF)*. The agents of ORF are typically governmental bodies which define the national curricula and policies, while the PRF involves agents who construct pedagogic texts and practices (Singh, 2002), such as educators, teacher training institutions, and education-related media. Textbooks, while not explicitly mentioned by Bernstein, could be included in the PRF as important materials in school subjects (Khawaja, 2024). The *field of reproduction* is where knowledge is enacted and taught in schools. Teachers serve as primary agents in delivering and enacting the curriculum, influencing how students engage with knowledge. Building on Bernstein's work, the teacher's role has been further recognized as one of the agents of recontextualization (e.g., Hardman et al., in press; Hordern, 2021; Kitson, 2020), which will be discussed in more detail in Section 2.6.

The pedagogic device, according to Bernstein, in essence, is a relay of power relations through three hierarchically related sets of rules – *distributive*,

recontextualizing, and *evaluative* – that regulate the relations between and within the three different fields. The *distributive rules* determine who has access to what knowledge. These rules differentiate knowledge across social groups, decide the legitimacy of knowledge for both production and educational purposes, and define who is eligible to teach or learn (Firth, 2018; Singh, 2002). In turn, these rules reproduce power structures by defining the limits of what is "thinkable" and "unthinkable" (Bernstein, 2000, p. 29). *Recontextualizing rules* regulate the adaptation of privileged knowledge into the pedagogic discourse, embedding both *regulative discourse*, which underpins the curriculum's values and social order, and *instructional discourse*, which guides the selection, sequencing, and pacing of content (Bernstein, 2000; Moore, 2013). Thus, the recontextualized knowledge in the school subjects is not only relocated but also refocused and altered to meet educational objectives, often diverging significantly from its original academic form (Bernstein, 2000). *Evaluative rules* regulate the pedagogic practices by defining and assessing what constitutes valid knowledge acquisition and appropriate dispositions for learning (Firth, 2018; Singh, 2002). Teachers utilize evaluative rules to emphasize aspects of the curriculum they consider essential for student learning, thereby influencing educational outcomes (Firth, 2018; Wright & Froehlich, 2012).

The knowledge recontextualization process, as delineated in Bernstein's pedagogic device, provides two critical insights for understanding the relationship between academic disciplines and school subjects. First, the subject knowledge finally taught in schools results from a struggle for power among the agents involved in the recontextualization process (Bernstein, 2000). Beyond the academic discipline itself, factors such as social values, ideologies, and differing perceptions of educational purposes influence the choices of what to teach in the school subjects (Hardman et al., in press; Puustinen, 2024; Puustinen et al., 2024). These agents may face tensions in terms of values and choices, as well as differing degrees of influence and authority in decision-making. As noted in Gericke et al.'s (2018) transformation framework, what knowledge is considered meaningful or powerful may be different during the top-down transformation at the societal, institutional, and classroom levels, influenced by the agents involved. It should be noted that the power dynamics in different fields in the pedagogic device depend on their historical and ideological contexts (Bernstein, 1990, p. 189). Thus, rather than serving as a universally applicable framework, the device provides an instrument to identify the power and structures related to knowledge across diverse educational contexts in different spaces and times. For example, while the ORF may exert dominant power over the PRF, and in turn direct teachers' practices according to the pedagogic device, teachers in some contexts actually possess considerable power to recontextualize knowledge rather than merely reproducing the pre-

recontextualized knowledge from the ORF and the PRF (Hordern, 2021; Kitson, 2020; Nordgren, 2021; Puustinen, 2022).

Second, building on what has come before, the power relations identified necessitate critical attention to the educational aims of the school subjects, which are usually seen as the starting points of knowledge selection and organization of school subjects (Deng, 2020). These aims often concern not only individual, but also economic, political, and societal needs (Deng, 2020, 2021). However, according to Bernstein's pedagogic device, underlying power structures may prevent these goals from genuinely serving the interests of students. It is crucial to remember that Bernstein's foundational concern was social inequality through schooling. Uncovering the power relations within knowledge recontextualization aims towards the transformation of power relations. Bernstein's earlier work on code theory illustrates how education often reproduces social inequality by limiting students' access to forms of knowledge and ways of thinking essential for their participation in society and personal development (Bernstein, 1990; Wheelahan, 2007). This reproduction may stem from unintentional "mistakes" or ideological biases within the recontextualization process (Hardman et al., in press; Puustinen, 2024; Puustinen et al., 2024). To transcend the limitations imposed by societal constraints, all students, regardless of their backgrounds, must have access to the knowledge that enables them to think the "yet-to-be-thought" and transform the "potential discursive gap" (Bernstein, 2000, p.30). A potential solution – the idea of powerful knowledge, which is a further development based on Bernstein's work – will be discussed in Section 2.3 and 2.4.

2.2 Aims of school education and the role of disciplinary knowledge in curricula

As mentioned above, while implicit power dynamics play a crucial role in framing subject knowledge, discussions about the aims (or purposes, ultimate ends) of school education guide the process of knowledge recontextualization more explicitly. Different perceived educational aims reflect the significance of academic discipline in different ways, which in turn leads to varying recontextualization outcomes and relationships between academic disciplines and school subjects.

The aims of education are multidimensional. Biesta (2009) has proposed a systematic framework that identifies three core functions of education: *qualification*, *socialization*, and *subjectification*. *Qualification* involves equipping learners with the knowledge, skills, and dispositions necessary for participation in various domains of life, including the workforce, civic spaces, and personal development. *Socialization* integrates individuals into existing cultural, social, and political orders, facilitating the continuation of traditions, norms, and values. *Subjectification* emphasizes individuality and autonomy, encouraging learners to

engage as independent and critical thinkers who can challenge or redefine existing structures. While Biesta (2009, p. 41) acknowledges that all these functions are interconnected and complementary, constituting a robust education system, he highlights *subjectification* as the highest priority of education, because it directs students to the existential question concerning human being in the world, and focuses on their freedom and autonomy (Biesta, 2021).

While Biesta does not address the content issues regarding the educational functions, curriculum scholars have linked the aims of education with different ways of knowledge selection and organization. For instance, in the English-speaking curriculum tradition, *academic rationalism*, *learner-centrism*, *social efficiency*, and *social reconstructionism* are seen as four different aims of schools (Deng, 2015, p. 81, 2020, p. 25). These different aims lead to different points of departure for knowledge selection and organization in the school curriculum: academic disciplines, student interests and existential experience, social expectations and demands, and social problems and issues (Deng, 2015, 2020).

- *Academic rationalism* prioritizes intellectual development through the initiation of students into specific bodies of disciplinary knowledge, techniques, and ways of thinking. The content emphasizes the structure and rigor of academic disciplines as the foundation for curriculum design.
- *Learner-centrism* focuses on fostering students' potential and self-actualization. This content prioritizes student interests and individual experiences, to promote autonomy and personal growth.
- *Social efficiency* emphasizes the preparation of youth to meet social and economic demands. The content focuses on societal and economic expectations, training youth to become productive and contributing members of society.
- *Social reconstructionism* uses schooling as a tool to address social inequalities and foster transformative societal reform. The content is about addressing societal challenges such as inequality, environmental issues, and democracy (Deng, 2020).

As mentioned in Chapter 1, the current trend regarding the educational aim is to develop 21st century competencies, which reflects a strong focus on *learner-centrism*, *social efficiency*, and *social reconstructionism* (Deng, 2020). The role of disciplinary knowledge, however, is missing in school curricula which encourage students to construct their own knowledge based on their interests and experience.

In contrast, aligning with Biesta's emphasis on the *subjectification* function of education, both the German *Bildung*-centred *Didaktik* tradition and the *Capabilities Approach* to education highlight the critical role of disciplinary knowledge in achieving the educational goal – individual autonomy and self-formation. In *Bildung*-centred *Didaktik*, education aims to develop independent individuals with intellectual and moral powers, enabling individuals to know, think,

and act responsibly, socially, and autonomously (Gundem, 2000; Hopmann, 2007; Humboldt, 2000). *Bildung* is achieved through knowing and linking to the world as much as possible (Humboldt, 2000). To do this, individuals need to engage with diverse forms of human thought and experience, represented by academic disciplines such as humanities and sciences (Lüth, 2000). In other words, *Bildung*-centred *Didaktik* views knowledge in specialized disciplines as significant for developing human powers, including understanding, capabilities, dispositions, and ways of thinking (Deng, 2022).

The *Capabilities Approach* is grounded in theories of human development and welfare economics (Nussbaum, 2011; Sen, 1999). When the *Capabilities Approach* is applied to education, its central aim is to promote human flourishing with combinations of human capabilities, which focus on what people are capable to do and to become, to lead more meaningful and free lives (Lambert et al., 2015; Nussbaum, 2011; Nussbaum & Sen, 1993; Sen, 1985; Walker & Unterhalter, 2007). Proponents assert that developing human capabilities entails the acquisition of specialized knowledge across various academic disciplines (Lambert, 2014, 2016a). This knowledge consists of distinctive perspectives, methods, and ways of thinking, which are dynamic and evolving rather than static or fixed (Lambert, 2018). Its high epistemic quality equips individuals to know, understand, and act effectively (Hudson, 2018).

The recognition of the role of knowledge in achieving *Bildung* and *Capabilities* is highly similar to Bernstein's (2000) notion of the "pedagogic rights" of young people to individual enhancement, social inclusion, and political participation. For Bernstein, access to knowledge is the key to addressing the inequalities of pedagogic rights, namely capabilities deprivation (Lambert et al., 2015). This knowledge has been further developed into the concept of "powerful knowledge" (Young, 2008a), which can give young people power to do and to become, in accord with the educational aim formulated in *Bildung* and *Capabilities* (Muller, 2022). Powerful knowledge has thus been a central focus in recent critiques against the competency discourse (Wheelahan, 2007), the revival of *Bildung*-centred *Didaktik* (Deng, 2021, 2022), and the development of *Capabilities Approach* (Lambert et al., 2015). As noted above, these advocates emphasize access to abstract, discipline-based scientific knowledge as the foundation of meaningful education for all students. Before introducing powerful knowledge, the next session provides another important factor – different perspectives on the nature of disciplinary knowledge – that shapes the perception of the contribution of disciplinary knowledge to education, alongside educational aims.

2.3 Different perspectives on the nature of disciplinary knowledge and three curriculum futures

The role of disciplinary knowledge in school curricula is also influenced by underpinning philosophical perspectives on knowledge per se. Young and Muller (2010) conceptualized three scenarios of school curricula – Future 1, Future 2, and Future 3, each grounded in competing perspectives on knowledge. These scenarios do not represent a chronological progression but instead provide a conceptual way of understanding the role of knowledge in different realistic curricula.

Future 1 is based on a positivist or "under socialized" perspective on knowledge, where knowledge is viewed as absolute, static, and unchanging (Young & Muller, 2010). The curriculum emphasizes knowledge for its own sake, focusing on the transmission of uncontested core knowledge from traditional subjects with given and fixed boundaries. This scenario is associated with a traditional and conservative way of teaching, which is centered on the literal transfer of knowledge from teacher to student, with the primary aim of reproducing this knowledge.

Future 2 is based on a constructivist or "over socialized" view of knowledge, which sees knowledge as a social construction, accounting for knowledge entirely in terms of the interests of its originators, namely "knowledge of the powerful" (Young & Muller, 2010; Young, 2013a). In effect, it reduces all knowledge to knowers and the power relations between them. Knowledge and truth are regarded as personal and relative. Aligning with the constructivist approach in education, the curricular focus shifts from knowledge and teaching to learning. The curriculum emphasizes generic skills or competencies, which are seen as equipment for students to construct their own knowledge. The boundaries between subjects are artificial and arbitrary, and experiential learning is highly valued. This scenario positions the learner at the center of the educational process and construes teachers as the facilitators of learning.

Future 3 is based on social realism, a perspective that arose as a response to the predominant social constructivism (Future 2), yet distinct from conservativism (Future 1) in educational studies, policy, and practice (Young et al., 2014). It recognizes that disciplinary knowledge, albeit socially constructed under given historical conditions, has objective, reliable, emergent properties. These properties are established through rigorous rules and methods during the knowledge creation, verification, and debate within specific academic communities. As a result, knowledge is not viewed as given but as fallible and always open to change through the debates and research of specialist communities (Young et al., 2014). This form of knowledge is regarded as "powerful knowledge" because it provides the best ways to understand the world to date (Young, 2013a, 2013b). In the Future 3 curriculum, subjects are neither fixed and static (as in Future 1) nor arbitrary (as in Future 2). Instead, Future 3 is best represented by a "powerful knowledge-led" curriculum

directed to promoting epistemic access to powerful knowledge for all students (Young, 2013a). Students are introduced to the epistemic rules of specialist communities, equipping them with tools to engage with the world objectively and transcend their everyday experiences. In addition, they are encouraged to engage in critical thinking and in challenging the knowledge.

Among the three scenarios, Future 1 and Future 2 represent two prevalent educational traditions. However, they are critiqued as flawed and reinforcing social inequality (Young, 2013a; Young & Muller, 2010). Future 1 reflects a traditional, knowledge-based model of education rooted in elite systems, usually transmitting established knowledge, which is usually "knowledge of the powerful" (Muller & Young, 2019), to those who typically belong to dominant social classes, in turn maintaining social hierarchies. The curriculum is designed for a select few, as mass schooling systems fail to induct all students equally. This results in tracked or streamed systems where the elite maintain access to the fixed knowledge, while disadvantaged learners are pushed into vocational tracks or dumbed-down curricula. In short, Future 1 curriculum reinforces social inequalities through stratification and exclusivity.

As a response to Future 1, Future 2 is a progressive and modern approach to education. However, it unintentionally exacerbates inequalities as well. By weakening subject boundaries and emphasizing generic skills, it obscures what needs to be learned and how knowledge is structured. The shifted focus to "learner constructing their own learning" based on individual interests and experiences assumes a level of prior knowledge and resources that disadvantaged groups often lack. As a result, this model denies disadvantaged learners access to specialized, transformative knowledge that is essential for upward mobility and meaningful participation in society.

Future 3 addresses to the limitations of Future 1 and Future 2 by offering a balanced and pragmatic alternative towards social justice through education. The core principle of Future 3 is that *access* to powerful knowledge is a right of all, not just the elite (Young & Muller, 2010). To achieve the goal of Future 3, it is essential to answer the key questions: *What constitutes powerful knowledge? More specifically, why is it important to construct school subjects by recontextualizing the academic disciplines?* These questions will be elaborated more deeply in the next section.

2.4 Powerful knowledge: the power to go beyond everyday experience and envisage alternatives

The starting point of proposing powerful knowledge is that there is some *better* knowledge which is more worthy to be selected into the school curricula for all students than the others (Young & Muller, 2013). This better knowledge, referred

to as "powerful knowledge", can offer students epistemic power to understand the world better, think beyond their everyday experience, and think the not-yet-thought. Grounded in a social realist approach to knowledge, Young (2013a) argues that powerful knowledge is specialized and emerges from the systematic intellectual frameworks of the disciplines, as distinct from context-specific, experiential knowledge.

The argument that specialized disciplinary knowledge is more powerful builds on its social, epistemic, and structural rationales by drawing on the distinction between specialized and non-specialized knowledge by Emile Durkheim, Lev Vygotsky, and Basil Bernstein (Young, 2009b; Young & Muller, 2013). Durkheim's differentiation between "sacred" and "profane" knowledge underscores that specialization is key to social progress, enabling societies to move from everyday survival needs to achieving theoretical, intellectual, and conceptual understandings of reality in order to transform it. This progression is rooted in the division of social labor, which facilitates the specialization of knowledge production. Similarly, Vygotsky's differentiation between "theoretical (or scientific)" and "everyday (or common sense)" knowledge provides an epistemic account of cognitive development. The task of formal education is to help students transform their everyday experience into theoretical knowledge to develop high order thinking. Bernstein, building on Durkheim's sociological account, further differentiates specialized knowledge along two dimensions – the internal relations (verticality) and external relations (grammaticality) of knowledge. Regarding the internal relations of knowledge, he distinguishes "hierarchical" structure, which is built cumulatively and progressively (e.g., natural sciences), and "horizontal" structure with its diverse co-existing parallel insights (e.g., social sciences and humanities). In terms of the external relations of knowledge, Bernstein distinguishes strong grammar, which describes reality with stability and reliability, from weak grammar, which is more context-dependent. While Bernstein's differentiation can risk overemphasizing the power of natural sciences at the expense of social sciences, humanities, and the arts, Young and Muller (2013) reinterpret it to affirm the diversity and sociality of specialized knowledge. They defend the distinctive power of different disciplines: while natural sciences are powerful due to their strong verticality and grammar, social sciences can offer objective insights into complex social realities through specialized methodologies and disciplinary rigor, and the arts provide universal expressions of humanity and essential resources for imagining moral and aesthetic alternatives.

In sum, powerful knowledge is specialized knowledge produced, debated, and validated by specialist communities (disciplines), distinct from everyday knowledge. Its power is rooted in its social-epistemic properties, including reliability, revisability, and emergence (Young & Muller, 2013). More importantly, the power of powerful knowledge is entailed by its effects of "power-to", namely an

ability, capacity, or disposition to do something (Maude, 2016; Muller & Young, 2019; Talbot, 2023). This intrinsic intellectual power enables individuals to understand the world in the best ways to date, think beyond their immediate experiences, and transcend social constraints (e.g., ideologies) to think the unthinkable. This transformative powerful knowledge should be an equal entitlement for all students.

Young and Muller's proposal of powerful knowledge has received significant attention from curriculum scholars and subject educators, and has triggered a range of critiques. The first critique is aimed at its strong emphasis on objective and systematically related knowledge. These critics are concerned that powerful knowledge promotes a scientism that marginalizes disciplines like humanities and arts (Alderson, 2020; Eaglestone, 2020; White, 2018), while also ignoring the value of knowledge produced outside academic disciplines (Barton, 2024; Deng, 2020). This links to a second line of critique, which challenges the binary oppositions in the theory (Alderson, 2020), especially between disciplinary and everyday knowledge. Geography educators have been particularly critical of the exclusion of everyday knowledge, since it is not only a foundational source for geographical research but also an important starting point in teaching (Catling & Martin, 2011; Roberts, 2014). The third critique comes from scholars working within *Bildung-centred Didaktik* traditions. They argue that the overemphasis on disciplinary knowledge and its epistemic power neglects broader educational aims, such as self-formation (Deng, 2020; Uljens, 2025; White, 2019). In response, advocates of powerful knowledge have offered further clarifications. They have emphasized that its original purpose was to address social inequality by ensuring that all students have epistemic access to specialized, transformative knowledge (Young & Muller, 2013; Hordern, 2019, 2024; Talbot, 2023). They also shift the focus to the "powers" of knowledge (Muller & Young, 2019; Talbot, 2023) and acknowledge the "powers" in various disciplinary domains (Young & Muller, 2013; Hordern, 2024). However, these shifts have raised a fourth concern: the definition of powerful knowledge has become increasingly unclear (White, 2018, 2019). The concept risks becoming a vague slogan, which could be used more as a political tool than an educational idea (Uljens, 2025). A fifth and growing critique highlights the hidden colonial nature behind powerful knowledge. Scholars point out that it tends to privilege the Western academic traditions while marginalizing everyday knowledge from other cultures and races, such as the hidden geographies of Indigenous peoples (Rudolph et al., 2018; Winter et al., 2024). If school curricula fail to acknowledge these issues, they risk reproducing racial inequalities (Puttick, 2023; Rudolph et al., 2018; Winter et al., 2024).

Despite these debates, the concept of powerful knowledge remains influential in curriculum studies and subject didactics. Its main contribution has been to revitalize the critical role of specialized knowledge in school curricula, especially in

an era dominated by competency-based discourse. Although contested, it has sparked valuable discussions on the role of knowledge in education. Instead of getting stuck in abstract arguments about terminology, it is more important to focus on shared meanings and how the concept works in educational realities. Subject education, such as school geography (see Section 2.5), has benefited from applying the idea to think about the powers or values that specific disciplines can offer to young people. The following section introduces the development of powerful geographical knowledge as a way to reflect on what to teach in school geography, and why it matters.

2.5 Powerful geographical knowledge: intellectual power and capabilities development

The idea of powerful knowledge has been explored widely in geography education to examine the value of geography for young people and identify what constitutes powerful geographical knowledge. One key initiative advancing this discussion is the international GeoCapabilities project, which has evolved significantly since its inception in 2013. Initially launched as a collaboration between partners from England, Finland, and the US, the pilot phase and Phase 1 (2013-2015) developed the theoretical foundation of GeoCapabilities by linking powerful knowledge with the capabilities approach, addressing the fundamental question of why geography should be taught (Lambert, 2011, 2014; Lambert et al., 2015; Solem et al., 2013). This phase also emphasized the role of teachers as curriculum makers, structuring geography teaching around three key questions: who to teach, what to teach, and how to teach. In Phase 2 (2015–2018), the project expanded to include 10 partners (Europe and the US) and over 20 associate partners worldwide, such as China, India, Japan, and New Zealand (https://www.geocapabilities.org/about/partners/). This phase focused on teacher professional development, producing online training materials to help teachers apply GeoCapabilities and powerful geographical knowledge in practice (Mitchell, 2022). So far, Phase 3 has extended the approach by collaborating with teachers and students in diverse national contexts, particularly in underprivileged schools across Europe, to examine how GeoCapabilities can enhance students' access to powerful geographical knowledge (Mitchell, 2022).

In the GeoCapabilities approach, three levels of powerful geographical knowledge were identified, all of which are needed by young people (Lambert et al., 2015):

- A deep descriptive world knowledge (L1).
- A critical conceptual knowledge that has explanatory power and systematicity, providing a relational understanding of people living on the planet (L2).

- A propensity to think through alternative social, economic, and environmental futures in specific place and locational contexts (L3).

Besides the three-level powerful geographical knowledge derived from the GeoCapabilities approach, Maude (2016, 2017) develops an alternative framework that builds on Young's definitions and descriptions of powerful knowledge (Young, 2008b, 2013a; Young et al., 2014). Focusing on the "power" dimension of powerful knowledge, namely how the knowledge enables people to do something, Maude (2016, 2017) distinguishes five types of powerful knowledge in geography:

- Knowledge that provides students with new ways of thinking about the world, which is embedded in geography's key concepts (M1).
- Knowledge that provides students with powerful ways to analyze, explain and understand the world, including geography's analytical concepts, explanatory concepts, and generalizations (M2).
- Knowledge that gives students some power over their own knowledge, namely evaluating claims about knowledge with geographical reasoning (M3).
- Knowledge that enables young people to follow and participate in debates on significant local, national, and global issues, i.e., applying geography to examine current issues (M4).
- Knowledge of the world that lies beyond the students' experience (M5).

Although these two approaches to powerful geographical knowledge differ, they are compatible, with L1 aligning with M5, L2 being similar to M2, and L3 paralleling M4 (Maude, 2018). Despite offering further specification of what constitutes powerful geographical knowledge, both frameworks remain too broad to provide a clear definition or criteria for selecting knowledge, as noted by Slater and Graves (2016). However, avoiding a rigid definition of powerful knowledge in geography is a deliberate choice. Lambert (2016b) has cautioned that defining a list of powerful knowledge risks it being applied too literally in designing the aims and contents of geography curricula, which would potentially revert to the Future 1 curriculum. Maude (2016, 2017, 2018) argued that these typologies should not lead to a list of content to be taught. Instead, they provide a way of thinking about the geography curriculum for teachers, students, and non-geographers. For teachers, the concept and typologies of powerful geographical knowledge serve as a tool for identifying the intellectual powers of any selected substantive content. This is helpful for teachers, regardless of following a prescribed curriculum or having autonomy to choose their teaching topics, to think, teach, and evaluate the knowledge in ways that empower students intellectually (Béneker & van der Vaart, 2020; Maude, 2018). For students, these typologies help them make more sense of the content for themselves. For non-geographers, especially those who make decisions about curricula, these typologies provide an explanation of the educational value of geography (Maude, 2016, 2017).

Béneker (2018) and her colleague (Béneker & van der Vaart, 2020) further refined the concept of powerful geographical knowledge, making it more practically applicable. Their work built on the aforementioned sociological base of powerful knowledge, as well as Maude's and Lambert et al.'s typologies, while also addressing skepticism and critiques from geography educators (e.g., Roberts, 2014). A key concern regarding the applicability of powerful knowledge in geography education is the important role of everyday knowledge in both geography research and teaching (Roberts, 2014, 2017). This specific dimension in the case of geography is considered, though not very obviously, in Béneker's (2018) expression of powerful geographical knowledge, which is structured around four fields: conceptual and theoretical knowledge, concrete geographical knowledge, knowledge of societal debates, and knowledge of knowledge. Aligning with this model, Béneker and van der Vaart (2020) proposed a knowledge curve model, which emphasizes the need to integrate diverse types of knowledge across various levels of abstraction in order to develop explanatory power, including very abstract concepts and very concrete facts. They identified that systematic knowledge, derived from the thematic generalization of conceptual and concrete knowledge, holds the highest explanatory power (Béneker, 2018; Béneker & van der Vaart, 2020). These two expressions of powerful geographical knowledge do not diverge from Lambert et al.'s and Maude's typologies; rather, they offer a more specific and practical way to understand the forms of powerful geographical knowledge.

In sum, the development of powerful geographical knowledge has demonstrated its meanings, significance, and potential for implementation in geography education. However, the crucial link between these theoretical ideas and their actualization in teaching and learning lies in the role of teachers. Positioned as "curriculum makers" in the GeoCapabilities project and as active agents of knowledge recontextualization in some works grounded in Bernstein's theory, teachers bear the responsibility for engaging in this essential knowledge work (Béneker et al., 2023). The next section further elaborates on how teachers can bring powerful knowledge into practice in the classroom.

2.6 Teachers' role in knowledge recontextualization

When it comes to bringing powerful knowledge (or the Future 3 curriculum) into practice, existing literature within geography education and beyond has consistently positioned teachers as key agents (e.g., Béneker et al., 2023; Healy, 2024; Kitson, 2020; Puustinen & Khawaja, 2021). Teachers' agentic role has been conceptualized as "teachers as curriculum makers" along the theoretical development of "curriculum making" and in the *Didaktik* tradition (Clandinin & Connelly, 1992; Deng, 2012, 2022; Doyle, 1992; Lambert & Morgan, 2010; Priestley & Philippou, 2018). Additionally, studies grounded in Bernstein's pedagogic device

refer to teachers as "recontextualization agents/recontextualizers" (Healy, 2024; Hordern, 2021; Khawaja & Puustinen, 2022; Kitson, 2020; Puustinen et al., 2024). Both conceptualizations highlight teacher agency in linking students with subject knowledge at the classroom level.

However, there are two nuanced strands of debate regarding the knowledge recontextualization principles of "teachers as curriculum makers" and "teachers as recontextualization agents". One strand emphasizes teachers' autonomy to make their own decisions about what to teach, and to recontextualize knowledge from the academic disciplines (Healy, 2024; Khawaja, 2024; Kitson, 2020; Puustinen et al., 2024; Mitchell, 2022). This strand is underpinned by a vision of the curriculum as a complex web in which teachers may cross boundaries to act as collaborative makers (Priestley & Philippou, 2018). A remarkable exemplar from geography education is the international GeoCapabilities project, which has developed a model of geography teachers' curriculum making (see Figure 1). Derived from Lambert and Morgan (2010, p. 50), this model retains the core idea of a good curriculum maker balancing three sources of "energy" in the classroom, namely the subject of geography, teachers' choices, and student experiences. This model is further developed in the GeoCapabilities project, which emphasizes geography teachers as active professional actors who make conscious, considered choices by drawing on disciplinary geography and identifying powerful geographical knowledge, rather than simply delivering a curriculum or central content (Bladh, 2020; Bustin, 2024; Lambert et al., 2015). To support teachers, the project further develops a helpful "toolkit" with practical steps for teachers to engage powerful disciplinary knowledge in their curriculum making (see Figure 2, adapted from Mitchell, 2022; Mitchell et al., 2022; Mitchell & Béneker, 2022).

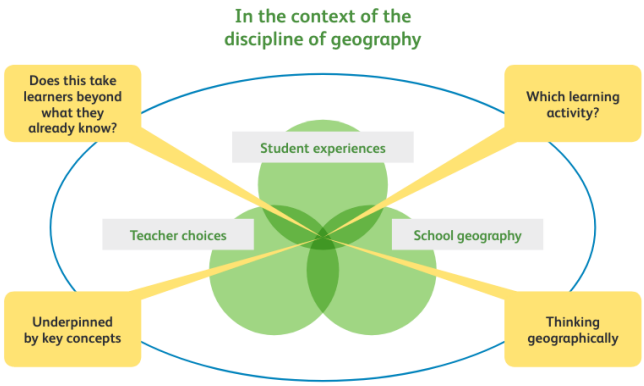


Figure 1 The curriculum-making model in GeoCapabilities project (Source: https://www.geocapabilities.org/geocapabilities-3/geocapabilities/, based on Lambert & Morgan, 2010).

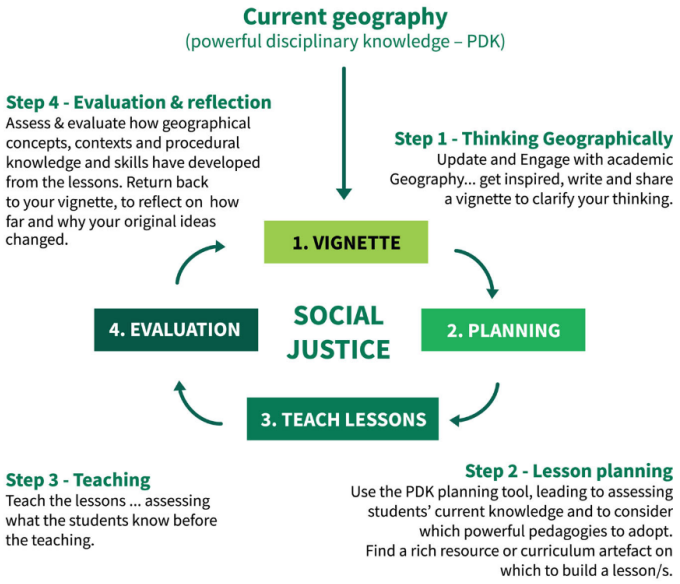


Figure 2 The GeoCapabilities approach in practical steps as a "toolkit" for teachers (Source: https://www.geocapabilities.org/geocapabilities-3).

In contrast, the other strand argues that teachers actively shape the curriculum at the classroom level to align with official curriculum frameworks, such as the educational aims outlined in the curriculum policies, rather than transcending or bypassing them. This perspective resonates with the educational model delineated in the "didactic triad" from the Nordic didactic tradition (see Figure 3). In the didactic triad, teachers interpret curriculum content through their disciplinary knowledge and make a fruitful encounter between content and student (Deng, 2022). The underpinning of this idea is a hierarchical vision of a curriculum making process that starts from the policy level, through the programmatic level, to the classroom level (Deng & Luke, 2008). This argument is also based on the premise that curriculum content is selected for some just educational purposes, towards such goals as the development of *Bildung*, capabilities, human potentials, and autonomy (Deng, 2022).

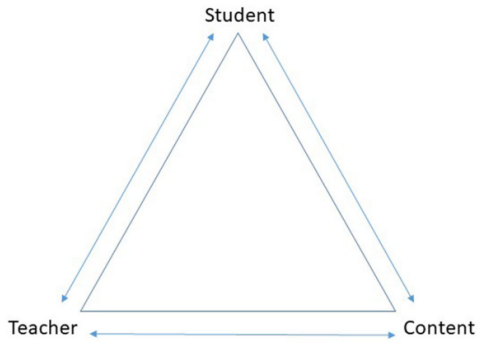


Figure 3 The didactic triad.

Despite the different recontextualization principles, both strands of "teachers as curriculum makers" share compatible educational aims, aligning with the foundational goals of powerful knowledge and the Future 3 curriculum (Muller, 2022). They share common goals through common paths, such as developing *Bildung*, capabilities, human potentials, and autonomy through powerful knowledge. The core debate lies in whether powerful knowledge should be embedded in the written curriculum, namely in the ORF and the PRF in Bernstein's pedagogic device framework, or whether powerful knowledge should rely on teachers' recontextualization. I argue that this distinction is highly context-dependent, and ideally, each field of recontextualization should be rich in powerful knowledge (Krause et al., 2025). However, drawing on Bernstein's pedagogic device (Section 2.1) and based on the empirical evidence regarding the outcomes of teachers' recontextualization (e.g., Mitchell, 2022; Puustinen & Khawaja, 2021), I agree – aligning with Puustinen et al. (2024) – that teachers who can identify powerful knowledge and effectively recontextualize disciplinary knowledge have the capacity to transcend the possible constraints imposed by the ORF and the PRF. By doing so, students have the opportunity to gain access to powerful knowledge and think the unthinkable even within a restrictive curriculum.

Nevertheless, being effective and responsible "curriculum makers" and "recontextualization agents" requires demanding intellectual work from teachers. The professional knowledge needed includes not only knowledge about the discipline (field of production) and pedagogical practice (field of reproduction), but also includes knowledge about education (the ORF and the PRF). This educational knowledge entails awareness of the political and social factors of schoolings, such as values, ideologies, economic goals, and educational traditions (Hordern, 2018, 2021; Puustinen, 2022; Puustinen et al., 2022; Säntti & Puustinen, 2024). Only by mastering these different fields of knowledge can teachers make autonomous and informed decisions to navigate the knowledge recontextualization.

So far, most research on teachers' recontextualization and curriculum-making has focused on decentralized educational systems, where teachers enjoy considerable autonomy in making their teaching choices (Healy, 2024; Khawaja & Puustinen, 2022; Kitson, 2020; Mitchell & Béneker, 2022). However, few studies have examined teachers' recontextualization in tightly regulated or hierarchical environments (e.g., China), where the ORF and the PRF may influence teachers' work heavily. Moreover, the structures of disciplinary knowledge can affect the complexity of teachers' recontextualization. A study in England indicates that while physics and history teachers were able to recontextualize knowledge from their respective disciplines, geography teachers faced greater challenges in doing so (Kitson, 2020). This difficulty arose from the breadth and hybrid nature of geography, which has led to the absence of a clear and unified epistemology within the discipline (Kitson, 2020; Liu et al., 2022). The understandings of geography can vary significantly among individual teachers (Miao, 2024), making teachers' recontextualization of geography intriguing. Therefore, the lack of empirical evidence regarding teachers' recontextualization in tightly regulated contexts, along with the dynamics of teachers' recontextualization in geography, form the basis of this study's focus.

2.7 Implications and critical reflections

To approach the gap between academic geography and school geography, the theoretical review above starts from the sociological lens of the knowledge recontextualization process with Bernstein's *pedagogic device*, which highlights the underlying power struggles in the selection and organization of knowledge within educational systems. While these struggles operate implicitly, different perspectives on educational aims and the role of disciplinary knowledge shape the relationship between academic disciplines and school subjects more explicitly. Building on Bernstein's foundational work, the concept of *powerful knowledge* offers a potential solution to make a meaningful curriculum that ensures all students have access to specialized, disciplinary knowledge. The concepts of *recontextualization* and *powerful knowledge* have been applied in geography education, exemplified in the *GeoCapabilities* project. Both *GeoCapabilities* and the broader literature on *recontextualization* and *powerful knowledge* increasingly highlight the role of teachers as curriculum makers and active agents of recontextualizing disciplinary knowledge into classrooms for equipping students with powerful knowledge. This review establishes a systematic conceptual framework and rationale for this study to navigate the gap between academic geography and school geography.

While the theoretical frameworks introduced in this study originate from English (primarily UK) academic traditions, their relevance extends beyond their original contexts. In particular, Michael Young's concept of *powerful knowledge*

has influenced Chinese curriculum studies significantly (Wen & Xie, 2018). Young's shift from social constructivism to social realism — moving from competencies-based learning and a devaluation of disciplinary knowledge to a balanced view that recognizes both knowledge objectivity and social construction — resonates with ongoing educational debates in China. Since the early 2000s, when China launched its eighth curriculum reform, discussions on knowledge versus competencies-based education have continued to shape curriculum policy (Wang, 2019; Wen & Xie, 2018; see also Section 3.2). Thus, Chinese scholars have engaged actively with Young's concept of *powerful knowledge* to rethink knowledge questions in curriculum studies (e.g., Wen et al., 2016; Young et al., 2017 [in Chinese]; Zhang et al., 2015). Along with *powerful knowledge*, the *GeoCapabilities* approach has also attracted attention from Chinese geography education researchers and has been enthusiastically applied in research and practice (An et al., 2022; An & Zhang, 2023; Gong et al., 2021; Hu et al., 2024; Miao, 2024). However, the Chinese engagement with these theories has largely involved mere introduction and direct adoption, with limited critical examination of the challenges of implementing them in China, a context significantly different from their origin.

Recognizing both the relevance of these theories to China and the need for critical examination, this study not only explores the gap between academic geography and school geography but also discusses how these theoretical perspectives align or misalign with the realities of Chinese geography education. Rather than simply applying these frameworks, this study will use the empirical insights from China to reflect on and potentially enrich these theories, while also providing a basis for their adaptation to the Chinese context.

Informed by the mechanism of knowledge recontextualization, the first research question – "*What is the gap, and why does it exist?*" – is to examine the agents involved in the "struggle for power" in selecting and organizing knowledge. At different stages and levels of the curriculum making process, various agents hold distinct perspectives on what constitutes powerful knowledge, shaping their evaluation and selection of geographical content (Deng, 2021; Gericke et al., 2018). Accordingly, the first sub-study engages relevant agents to investigate this research question.

The GeoCapabilities approach provides a valuable framework for examining the second research question – "*(Why) does bridging the gap matter – in what way does geography knowledge foster student development?*". Before bridging the gap, it is essential to evaluate and justify the educational contribution or potential of geographical knowledge in terms of developing human capabilities.

The theoretical ideas of "teachers as curriculum makers" and "recontextualization agents" shape the focus of the third sub-study on geography teachers. The lack of empirical evidence regarding teachers' recontextualization in tightly regulated contexts, along with the dynamics of teachers' recontextualization

in geography, underscore the value of exploring the third research question – "*How can geography teachers, as curriculum makers, effectively recontextualize disciplinary knowledge into the classroom?*" – in the Chinese context.

3 Context

This chapter provides background for investigating the gap between academic geography and school geography in the Chinese context. It outlines the status of geography as an academic discipline, the role of geography as a school subject within the broader curriculum policy, and the structure of geography teacher education. Additionally, this chapter introduces key themes in geography education research in China, particularly in the context of ongoing curriculum reforms, to discuss the relevance of engaging with the theoretical ideas of powerful knowledge, recontextualization, GeoCapabilities, and teachers as curriculum makers.

3.1 Geography as an academic discipline in China

Geography is a dynamic and evolving discipline, widely recognized for its integrative nature in bridging natural and social sciences, and for its ability to address complex societal and environmental challenges (Murphy, 2018). Chinese geography exemplifies this breadth, encompassing numerous subfields. Traditionally, geography is divided into physical geography and human geography. Physical geography focuses on natural environmental phenomena, including geomorphology, hydro-geography, climatology, and biogeography (Liu, 2007). Human geography explores spatial dimensions of human activities, encompassing for example cultural geography, political geography, economic geography, population geography, and urban geography (Zhao et al., 2006). Over the past half-century, knowledge production in geography has become increasingly fragmented, driven by small, specialized communities (Liu et al., 2022). While this inclusiveness and specialization have enhanced geography's societal relevance and sustainability, they also pose challenges to the discipline, as its scope risks becoming too broad to maintain a unified identity (Liu et al., 2022).

Geography in China has a strong natural scientific orientation, with the mission of addressing the nation's strategic needs (Qian & Zhang, 2022). Its development in the early 20th century was heavily influenced by Western theories and methodologies, complemented by classical Chinese philosophies that emphasize harmony between humans and nature (Fan, 2022; Qian & Zhang, 2022). During the mid-20th century, Chinese geography adopted Soviet paradigms, prioritizing economic geography for productivity and regional planning (Fan, 2022; Qian &

Zhang, 2022). In recent decades, it has increasingly incorporated Anglophone academic practices, particularly sustainability topics, quantitative methodologies, and big data applications (Fan, 2022; Qian & Zhang, 2022). Fu (2017), the President of the Geographical Society of China, has described geography as a science that reveals spatial distribution, temporal evolution, and regional characteristics of geographical elements or complexes. He highlighted the current need for Chinese geography to address the nation's strategic priorities, such as urbanization, ecological processes, water resource management, and geopolitics (Fu, 2017).

The natural scientific orientation of Chinese geography is also evidenced in its educational practices. Geography in Chinese universities has traditionally been classified as a natural science, emphasizing mathematical modeling, quantitative methods, and practical applications (Cheng & Liu, 2022; Qian & Zhang, 2022). Geography-related majors are typically awarded Bachelor of Science degrees, including those studying human geography, which focuses heavily on positivist and rationalist approaches, with limited engagement in sociological theories or qualitative methods (Qian & Zhang, 2022).

While geography in China often addresses domestic challenges, it is increasingly aligning with global – primarily referring to anglophone – academic practices and interdisciplinary approaches (Liu et al., 2022; Qian & Zhang, 2022). Chinese geographers engage actively in international dialogues and bridge epistemological and methodological gaps with anglophone academia by incorporating critical and reflexive paradigms that address inequality, identity, and postmodern theories (Qian & Zhang, 2022). This dual focus on national needs and international engagement underscores the discipline's adaptability and relevance in a rapidly changing academic and geopolitical landscape.

3.2 Geography as a school subject in China

Before examining the subject of geography, it is important to understand the broader curriculum background in China. In 2018, the Ministry of Education (MoE PRC) issued a revised national curriculum, reflecting a shift from a knowledge-based to a competencies-based (*suyang*, 素养) approach for upper secondary school education in line with the international competency turn in curriculum design (Wang, 2019). This reform reorients education from focusing on content and textbooks to emphasizing outcomes and the broader purpose of education (Zhong & Cui, 2018). *Suyang* (素养), as the educational goal, refers to the key competencies, character traits, and values that individuals demonstrate when applying knowledge and skills in complex situations (Wang, 2019). China's core competencies framework comprises three dimensions (autonomous development, civic participation, and cultural foundation), six modules (e.g., learning to learn, healthy

living, and humanistic understanding), and 18 more specific items within modules (see Figure 4, adapted from Wang, 2019), which are considered the key competencies of a whole person. While these overarching goals are shared across subjects, each subject defines its specific core competencies that align with and contribute to these broader educational aims. Subject core competencies represent the positive values, essential characteristics, and key skills that students develop within each subject area (Zhong & Cui, 2018). By the start of my doctoral study, the competencies-based curriculum had been fully implemented across all aspects of upper secondary school education in China, including curriculum standards, textbooks, teaching, and assessment. However, the curriculum reform for lower secondary schools only began in 2022. Therefore, this study focuses on the upper secondary school level.

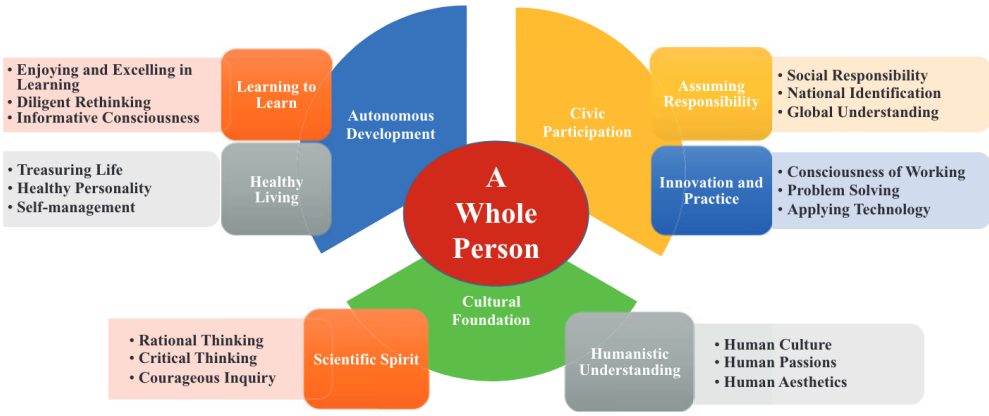


Figure 4 China's key competencies framework (adapted from Wang, 2019).

Geography is taught as a separate subject in Chinese upper secondary schools, maintaining its standing as one of the humanities subjects (along with history and politics), due to the long-standing categorization tradition (Miao, 2024). It covers diverse themes that reflect the breadth of the discipline. In Year 10, geography is compulsory and provides foundational physical and human geography knowledge, including elements in GIS. In Years 11–12, it becomes optional, intended for those taking the geography Gaokao (national college entrance examination), allowing deeper exploration of specialized fields like oceanography, political geography, and urban planning, which reflects the discipline's specialization (MoE PRC, 2018). The national geography curriculum defines four core competencies as the subject's aims, namely:

- awareness of human-nature relations (人地协调观);
- ability to think with a systemic approach (综合思维);

- ability to analyze places in terms of characteristics, scale, and connections (区域认知);
- ability to conduct geographic enquiries (地理实践力) (MoE PRC, 2018, my interpretive translation).

Furthermore, the national geography curriculum specifies detailed content for teaching and learning, typically consisting of 8 to 12 items per module. For example, regarding the theme of rural and urban geography within the compulsory human geography module (the focused topic in Sub-study III), the curriculum prescribes three key learning items: utilizing examples to elucidate the spatial structures of urban and rural areas and demonstrate the significance of the proper utilization of these spaces; employing examples to illustrate regional cultures in urban and rural landscapes; utilizing data to elucidate the process and characteristics of urbanization in various regions, as well as the advantages and disadvantages of urbanization (MoE PRC, 2018).

In China, textbooks serve as a central framework for teaching, with a strong expectation that teachers will adhere to them in their practice (Xu, 2021). Textbook content aligns with the national curriculum, elaborating on the substantive items mentioned above. Five versions of geography textbooks, published in 2019 by various presses such as the People's Education Press and Hunan Education Press, are used nationwide. Written by academic geographers and education researchers, these textbooks undergo a rigorous approval process by the National Textbook Committee (MoE PRC, 2019). District education bureaus select which version is to be used by schools in their jurisdiction. While the knowledge selection and organization of these textbooks are largely consistent across versions – to meet the requirements of the curriculum – editions vary in their instructional approaches, such as the use of inquiry cases and knowledge pacing. For instance, urban geography (the focus topic in Sub-study III) content in all textbook editions covers three main themes: spatial structures in urban areas, urbanization, and regional cultures and urban landscapes, each with several similar subthemes.

The inclusion of diverse geography subfields in the school curriculum presents a potential challenge for teachers: teaching a wide range of content while ensuring the depth and quality of instruction can be demanding, as teachers' expertise across these subfields can vary widely. This may lead to their relying on textbooks, which may not align with the discipline's dynamic nature (Sidaway & Hall, 2018). However, the diversity of disciplinary backgrounds among Chinese geography teachers may offer both opportunities and challenges in imparting up-to-date geographical knowledge, as elaborated on next.

3.3 Geography teacher education in China

Chinese geography teachers have various educational backgrounds, which include formal ITE and various geography-related majors. ITE for geography teachers in China occurs predominantly within university geography departments, which offer four-year bachelors' programs, two or three-year master's programs, and sometimes even doctoral programs. In bachelor's programs, over 50% of the study time is dedicated to disciplinary knowledge in various subfields of geography, supported by department specialists (MoE PRC, 2017). In turn, approximately 30% of study time in bachelor's programs and most of the time in master's programs is dedicated to educational knowledge and pedagogical skills (MoE PRC, 2017; National Education Professional Degree Graduate Education Steering Committee, 2022). Most ITE graduates with bachelor's or master's degrees go on to teach geography in secondary schools. Because ITE is based in geography departments, these teachers can benefit from academic environments, interacting with geographers, accessing cutting-edge research, and participating in projects led by geography researchers. This involvement sometimes leads to expertise in specific geographical areas, providing advantages when teaching related topics in school geography.

There is also an alternative pathway to becoming a school geography teacher in China. Increasingly, graduates from various geography majors and related fields are becoming geography teachers. This trend is driven by factors such as the increased demand for geography teachers caused by the 2014 Gaokao reform, which led more students to choose the subject (Miao, 2024; MoE PRC, 2014; Peng & Yang, 2018; Zhang & Dong, 2016). Additionally, the teaching profession attracts graduates seeking stable, well-remunerated positions in an uncertain job market, especially in developed cities (Qi, 2021). Furthermore, a teacher qualification is accessible to university graduates who pass the National Teacher Certification Examination (CPG PRC, 1993). Some upper secondary schools even prefer hiring graduates with advanced degrees in geography majors (e.g., geomorphology, GIS, urban geography) from prestigious universities due to their specialized knowledge, which supports students in high-level geography competitions and enhances the perceived quality of a school's teaching staff (Qi, 2021).

As a result, geography teachers' diverse disciplinary backgrounds may lead to varied disciplinary knowledge or expertise. Teachers from ITE programs in geography departments are expected to possess a systematic understanding of geography and may specialize in specific subfields, benefiting from their departments' academic resources. Teachers who transition from specialized geography fields to school teaching may bring in-depth knowledge from their previous majors, which can be advantageous for teaching related topics. However, their expertise may be limited to specific areas, posing challenges when teaching broader topics in geography.

3.4 Geography education research in China

Recently, geography education research in China has been strongly oriented to the national policy shift toward developing students' competencies (Duan et al., 2024). Based on the literature reviews on the latest year (2024), studies on Chinese geography education have predominantly focused on the four geography core competencies (see Section 3.2) and their integration in the curriculum, textbook development, teaching practices, and assessments (Wang & Zhu, 2025; Zhang et al., 2025). Research has also explored interdisciplinary learning, field-based learning, AI integration, and teacher professional development for these new trends (Wang & Zhu, 2025; Zhang et al., 2025).

While these research directions are prevalent, they operate primarily within the policy discourse, treating competencies-based education as an unquestioned goal rather than critically examining its impact on knowledge selection and curriculum structure. While the research focuses align with the main components in the knowledge recontextualization process – such as the national curriculum, textbooks, assessments, and teacher education – it rarely recognizes curriculum policy itself as a significant control mechanism in the recontextualization process. In other words, these studies overlook the power relations that shape the recontextualization in geography education.

In contrast, theoretical concepts such as recontextualization and powerful knowledge provide an alternative lens, moving beyond the implementation of competencies to question which knowledge is considered valuable, who determines the knowledge represented in classrooms, and how disciplinary knowledge is recontextualized in the education system. Rather than focusing solely on the practical delivery of competencies, this study critically examines how the competencies framework itself influences knowledge organization and selection in geography education.

Furthermore, although the concept of competencies-based education dominates Chinese geography education research, it does not align conceptually with powerful knowledge (see Sections 1.1.2, 2.2, and 2.4). Competency-based education emphasizes skills, abilities, and learning outcomes, yet it does not explicitly engage with the disciplinary rigor, specificity, and epistemic significance of geographical knowledge. At the same time, Chinese scholars have shown growing interest in concepts such as powerful knowledge, incorporating these ideas into educational research (see Section 2.7). This creates an unresolved tension: *Does the implementation of competencies-based geography education in China truly align with the theoretical understanding of competencies, or does it, in practice, intersect with the ideas of powerful knowledge?*

Currently, there is little empirical research that critically examines the tension between competencies-based education and disciplinary knowledge in China. This study engages directly with this conceptual ambiguity in Chinese geography

education research. Engaging with theoretical concepts such as recontextualization and powerful knowledge as analytical tools, this study examines how competencies are understood and enacted in Chinese geography education. Rather than simply applying anglophone curriculum theories to China, this study utilizes the theories to clarify and refine conceptual inconsistencies in the Chinese discourse. Moreover, by engaging with the Chinese educational experience, this study contributes to the cross-cultural validation and theoretical refinement of these English frameworks, expanding their applicability beyond their origins.

4 Methods

The aim of this thesis is to deepen our understanding of the challenges and opportunities in bridging the gap between academic geography and school geography by conducting three individual sub-studies. This study primarily employs a qualitative methodological approach to provide rich descriptions, interpretations, and deeper insights into the phenomenon (Lichtman 2013), incorporating multiple research methods and materials to meet the needs and purposes of each sub-study (see Table 1).

Table 1 Research methods in the three sub-studies

Research questions in this thesis	Sub-studies	Methods for collecting data	Methods for analyzing data
(1) What is the gap, and why does it exist?	Sub-study I: Exploring the gap between academic geography and school geography: Knowledge transformation of the competencies-based curriculum making in China	Questionnaire survey, interviews	Descriptive statistics, thematic analysis
(2) (Why) does bridging the gap matter – in what way does geography knowledge foster student development?	Sub-study II: GeoCapabilities approach to climate change education: Developing an epistemic model for geographical thinking	Interviews	Thematic analysis
(3) How can geography teachers, as curriculum makers, effectively recontextualize disciplinary knowledge in the classroom?	Sub-study III: Recontextualizing urban geography in Chinese upper secondary schools: The role of teachers' disciplinary knowledge	Classroom observations, interviews, and teaching-related document collection	Qualitative content analysis

While the selection of research methods follows a pragmatic approach, the underpinning philosophical assumptions align with a social realist perspective on knowledge, especially in social sciences. This is consistent with the theoretical perspectives that guide this study (see Chapter 2). Ontologically, social (critical) realism posits that reality exists independently of the observer but can be understood through three interrelated levels: the *empirical* (what is observed or experienced), the *actual* (events that occur regardless of observation), and the *real*

(the underlying structures and mechanisms that generate these events) (Bhaskar, 2008). Epistemologically, this perspective rejects both the positivist belief that reality can be fully and objectively known and the constructivist view that knowledge is purely shaped by individual experiences. Instead, it integrates aspects of both positions, acknowledging that while our knowledge of reality is always partial and subject to revision, it is nonetheless possible to get closer to uncovering the underlying mechanisms (Bhaskar, 1998; Maton & Moore, 2010). Taking an example related to this study, the gap between academic geography and school geography in the Chinese context (as an *actual* event) can be examined through *empirical* observations of various stakeholders' perspectives and teachers' practices. By engaging with the established theories, this study strives to uncover the deeper structural tensions and teachers' agency within the knowledge recontextualization process (as the *real* level). The following sections provide a detailed methodological overview across three sub-studies, including study design, participant recruitment, data collection, and analysis procedures.

4.1 Sub-study I

4.1.1 Study design

The aim of this sub-study is to examine the nature of the knowledge gap between academic geography and school geography within the context of China's competencies-based curriculum. This study employs the theoretical framework of knowledge transformation (Deng, 2021; Gericke et al., 2018) to identify the agents involved in the process of transforming disciplinary knowledge into subject knowledge. Building on Bernstein's (1990, 2000) *recontextualization* and the European tradition of *didactics*, Gericke et al. (2018) develop knowledge transformation as taking place at three hierarchical levels, namely the societal, institutional, and classroom. Integrating the concept of powerful knowledge, they argue that various agents at these levels hold distinct perspectives on what constitutes powerful knowledge, influencing how content is selected and organized. Deng (2021) extends it into a normative framework to guide the knowledge transformation at different levels to select disciplinary knowledge for developing human power or *Bildung*, which encompasses competencies development.

Informed by the knowledge transformation framework, this study identified the agents involved across the societal, institutional, and classroom levels of knowledge transformation in the Chinese context (see Table 2). In China, the societal level, determined by a selected group of academic geographers and researchers in geography education, can be examined through an analysis of curriculum guidelines and policy documents related to the geography curriculum reform (e.g., MoE PRC, 2018; Wei & Zhu, 2018). The institutional level includes designing

geography curriculum standards, textbooks, and Gaokao (central assessment). This process is mainly carried out by geographers and researchers in geography education. Transformation at the classroom level is undertaken by in-service teachers who enact the curriculum in their classes. In-service teachers' understanding and interpretation of geographical knowledge is heavily impacted by their initial teacher education, which is delivered by teacher educators, namely researchers in geography education. The institutional and classroom levels were examined through online surveys and semi-structured interviews with the agents involved in the transformation process. Given that different agents may perceive the gap in diverse ways, collecting multiple agents' voices can provide a more comprehensive understanding of the gap.

Table 2 Knowledge transformation framework that guides the study design of Sub-study I

Level	Description of the knowledge transformation process (informed by Deng (2021); Gericke et al. (2018))	Agents involved in the Chinese context
Societal	Driven by educational objectives through the recognition of the critical role of geographical knowledge in students' development	Academic geographers, researchers in geography education
Institutional	Determined to achieve subject goals through the selection and organization of geographical knowledge from academic fields into the content of school curriculum	Academic geographers, researchers in geography education
Classroom	Enacted through the interpretation of content by teachers in classrooms, which enables students to acquire and use geographical knowledge to create transformative experiences	Teachers, teacher educators

4.1.2 Data collection

To investigate the gap at the institutional and classroom levels of knowledge transformation, this study employed a mixed-methods approach, beginning with an online questionnaire survey distributed via social media platforms (i.e., WeChat and QQ). The questionnaires and the interview questions were tailored to suit each group of participants (see Appendix 1). The participant recruitment leveraged the professional backgrounds and networks of the researchers of this sub-study. I, as a former ITE student at a normal university in China, disseminated the questionnaire to my former peers and a few online learning communities for geography education. Additionally, my Chinese co-author of this sub-study, who had previously worked as a secondary school geography teacher in China, distributed the survey through her networks of in-service geography teachers. Geographers and geography educators were also part of these professional networks. To ensure the survey responses were representative of the broader population, the survey primarily targeted participants who were studying at, working in, or had graduated from

normal universities in China, as these institutions are the primary training providers for pre- and in-service teachers.

A total of 182 valid survey responses were received, comprising academic geographers (N=84), teacher educators (N=3), in-service teachers (N=47), and pre-service teachers (N=48), providing a broad perspective on the knowledge gap in China. Following the survey, semi-structured in-depth interviews were conducted with a subset of volunteer respondents (N=22) via telephone or face-to-face, with each interview lasting approximately 20–30 minutes. All interviews were recorded using a Dictaphone and transcribed for further analysis. The data, both survey and interviews, were collected from February to April 2021. Ethical approval was obtained prior to data collection, and participants provided informed consent, ensuring compliance with data protection and privacy standards. Demographic information of the participants is presented in Table 3.

Table 3 Demographics of participants in Sub-study I

Participants	Number		Institution	Professional title / Working experience	Research field / Educational background
	Survey	Interview			
Geographers	84	8	Departments of Geography at various normal universities in China	Professor, associate professor, and lecturer	Cover physical geography, human geography, and GIS
Teacher educators	3	2			Geography education
Pre-service teachers	48	7		-	Studying in the bachelor's or master's degree programs, majoring in geography education
In-service teachers	47	5	Different upper secondary schools	Teaching experience varies from 3 to 30 years	With bachelor's or master's degree in geography education

Participants were asked to give their perspectives on whether and what kinds of gap there were between academic geography and school geography and how they considered bridging the gap. The survey included both closed-ended and open-ended questions. Closed-ended questions included a 5-point Likert scale (from strongly disagree to strongly agree) for participants to self-evaluate their grasp of disciplinary knowledge, perceptions of the gap at two levels, and their attitudes toward bridging the gap. Additionally, some questions required participants to select one or more applicable items from a predefined list, allowing them to indicate

agreement with specific aspects of the gap at different levels. To gain deeper insights, open-ended questions in the survey and semi-structured interviews were used to explore participants' detailed descriptions of how the gap manifests in practice, including specific examples. Participants could elaborate on the reasoning behind their responses in the closed-ended survey, providing explanations for their choices and perspectives on the challenges of bridging the gap.

4.1.3 Data analysis

The quantitative data from the survey were analyzed using descriptive statistics to identify trends and variations in responses. The qualitative data from the open-ended questions in the survey and interviews were processed by thematic analysis to determine the gap between academic geography and school geography. Thematic analysis is an approach to interpreting people's views, opinions, experiences, or values from a set of qualitative data, including interview transcriptions and survey responses (Braun & Clarke, 2006). Following the steps of thematic analysis (Braun & Clarke, 2006), first, the data analysis process began with familiarizing researchers (the first and third authors in Sub-study I) with the data set. Second, initial codes were generated by coding meaningful points regarding the divide between academic and school geography from the participants. In the third phase, codes featuring similar contents were collated to yield themes. To identify the gap between the two sectors in a systematic way, deductive and inductive analysis were combined to come up with further themes. The deductive analysis was informed by existing literature that discussed some differences between the two sectors. A data-driven inductive analysis was used to complement and examine the deductive analysis as previous studies only gave a part of the picture of the gap issue. Steps four and five involved reviewing and defining the main themes that had been identified. In the final step, examples were selected to produce a report of the analysis. The data analysis was conducted in Chinese, which is the original language of all the questions in the survey and participants' answers. After the organization of the data, including statistical analysis and code book development, the data were translated into English and verified by co-researchers (the first and third authors in Sub-study I).

4.2 Sub-study II

4.2.1 Study design

This sub-study aims to explore the need to bridge the gap to better foster student development. Building on the insights from Sub-study I, which identified a notable

gap in the topic of climate change, particularly the lack of comprehensive geographical thinking in school geography, Sub-study II uses climate change as a focal topic. It applies the GeoCapabilities approach (see Section 2.5) to examine the educational value of multi-perspective geographical thinking in developing students' capabilities. The intended outcome of this sub-study is developing an epistemic model for thinking climate change geographically, which supports teachers' curriculum-making. The development and evaluation of the epistemic model underwent a four-step co-construction design:

- Step 1: Developing the preliminary model by thinking geographically
  Draw upon academic insights regarding the human-environmental relationship within the geography discipline to establish the preliminary epistemic model. This is a disciplinary-oriented preliminary model that represents the geographical understanding of climate change.
- Step 2: Interviews with experts in the GeoCapabilities perspective
  Conduct interviews with geography education researchers who subscribe to the GeoCapabilities viewpoint and collect their views on important geographical thinking for students to better understand climate change in an open manner.
- Step 3: Interaction with experts to reflect on the preliminary model
  Present the preliminary model to the interviewees. Reflect on their geographical thinking in the preliminary model. Discuss the similarities and differences between their original opinions and the preliminary model.
- Step 4: Examining the educational potential of the reflected model
  Anticipate the capabilities that can be developed through shared geographical thinking about climate change in the reflected model, which balances disciplinary and educational perspectives.

4.2.2 Data collection

To examine the educational potential of the geographical perspectives based on the GeoCapabilities approach, this study conducted semi-structured, in-depth interviews with nine academic experts involved in different phases of the GeoCapabilities project. Two of the experts were school-based researchers and the others were university-based researchers. The interviewees were from different countries: Australia, China, Czechia, Finland, the Netherlands, Sweden, the UK, and the USA. The international nature of the data collection was compatible with the aim of the project: to communicate the purposes of school geography internationally (Lambert et al., 2015). As geography education researchers, the participants were able to provide rich understandings of both the geography discipline and school geography in their own contexts.

The interviews were guided by two main questions: *What kinds of geographical perspectives are important for understanding climate change? What contribution can those geographical perspectives offer for young people to develop their capabilities to react to climate change?* The whole procedure and the interview frame were detailed in Appendix 2. The interviews were conducted in March 2023 via Microsoft Teams, with each lasting from 50 to 90 minutes. The recordings, with consent, were transcribed and subsequently collated for further analysis.

4.2.3 Data analysis

The data analysis was guided by Braun and Clarke's (2006) six phases of thematic analysis: familiarizing oneself with the data; generating initial codes; searching for themes; reviewing the themes; defining and naming themes; and producing reports (as described in Sub-study I, see Section 4.1.3). To facilitate the different steps involved in co-constructing the epistemic model, both inductive (data-driven) and deductive (pre-existing frame-based) analyses were applied. At the beginning of the interviews, participants were asked about the geographical perspectives they deemed important for understanding climate change. Their responses reflected diverse ways of structuring geographical thinking, influenced by their epistemological perspectives. To identify themes from their original responses, the analysis initially applied an inductive approach. Subsequently, a deductive approach was employed to explore which geographical perspectives were valued by the participants, with the preliminary model serving as an analytical framework. The interactive step in the interviews proved beneficial in minimizing misunderstandings between researchers and participants. Additionally, inductive analysis was conducted to generate themes regarding participants' views on the capabilities that can be developed from thinking geographically via different perspectives.

4.3 Sub-study III

4.3.1 Study design and participant recruitment

This sub-study aimed to investigate how teachers in the Chinese context with varying levels of disciplinary expertise recontextualize disciplinary knowledge in classroom settings. It employed a case study design, which has been effectively used in previous research on teachers' recontextualization (Healy, 2024; Khawaja & Puustinen, 2022; Kitson, 2020). Case study enables the detailed examination of real-life, contemporary cases within their natural conditions over time (Creswell & Poth, 2016) and can thus offer rich and in-depth insights into teachers'

recontextualization practices. Furthermore, a multiple case study approach was adopted to facilitate a holistic comparison across different cases (Yin, 2018). This comparative analysis is crucial for discerning variations and possible patterns in recontextualization, aligning with the study's aim of uncovering the potential impacts of teachers' disciplinary knowledge.

To ensure comparability among cases, this sub-study focused on the teaching of urban geography in upper secondary compulsory human geography. This topic was selected because it was commonly being taught in classrooms at the time of data collection. Additionally, I had access to a network of teachers with strong backgrounds in urban geography, which provided an opportunity to gain valuable insight into how these teachers recontextualize their disciplinary knowledge in practice. With the topic determined, the first selection criterion was to recruit teachers handling the same teaching module to ensure consistency across cases. The second key criterion was to ensure variation in teachers' disciplinary expertise by recruiting both teachers with and without specific disciplinary expertise in urban geography, discernible through their educational backgrounds and academic experience. To find participants capable of providing in-depth and informative insights – a principle of effective case studies – the recruitment process began within my network and expanded through snowball sampling as network informants recommended additional participants.

Ultimately, four geography teachers were selected – Alice, Bella, Chris, and David (pseudonyms) – who agreed to participate voluntarily and provide the necessary data. The participants displayed the intended variation in educational background: three teachers possessed varying levels of expertise in urban geography, while one teacher merely had a background in ITE, as detailed in Table 4. All participants were early-career teachers with less than five years of teaching experience, working in four different cities in two provinces (G and J). This can be considered a typical recruitment outcome considering the researcher's network. This case study approach prioritized depth and relevance over representativeness, acknowledging that the selected teachers, characterized by two types based on whether they possessed urban geography expertise, were not representative of all conditions of geography teachers in China.

Table 4 Participants and data of Sub-study III

Participant	Academic background	Data source
Alice	Bachelor and master: geography education (ITE programs)	Complete classroom video recordings, interview, lesson slides
Bella	Bachelor: human geography and urban/rural planning Master: human geography (specific area: population geography and urban geography)	Complete classroom video recordings, interview, lesson plans (general outline), lesson slides

Chris	Bachelor: human geography and urban/rural planning Master: human geography (specific area: land use and ecosystem services)	Incomplete classroom audio recordings, interview, lesson slides
David	Bachelor: human geography and urban/rural planning Master: geography education (ITE program) (kept studying urban geography and published some research papers)	Incomplete classroom audio recordings, interview, lesson plans (word-for-word teaching scripts), lesson slides

4.3.2 Data collection

To gain a comprehensive understanding of teachers' recontextualization, this study employed a triangulation approach by collecting multiple types of data from each teacher, including lesson recordings, interviews, and teaching-related documents such as lesson slides and lesson plans. Utilizing diverse data sources not only enriches the depth of the analysis but also enhances the reliability and validity of the research findings. Additionally, as participating in the study involved increased workloads and time commitments for the case teachers, and because different schools may have had varying regulations on data sharing, there was a risk that not all the desired data could be obtained. A combination of multiple data sources can compensate for any such gap in data completeness. All data were obtained with the participants' consent and were ethically approved, ensuring adherence to data protection and privacy standards. Data from all participants were collected concurrently and remotely in March–April 2024, as it was not feasible for the researcher to travel to different cities during the period when most schools were teaching the same module. The data collected from each participant are detailed in Table 4.

Classroom observations

Classroom observation was the key method for examining teachers' recontextualization practices. The focus of the observations was on teachers' organization of knowledge in their lessons. Accordingly, the participants were requested to record all lessons on their teaching of "urban geography" in video or audio to facilitate the researcher's observations. The number of lessons within this module ranged from three to six, depending on the teaching plans at different schools, with each lesson lasting 40 minutes under normal teaching conditions. Despite the intention to observe all lessons, practical constraints resulted in incomplete recordings from two participants. Nonetheless, these gaps were effectively bridged by their submitting lesson slides and plans for the remainder of the lessons. This was validated by a brief post-teaching inquiry, which confirmed that their lessons had been largely consistent with their detailed teaching scripts and lesson slides.

Interviews

Each teacher participated in a semi-structured interview during the week before their teaching. Drawing on the components from Bernstein's *recontextualization*, the interviews were designed to capture the teachers' understanding of the discipline, views on the subject and content, and lesson planning to explain their classroom practices. Each interview lasted 30 to 60 minutes and was recorded and transcribed for analysis. The detailed interview frame can be seen in Appendix 3.

Teaching-related documents

The teaching-related documents collected included lesson slides, lesson plans, curriculum documents, and the textbooks used by the teachers. Lesson slides, which are commonly used alongside textbooks, serve multiple functions in the classroom. They structure content delivery, emphasize key points, and provide visual aids that facilitate the teachers' instruction. These slides can assist researchers in observing the teachers' selection, sequencing, pacing, and appropriation of knowledge. All the participants provided slides for the whole of their lessons. Similarly, lesson plans provide another resource for understanding teachers' knowledge organization. Although it is standard practice to prepare lesson plans before teaching, the level of detail of these plans can vary widely among teachers, influenced by their schedules and experience. For example, David prepared detailed, word-for-word scripts for his lessons, and Bella created only generalized outlines, while the other two teachers did not write lesson plans at all. Additionally, the study material included the national curriculum document and two versions of textbooks that the participants used, including People's Education Press and Hunan Education Press.

4.3.3 Data analysis

This study employed qualitative content analysis to manage and interpret the extensive data collected from multiple sources. Qualitative content analysis can systematically unpack the meaning of qualitative materials by classifying them into categories (Schreier, 2012). The primary steps in qualitative content analysis involve building the coding frame, namely categories, and segmenting the materials into coding units (Mayring, 2022). In this study, the coding categories were mainly theory-driven and further refined through analysis of the data. The materials were segmented using thematic criteria, such as teaching themes.

To examine the extent to which the teachers recontextualized disciplinary knowledge, lesson recordings and teaching documents were analyzed. The extensive data were segmented into smaller, more manageable coding units based

on teaching themes in the textbooks, given that all participants taught with the themes. The analysis comprised three main steps:

1. Categorizing knowledge sources. First, the analysis focused on the sources of knowledge presented in the teachers' lessons to identify whether the knowledge had come from the prescribed knowledge in the textbooks, the teachers' own disciplinary knowledge beyond the textbooks, or other sources. This categorization was informed by both recontextualization theory and emergent patterns in the data.
2. Evaluating strength of knowledge source usage. Second, the degree to which teachers utilized different knowledge sources was evaluated on a four-level scale: strong use (+++), moderate use (++), light use (+), and no use (−), to provide a visual representation of the complexity of knowledge use in the lessons. The evaluation focused primarily on the quality, depth, and impact of knowledge integration rather than adhering solely to quantitative measures like time allocation. Detailed rating criteria and illustrative examples are provided in Appendix 4. To enhance the reliability of the categorization and evaluation, repeated coding was conducted.
3. Examining powerful knowledge. Third, based on the use of various knowledge sources, the analysis further focused on teachers' use of their disciplinary knowledge and examined the extent to which it imparted geographical thinking and powerful knowledge. Here, the aim was to determine whether teachers meaningfully recontextualized disciplinary knowledge and to identify their role in this process. Powerful geographical knowledge is defined as extending beyond a fixed set of given content to deepen students' geographical thinking and expand their perspectives beyond their own experiences (Bouwmans & Béneker, 2018). The analysis was guided by the widely acknowledged categories of powerful geographical knowledge (Lambert et al., 2015; Maude, 2016) and the core competencies of geography as a school subject in China, which align with powerful geographical knowledge (results from Sub-study I). These three perspectives on powerful geographical knowledge are presented in Table 5.

Table 5 Three perspectives of powerful geographical knowledge

Perspective	Categories of powerful geographical knowledge
Lambert et al. (2015)	A deep descriptive world knowledge. (L1) A critical conceptual knowledge that has explanatory power and systematicity, providing a relational understanding of people living on the planet. (L2) A propensity to think through alternative social, economic, and environmental futures in specific place and locational contexts. (L3)
Maude (2016)	New ways of thinking about the world; meta-concepts (e.g., place, space, environment) to enhance geographical thinking. (M1) Knowledge that provides students with powerful ways to analyze, explain, and understand the world. (M2)

	Knowledge that gives students some power over their own geographical knowledge; how knowledge is developed and tested in the discipline. (M3) Knowledge that enables young people to follow and participate in debates on significant local, national, and global issues. (M4) Knowledge of the world. (M5)
Chinese geography core competencies (MoE PRC, 2018)	Awareness of human-nature relations. (C1) Ability to think in a systemic approach. (C2) Ability to analyze places in terms of characteristics, scale, and connections. (C3) Ability to conduct geographic enquiries. (C4)

Subsequently, the interview data were analyzed to explain participants' recontextualization practices. Their understanding of the discipline and their views on the school subject, shaped by their different academic backgrounds, were linked to their teaching practices to shed light on how their disciplinary knowledge influences their recontextualization practices.

5 Findings

This chapter summarizes the main findings from three sub-studies, structured in three sections (5.1, 5.2, and 5.3) in response to the three research questions and three sub-studies of this thesis. Further details on the findings of each sub-study can be found in the corresponding publications. To enhance the transparency and communication of the research, this chapter also includes useful resources that had to be omitted from the publications. These are provided in the appendix.

5.1 The gap between academic geography and school geography in China: knowledge transformation in the competencies-based curriculum

Sub-study I investigates the gap across three levels – societal, institutional, and classroom – of the knowledge transformation process in the Chinese context. As discussed in Section 4.1.1, the societal level (Section 5.1.1) is examined in terms of whether educational objectives are informed by a recognition of the critical role of geographical knowledge in students' development. The institutional level (Section 5.1.2) is explored through the selection and organization of geographical knowledge from academic disciplines into the school curriculum. The classroom level (Section 5.1.3) is analyzed through teachers' enactment of curriculum content, focusing on how this enables students to acquire and apply geographical knowledge in ways that foster transformative learning experiences.

5.1.1 The role of geographical knowledge in educational objectives

Through examining the curriculum guideline and policy document (MoE PRC, 2018; Wei & Zhu, 2018), it is found that geographical disciplinary knowledge plays an important role in the national competencies-based curriculum, which emphasizes the importance of knowing and thinking like a geographer. To achieve the distinctive values of the disciplinary knowledge, school geography is considered to provide epistemic access to academic geography through building students' core competencies in four areas (i.e., awareness of human-nature relations; ability to

think in a systemic approach; ability to analyze places in terms of characteristics, scale, and connections; ability to conduct geographic inquiries; see Section 3.2). These geography competencies are firmly rooted in and considered to be cores of the Chinese geography discipline (Liu, et al., 2018). Moreover, the four geography competencies align closely with Maude (2016)'s five types of powerful geographical knowledge.

5.1.2 Geographical content in school curriculum

At the institutional level (e.g., curriculum standard, textbooks, Gaokao), a notable gap between academic geography and school geography was identified. Two main issues contribute to this gap in school geography: (1) inadequate involvement of disciplinary advancement, and (2) insufficient support from the academic community. The first issue is evident in the outdated disciplinary structure and insufficient advanced disciplinary knowledge. The second issue is reflected in unreliable diagrams, outdated information, inconsistent knowledge organization, and a restricted range of geographical approaches.

5.1.3 Geography teaching and learning

At the classroom level, twelve potential gaps identified in the literatures were confirmed to varying extents by all participant groups within the Chinese context. These gaps relate to factual knowledge, the nature of the subject, key concepts, study topics, principles, approaches, methods, geographical thinking, skills, maps and terminology, values, and advanced knowledge. Additionally, interview data revealed further gaps. Generally, the gap at the classroom level aligns with the two themes observed at the institutional level. First, teachers' use of approaches, methods, and content often fails to reflect the evolving and dynamic nature of academic geography. Second, there is a lack of multiple geographical perspectives and insufficient use of models as conceptual tools in classroom practice. These findings highlight the common challenge faced by teachers in keeping their knowledge current after completing ITE.

In summary, through the knowledge transformation across three levels, while geographical knowledge is valued at the societal level, significant discrepancies exist between academic and school geography at both the institutional and classroom levels.

5.1.4 Challenges in bridging the gap

Although approximately 95% of survey participants recognized the need to bridge the gap between academic and school geography to develop competencies, they also

acknowledged the considerable challenges involved at both the institutional and classroom levels.

At the institutional level, divergent goals between universities and schools were presented as a core challenge. It was argued that universities prioritize advancing research and knowledge creation, while schools focus on providing students with basic geographical understanding to prepare them to be informed citizens. Teachers felt constrained by the standardized exams, which limited their autonomy and prevented them from fully integrating academic geography into their practice. They pointed out that the slow process of updating curriculum standards and textbooks causes school geography to struggle to keep pace with the rapid development of academic knowledge.

At the classroom level, some teachers attempted to introduce advanced geographical knowledge to broaden their students' understanding. However, they faced difficulties because some students lacked the cognitive capacity to grasp abstract or complex concepts. Teachers also struggled to simplify academic knowledge without distorting it. Instead, the simplification inevitably undermined the rigor of knowledge. Some teachers expressed a desire to engage more with the academic community to improve their subject knowledge and teaching practices, but they recognized that bringing cutting-edge knowledge directly into school lessons could confuse students and disrupt the curriculum. The interviews highlighted the need for stronger partnerships between schools and universities to bridge the gap effectively.

5.2 Educational potential of geographical thinking in developing young people's capabilities: the case of climate change

Sub-study II seeks to bridge the gap between academic geography and school geography by exploring the educational potential of geographical knowledge. Rather than being confined to a single national context, this sub-study adopts the internationally renowned GeoCapabilities approach to communicate the broader educational value of geography. Using climate change as a case topic, the study aims to develop an epistemic model to support geography teachers' curriculum making. First, a preliminary epistemic model was constructed by identifying four key geographical perspectives – natural scientific, humanistic, social scientific, and posthuman – based on a review of literature in academic geography (Section 5.2.1). Subsequently, drawing on interviews with nine geography education researchers involved in the GeoCapabilities project, the study examined how these multiple perspectives contribute to developing students' capabilities to engage with and respond to climate change (Section 5.2.2).

5.2.1 Preliminary epistemic model for geographical thinking: multiple perspectives of human-environmental relationship

A review of contemporary geographical studies revealed multiple perspectives on geographical thinking, particularly regarding the core concept of the human-environmental relationship, which offer valuable insights into understanding the complexity of climate change. Building on this body of literature, a preliminary epistemic model was developed, comprising four key perspectives within the discipline for making sense of climate change: natural scientific, humanistic, social scientific, and posthuman (see Figure 5).

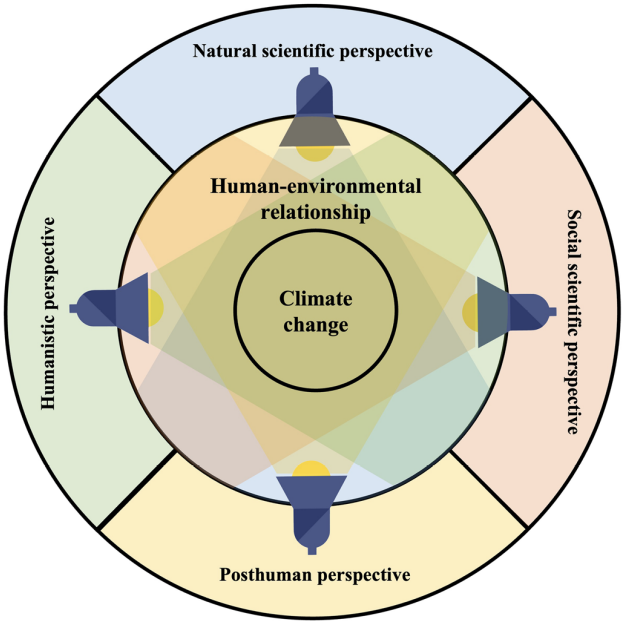


Figure 5 The preliminary epistemic model for thinking about climate change geographically.

This model was adapted from Freeman and Morgan's (2014) three-lamp model for understanding the concept of *place*. They employ the metaphor of three "lamps" to illuminate different epistemological perspectives on geographical thinking: natural scientific (focus on spatial and objective aspects, often with a positivist approach), humanistic (focus on individual, personal, subjective experiences), and social scientific (focus on socio-political processes). In a similar way, the combination of these perspectives can shape a holistic understanding of the *human-environmental relationship* – both as a key concept and as the core of geography (Holt-Jensen, 2018). Apart from the three basic perspectives, another emerging stream of thought – the posthuman perspective – has made a productive contribution to current geographical studies by challenging and shifting earlier

anthropocentric perspectives to a focus on more-than-human agency in thinking about the human-environmental relationship (Falcon, 2023; Greenhough, 2014; Miele & Bear, 2022). Together, these four perspectives represent distinct ways of seeing and interpreting the human-environmental relationship, and each shapes different ways of conceptualizing and explaining climate change (see Table 6). More details on the theoretical underpinnings of these perspectives, including their respective ontological and epistemological positions, are provided in Appendix 5.

Table 6 Understanding climate change from different geographical perspectives

Geographical perspectives	Understanding human-environmental relationship (sample views on climate change)
Natural scientific perspective	Both physical and human elements are regarded as objects that can be observed and measured by scientific methods, aiding in problem-solving. (e.g., mitigating climate change by reducing greenhouse gases)
Humanistic perspective	Focusing on individual experience and human subjectivity—how people attach their subjectivity to the environment. (e.g., reflecting on the human condition and values based on responses to climate change)
Social scientific perspective	Focusing on social justice issues from the standpoint of various individuals, groups, and societies, especially in terms of different identities based on socio-economic background, gender, race, age, and disability status, to name a few, in their relationship with the environment. (e.g., criticizing social justice issues among different people in climate policymaking)
Posthuman perspective	Challenging the separation between humans and the environment; engaging with the materiality and agency of non-human entities; tracing relations in the environment network. (e.g., seeing climate change as a hybrid and more-than-climate assemblage where humans and non-humans are mutually implicated in, constitutive of, and vulnerable to climate change; extending care to more-than-human strangers, such as multispecies, in cataclysmic times; adapting and learning to be affected by an unruly planet)

These four perspectives are embedded in broader paradigm shifts within modern geographical thought, moving from de-humanized, to anthropocentric, and more recently, to anti-anthropocentric approaches to human-environmental relations. However, these categories do not represent fixed or universally applied divisions. Alternative ways of classifying geographical thoughts exist, and some schools of research, such as poststructuralist geographies, move between or challenge the boundaries of these perspectives by combining socio-political critique with more-than-human thinking (Cresswell, 2013). These nuances reflect the dynamic, evolving, and contestable nature of geography as a discipline. Yet this epistemic model aims to make visible the various assumptions and focuses on human-environmental relationship. Despite their different theoretical foundations and the tensions that exist between them, each perspective holds distinct value as a

tool for geographers to understand the diversity and complexity of the world (Cresswell, 2013). These tensions raise important questions for school geography: whether the plural perspectives of academic geography can enhance the epistemic quality of teaching climate change, and how they can do so. The following section addresses these questions, based on interviews with experts involved in the GeoCapabilities project.

5.2.2 Multi-perspective geographical thinking and capabilities development

Before the preliminary model was presented, the expert interviews revealed four valued aspects of geographical thinking about climate change. These aspects included: factual knowledge, natural and social processes, geography concepts, and solutions and values related to climate change. The geographical perspectives in the preliminary model were implicitly reflected in their original views (see Table 7). The experts' initial responses were dominated by the natural scientific and social scientific perspectives, especially in the themes dealing with facts and explanations for climate change processes, while they integrated the other two geographical perspectives in the theme discussing solutions and values. Their responses did not straightforwardly indicate which specific perspective related to the theme of relevant geography concepts because the understanding of those concepts can involve different perspectives, whereas the participants merely provided a general description of these ideas in the interviews.

Table 7 Interviewees' ideas on geographical thinking about climate change, colored based on authors' analysis (blue: natural scientific perspective; green: humanistic perspective; red: social scientific perspective; yellow: posthuman perspective)

Themes	Codes
Factual phenomena, data, and events related to climate change	Atmospheric changes (global distribution of rising temperatures and CO2) (P1, P4, P6)
	Changing landscapes and natural disasters related to climate change (e.g., melting glaciers and rising sea level) (P4, P5, P7, P9)
	Vulnerable people (climate refugee / immigrants) because of climate change (P1, P9)
	It is difficult to reach agreements about climate change among different countries based on intergovernmental negotiations (P1, P2, P6)
Explanation of the processes of climate change	Explaining the physical processes of climate change, i.e., increasing levels of greenhouse gas pollution, by learning about physical geography, meteorology, earth system science, and climatology (P1, P2, P3, P4, P6, P7, P9)
	Explaining the social processes underpinning climate justice issues, e.g., different historical responsibilities, political conflicts, and economic relationships among different countries (P1, P2, P3, P4, P6, P7, P8, P9)

	Providing the political economic reasons (capitalism) for climate change (P3)
Relevant geography concepts for understanding climate change	Human-environmental (nature-society) relationship / interactions (P1, P3, P4, P5, P6, P8, P9)
	Place (P1, P3, P6, P7, P8)
	Space (P1, P5, P8)
	Scale (local and global) (P3, P5)
	Time and development / change (P5, P9)
Solutions and values for reacting to climate change	Paying attention to local, indigenous, minority, or ethnic knowledge and experiences with climate change (P3, P7)
	Promoting survival knowledge to react to possible disasters in local areas (P9)
	Addressing climate change requires global collaboration (P1)
	Providing hope that individual agency can make a difference in dealing with climate change (P1, P2, P5)
	Foregrounding the role of individual moral actions and behaviors in mitigating greenhouse gas emissions (e.g., food and transportation choices) (P2, P5)
	Showing care and empathy for the surrounding environment, knowing how other species change and adapt to climate change (P2, P3, P9)
	Discerning the differences between fact, fiction, and opinions about climate change (P3, P6, P7)
	Becoming aware of the social justice issues underlying climate change, e.g., responsibilities and vulnerabilities of various countries (P1, P2)

During the interactive phase, when participants were invited to reflect on their initial responses in light of the preliminary epistemic model, they generally affirmed the importance of the natural scientific, humanistic, and social scientific perspectives. However, the posthuman perspective was initially unfamiliar to many experts. After discussion, most experts acknowledged its potential value, particularly in encouraging students to move beyond anthropocentric views and to consider the agency of non-human entities. A minor discrepancy also emerged concerning the humanistic perspective. Some participants had initially conflated this perspective with general human geography. Clarifying the distinction led to a common appreciation for including all preliminary perspectives in the model.

The experts further discussed the educational potential of the epistemic model through the GeoCapabilities approach. Their insights highlighted both the unique contributions of each individual perspective and the transformative potential of combining all four perspectives. Separately, the natural scientific perspective can provide students with data literacy and an understanding of physical processes like the greenhouse effect; the humanistic perspective can foster students' sense of personal agency and their connection to environmental values; the social scientific perspective can develop students' awareness of climate justice, policy debates, and

power relations; and the posthuman perspective can encourage students to recognize the agency of non-humans and cultivate empathy for more-than-human lives. Synergistically, the presentation of multiple perspectives has the potential to nurture generic capabilities: critical thinking to assess diverse information sources and analyze climate change issues holistically, as well as freedom and agency to think independently, make informed decisions, and take actions regarding climate change.

5.3 Teachers' recontextualization and the role of their disciplinary knowledge: the case of urban geography

Sub-study III, designed as a case study, investigates how the four Chinese geography teachers recontextualize disciplinary knowledge in their teaching of urban geography, and examines the role that their disciplinary knowledge plays in this process. Section 5.3.1 analyzes the teachers' recontextualization practices. Section 5.3.2 explores how these practices are shaped by their disciplinary knowledge. Section 5.3.3 highlights an additional key finding – teachers' motivational factors – which, intertwined with their disciplinary knowledge, also influence teachers' recontextualization practices.

5.3.1 Teachers' recontextualization practices

The classroom observations and analysis of teaching related documents revealed that while all the case teachers covered the prescribed curriculum and textbook content consistently, they also exercised agency in recontextualizing disciplinary knowledge to varying degrees. The teachers drew upon four main knowledge sources in their lessons: knowledge provided in textbooks, teachers' disciplinary knowledge beyond textbooks, local cases relevant to students' experiences and everyday knowledge, and extension knowledge beyond the other three types, e.g., other examples, cases, and data.

Regarding the recontextualization of their disciplinary knowledge, teachers with stronger backgrounds in urban geography enriched their teaching by incorporating advanced disciplinary knowledge, contemporary research, and alternative geographical perspectives. Notably, David reorganized textbook content based on the structure of university-level geography knowledge and introduced theoretical models and international case studies. Bella supplemented textbook explanations with her own expertise in urban and population geography. In contrast, the teacher without specialized urban geography training relied predominantly on textbook content and made few modifications. Beyond disciplinary knowledge, all the teachers used local examples to reify the urban geography knowledge, though the extent and depth of these examples varied. Teachers who drew more heavily on

disciplinary knowledge tended to reduce their use of textbook-provided cases, replacing them with more relevant or current examples.

Teachers' recontextualization practices were further analyzed to evaluate whether they contributed to enhancing geographical thinking and fostering powerful knowledge, and how they did so. By using three established frameworks – Lambert et al.'s (2015) and Maude's (2016) powerful geographical knowledge, and the core geography competencies in the Chinese curriculum (MoE PRC, 2018) (see Section 4.3.3) – the analysis revealed notable variations in both the ways in which powerful knowledge was introduced and the extent to which this was done. While most recontextualization practices contributed to substantial engagement with powerful knowledge, enabling students to envisage alternatives, some instances did not achieve this outcome, as they focused primarily on factual knowledge transmission without developing students' conceptual understanding or geographical thinking.

5.3.2 The role of teachers' disciplinary knowledge in their recontextualization

The interviews revealed that teachers' disciplinary knowledge played a pivotal role in shaping whether, how, and how much they recontextualized knowledge in their lessons. The teachers with specialized knowledge in urban geography and a deeper understanding of the geography discipline practiced more selection, adaptation, and enrichment of content, in turn introducing geographical thinking and powerful knowledge into their teaching. Their subject expertise enabled them to evaluate the textbook critically, challenge its limitations, and offer alternative perspectives. Notably, these teachers conveyed both the "end products" of disciplinary knowledge (e.g., factual information, established models) and the "ways of thinking, studying, and knowing" within geography (e.g., theoretical debates, contested knowledge, disciplinary development). In contrast, the teachers without advanced disciplinary knowledge largely adhered to textbook content, showing limited practice in criticizing or extending it.

5.3.3 Beyond disciplinary knowledge: teachers' motivational factors for recontextualization

While disciplinary knowledge provided the resources for the teachers' recontextualization practices, the study found that motivating factors also played a crucial role, intertwined with their disciplinary knowledge. Two key motivational drivers were identified, including teachers' intrinsic motivation and their awareness of external challenges.

The teachers' intrinsic motivation was reflected in their personal interest and passion for the discipline, as well as their positive attitudes towards disciplinary knowledge for students' development. Strong intrinsic motivation drove the teachers to share the richness of the discipline with students, and in turn, engage actively in recontextualization. However, the extent to which this desire translated into practice ultimately depended on their disciplinary expertise, which determined the resources they could draw upon.

The teachers' awareness of external challenges included their perceptions of curriculum limitations and the demands of high-stakes exams (i.e., Gaokao). This central assessment was regarded as demanding, with high-order disciplinary thinking required to solve complex real-world issues. In these four cases, the teachers who viewed the textbooks as inadequate for developing students' geographical thinking or preparing them for difficult exam tasks were more inclined to draw on their disciplinary knowledge to fill these gaps.

Overall, this case study found that the teacher who exhibited both strong disciplinary knowledge and high motivation was the most active in recontextualizing disciplinary knowledge. In contrast, the teachers who lacked either disciplinary expertise or motivation engaged in more limited recontextualization practices.

6 Discussion

This chapter synthesizes the key findings from the three empirical sub-studies and discusses them by engaging with the broader theoretical concepts of knowledge recontextualization, powerful knowledge, and teachers as curriculum makers in subject education and curriculum studies. By engaging with the existing literature, it highlights the theoretical, practical, and systemic insights that emerge from this study.

Theoretically (Section 6.1), the study examines the process of knowledge recontextualization in Chinese geography education based on Sub-study I and Sub-study III, identifying the barriers and enablers that influence students' access to powerful knowledge and shape the realization of a Future 3 curriculum. It extends the discussion on a deeper understanding of teacher agency in knowledge recontextualization and contributing to the development of powerful knowledge. Practically (Section 6.2), the findings underscore the importance of strengthening teachers' professional knowledge – including disciplinary, educational, and pedagogical knowledge – to empower them as agentic curriculum makers. Systemically (Section 6.3), the discussion explores the broader educational and policy implications of enabling a Future 3 curriculum, highlighting the collaborative efforts from different stakeholders in the system.

Finally, Section 6.4 reflects critically on the limitations and proposes directions for future research to further investigate the complexities of knowledge recontextualization and validate the theoretical assumptions of powerful knowledge.

6.1 Knowledge recontextualization in Chinese geography education: barriers and enablers for students' access to powerful knowledge

Overall, this study employs Bernstein's idea of knowledge recontextualization and its development into powerful knowledge as a curriculum principle, which serves as a conceptual lens and analytical framework to examine the challenges and opportunities of bridging the gap between academic geography and school geography. The empirical Sub-study I and Sub-study III not only extend the applicability of these theoretical frameworks but also reify and enrich them by

validating their assumptions in the Chinese educational system as a fresh context. The knowledge recontextualization in Chinese geography education follows a structured yet dynamic process. Different agents, situated across various recontextualization fields, play roles in the recontextualization of geography knowledge (see Figure 6). Some agents may act as barriers or enablers for students' access to powerful knowledge, depending on their implementation. The tensions and interactions among these agents collectively shape the relationship between academic and school geography, influencing the extent to which the power of geography knowledge is ultimately accessed by students. A deeper understanding of these mechanisms not only clarifies what the gap is and why it exists, but also illuminates pathways and strategies for addressing it.

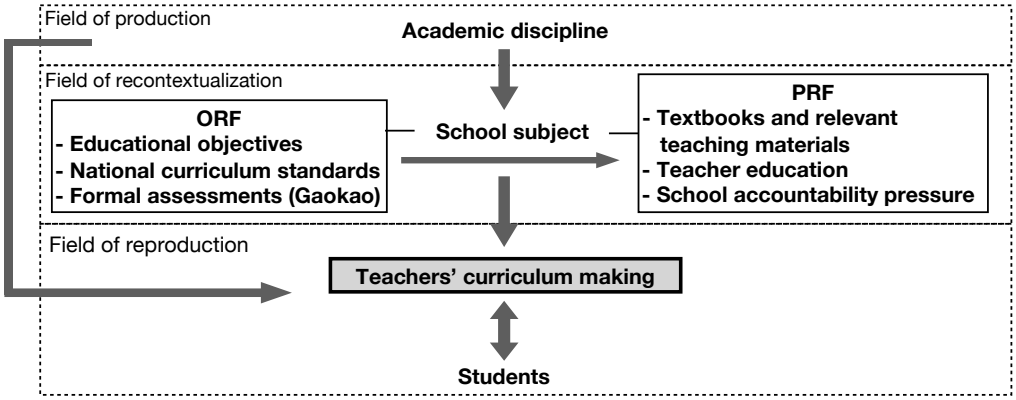


Figure 6 Knowledge recontextualization in Chinese geography education, reifying Bernstein's pedagogic device by taking into account the Chinese context and the empirical evidence from Sub-study I & Sub-study III.

6.1.1 Official recontextualization field (ORF)

In the Chinese educational system, the ORF encompasses the educational objectives of geography curriculum, national curriculum standards, and formal assessments (Gaokao), which are mainly carried out by a select group of geographers, geography education researchers, and curriculum policy makers.

Competencies as educational objectives: an enabler

Contrary to common assumptions that a competency-based curriculum undermines disciplinary knowledge (Deng, 2021; Moore, 2009; Young & Muller, 2010), the findings from Sub-study I indicate that the Chinese core competency framework in geography curriculum highlights the power of disciplinary knowledge. Rather than opposing knowledge and competencies, geography knowledge is perceived as a valuable resource for developing both subject and generic

competencies, which aligns with Deng's (2020) suggestion of "cultivation via knowledge". The discipline-based subject competencies framework can serve as an enabler for access to powerful geographical knowledge.

National curriculum standards: a barrier
Findings from Sub-study I and Sub-study III reveal that the prescribed content in national curriculum standards has failed to keep up with the development of academic geography, contributing to the gap between the two sectors. The outdated structure of geography and insufficient advanced knowledge in curriculum documents represent a Future 1 curriculum, in which knowledge is fixed, static, and given (Young & Muller, 2010). Only delivering the content limits students' engagement with the evolving discipline and the powerful knowledge needed to think alternatives. Meanwhile, this does not align with the educational objectives to develop competencies.

Standardized yet discipline-oriented formal assessments (Gaokao): both barrier and enabler
The role of Gaokao has dual effects on promoting powerful knowledge. On the one hand, findings from Sub-study I suggest that the high stakes standardized exams reinforce rigid answer structures, limiting students' ability to engage in multi-perspective geographical thinking and reasoning. In this sense, this restriction acts as a barrier, constraining how students understand and explain the world, limiting the space for challenging knowledge. However, the findings from Sub-study III reveal that Gaokao also demands high order thinking, requiring students to analyze, explain, and solve complex real-world geographical problems. The tasks often draw on cutting-edge academic research by geographers. In this sense, the demands of Gaokao have the potential to serve as a bridge between academic and school geography, fostering a deeper engagement with geographical thinking. Thus, the extent to which Gaokao functions as a barrier or enabler depends on how assessment criteria are designed and implemented. Tasks with higher-order thinking can promote epistemic access to powerful knowledge better than lower-order thinking (Krause et al., 2021).

6.1.2 Pedagogical recontextualization field (PRF)

The PRF consists of textbooks and relevant teaching materials, teacher education, and school accountability pressures. Aligning with the national curriculum standards, the design of official textbooks involves a select group of geographers and geography education researchers. Other teaching materials could involve geography educators more broadly, including high school teachers. The school

accountability pressures are applied by the school leaders, who determine the school values and evaluate the teaching quality.

Textbooks and teaching materials: a barrier with potential for remedy

As with the national curriculum standards, the findings from Sub-study I and Sub-study III indicate that textbooks often contain outdated and questionable content, presenting a significant gap between academic and school geography. As the primary resource for classroom instruction, the limitations of textbooks act as a barrier to access to powerful knowledge. However, the findings from Sub-study III suggest that teachers can actively supplement textbooks with alternative teaching materials, including online resources, shared lesson planning and experience within teacher networks, and teachers' teaching-based research. The supplementary materials have the potential to mitigate the knowledge gap, depending on how teachers select and design their teaching resources to enrich their instruction with powerful knowledge.

Teacher education (ITE): a potential barrier

This study primarily involves initial teacher education (ITE) which plays a crucial role in shaping teachers' disciplinary and pedagogical expertise. While this study does not provide direct evidence regarding the overall quality of ITE, findings from Sub-study III indicate that a teacher who only has ITE background relies heavily on curriculum standards and textbooks, both of which already exhibit a disconnection from academic geography. This reliance reinforces the lack of exposure to contemporary geographical development and a teaching culture that prioritizes content delivery over disciplinary engagement. Nevertheless, a single observation cannot be used to generalize the quality of ITE as a whole. My experience in ITE suggests that pre-service teachers have rich opportunities to engage with the discipline, highlighting the potential for strong disciplinary preparation. The findings from Sub-study III further confirm that teachers' solid disciplinary knowledge is a key enabler in their ability to promote powerful knowledge in school geography. However, if ITE is primarily oriented toward delivering prescribed content from official curriculum materials, it risks functioning as a constraint rather than a support for powerful knowledge.

School accountability pressures: a conditional factor depended on exams

In the Chinese educational system, teaching quality is largely evaluated based on student performance in standardized exams. As a result, teachers often structure their instruction around techniques to achieve better exam outcomes. In this regard, the influence of school accountability pressures on knowledge recontextualization depends on the nature of assessment itself. If exams prioritize fixed, absolute, and static knowledge, accountability pressures act as a barrier by

discouraging teachers from integrating powerful knowledge. If exams require high order thinking and problem-solving, accountability pressures can serve as a driver for teachers to integrate geographical thinking in their instruction. Thus, the exam-driven nature of Chinese schooling creates a tension where school accountability pressures can either hinder or facilitate access to powerful knowledge, depending on assessment design.

6.1.3 Teachers' curriculum making and students' learning

Teachers' agency in recontextualization: an enabler

As discussed above, the findings from Sub-study I and Sub-study III indicate that the ORF and the PRF play dominant role in Chinese teachers' curriculum making, especially the curriculum standards, textbooks, and Gaokao. However, teachers still exercise their agency in transcending curricular limitations and shaping the knowledge that students ultimately receive. This adds to our knowledge about teacher agency in a highly regulated context, as evidenced in the decentralized educational systems where teachers enjoy considerable autonomy in making their teaching choices (Healy, 2024; Khawaja & Puustinen, 2022; Kitson, 2020; Mitchell & Béneker, 2022). Rather than merely delivering prescribed content in the ORF and the PRF, teachers can actively recontextualize disciplinary knowledge and introduce powerful knowledge. This further supports the argument of teachers' role as recontextualization agents and the existence of a "teacher recontextualizing field (TRF)" (Healy, 2024; Hordern, 2021; Puustinen et al., 2024), and the possibility for Chinese teachers to consider recontextualizing the epistemic model developed in Sub-study II in their teaching.

Overcome learning barriers: linking everyday concrete knowledge with abstract disciplinary knowledge

Despite the potential for teacher-led recontextualization and their enrichment of powerful knowledge in classroom practice, as evidenced in Sub-study III, the findings from Sub-study I indicate that the gap between academic geography and school geography at the classroom level remains significant. The main challenge is that teachers struggle to integrate academic geography into teachable content while maintaining scientific rigor. Additionally, students' cognitive difficulties in engaging with complex geographical concepts present another barrier. To address these barriers, geography educators have emphasized the importance of connecting students' everyday knowledge with disciplinary knowledge in pedagogical practices to make abstract geographical concepts more accessible and meaningful (Roberts, 2014, 2023; Tani, 2022). Another pedagogical strategy is to integrate concrete and substantial knowledge with abstract concepts to enhance students' explanatory power in geographical thinking (Béneker & van der Vaart, 2020). The case studies

from Sub-study III illustrate how teachers actively draw on students' everyday experiences to facilitate their engagement with complex geographical reasoning, demonstrating these practical strategies for overcoming cognitive barriers in access to powerful knowledge.

6.1.4 Spotlighting on teachers' role in recontextualization

Through an analysis of the knowledge recontextualization process, this study identifies the barriers and enablers for students' access to powerful knowledge in Chinese geography education. These insights further underscore the critical role of teacher agency and the importance of teachers as key agents in the recontextualization process. Given that teachers ultimately decide what knowledge is presented in the classroom and what knowledge students can access, their role is pivotal in determining the extent to which powerful knowledge is effectively transmitted and whether students can fully engage with its transformative potential. Even when knowledge recontextualized at the ORF and the PRF aligns with the principles of powerful knowledge, students' access to it may still be limited if teachers do not fully grasp its power or unlock its potential effectively through their instructional practices. Conversely, even when the ORF and the PRF impose constraints on the transmission of powerful knowledge, teachers can still exercise their agency to recontextualize disciplinary knowledge, creating opportunities for students to engage with high order geographical thinking. This further reinforces the central focus of research and practice on powerful knowledge, which emphasizes supporting teachers and enhancing their professional knowledge to be agentic and effective curriculum makers (e.g., Béneker et al., 2023; Hordern, 2018, 2021; Puustinen, 2022; Krause et al., 2025). In the next section, teachers' professional knowledge will be discussed, including disciplinary knowledge, educational knowledge, and pedagogical knowledge, all of which are needed in teachers' recontextualization.

6.2 Strengthening teachers' professional knowledge for being agentic curriculum makers

6.2.1 Teacher's disciplinary knowledge: the "what" of recontextualization

Sub-study III demonstrates that teachers' disciplinary knowledge directly influences or limits whether they recontextualize knowledge in the classroom, what, and how much, and in turn, influences students' access to powerful knowledge. However, Sub-study I reveals that many geography teachers lack sufficient

disciplinary engagement after they enter the teaching career, underscoring the need to support teachers' disciplinary knowledge for curriculum-making.

Sub-study II addresses this by developing an epistemic model to enhance teachers' geographical thinking and, in turn, support their curriculum-making. Existing literature and findings from Sub-study I indicate that the teaching of climate change in school geography is often framed through a limited natural scientific perspective, overlooking the multiple perspectives inherent in geographical thinking. Sub-study II contributes by introducing an epistemic model that integrates plural geographical perspectives on human-environment relationships, fostering a more comprehensive understanding of climate change. Additionally, this study examines the potential of the epistemic model from the GeoCapabilities perspective.

However, the extent to which teachers engage with geographical thinking ultimately depends on their curriculum-making choices by considering students' needs and specific classroom contexts. Nevertheless, to make critical and informed curricular decisions, teachers must first develop a strong foundation in disciplinary knowledge and a deep understanding of geographical thinking, as shown in the toolkit for teachers developed in the GeoCapabilities project (see Figure 2, p. 23, see also Mitchell, 2022; Mitchell & Béneker, 2022; Mitchell et al., 2022). In doing so, researchers have proposed various strategies to strengthen the connection and collaboration between school educators and geographers to bridge their gap (e.g., Butt & Collins, 2018; Finn et al., 2022). However, as the discipline continues to evolve, teachers' engagement with academic geography should be ongoing, ensuring that they remain updated on new geography knowledge, perspectives, and disciplinary debates.

6.2.2 Teachers' educational knowledge: the "why" of recontextualization

While strong disciplinary knowledge is essential, Sub-study III reveals that it does not automatically lead teachers to recontextualize knowledge without various internal and external motivating factors. Moreover, teachers' recontextualization efforts do not always result in powerful knowledge. To act as agentic curriculum makers and meaningfully recontextualize the discipline, teachers require not only disciplinary knowledge but also educational knowledge. The educational knowledge is of twofold significance: understanding the educational system and power structures; and linking disciplinary knowledge to educational meaning.

First, teachers need to understand the school subject within the broader educational system, including the aims and values embedded in knowledge as it is recontextualized through the ORF and the PRF within political and social contexts. In other words, teachers need an awareness of the institutional and policy-level

factors that shape the recontextualization of knowledge (Hordern, 2021; Puustinen, 2022). The findings from Sub-study I and Sub-study III indicate that teachers work within a constrained curriculum environment, and often lack a full recognition of the structural forces that influence their work. A critical aspect of educational knowledge is the ability to reflect on the existing curriculum and recognize the need for recontextualization, which in turn shapes teachers' motivation to engage in recontextualization practices. Developing such awareness enables teachers to identify spaces of agency, allowing them to navigate, negotiate, and challenge curriculum constraints more effectively. However, within existing power relations, institutional and policy-level structures in tightly regulated educational contexts may not necessarily support teachers in engaging critically with the curriculum (Lim, 2017). While these structures often reinforce existing constraints, teachers' agency in recontextualization is still observed in this study.

Second – developed from the first – teachers' educational knowledge is important for connecting disciplinary knowledge to its broader educational meanings. This involves not only understanding how some knowledge has been selected for certain educational purposes but also transcending its given values and recognizing the broader power of disciplinary knowledge to enable students to think the unthinkable (Bernstein, 2000; Lim, 2017). When teachers focus solely on delivering factual knowledge without considering its underlying power (Talbot, 2023), they present only the discipline's end product, rather than presenting it as a dynamic and evolving body of thought. More crucial for students is learning how knowledge is produced, evaluated, validated, and debated, equipping them with the tools to critically engage with and challenge knowledge produced by the powerful (Puustinen & Khawaja, 2021). For instance, when teachers apply the epistemic model developed in Sub-study II, simply introducing the four geographical perspectives (as shown in Figure 5, p. 50) may result in a static presentation of knowledge. This risks reproducing a "Future 1" curriculum, where students merely memorize the perspectives without engaging with their deeper meaning. However, if teachers guide students to explore how these perspectives have developed, how they are debated, and how they complement or challenge one another (as illustrated in Appendix 5), they can begin to unlock the epistemic power of geography. In doing so, knowledge is no longer presented as fixed, but as a dynamic, contested, and evolving process that empowers students to think critically and independently.

6.2.3 Teachers' pedagogical knowledge: the "how" of recontextualization

As Sub-study I highlights, a key pedagogical challenge in recontextualization is how teachers transform abstract, conceptual knowledge into forms that students can grasp while maintaining its disciplinary rigor. This requires pedagogical expertise

to bridge the gap between complex geographical thinking and student cognitive levels. This specialized form of teacher knowledge has been conceptualized as pedagogical content knowledge (PCK), which enables teachers to transform disciplinary knowledge into pedagogically powerful representations that adapt to students' abilities and backgrounds (Shulman, 1987). PCK includes knowledge of pedagogical representations, students' prior knowledge, learning difficulties, and misconceptions, and instructional strategies that address these challenges (Shulman, 1986). It is the sophisticated intellectual work that teachers undertake to facilitate meaningful learning. While extensive research has examined teachers' PCK across disciplines, particularly in science, math, and language education (e.g., Grossman, 1990; Hill et al., 2008; Magnusson et al., 1999), relatively little is known about the PCK of geography teachers (Smit et al., 2023).

Although PCK is not the primary focus of this study, Sub-study III explores how geography teachers recontextualize disciplinary knowledge in the classroom. The findings indicate that teachers frequently draw on students' everyday experiences to facilitate their understanding of abstract geographical concepts, aligning with existing literature (Béneker & van der Vaart, 2020; Roberts, 2014, 2023; Tani, 2022). However, while these insights contribute to our understanding of recontextualization in geography teaching, this study does not systematically examine the specific pedagogical strategies and knowledge bases that support this process. Given the significance of recontextualization in facilitating powerful geographical knowledge, it is necessary to understand teachers' PCK more deeply in recontextualizing geography knowledge in certain educational contexts.

6.3 Systemic support for fostering teacher agency and enabling a Future 3 curriculum

This study, drawing on Bernstein's (1999, 2000) recontextualization framework, examines the mechanisms of regulation in the knowledge recontextualization process and identifies the barriers and enablers that influence students' access to powerful geographical knowledge (as discussed in Section 6.1). These findings align with existing research that emphasizes the critical role of teacher agency in the development of powerful knowledge (Béneker et al., 2023; Lambert et al., 2015; Puustinen & Khawaja, 2021). However, teacher agency does not operate in isolation; rather, it is embedded within a complex educational system, influenced by both enabling and constraining conditions across different contexts (Priestley et al., 2012; Rushton & Bird, 2024). While individual teachers may exercise professional agency in recontextualizing powerful knowledge, the assumption that all teachers can do so effectively is problematic, especially in education systems where policies are increasingly prescriptive and teacher autonomy is restricted (Hordern, 2021). For teacher agency to be realized and sustained, it requires a

supportive system that values professional autonomy, enables flexibility, and reduces performativity pressures (Miao, 2024).

Realizing a Future 3 curriculum, which fosters teacher agency and provides students with access to powerful knowledge, requires shared responsibility among multiple stakeholders in the educational system (Krause et al., 2025). Bernstein's recontextualization framework serves as a validated tool for analyzing this shared responsibility across different educational contexts, as it identifies agents, power relations, and control mechanisms that shape the knowledge recontextualization process. For instance, based on observations across seven countries, Krause et al. (2025) identify key enablers that support an ideal Future 3 curriculum throughout the knowledge recontextualization process. In a similar way, this study deepens these insights by providing a more context-specific understanding of enablers and barriers within the Chinese educational system. The findings suggest that several structural elements require thoughtful consideration. First, the official curriculum standards, textbooks, and formal assessments must be considered as to whether they align with educational objectives that aim to develop and evaluate discipline core competencies and high order geographical thinking. Second, school leadership and broader curriculum policies need to provide teachers with sufficient space to make their professional decisions, allowing them to adapt content meaningfully. Finally, teacher education needs to ensure that teachers have access to good quality and up to date disciplinary, educational, and pedagogical knowledge, equipping them with professional knowledge for effective recontextualization.

6.4 Limitations and directions for future study

While this study offers valuable empirical and theoretical insights into how to address the gap between academic geography and school geography, it has several limitations. This section highlights the limitations of the three individual sub-studies and the overall limitations of this thesis, and proposes directions for future research.

Sub-study I examines the gap between academic and school geography by analyzing the perspectives of different agents within the Chinese educational context. The findings rely on a limited number of participants' self-evaluations of their understanding of both academic and school geography, raising concerns about the reliability and subjectivity of their perceptions. Data collection was conducted within institutional settings familiar to the researchers (the first and third authors of Sub-study I), which may have influenced the participants' responses. The varying degrees of oversight in the interview and online survey formats might also have affected the openness and depth of participants' views – the reason why both methods were combined in this sub-study. Furthermore, given that the professional backgrounds and values among different groups of participants might influence

their interpretations of academic geography and school geography, the extent to which their perspectives reflect the actual gap remains uncertain. However, this study does not examine whether and how different agents' views on the nature of geography differ. Exploring their perception gap would provide deeper insights into how professional positioning shapes understandings of the knowledge gap and recontextualization, which would be an important direction for future research.

Sub-study II introduces an epistemic model to support teachers in recontextualizing geographical thinking. A key limitation is that the articulation of the four geographical perspectives in the epistemic model is based mainly on English-language literature, which might exclude knowledge from other sources in different languages. Participants' general appreciation of the model may reflect their deep engagement with English-based research traditions in both academic and school geography. Considering ongoing decolonization debates in geography and climate change studies (Radcliffe, 2022; Johnson et al., 2022), the model should be approached critically, which can be seen as a practice of engaging with powerful knowledge (postcolonialist geography). Future research should replicate the co-construction process with a broader range of contributors – not only geography education researchers but also geographers, teachers, and students – across diverse contexts. The second limitation is that this sub-study does not investigate its practical application in classrooms. The effectiveness of this model in real teaching contexts remains unexplored, leaving future studies to investigate how teachers implement it and how it influences students' understanding of powerful geographical knowledge.

Sub-study III explores how teachers recontextualize knowledge in classroom settings. As discussed in Section 6.2.3, this sub-study does not provide a detailed analysis of pedagogical strategies, which is an important domain of teachers' professional knowledge in recontextualization. Further research is needed to identify what instructional approaches can better support students' development of powerful knowledge. Additionally, the study is based on a small sample of teachers, which may include biases related to specific school contexts and teachers' disciplinary backgrounds. While small samples are appropriate for in-depth qualitative inquiry, further empirical research across diverse contexts (e.g., countries, schools, subjects, and teacher profiles) is necessary to validate and refine theoretical understandings of teachers' recontextualization practices. Furthermore, more theoretical discussions are needed to develop a more nuanced and context-sensitive understanding by synthesizing insights across different empirical settings.

Overall, this thesis primarily focuses on curriculum structures and teachers' role in knowledge recontextualization. It should be remembered that the ultimate goal of addressing the gap between academic geography and school geography is to improve students' access to powerful knowledge. While this study provides a systematic understanding of the gap issue through the knowledge

recontextualization process, it does not assess students' actual learning experience, especially whether they truly benefit from powerful knowledge. Existing research has also focused largely on curriculum and teacher perspectives, with an assumption that powerful knowledge automatically empowers students. However, empirical evidence regarding students' outcomes remains limited, particularly its impact on their cognitive development and behavioral transformation. This research gap exists not only in geography education but also across other subject areas. Thus, an important avenue for future research is to evaluate students' learning outcomes, focusing on how powerful knowledge is experienced and applied by students. Shifting the focus toward student perspectives would provide more convincing validation for advocating the idea of powerful knowledge and Future 3 curriculum in education.

Moreover, as discussed in the self-critical reflection at the beginning of the thesis (see Chapter 1, p. 2), this study engages theoretical ideas – particularly powerful knowledge, recontextualization, and GeoCapabilities – that originate from English-speaking contexts but are applied in the Chinese educational setting. While these theories are analytically valuable, it also raises broader questions about the conceptual translation and theoretical adaptability of these theories across different systems. Future research could explore how educators and scholars in different national contexts interpret and utilize these concepts: for instance, whether participants in Sub-study II – although all involved in the same international project – understood the idea of GeoCapabilities in similar ways; and how scholars in China and elsewhere adapt the notion of powerful knowledge to align with (or challenge) the competency discourses in the curriculum reform. This cross-cultural dialogue would not only enrich theoretical clarity but also help determine the extent to which such theories can serve as truly global resources for understanding curriculum and knowledge issues in education.

7 Conclusion

The lack of empirical research and deep theoretical understanding of the knowledge gap between academic geography and school geography served as a major impetus for this study. The interconnected theories of knowledge recontextualization, powerful knowledge, GeoCapabilities, and teachers as curriculum makers provide a critical lens for exploring this gap. Situated within the Chinese context, this study identifies a significant gap that emerges when disciplinary knowledge is transformed to institutional and classroom levels of curriculum making, although disciplinary knowledge is valued for developing competencies as educational objectives. To bridge the gap in the sense of providing students with access to powerful knowledge and fostering their development, this study develops an epistemic model of geographical thinking to help in teaching the concept of the human-environmental relationship and topic of climate change. The educational potential of the epistemic model is examined with regard to developing young people's capabilities, which is relevant to geography education across broader contexts. This study also examines Chinese teachers' active role in recontextualizing disciplinary knowledge to transcend the curriculum constraints and promote powerful knowledge in the classrooms, even in a tightly regulated curriculum system.

Overall, this study contributes to a systematic understanding of this gap between academic geography and school geography, articulates the educational potential of geographical knowledge for developing young people's capabilities, and identifies several barriers and enablers that influence students' access to powerful knowledge throughout the knowledge recontextualization process. These insights are valuable for stakeholders in the educational system seeking to bridge the gap and enhance the quality of geography education, especially by supporting teachers' role in recontextualization. Beyond geography education, this study also offers insights for educators in other school subjects facing similar challenges in recontextualizing disciplinary knowledge into school teaching and learning. Furthermore, by critically applying these theoretical frameworks in the Chinese educational context, this study extends their applicability while refining their underlying assumptions. In the future, understanding teachers' professional knowledge and students' engagement with and benefit from powerful knowledge will be a key direction for advancing the research in this field and informing future curriculum reforms.

Further empirical studies across diverse educational contexts, along with deeper theoretical discussions, are needed to enrich our understanding of knowledge and curriculum issues and to enhance the broader applicability of existing theories.

References

Adams, P. C., Hoelscher, S., & Till, K. E. (Eds.). (2001). *Textures of place: Exploring humanist geographies*. University of Minnesota Press.

Alderson, P. (2020). Powerful knowledge and the curriculum: Contradictions and dichotomies. *British Educational Research Journal*, 46(1), 26–43. https://doi.org/10.1002/berj.3570

An, Z., Liang, X., Zhang, J., & Ge, J. (2022). 为了强有力的地理课程——国外“强有力的地理知识”研究述评及启示 [Towards a powerful geography curriculum: A review and insights from international research on “powerful geographical knowledge”]. *Geography Teaching*, 13, 56–60. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2022&filename=DLJX202213013&uniplatform=OVERSEA&v=HlEG_vDu9jqnWAYct1FGKwXxnr8LGeoV46wYRr9Jje0fm44YaczdW8bBdP80vaVI

An, Z., & Zhang, J. (2023). 地理学科“强有力的教学”现存问题与实现策略 [Current issues and implementation strategies for “powerful teaching” in geography]. *Geography Teaching*, 15, 4–7. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2023&filename=DLJX202315001&uniplatform=OVERSEA&v=Fj4Zy6ZL0qrrvDkh4XaEBkvwqXzhwuQD-wISJiNSuInlGuSYqIxG1ajoZ6O30hqt

Ball, S. J. (2017). *The education debate*. Policy Press.

Barton, K. C. (2024). Knowledge without disciplines: A critique of social realism’s disciplinary fixation. *Journal of Curriculum Studies*, 56(3), 235–245. https://doi.org/10.1080/00220272.2024.2328058

Béneker, T. (2018). *Powerful knowledge in geography education* [Inaugural lecture]. Utrecht University. https://www.uu.nl/sites/default/files/20190319-inaugural_lecture-tine_beneker.pdf

Béneker, T., Bladh, G., & Lambert, D. (2023). Exploring ‘Future three’ curriculum scenarios in practice: Learning from the GeoCapabilities project. *The Curriculum Journal*, 35(3), 396–411. https://doi.org/10.1002/curj.240

Béneker, T., Sanders, R., Tani, S., Taylor, L., & van der. Vaart, R. (2007). Teaching the geographies of urban areas: Views and visions. *International Research in Geographical and Environmental Education*, 16(3), 250–267. https://doi.org/10.2167/irgee210.0

Béneker, T., & van der Vaart, R. (2020). The knowledge curve: Combining types of knowledges leads to powerful thinking. *International Research in Geographical and Environmental Education*, 29(3), 221–231. https://doi.org/10.1080/10382046.2020.1749755

Bernstein, B. (1990). *Class, codes and control: The structuring of pedagogic discourse*. Routledge.

Bernstein, B. (2000). *Pedagogy, symbolic control, and identity: Theory, research, critique*. Rowman & Littlefield.

Bhaskar, R. (1998). *The possibility of naturalism: A philosophical critique of the contemporary human sciences*. Routledge.

Bhaskar, R. (2008). *A realist theory of science*. Routledge.

Biesta, G. (2005). Against learning: Reclaiming a language for education in an age of learning. *Nordisk Pedagogik*, 25(1), 54–66. https://doi.org/10.18261/ISSN1891-5949-2005-01-06

Biesta, G. (2009). Good education in an age of measurement: On the need to reconnect with the question of purpose in education. *Educational Assessment, Evaluation and Accountability*, 21(1), 33–46. https://doi.org/10.1007/s11092-008-9064-9

Biesta, G. (2021). *World-centred education: A view for the present*. Routledge.

Biesta, G., & Priestley, M. (2013). Capacities and the curriculum. In M. Priestley & G. Biesta (Eds.), *Reinventing the curriculum: New trends in curriculum policy and practice* (pp. 35–49). Bloomsbury Academic.

Bladh, G. (2020). GeoCapabilities, Didaktical analysis and curriculum thinking – furthering the dialogue between Didaktik and curriculum. *International Research in Geographical and Environmental Education*, 29(3), 206–220. https://doi.org/10.1080/10382046.2020.1749766

Blaikie, P. M., & Brookfield, H. (Eds.). (1987). *Land degradation and society*. Routledge.

Bonnett, A. (2003). Geography as the world discipline: Connecting popular and academic geographical imaginations. *Area*, 35(1), 55–63. https://doi.org/10.1111/1475-4762.00110

Bonnett, A. (2008). *What is geography?* Sage.

Bouwmans, M., & Béneker, T. (2018). Identifying powerful geographical knowledge in integrated curricula in Dutch schools. *London Review of Education*, 16(3), 445–459. https://doi.org/10.18546/LRE.16.3.07

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

Bunge, W. (1962). *Theoretical geography*. C. W. K. Gleerup.

Bustin, R. (2022). Teaching the geographies of the homeless: A GeoCapabilities approach. *Geography*, 107(1), 46–54. https://doi.org/10.1080/00167487.2022.2019497

Bustin, R. (2024). *What are we teaching? Powerful knowledge and a capabilities curriculum*. Crown House Publishing.

Butt, G. (2019). Bridging the divide between school and university geography – 'mind the gap!' In H. Walkington, J. Hill, & S. Dyer (Eds.), *Handbook for teaching and learning in geography* (pp. 31–45). Edward Elgar Publishing.

Butt, G., & Collins, G. (2018). Understanding the gap between schools and universities. In M. Jones & D. Lambert (Eds.), *Debates in geography education* (pp. 263–274). Routledge.

Castree, N., Fuller, D., & Lambert, D. (2007). Geography without borders. *Transactions of the Institute of British Geographers*, 32(2), 129–132. https://doi.org/10.1111/j.1475-5661.2007.00252.x

Catling, S., & Martin, F. (2011). Contesting powerful knowledge: the primary geography curriculum as an articulation between academic and children's (ethno-) geographies. *The Curriculum Journal*, 22(3), 317 – 335. https://doi.org/10.1080/09585176.2011.601624

Cheng, H., & Liu, W. (2022). Geography, area studies and Chinese world-writing. *Progress in Human Geography*, 46(4), 1065–1085. https://doi.org/10.1177/03091325221096179

Chevallard, Y., & Bosch, M. (2020). Didactic transposition in mathematics education. In S. Lerman (Ed.), *Encyclopedia of mathematics education* (pp. 214–218). Springer.

Clandinin, D. J., & Connelly, F. M. (1992). Teacher as curriculum maker. In P. W. Jackson (Ed.), *Handbook of research on curriculum: A project of the American Educational Research Association* (pp. 363–401). Macmillan Publishing Company.

CPG PRC. (1993). 中华人民共和国教师法[*Teachers' law of the People's Republic of China*]. https://www.gov.cn/banshi/2005-05/25/content_937.htm

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage Publications.

Cresswell, T. (2013). *Geographic thought: A critical introduction*. Wiley-Blackwell.

Cresswell, T. (2024). *Geographic thought: A critical introduction (2nd ed.)*. Wiley-Blackwell.

Deleuze, G., & Guattari, F. (1988). *A thousand plateaus: Capitalism and schizophrenia*. Athlone.

Deng, Z. (2012). Curriculum making in the new curriculum reform: Structure, process, and meaning. In H. Yin & J. C.-K. Lee (Eds.), *Curriculum reform in China: Changes and challenges* (pp. 31–46). Nova Science.

Deng, Z. (2015). Organization and sequencing of subject matters. In M. F. He, B. D. Schultz, & W. H. Schubert (Eds.), *Sage guide to curriculum in education* (pp. 78–86). Sage.

Deng, Z. (2020). *Knowledge, content, curriculum and didaktik: Beyond social realism*. Routledge.

Deng, Z. (2021). Powerful knowledge, transformations and Didaktik/curriculum thinking. *British Educational Research Journal*, 47(6), 1652–1674. https://doi.org/10.1002/berj.3748

Deng, Z. (2022). Powerful knowledge, educational potential and knowledge-rich curriculum: Pushing the boundaries. *Journal of Curriculum Studies*, 54(5), 599–617. https://doi.org/10.1080/00220272.2022.2089538

Deng, Z., & Luke, A. (2008). Subject matter: Defining and theorizing school subjects. In F. M. Connelly, M. F. He, & J. Phillion (Eds.), *The Sage handbook of curriculum and instruction* (pp. 66–87). Sage.

Dowling, R., Lloyd, K., & Suchet-Pearson, S. (2017). Qualitative methods II: "More-than-human" methodologies and/in Praxis. *Progress in Human Geography*, 41(6), 823–831. https://doi.org/10.1177/0309132516664439

Doyle, W. (1992) Constructing curriculum in the classroom. In F. Oser, A. Dick, & J.-L. Patry (Eds.), *Effective and responsible teaching: The new syntheses* (pp. 66–79). Jossey-Bass.

Duan, Y., Ding, R., & Liu, S. (2024). Futures for geography education in China. In S. W. Bednarz & J. T. Mitchell (Eds.), *Handbook of geography education* (pp. 823–838). Springer Nature.

Duobliené, L., Kaire, S., & Vaitekaitis, J. (2023). Education for the future: Applying concepts from the new materialist discourse to UNESCO and OECD publications. *The Journal of Environmental Education*, 54(3), 213–224. https://doi.org/10.1080/00958964.2023.2188576

Eaglestone, R. (2020). 'Powerful knowledge', 'cultural literacy' and the study of literature in schools. *Impact*, 2020(26), 2–41. https://doi.org/10.1111/2048-416X.2020.12006.x

Falcon, J. (2023). Toward a critical posthuman geography. *Cultural Geographies*, 30(1), 19–34. https://doi.org/10.1177/14744740221110579

Fan, J. (2022). A century of integrated research on the human-environment system in Chinese human geography. *Progress in Human Geography*, 46(4), 988–1008. https://doi.org/10.1177/03091325221085594

Finn, M., Hammond, L., Healy, G., Todd, J. D., Marvell, A., McKendrick, J. H., & Yorke, L. (2022). Looking ahead to the future of GeogEd: Creating spaces of exchange between communities of practice. *Area*, 54(1), 41–51. https://doi.org/10.1111/area.12701

Firth, R. (2018). Recontextualizing geography as a school subject. In D. Lambert & M. Jones (Eds.), *Debates in Geography Education* (pp. 275–286). Routledge.

Freeman, D., & Morgan, A. (2014). Teaching about places. *Teaching Geography*, 39(3), 94–98. https://doi.org/10.2307/26455133

Fu, B. (2017). 地理学:从知识、科学到决策[Geography: From knowledge, science to decision making support]. *Acta Geographica Sinica*, 72(11), 1923–1932. https://kns.cnki.net/kcms/detail/11.1856.P.20171114.1031.002.html

Gericke, N., Hudson, B. J., Olin-Scheller, C., & Stolare, M. (2018). Powerful knowledge, transformations and the need for empirical studies across school subjects. *London Review of Education*, 16(3), 428–444. https://doi.org/10.18546/LRE.16.3.06

Gong, Q., Brooks, C., & Duan, Y. (2021). A teacher's role in making a given knowledge curriculum into a powerful knowledge curriculum. *Geography*, 106(1), 39–48. https://doi.org/10.1080/00167487.2020.1862591

Goudie, A. (1993). Schools and universities – the great divide. *Geography*, 78(4), 338–339. http://www.jstor.org/stable/40572548

Greenhough, B. (2014). More-than-human geographies. In R. Lee, N. Castree, R. Kitchin, V. Lawson, A. Paasi, C. Philo, S. Radcliffe, S. M. Roberts, & C. W. J. Withers (Eds.), *The Sage handbook of human geography* (pp. 94–119). Sage Publications.

Gregory, S. (1963). *Statistical methods and the geographer*. Longman.

Grossman, P. L. (1990). *The making of a teacher: Teacher knowledge and teacher education*. Teachers College Press.

Gundem, B. B. (2000). Understanding European didactics. In B. Moon, M. B. Peretz, & S. Brown (Eds.), *Routledge international companion to education* (pp. 235–262). Routledge.

Haraway, D. (2016). *Staying with the trouble*. Duke University Press.

Hardman, M., Nilsberth, M. & Puustinen, M. (in press). *Bringing powerful knowledge into classrooms: Subject teachers as recontextualising agents*. UCL Press.

Healy, G. E. (2024). *Rendering visible teachers' intellectual work: An examination of the recontextualization of knowledge through geography teachers' professional practice* [PhD dissertation]. University College London.

Hill, H. C., Ball, D. L., & Schilling, S. G. (2008). Unpacking pedagogical content knowledge: Conceptualizing and measuring teachers' topic-specific knowledge of students. *Journal for Research in Mathematics Education*, 39(4), 372–400. https://doi.org/10.5951/jresematheduc.39.4.0372

Hill, J. L., & Jones, M. (2010). 'Joined-up geography': Connecting school-level and university-level geographies. *Geography*, 95(1), 22–32. https://www.jstor.org/stable/40574787

Holt-Jensen, A. (2018). *Geography: History and concepts*. Sage Publications.

Hopmann, S. (2007). Restrained teaching: The common cores of Didaktik. *European Educational Research Journal*, 6(2), 109–124. https://doi.org/10.2304/eerj.2007.6.2.109

Hordern, J. (2018). Is powerful educational knowledge possible? *Cambridge Journal of Education*, 48(6), 787–802. https://doi.org/10.1080/0305764X.2018.1427218

Hordern, J. (2019). Exercise and intervention: On the sociology of powerful knowledge. *London Review of Education*, 17(1), 26–37. https://doi.org/10.18546/LRE.17.1.03

Hordern, J. (2021). Recontextualization and the teaching of subjects. *The Curriculum Journal*, 32(4), 592–606. https://doi.org/10.1002/curj.110

Hordern, J. (2024). On the intellectual horizons of social realism: A response to Barton. *Journal of Curriculum Studies*, 57(1), 47–55. https://doi.org/10.1080/00220272.2024.2375238

Hu, Q., Fan, M., Tian, Y., Tao, X., & Liu, A. (2024). Evolving into curriculum makers: The pivotal role of geography teachers as "boundary teachers". *International Research in Geographical and Environmental Education*. https://doi.org/10.1080/10382046.2024.2426398

Hudson, B. (2018). Powerful knowledge and epistemic quality in school mathematics. *London Review of Education*, 16(3), 384–397. https://doi.org/10.18546/LRE.16.3.03

Hulme, M. (2008). Geographical work at the boundaries of climate change. *Transactions of the Institute of British Geographers*, 33(1), 5–11. https://doi.org/10.1111/j.1475-5661.2007.00289.x

Humboldt, W. V. (2000). Theory of bildung. In I. Westbury, S. Hopmann, & K. Riquarts (Eds.), *Teaching as a reflective practice: The German Didaktik tradition* (pp. 57–61). Erlbaum.

Ingold, T. (2021). *The perception of the environment: Essays on livelihood, dwelling and skill*. Routledge.

Janelle, D. G., Warf, B., & Hansen, K. (Eds.). (2004). *WorldMinds: Geographical perspectives on 100 problems*. Kluwer Academic Publishers.

Johnson, D. E., Parsons, M., & Fisher, K. (2022). Indigenous climate change adaptation: New directions for emerging scholarship. *Environment and Planning E: Nature and Space*, 5(3), 1541–1578. https://doi.org/10.1177/25148486211022450

Khawaja, A. (2024). *Historical literacy in Finnish primary classrooms: Teaching history or things about the past?* [PhD dissertation]. Helsinki Studies in Education, 178.

Khawaja, A., & Puustinen, M. (2022). Recontextualizing history in primary school: Discourses in the classroom. *History Education Research Journal*, 19(1), 7. https://doi.org/10.14324/HERJ.19.1.07

Kinder, A., & Brace, S. (2022). The Geography and Education Research Group and school geography: Problematics and possibilities. *Area*, 54(1), 33–40. https://doi.org/10.1111/area.12769

Kitson, A. (2020). *Teachers as recontextualization agents: A study of expert teachers' knowledge and their role in the recontextualization process across different subjects* [PhD dissertation]. University College London.

Krause, U., Béneker, T., Van Tartwijk, J., & Maier, V. (2021). Curriculum contexts, recontextualisation and attention for higher-order thinking. *London Review of Education*, 19(1), 24, 1–17. https://doi.org/10.14324/LRE.19.1.24

Krause, U., Rawlings, E., Flajšhans, R., He, X., He, Y., Ito, N., Milaras, M., Yang, J., Hanus, M., & Béneker, T. (2025). The barriers and enablers of curriculum thinking and teacher agency in geography education: A multinational study. *International Research in Geographical and Environmental Education*, 34(3), 220–236. https://doi-org.libproxy.helsinki.fi/10.1080/10382046.2025.2466160

Labaree, D. F. (2014). Let's measure what no one teaches: PISA, NCLB, and the shrinking aims of education. *Teachers College Record*, 116(9), 1–14. https://doi-org/10.1177/016146811411600905

Lambert, D. (2011). Reviewing the case for geography, and the 'knowledge turn' in the English National Curriculum. *The Curriculum Journal*, 22(2), 243–264. https://doi.org/10.1080/09585176.2011.574991

Lambert, D. (2014). Curriculum thinking, 'capabilities' and the place of geographical knowledge in schools. *Syakaika Kenkyu* (*Journal of Japanese Educational Research Associaon for the Social Studies)*, 81(3), 1–11. https://doi.org/10.20799/jerasskenkyu.81.0_1

Lambert, D. (2016a). Chapter 25: Geography. In D. Wyse, L. Hayward, & J. Pandya (Eds.), *The Sage handbook of curriculum, pedagogy and assessment* (pp. 397–407). Sage.

Lambert, D. (2016b). A response to Graves and Slater. *International Research in Geographical and Environmental Education*, 25(3), 192–193. https://doi.org/10.1080/10382046.2016.1155321

Lambert, D. (2018). Geography, capabilities and the educated person. In E. Shin, & S. Witham Bednarz (Eds.), *Spatial citizenship education: Citizenship through geography* (pp. 22–40). Routledge.

Lambert, D., & Morgan, J. (2010). *Teaching geography 11-18: A conceptual approach*. Open University Press.

Lambert, D., Solem, M., & 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), 723–735. https://doi.org/10.1080/00045608.2015.1022128

Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Latour, B. (2014). Some advantages of the notion of "critical zone" for geopolitics. *Procedia Earth and Planetary Science*, 10, 3–6. https://doi.org/10.1016/j.proeps.2014.08.002

Latour, B. (2017). *Facing Gaia: Eight lectures on the new climatic regime*. Polity Press.

Lichtman, M. (2013). *Qualitative research in education: A user's guide*. Sage.

Lim, L. (2017). Regulating the unthinkable: Bernstein's pedagogic device and the paradox of control. *International Studies in Sociology of Education*, 26(4), 353–374. https://doi.org/10.1080/09620214.2017.1317605

Lingard, B., Sellar, S., & Baroutsis, A. (2015). Researching the habitus of global policy actors in education. *Cambridge Journal of Education*, 45(1), 25–42. https://doi.org/10.1080/0305764X.2014.988686

Liu, N. (2007). *自然地理学 [Physical geography]*. Science Press.

Liu, W., Cheng, H., & Han, X. (2022). Rebuilding geography for the 21st century through disciplinary reunification and social engagement. *Environment and Planning F*, 1(1), 114-124. https://doi.org/10.1177/26349825221082162

Liu, Y., Lu, D., Bao, J., Ye, C., Tang, M., Liu, Y., Zhao, Y., Feng, Z., Huang, X., Hao, Q., Huang, G., Wang, F., Wei, Z., Wang, L., Xie, Y., & Qian, L. (2018). 如何回归地理学: 我的思考与实践 [How to revive geography: Our reflection and practice]. *Geographical Research*, 37(6), 1049–1069. https://oversea.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2018&filename=DLYJ201806002&uniplatform=OVERSEA&v=jxZEPYyDYopLc903OBram00J6-7FV4HA6XIA5ztLU7HDMZIbb2qbedfEYOmh5eyB

Lüth, C. (2000). On Wilhelm von Humboldt's theory of Bildung. In I. Westbury, S. Hopmann, & K. Riquarts (Eds.), *Teaching as a reflective practice: The German Didaktik tradition* (pp. 63–84). Erlbaum.

Magni, G. (2017). Indigenous knowledge and implications for the sustainable development agenda. *European Journal of Education*, 52(4), 437–447. https://doi.org/10.1111/ejed.12238

Magnusson, S., Krajcik, J., & Borko, H. (1999). Nature, sources, and development of pedagogical content knowledge for science teaching. In J. Gess-Newsome & N. G. Lederman (Eds.), *Examining pedagogical content knowledge* (pp. 95–132). Springer.

Maton, K., & Moore, R. (Eds.). (2010). *Social realism, knowledge and the sociology of education*. Bloomsbury Publishing.

Maude, A. (2016). What might powerful geographical knowledge look like? *Geography*, 101(2), 70–76. https://doi.org/10.1080/00167487.2016.12093987

Maude, A. (2017). Applying the concept of powerful knowledge to school geography. In C. Brooks, G. Butt, & M. Fargher (Eds.), *The power of geographical thinking* (pp. 27–40). Springer International Publishing.

Maude, A. (2018). Geography and powerful knowledge: A contribution to the debate. *International Research in Geographical and Environmental Education*, 27(2), 179–190. https://doi.org/10.1080/10382046.2017.1320899

Mayring, P. (2022). *Qualitative content analysis: A step-by-step guide*. Sage.

Miao, X. (2024). *Geography curriculum making in Shanghai: Teacher agency in times of change* [PhD dissertation]. University of Stirling.

Miele, M., & Bear, C. (2022). Geography and posthumanism. In S. Herbrechter, I. Callus, M. Rossini, M. Grech, M. de Bruin-Molé, & C. J. Müller (Eds.), *Palgrave handbook of critical posthumanism* (pp. 749–772). Springer International Publishing.

Mitchell, D. (2022). GeoCapabilities 3—Knowledge and values in education for the Anthropocene. *International Research in Geographical and Environmental Education*, 31(4), 265–281. https://doi.org/10.1080/10382046.2022.2133353

Mitchell, D., & Béneker, T. (2022). Expanding students' concept of 'home'. In M. Biddulph, S. Catling, L. Hammond, & J. H. McKendrick (Eds.), *Children, education and geography* (pp. 182–197). Routledge.

Mitchell, D., Hanus, M., Béneker, T., Biddulph, M., Leininger-Frézal, C., Zwartjes, L., & Donert, K. (2022). Enhancing teachers' expertise through curriculum leadership—Lessons from the GeoCapabilities 3 project. *Journal of Geography*, 121(5–6), 162–172. https://doi.org/10.1080/00221341.2022.2149838

MoE PRC. (2014). *国务院印发《关于深化考试招生制度改革的实施意见》[Implementation opinions of the state council on deepening the reform of the examination and enrollment system]*. http://www.moe.gov.cn/jyb_xwfb/s5147/201409/t20140905_174589.html

MoE PRC. (2017). (2017). *中学教育专业认证标准[Accreditation standards for secondary education majors]*. http://www.moe.gov.cn/srcsite/A10/s7011/201711/t20171106_318535.html

MoE PRC. (2018). *高中地理课程标准[Curriculum standard of high school geography]*. People's Education Press.

MoE PRC. (2019). *中小学教材管理办法[Measures for the administration of primary and secondary school textbooks]*. http://www.moe.gov.cn/srcsite/A26/moe_714/202001/t20200107_414578.html

Moore, R. (2009). *Towards the sociology of truth*. Continuum.

Moore, R. (2013). *Basil Bernstein: The thinker and the field*. Routledge.

Morgan, J. (2017). The making of geographical ignorance? *Geography*, 102(1), 18–25. https://doi.org/10.1080/00167487.2017.12094005

Muller, J. (2023). Powerful knowledge, disciplinary knowledge, curriculum knowledge: Educational knowledge in question. *International Research in Geographical and Environmental Education*, 32(1), 20–34. https://doi.org/10.1080/10382046.2022.2058349

Muller, J., & Young, M. (2019). Knowledge, power and powerful knowledge re-visited. *The Curriculum Journal*, 30(2), 196–214. https://doi.org/10.1080/09585176.2019.1570292

Murphy, A. B. (2018). *Geography: Why it matters*. Polity.

National Education Professional Degree Graduate Education Steering Committee. (2022). *研究生教育学科专业简介及其学位基本要求 [Overview of graduate education disciplines and basic degree requirements]*. https://www.acge.org.cn/encyclopediaFront/enterEncyclopediaIndex

Niemelä, M. A. (2021). Crossing curricular boundaries for powerful knowledge. *The Curriculum Journal*, 32(2), 359–375. https://doi.org/10.1002/curj.77

Nordgren, K. (2021). Powerful knowledge for what? History education and 45-degree discourse. In A. Chapman (Ed.), *Knowing history in schools: Powerful knowledge and the power of knowledge* (pp. 177–201). UCL Press.

Nussbaum, M. (2011). *Creating capabilities: The human development approach*. Harvard University Press.

Nussbaum, M., & Sen, A. (1993). *The quality of life*. Oxford University Press.

Peng, L., & Yang, T. (2018). 高考改革背景下地理在高校选考科目中的地位——以上海市 2017 年普通本科招生计划为例[The status of geography in college entrance examination under the background of college entrance examination reform: A case study of Shanghai general undergraduate enrollment plan in 2017]. *Teaching Reference of Middle School Geography* (08), 4–5. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2023&filename=ZDCK201808003&uniplatform=OVERSEA&v=WIuEtQbyPd6D60-ZcAcepNf1Ntym71vu1B20Br-ECJps937XiJXkSUVZEvcbTXxi

Philo, C. (1992). Neglected rural geographies: A review. *Journal of Rural Studies*, 8(2), 193–207. https://doi.org/10.1016/0743-0167(92)90077-J

Priestley, M., Edwards, R., Priestley, A., & Miller, K. (2012). Teacher agency in curriculum making: Agents of change and spaces for manoeuvre. *Curriculum Inquiry*, 42(2), 191–214. https://doi.org/10.1111/j.1467-873X.2012.00588.x

Priestley, M., & Philippou, S. (2018). Curriculum making as social practice: Complex webs of enactment. *The Curriculum Journal*, 29(2), 151–158. https://doi.org/10.1080/09585176.2018.1451096

Puttick, S., & 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), 126–134. https://doi.org/10.1080/00167487.2020.12106474

Puttick, S. (2023). Power, knowledge and prisoners. In S. Puttick (Ed.), *The geography teaching adventure* (pp. 53–73). Routledge.

Puustinen, M. (2022). Teacher education and history teachers' powerful professional knowledge. In B. Hudson, N. Gericke, C. Olin-Scheller, & M. Stolare (Eds.), *International perspectives on knowledge and quality: Implications for innovation in teacher education policy and practice* (pp. 45–62). Bloomsbury Academic.

Puustinen, M. (2024). Teachers and school subjects in Finland. In E. Rata (Ed.), *Research handbook on curriculum and education* (pp. 431–441). Edward Elgar Publishing.

Puustinen, M., & Khawaja, A. (2021). Envisaging the alternatives: From knowledge of the powerful to powerful knowledge in history classrooms.

Journal of Curriculum Studies, 53(1), 16–31. https://doi.org/10.1080/00220272.2019.1703273

Puustinen, M., Khawaja, A., Marjokorpi, J., & Säntti, J. (2024). Tiedon harharetkiä? Opettajat tiedonalatiedon rekontekstualisoijina [Misguided knowledge? Teachers as recontextualizers of disciplinary knowledge]. *Ainedidaktiikka,* 8(1), 51–71. https://doi.org/10.23988/ad.143883

Puustinen, M., Säntti, J., & Simola, H. (2022). Five decades of persistent decontextualisation of academic teacher education in Finland. *International Journal of Educational Research*, 116, 102053. https://doi.org/10.1016/j.ijer.2022.102053

Qi, W. (2021). 非师范生从教三问 [Three questions to teachers without teacher education]. *China Youth Daily*. https://m.cyol.com/gb/articles/2021-12/20/content_LRb04CG7V.html

Qian, J., & Zhang, H. (2022). University geography in China: History, opportunities, and challenges. *Transactions of the Institute of British Geographers*, tran.12435. https://doi.org/10.1111/tran.12435

Radcliffe, S. (2022). *Decolonizing geography: An introduction*. Polity Press.

Rautio, P., Hohti, R., Leinonen, R., & Tammi, T. (2017). Reconfiguring urban environmental education with "shitgull" and a "shop". *Environmental Education Research*, 23(10), 1379–1390. https://doi.org/10.1080/13504622.2017.1325446

Rawding, C. (2010). What are the connections between subject developments in academic and school geography? *International Research in Geographical and Environmental Education*, 19(2), 119–125. https://doi.org/10.1080/10382046.2010.482198

Rawling, E. (2018). Place in geography: Change and challenge. In M. Jones & D. Lambert (Eds.), *Debates in geography education* (pp. 49–61). Routledge.

Relph, E. (1976). *Place and placelessness*. Pion.

Ro, J. (2024). Enacting powerful knowledge: Overcoming the chasm of curriculum and teaching through teacher professionalism. *Journal of Curriculum Studies*, 56(3), 283–296. https://doi.org/10.1080/00220272.2024.2318726

Roberts, M. (2014). Powerful knowledge and geographical education. *The Curriculum Journal*, 25(2), 187–209. https://doi.org/10.1080/09585176.2014.894481

Roberts, M. (2017). Geographical education is powerful if... *Teaching Geography*, 42(1), 6–9. https://portal.geography.org.uk/downloads/journals/TG_SPR_2017_ROBERTS.pdf

Roberts, M. (2023). Powerful pedagogies for the school geography curriculum. *International Research in Geographical and Environmental Education,* 32(1), 69–84. https://doi.org/10.1080/10382046.2022.2146840

Rose, G. (1993). *Feminism and geography: The limits of geographical knowledge*. Polity Press.

Rudolph, S., Sriprakash, A., & Gerrard, J. (2018). Knowledge and racial violence: The shine and shadow of 'powerful knowledge'. *Ethics and Education*, 13(1), 22–38. https://doi.org/10.1080/17449642.2018.1428719

Rushton, E. A. C., & Bird, A. (2024). Space as a lens for teacher agency: A case study of three beginning teachers in England, UK. *The Curriculum Journal*, 35, 254–270. https://doi.org/10.1002/curj.224

Säntti, J., & Puustinen, M. (2024). Mitä on merkityksellinen kasvatustieteellinen tieto ja miten sitä voisi rakentaa opettajankoulutuksessa? [What is relevant educational knowledge and how could it be built in teacher education?]. *Kasvatus & Aika*, 18(2), 24–39. https://doi.org/10.33350/ka.129467

Sen, A. (1985). *Commodities and capabilities*. North-Holland.

Sen, A. (1999). *Development as freedom*. Oxford University Press.

Schaffar, B., & Wolff, L.-A. (2024). Phenomenon-based learning in Finland: A critical overview of its historical and philosophical roots. *Cogent Education*, 11(1), 2309733. https://doi.org/10.1080/2331186X.2024.2309733

Schreier, M. (2012). *Qualitative content analysis in practice*. Sage.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4–14. https://doi.org/10.3102/0013189X015002004

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–22. https://doi.org/10.17763/haer.57.1.j463w79r56455411

Sidaway, J. D., & Hall, T. (2018). Geography textbooks, pedagogy and disciplinary traditions. *Area*, 50(1), 34–42. https://doi.org/10.1111/area.12397

Singh, P. (2002). Pedagogizing knowledge: Bernstein's theory of the pedagogic device. *British Journal of Sociology of Education*, 23(4), 571–582. https://doi.org/10.1080/0142569022000038422

Slater, F., & Graves, N. (2016). Geography and powerful knowledge. *International Research in Geographical and Environmental Education*, 25(3), 189–192. https://doi.org/10.1080/10382046.2016.1155321

Smit, E., Tuithof, H., Savelsbergh, E., & Béneker, T. (2023). Geography teachers' pedagogical content knowledge: A systematic review. *Journal of Geography*, 122(1), 20–29. https://doi.org/10.1080/00221341.2023.2173796

Smith, N. (1984). *Uneven development: Nature, capital, and the production of space*. Blackwell.

Solem, M., Lambert, D., & 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), 214–229. https://dergipark.org.tr/tr/download/article-file/115300

Standish, A., Hawley, D., & Willy, T. (2016). The London Geography Alliance: Re-connecting the school subject with the university discipline. *London Review of Education*, 14(2), 83–103. https://doi.org/10.18546/LRE.14.2.06

Stannard, K. (2003). Earth to academia: On the need to reconnect university and school geography. *Area*, 35(3), 316–322. https://doi.org/10.1111/1475-4762.00181

Stengel, B. S. (1997). 'Academic discipline' and 'school subject': Contestable curricular concepts. *Journal of Curriculum Studies*, 29(5), 585–602. https://doi.org/10.1080/002202797183928

Talbot, D. (2023). Knowledge, knowers, and power: Understanding the 'power' of powerful knowledge. *Journal of Curriculum Studies*, 55(6), 633–645. https://doi.org/10.1080/00220272.2023.2256009

Tani, S. (2017). Reflected places of childhood: Applying the ideas of humanistic and cultural geographies to environmental education research. *Environmental Education Research*, 23(10), 1501–1509. https://doi.org/10.1080/13504622.2016.1269875

Tani, S. (2022). Climate change and geography education: Could young people's geographies and powerful disciplinary knowledge make a change? In R. Morri, D. Pasquinelli d'Allegra, & C. Pesaresi (Eds.), *Il cammino di un geografo, un geografo in cammino: Scritti in onore di Gino De Vecchis [The journey of a geographer, a geographer on the move: Writings in honor of Gino De Vecchis]* (pp. 160–172). Franco Angeli.

Taylor, P. J., & O'Keefe, P. (2021). In praise of geography as a field of study for the climate emergency. *The Geographical Journal*, 187(4), 394–401. https://doi.org/10.1111/geoj.12404

Tuan, Y. F. (1974). *Topophilia: A study of environmental perception, attitudes, and values*. Columbia University Press.

Tuan, Y. F. (1976). Humanistic geography. *Annals of the Association of American Geographers*, 66(2), 266–276. https://doi.org/10.1111/j.1467-8306.1976.tb01089.x

Tuan, Y. F. (1984). *Dominance and affection: The making of pets*. Yale University Press.

Tuan, Y. F. (1991). A view of geography. *Geographical Review*, 81(1), 99–107. https://doi.org/10.2307/215179

Tuan, Y. F. (1998). *Escapism*. Johns Hopkins University Press.

Tuan, Y. F. (2006). 人文主义地理学之我见 [Humanistic geography: A personal view]. *Progress in Geography*, 25(2), 1–7. https://doi.org/10.11820/dlkxjz.2006.02.001

Uljens, M. (2025). On powerful knowledge as a policy concept and sociological theory. *Journal of Curriculum Studies*, 57(1), 55–63. https://doi.org/10.1080/00220272.2024.2436354

Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international frameworks for 21st century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, 44(3), 299–321. https://doi.org/10.1080/00220272.2012.668938

Walker, M., & Unterhalter, E. (Eds.). (2007). *Amartya Sen's capability approach and social justice in education*. Palgrave Macmillan.

Wang, T. (2019). Competence for students' future: Curriculum change and policy redesign in China. *ECNU Review of Education*, 2(2), 234–245. https://doi.org/10.1177/2096531119850905

Wang, S., & Zhu, X. (2025). 2024 年地理教科研成果图谱分析及 2025 年研究展望 [Analysis of the 2024 geography education research landscape and prospects for 2025]. *Teaching Reference of Middle School Geography*, 3, 9–14. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDAUTO&filename=ZDCK202507003&uniplatform=OVERSEA&v=OraNv81IK-Ws8_27M-ByQiS__ckGdc2hD43HUeaOm_qBydSSlCN5gmZIFLTFbslD

Wei, Z., & Zhu, X. (2018). *高中地理课程标准解读 [Interpretation of the senior secondary geography curriculum standards]*. Higher Education Press.

Wen, W., & Xie, W. (2017). Michael Young's influence on the sociology of education. In D. Guile, D. Lambert, & M. J. Reiss (Eds.), *Sociology, curriculum studies and professional knowledge: New perspectives on the work of Michael Young* (pp. 97–105). Routledge.

Wen, W., Xu, T., & Xie, W. (2016). 把教育带回来——麦克·扬对社会建构主义的超越与启示[Bringing education back: Michael Young's transcendence of and insights into social constructivism]. *Educational Research*, 3(434), 155–159. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2016&filename=JYYJ201603022&uniplatform=OVERSEA&v=sHghKT_m1To3QrJWBRLxWhoI5Fbg7EBiZYiELUpaBHOkHmm3QGOM1D6OnjEi8Pp1

Wheelahan, L. (2007). How competency-based training locks the working class out of powerful knowledge: A modified Bernsteinian analysis. *British Journal of Sociology of Education*, 28(5), 637–651. https://doi.org/10.1080/01425690701505540

White, J. (2018). The weakness of 'powerful knowledge'. *London Review of Education*, 16(2), 325–335. https://doi.org/10.18546/LRE.16.2.11

White, J. (2019). The end of powerful knowledge? *London Review of Education*, 17(3), 429–438. https://doi.org/10.18546/LRE.17.3.15

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

Williams, J. (2021). The color of climate change: Making the racial injustice of climate change visible. *Geography*, 106(3), 136–142. https://doi.org/10.1080/00167487.2021.1970928

Wright, R., & Froehlich, H. (2012). Basil Bernstein's theory of the pedagogic device and formal music schooling: Putting the theory into practice. *Theory into Practice*, 51 (3), 212–220. https://www.jstor.org/stable/23263363

Xu, S. (2021). The legitimization of textbook reform: Strategies and challenges in China. *Journal of Curriculum Studies*, 53(6), 749–764. https://doi.org/10.1080/00220272.2021.1925745

Yin, R. K. (2018). *Case study research and applications*. Sage.

Young, M. (Ed.). (1971). *Knowledge and control: New directions for the sociology of education*. Collier-Macmillan.

Young, M (2008a). *Bringing knowledge back in: From social constructivism to social realism in the sociology of education*. Routledge.

Young, M. (2008b). From constructivism to realism in the sociology of the curriculum. *Review of Research in Education*, 32(1), 1–28. https://doi.org/10.3102/0091732X07308969

Young, M. (2009a). What are schools for? In H. Daniels, H. Lauder, & J. Porter (Eds.), *Knowledge, values and educational policy: A critical perspective* (pp. 10–18). Routledge.

Young, M. (2009b). Education, globalisation and the 'voice of knowledge'. *Journal of Education and Work*, 22(3), 193–204. https://doi.org/10.1080/13639080902957848

Young, M. (2013a). Overcoming the crisis in curriculum theory: A knowledge-based approach. *Journal of Curriculum Studies*, 45(2), 101–118. https://doi.org/10.1080/00220272.2013.764505

Young, M. (2013b). Powerful knowledge: An analytically useful concept or just a 'sexy sounding term'? A response to John Beck's 'Powerful knowledge, esoteric knowledge, curriculum knowledge'. *Cambridge Journal of Education*, 43(2), 195–198. https://doi.org/10.1080/0305764X.2013.776356

Young, M., Lambert, D., Roberts, C., & Roberts, M. (2014). *Knowledge and the future school: Curriculum and social justice*. Bloomsbury Publishing.

Young, M., & Muller, J. (2010). Three educational scenarios for the future: Lessons from the sociology of knowledge. *European Journal of Education*, 45(1), 11–27. https://doi.org/10.1111/j.1465-3435.2009.01413.x

Young, M., & Muller, J. (2013). On the powers of powerful knowledge. *Review of Education*, 1(3), 229–250. https://doi.org/10.1002/rev3.3017

Young, M., Zhang, J., & Xu, T. (2017). 从"有权者的知识"到"强有力的知识"——麦克·扬与张建珍、许甜关于课程知识观转型的对话 [From "knowledge of the powerful" to "powerful knowledge": A dialogue between Michael Young, Jianzhen Zhang, and Tian Xu on the transformation of curriculum knowledge]. *Journal of East China Normal University: Educational Sciences*, (2), 99–105. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2017&filename=HDXK201702012&uniplatform=OVERSEA&v=8a7hIaVanyqTui3l9AW8yTQRlXa0R9GuOm7Wt3lyG85O-KmeaJz0B7aYRIQVFQ9-

Zhang, L., & Dong, J. (2016). 谈高考改革背景下地理在"211"高校选考科目中的地位 [The status of geography in "211" college entrance examination subject under the background of college entrance examination reform]. *Teaching Reference of Middle School Geography* (16), 60–62. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2023&filename=ZDCK201616042&uniplatform=OVERSEA&v=fl1-UxPyZU63Kw-fLbem6OFspF-Zq6Ojk6oMt3ulH0C-MpwaOIYhbu7dK8rP2FbV

Zhang, J., Shen, Y., & Zhuang, W. (2025). 我国地理教育研究的热点与未来展望——基于 2024 年人大复印报刊资料的分析 [Hot topics and future prospects of geographical education research in China: An analysis based on the 2024 Renmin University Reprinted Journals]. *Geography Teaching*, 3, 4–7. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDAUTO&filename=DLJX202503001&uniplatform=OVERSEA&v=ndVeozj2Mu7D27LIMrdHGh838KesTxSjWl2vdVj-TEtPIPWKiveFj-qhGH6oVikE

Zhang, J., Xu, T., & Lambert, D. (2015). 论麦克·杨的"强有力的知识" [On Michael Young's "powerful knowledge"]. *Tsinghua Journal of Education*, 36(6), 53–60. https://www.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2016&filename=QHDJ201506008&uniplatform=OVERSEA&v=INgWWl8R54tgkSdCq3jrZzkTWk34EFp1i8wmO0kvAn3FcrXrEYyLNgqcIOaFp5av

Zhao, R., Wang, E., Zhang, X., Liu, J., Zhou, S., Li, G., & Han, M. (2006). *人文地理学 [Human geography]*. Higher Education Press.

Zhong, Q., & Cui, Y. (2018). *核心素养研究 [Research on Core Competencies]*. East China Normal University Press.

Appendices

Appendix 1. Specific questions in questionnaire survey and interview in Sub-study I

Table 8 Questionnaire survey and interview frame of Sub-study I

Research questions	Questionnaire survey	Interview
In the knowledge transformation process at the institutional and classroom levels, what are the gaps between academic geography and school geography?	• What extent do four types of agents think of the gap between academic geography and school geography in terms of curriculum standards, textbooks, and Gaokao? (Likert scale) • What specific examples can they give if they think the gap is obvious? (open ended) • How do geographers and teacher educators who have visited classrooms evaluate the geographical knowledge represented by teachers on five scales? (Likert scale) • Do the four types of participants think that there are gaps between academic geography and school geography in the assumed 12 aspects (see results)? (Likert scale) • Besides the 12 potential gaps, what else? (open ended)	• From the perspectives of the four types of participants, what is the specific gap and how is the gap represented between academic geography and school geography in terms of curriculum standards, textbooks, and Gaokao? • Why do geographers and teacher educators give a satisfied or unsatisfied evaluation to the classrooms? What can be improved in the geography classrooms? • How is the gap presented in classrooms from the views of the four types of agents?
What are the challenges in bridging the gap to generate powerful geographical knowledge?		• What challenges do the four types of agents think in terms of bridging the gap?

Appendix 2. Interview frame of Sub-study II

The interview procedures follow the four steps of the model co-construction.

Step 1: Preliminary model (no interview question)

Step 2: Open interview
• Warming-up questions:
How did you get involved with GeoCapabilities? How do you understand GeoCapabilities?
How would you describe the geography curriculum at the lower and upper secondary level in your country? What do you think are the main elements and issues in the curriculum?
Do you think that school geography plays a role in the topic of climate change? If so, what role does it play? What issues on climate change are taught in the schools?
• In your opinion, what geographical perspectives are needed to understand climate change in a geographical way?
• Why do you think these geographical perspectives are important for students?

Step 3: Interaction
• What do you think about the "four lamps" model as a presentation of the needed geographical perspectives?
Prompt questions:
• Are your ideas about geographical perspectives of climate change included in this model? If they are not included, what would you like to add to or change in the model? Why do you think that this perspective is important?
• I notice that you did not mention a (or some) perspective. Do you think that this perspective could play a role in climate change education? Or do you think that this perspective is irrelevant in the context of climate change education?

Step 4: Examined model
• What climate capabilities would you expect the geographical perspectives to help students to develop?
Extending questions – reflect on the current status:
• From your experience in geography education, what roles do these geographical perspectives currently play in the didactics (curriculum making) of climate change education in your country?
Prompt questions:
• Are there some perspectives that are highly emphasized, or some that are insufficiently presented?
• If there is a gap between the current representation of geographical thinking and the "lamp model", what is your view of this gap?

• Are there opportunities to bridge the gap by applying the “lamp model”? And what are the possible opportunities?
• Are there challenges in bridging the gap by applying the “lamp model”? And what are the possible challenges?

Appendix 3. Interview frame of Sub-study III

Teachers' background

• Work experience: city, school, and year of teaching.
• Educational background: university and year of graduation, degrees and majors, and geography courses covered in the degrees.
• Do you have any other education, training, or research experience related to geography?

Teachers' identity and their views on geography as an academic discipline and a school subject

• How do you see your professional role: are you an educator, a teacher, a geographer? Are some roles stronger while others weaker? How do these roles feature in your work?
• How do you see geography as an academic discipline? (e.g., its definition, values, scope, main ideas, etc.)
• What do you think of the importance of geography as an academic discipline? What is its significance that differs from that of other disciplines?
• How do you see geography as a school subject? (e.g., its values, scope, main ideas, etc.)
• How do you see the relationship between academic geography and school geography?
• Do you follow research about geography, education, and geography education? Why are you interested in it? Could you give some examples?
• How do you describe geographical thinking? Is it important and why?
• How well do you think your geography professionalism allows you to master school teaching? Is there any aspect of geographic expertise that you lack? How could you acquire that expertise?

Teachers' views on geography curriculum and teaching

• What do you think is the aim or purpose of geography teaching?
• Could you describe the typical process you use to plan your geography lessons? Is the process required by others or not?
• What types of curriculum materials do you use (e.g., national curriculum, guides, textbooks, etc.)? How important do you think these official materials are for teaching?
• Do the official materials offer everything you need? If not, what is lacking?
• Do you use other materials beyond the official materials? Do you make your own materials? Why?
• How do you think geography is learned best?

Teachers' views on urban geography and the teaching of urban geography

• Do you have expertise in urban geography? How did you acquire this expertise? To what extent does this expertise help you in teaching the related content in school? Could you give some examples?
• How would you describe urban geography as a subfield of geography? (e.g., its features, relevant topics, some important theories or perspectives, relevant scales of study, etc.)
• What is the relevant content of urban geography in the school geography curriculum? What do you think about the relationship between this content and urban geography?
• Why should students learn the urban geography content?
• What kind of knowledge or perspective in urban geography is (the most) important for students to learn?
• To what extent are you satisfied with the content selection of the official curriculum materials (e.g., knowledge, cases or examples, and explanations, etc.)? Is there something important that you want to highlight? Or what makes you dissatisfied? Please explain with examples.
• Do you have alternative ideas for teaching urban geography knowledge that you believe are better? Why are these alternatives better than those in the official curriculum materials?
• For those who have expertise in urban geography, how does this expertise influence
your understanding of the curriculum materials, lesson planning, and teaching (e.g., choosing cases, etc.)?
• Finally, is there anything else you would like to add, or is there anything that is not clear?

Appendix 4. Evaluation criteria for strength of knowledge sources usage in teachers' lessons

Based on the prior analysis, four types of knowledge sources emerged: knowledge provided in textbooks (T), teachers' disciplinary knowledge (D), local cases relevant to students' experiences and everyday knowledge (L), and extension knowledge beyond T, D, and L (E).

A four-level scale was employed to further analyze the degree to which teachers used these knowledge sources: strong use (+++), moderate use (++), light use (+), and no use (–). This evaluation prioritizes the quality and depth of knowledge use over strict time measurements, considering many contextual factors could influence the time spent on the instruction of a theme. The rating criteria vary among different knowledge sources (see Table 9), particular between textbook knowledge and the other three sources, considering different expectations for coverage in the Chinese context. While most of the textbook content is expected to be covered by teachers, the other sources (D, L, and E) are regarded as optional and flexible materials. Thus, full coverage of T is rated as "strong use (+++)", while some pieces of additional but impactful D, L, and E could also be rated as "strong use (+++)" if they provided an alternative perspective or challenged the T. However, the strength of a source's use is often, but not always, associated with the time devoted to it.

For example, in a given teaching theme ("Meaning and mechanism" of "Urbanization"), the teacher Bella spent approximately 10 minutes thoroughly covering all the textbook content, and she was thus given a strong use (+++) rating for T. She dedicated 3 minutes to introducing an alternative, significant disciplinary perspective, which was rated as moderate use (++) for D. Despite the brief time allocation for D, it received a higher rating than might be expected due to the depth of the content, its significant impact on student understanding, and its effective integration into the lesson.

Table 9 The complete set of rating criteria

*A rating level is assigned when the observed usage meets one of the criteria for that level.

Level	Criteria*
Knowledge provided in textbook (T)	
Strong use (+++)	Cover all textbook content Accurately represent and elaborate on textbook content Use textbook as primary source
Moderate use (++)	Partially cover textbook content Selectively represent and elaborate on textbook content Replace some textbook content with other sources
Light use (+)	Briefly touch on textbook content

	Use other sources more than textbook
No use (−)	Skip all the textbook content
Teachers' disciplinary knowledge beyond textbook (D)	
Strong use (+++)	Supplement with significant disciplinary knowledge Challenge textbook knowledge and provide alternative perspectives Use disciplinary knowledge beyond textbook as primary source
Moderate use (++)	Add some disciplinary knowledge beyond textbook Provide additional explanations or perspectives beyond textbook Incorporate personal expertise relevant to textbook knowledge
Light use (+)	Add minor supplementary information from discipline Slightly incorporate personal expertise
No use (−)	No extra disciplinary knowledge beyond textbook
Local cases relevant to students' experiences and everyday knowledge (L)	
Strong use (+++)	Supplement extensive local cases beyond textbook's cases Replace most of textbook's cases with local cases Connect the knowledge with local experiences frequently Deeply focus and elaborate on local cases
Moderate use (++)	Supplement several local cases in addition to textbook's cases Replace part of textbook's cases with local cases Connect the knowledge with local experiences occasionally Provide some explanations of local cases
Light use (+)	Briefly mention one or two local examples Provide slight explanations of local examples
No use (−)	Not mention local cases or examples beyond textbook
Extension knowledge beyond T, D, and L (e.g., other examples, cases, and data) (E)	
Strong use (+++)	Supplement extensive information beyond T, D, and L Replace most of textbook's cases with other cases beyond E Connect the knowledge with other examples frequently Deeply focus and elaborate on other cases beyond E
Moderate use (++)	Supplement some information beyond T, D, L Replace part of textbook's cases with other cases beyond E Connect the knowledge with other examples occasionally Provide some explanations of other cases
No use (−)	Not mention extension knowledge beyond T, D, and L

When interpreting these ratings, source-specific baselines and the comparison approach should be considered. Textbook knowledge carries a strong baseline (+++), as teachers are expected to cover most of this material. By contrast, other sources have a no use (−) baseline, indicating their optional nature in instruction. Therefore, comparisons should be made across teachers for the same knowledge source (e.g., comparing strength of usage of T between two teachers is advisable). However, comparing different knowledge sources for a single teacher (e.g.,

comparing one teacher's use of T vs. D) is not advisable due to differing baselines and expectations.

Appendix 5. The theoretical underpinnings of geographical perspectives in the epistemic model: literature review of geographical studies concerning human-environmental relationship and climate change

Natural scientific perspective

The natural scientific perspective of geography strives for objectivity to be a spatial science. Both natural and human components are de-animated as objects and studied externally (Ingold, 2021), without considering the difference between human processes and non-human processes. To pursue accurate representation of the world and sound evidence for bringing solutions to problems, geographers make use of quantitative methodologies, such as measurement and calculations (Gregory, 1963). This ends up producing context-free and propositional knowledge by formulating theories, models, or laws that govern the spatial patterns of human and physical elements as research outcomes (Bunge, 1962).

The natural scientific perspective has been a dominant approach for geographers in studying climate change as a problem to be solved (Hulme, 2008; Janelle et al., 2004). Focusing on the spatial configurations of relevant physical and human components (e.g., temperature, precipitation, greenhouse gases emission, population, and economic growth, etc.) based on measurable data, geographers contribute to the scientific facts and mechanism of climate change that human greenhouse gases emissions have warmed the atmosphere, oceans, and land. The scientific research outcomes often serve to inform policy making and actions which are dominated by the targets for reducing carbon consumption (Taylor & O'Keefe, 2021).

Humanistic perspective

In contrast to the erasure of the human in the natural scientific perspective, the humanistic perspective of geography brings humanity into the discussion of the human-environmental relationship. Geography is conceptualized as a study of the earth as the home of people rather than just a planet in space (Tuan, 1991), which is in line with Bonnett's (2008) claim that geography is, in the end, always about humans' survival. This understanding of the earth implies a human-centered concern, especially the meanings defined by people. Therefore, the humanistic perspective highlights the subjectivities and agency of humans, such as their senses, experience, affection, and imaginations, rather than seeing people as homogeneous rational beings (Tuan, 1974). The environment is thus understood as places imbued with meanings given by humans (Adams et al., 2001; Tani, 2017). How people attach meanings to the place will influence how they interact with the environment (Relph, 1976). In turn, the hidden humanity (people's subjectivities) can be captured from the phenomena of human-environmental interaction, people's

geographical behaviors, and human landscapes. Therefore, the humanistic perspective can ultimately provide a better understanding of the human itself, including such aspects as human values and the human condition (Adams et al., 2001; Tuan, 1976).

The founder of humanistic geography, Yi-Fu Tuan, has revealed some fundamental aspects of humanity from his observation of the world. Some aspects of humanity can also be captured behind climate change because it represents the tension between the human and the environment. For example, a need for security, an aspiration to nurturance and stability, and a fear of the uncertain nature drive people to transform nature, to make the earth a stable and living home (Tuan, 1979). Although people aspire for a good lifeworld, the opposing forces in humanity such as violence and destruction, misuse of power, and desire to dominate, control, and tame nature, might make for a worse earth (Tuan, 1984, 2006). In addition, there is an enduring desire to escape the reality and embrace alternatives in humanity, called escapism (Tuan, 1998), which could also be applied to understanding people's behaviors in contributing to, suffering from, and reacting to climate change. To escape from the harsh natural environment, people desire to transform nature into a safe place. When people face a crisis due to the over-transformation of nature, such as human-induced climate change, escapism again drives people to seek solutions for returning to nature as it was.

In other words, humanistic geography provides a reflexive and caring lens to deeply understand humans per se and their interaction with the environment. In addition to understanding the influence of human beings on climate change, the humanistic approach also implies a hope to mitigate climate change by changing individuals' values and demands for consumption.

Social scientific perspective

The social scientific perspective of geography is another approach that highlights human processes, but more critically than the humanistic perspective. It associates environmental issues with social justice, and is dedicated to revealing, critiquing, and transforming the injustice existing among individuals, groups, and societies (Cresswell, 2013). Differences among people in class, gender, race, bodily ability, age, and a plethora of other aspects of identity are considered. Engaging with social theories, such as Marxist, feminist, and decolonizing thought, geographers gain understandings of different ways of human-environmental relationship along with social inequality and unequal power relations.

A strong argument from the social scientific perspective is the critique of capitalism. It is widely argued that capitalism is an unsustainable political economic system which drives over-consumption and the accumulation of surplus capital and profit by transforming the natural environment, and results in environmental and social crises (Blaikie & Brookfield, 1987; Mitchell, 2022; Smith, 1984), including

anthropogenic climate change. Concerning the differences among people in terms of power relations, the critique also makes the point that while the people who have more power contribute more to causing climate change, in turn those who have less power and contribute less suffer more from the impacts and are sometimes seen as more guilty (Cresswell, 2013). For instance, it was found that "inequalities fall along racial lines that people of color are much more likely to be adversely affected by climate change, while majority white countries bear the greatest responsibility for historical emissions" (Williams 2021, pp. 136). As the voices of marginalized others have been evoked as subjects of inquiry, vulnerable people (e.g., poor, female, old, and disabled people, etc.) and their local stories of interaction with the environment become important focuses in geography research (Philo, 1992; Rose, 1993). In addition to the critiques, the social scientific perspective provides insights for policy making to address climate change with its concern for differences among people. One of the arguments is to emphasize the values of indigenous environmental knowledge and advocate local solutions rather than following a united global scheme (Magni, 2017).

Posthuman perspective

The posthuman perspective of geography is led by anti-anthropocentric thinking distinct from the humanistic and social scientific perspectives, while it differs from the natural scientific perspective by emphasizing the agency of non-humans. It moves away from an implicit belief in the previous three perspectives that humans are separate from the environment, towards blurring the boundary and the idea that humans are part of the environment (Duoblienė et al., 2023). Extracting from the philosophical ground of posthumanism, geographers rethink the complex human-environmental relationship by embracing the study of relations: not only identifying that there are relations, but also recognizing that the relations are dynamic and ongoing processes (Dowling et al., 2017; Falcon, 2023). Some posthuman thought is strongly engaged with geographical understanding of humans, non-humans, and the environment (Cresswell, 2013). For example, it is argued that, inhabiting the critical zone on the earth (Latour 2014), humans emerge from, and actively engage in relations with the earth where humans are entwined in a myriad of unfinished configurations of places, times, matters, and meanings (Haraway, 2016). In relational thinking, agency is an outcome of the connectedness between humans and non-humans, and thus is extended to the more-than-human world, rather than being an attribute or product only of humans (Latour, 2005). As humans' becoming-with the earth (Haraway, 2016), the environment is not perceived as a resource for human activities subordinated to human governors, but rather a network or assemblage where a multitude of heterogenous parts encounter each other (Deleuze & Guattari, 1988; Latour, 2005). The existence of each agent in

the environmental networks depends on its connections to the others, and every agent is the cause and consequence of each other (Cresswell, 2013).

In contrast to the anthropocentric approach, the context of climate change is regarded as a form of change in human relations with the world rather than a crisis passing in the Anthropocene from the posthuman perspective (Latour, 2017). These relations are not as clear, identifiably one-to-one, and causal as anthropocentric opinions of the causes and impacts of climate change, but rather uncertain, temporal, and dynamic (Rautio et al., 2017), which might be exemplified by the complex and unpredictable climate change feedback on various spatial and time scales, intertwined with various bodies on the earth. Facing the uncertainty in the context of climate change, there is a resistance to bringing fixes and certainty to overcome the discomfort but rather an embracing of "staying with the trouble" (Haraway, 2016). This is a call for an alternative way of responding: to live in the thick present, to become-with the earth, to recognize the more-than-human beings, to care and to live well with multispecies surroundings (Haraway, 2016). The posthuman perspective inspires humans to care for the multiple forms of life rather than humans per se in the context of climate change, and to seek for a new balance in their changing relations with the environment.

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Exploring the gap between academic geography and school geography : Knowledge transformation of the competencies-based curriculum making in China

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Exploring the gap between academic geography and school geography: Knowledge transformation of the competencies-based curriculum making in China

The gap between academic geography and school geography is of ongoing interest in geography education. To achieve a comprehensive understanding of the gap, this article describes how a framework of knowledge transformation was applied and validated in China. A total of 182 individuals involved in geography education took part in this study; these included geographers, pre- and in-service geography teachers, and geography teacher educators. Though geographical knowledge is seen as important at the societal level, this research found substantial discrepancies between academic and school geography at the institutional and classroom levels of knowledge transformation. Insufficient engagement in disciplinary development and a lack of support from the academic community are two major reasons for the gap. Finally, future progress in addressing the gap in order to generate powerful geographical knowledge in the competencies-based curricula is highlighted.

Keywords: knowledge transformation; geographical disciplinary knowledge; powerful knowledge; competency

Introduction

It has been stated that a 'gulf', 'gap', 'chasm', 'divide' or 'divorce' persists between school geography and the academic discipline across different national settings (e.g. Goudie, 1993; Bonnett, 2003; Stannard, 2003; Hill and Jones, 2010; Butt, 2019). For instance, Rawling (2018) argues that the school geography curriculum in England only focuses on a descriptive approach to 'place' (a key concept in geography), rather than understandings from humanistic approaches, which causes a huge loss of educational potential. Secondary students' academic performance and their desire to pursue a degree in geography can be harmed by the disconnect between academic geography and the school curriculum (Butt, 2019). As a response to this, geographers in both academia and schools have been increasingly interested in bridging the gap between the two sectors (Butt, 2019; Kinder and Brace, 2022). How wide this gap is remains

unknown despite attempts to transfer the concepts and understandings of academic geography to school geography teaching (e.g. Hammond, 2019; Bustin, 2022).

A critical role of the school curriculum is to pass on disciplinary knowledge to future generations; this encompasses content, concepts and methods that have their origins in the academic discipline (Young, 2013; Young *et al.*, 2014). However, as curriculum development moves away from a focus on knowledge towards a focus on competency (Deng, 2021), the problem of the curriculum undermining knowledge while overvaluing general abilities has been raised by some scholars (e.g. Yates and Collins, 2010; Young and Muller, 2010). The concept of 'powerful knowledge' was proposed by Young (2008) to reinstate the critical role of disciplinary knowledge in curriculum making. This was further developed by Deng (2021) for cultivating human powers in areas of competency such as 'understanding, ways of thinking, capabilities, and dispositions' (p. 1654). In recent years, debates in the educational community regarding whether or not the knowledge gaps should be filled, have shifted focus to the issue of how academic disciplines and school subjects should work together to generate powerful knowledge that is of value to all students (e.g. Butt and Collins, 2018; Ferreira, 2018; Finn *et al.*, 2022; Puttick, 2022).

Gericke *et al.* (2018) termed the process of converting academic knowledge into school subjects as 'transformation'. Following Gericke *et al.* (2018), Deng (2021) proposed a 'knowledge transformation' approach to meet the educational goal of better developing human powers. According to Deng (2021), knowledge transformation is a systematic strategy to promote the development of powerful knowledge by transforming disciplinary knowledge into educational purposes, institutional curricula and classroom teaching at three distinct levels. During knowledge transformation, each of the societal, institutional and classroom levels, is identified with a unique set of rationales and challenges for bridging the gap between specialised knowledge and knowledge in educational settings. This necessitates the

involvement of various educational agents and stakeholders (e.g. teachers, curriculum developers, teacher educators, academics). For instance, in the area of geography education, Gong *et al.* (2021) have examined the paths and challenges that a geography teacher faces when trying to instil powerful geographical knowledge in their students from a pedagogical point of view. They concluded that teachers' strong comprehension of powerful knowledge plays a significant part in the transformation process that occurs in the classroom.

However, outside the classroom, insufficient research attention has been paid to the societal and institutional levels of knowledge transformation. More empirical research is needed to clarify, refine and validate the theoretical arguments of knowledge transformation (Deng, 2021). The aim of this study is to fill the lacuna by applying the framework of knowledge transformation to explore the issue of the gap between academic geography and school geography using the competencies-based curriculum for upper secondary schools in China as an example. In order to reflect on its knowledge transformation at the societal level, we began with a brief overview of the current curriculum reform of geography education in China. We then conducted online surveys and semi-structured interviews with individuals involved in geography education in order to understand the transformation processes at the institutional and classroom levels. In addition to presenting the empirical data to validate the theoretical premises of knowledge transformation, this study contributes to a better understanding of the gap between academic geography and school geography for the promotion of geography education in competencies-based curriculum making.

The role of geographical knowledge in the competencies-based curriculum in China

In China, geographical disciplinary knowledge plays an important role in the national competencies-based curriculum, emphasising the importance of knowing and thinking like a geographer. For example, Wei and Zhu (2018) assert that the acquisition of geographical knowledge is essential for anchoring students' development of life-long competencies such as

a long-term perspective on human-environment relationships, a sense of pride in their hometowns and country, an awareness of the world beyond their borders and the ability to take on social responsibilities. To achieve the distinctive values of the disciplinary knowledge, school geography is considered to provide epistemic access to academic geography through building students' core competencies in four areas, namely:

- 'awareness of human-nature relations
- ability to think in a systemic approach
- ability to analyse places in terms of characteristics, scale, and connections
- ability to conduct geographic enquiries' (Ministry of Education of the People's Republic of China (MoE PRC), 2018, p. 6).

Examining how humans interact with environments has always been a central topic in geography (Liu *et al.*, 2018). With an awareness of the interconnections between humans and the natural world, students are better equipped to make ecologically-responsible choices when faced with environmental challenges. Additionally, systemic thinking, locational and spatial analysis are distinctive and central approaches to geography that activate students' analytical and explanatory power, enabling them to gain insights into the complex issues that arise in places at various scales (Liu *et al.*, 2018). Moreover, the ability to carry out geographical enquiry can enable students to confront challenges in wide-ranging settings, behave as independent and critical thinkers, challenge existing knowledge and construct new knowledge through critical thinking and creative problem solving. These four core competencies in the Chinese national geography curriculum standards align with Maude's (2016) five types of powerful geographical knowledge (PGK):

- 'Type 1: Knowledge that provides students with "new ways of thinking about the world"
- Type 2: Knowledge that provides students with powerful ways to analyse,

explain and understand the world

- Type 3: Knowledge that gives students some power over their own knowledge
- Type 4: Knowledge that enables young people to follow and participate in debates on significant local, national, and global issues
- Type 5: Knowledge of the world' (pp. 72-5).

An overview of core competencies for upper secondary school geography, along with the types of PGK that correlate with each, is presented in Table 1.

Table 1: An overview of core competencies for upper secondary school geography in China. Source: MoE PRC (2018).

Core competency	Description	Type of PGK
Awareness of human-nature relations	Student can understand the causal interaction between nature and human activities	Type 4
Ability to think in a systemic approach	Students can consider the effect of the intertwined natural and human factors in the analysis of complex issues or landscapes in specific time and space and understand the processes of the changing landscape	Type 1, Type 2
Ability to analyse places in terms of characteristics, scale and connections	Students can identify the unique characteristics of places at different levels of scale and the interconnections between places	Type 1, Type 2, Type 4, Type 5
Ability to conduct geographic enquiries	Students can conduct geographic enquiries like observation, fieldwork, and experiments, and use geographic tools like maps to collect relevant data in the analysis of geographical issues	Type 3

The national geography curriculum standards in China, which were developed by agents such as geographers and researchers in geography education, reflect the educational significance of cultivating geographical ways of knowing for advancing students' lifelong development in a manner that is consistent with international understanding and practices. The standards prescribe the kinds of content that need to be selected and organised into the curriculum from the body of geographical disciplinary knowledge and how the knowledge that

is selected should be delivered in the classroom; namely knowledge transformation at the institutional and classroom levels. This led us to question whether the goal of generating powerful knowledge to empower students is consistently conveyed throughout these transformation processes, because a multiplicity of educational agents with diverse sets of concerns are involved. The two research questions that guide our study are:

1 In the knowledge transformation process at the institutional and classroom levels, what are the gaps between academic geography and school geography?

2 What are the challenges in bridging the gap to generate powerful geographical knowledge?

Methods

To explore the gap between academic and school geography at the institutional and classroom levels, we employed the analytical framework of knowledge transformation to identify the agents involved in these two processes (see Table 2). In China, at the institutional level, the transformation process includes designing geography curriculum standards, textbooks and Gaokao (the national higher education entrance examination). This process is mainly carried out by geographers and researchers in geography education. Transformation at the classroom level is undertaken by in-service teachers who enact the curriculum in their classes. In-service teachers' understanding and interpretation of geographical knowledge is heavily impacted by their initial teacher education, which is delivered by teacher educators, namely researchers in geography education.

Table 2: The analytical framework of geographical knowledge transformation.

Level	Description of the knowledge transformation process	Agents involved

Societal	Driven by educational objectives through the recognition of the critical role of geographical knowledge in the development of students	Academic geographers, researchers in geography education
Institutional	Determined to achieve subject goals through the selection and organisation of geographical knowledge from academic fields into the content of school curriculum	Academic geographers, researchers in geography education
Classroom	Enacted through the interpretation of content by teachers in classrooms, which enables students to acquire and use geographical knowledge to create transformative experiences	Teachers, teacher educators

The study was conducted as an online survey involving academic geographers (N=84), teacher educators (N=3), in-service teachers (N=47) and pre-service teachers (N=48). This was followed by semi-structured in-depth interviews lasting 20–30 minutes with a group of volunteer respondents from the survey (N=22) [i]. Demographic information on the participants is presented in Table 3. Participants were asked to give their perspective on whether and what kinds of gap there were between academic geography and school geography and how they considered bridging the gap to develop powerful knowledge. The data, both quantitative and qualitative, were collected from February to April 2021. The quantitative data from the online survey were analysed by using descriptive statistics. The qualitative data from the open-ended questions in the survey and interviews were analysed to determine the gap between academic geography and school geography by using thematic analysis (Braun and Clarke, 2006).

Table 3: Demographics of the survey and interview participants. Note: Higher education institutions in China that provide Bachelor's programmes for future teachers are called 'normal universities'.

Participant type	Number		Institution	Professional title / work experience	Research field / educational background
	Surveyed	Interviewed			

Geographers	84	8	Departments of Geography at various normal universities in China	Professor, associate professor, and lecturer	]Physical geography, human geography, and GIS
Teacher educators	3	2			Geography education
Pre-service teachers	48	7		-	Studying for bachelor's or master's degree programme, majoring in geography education
In-service teachers	47	5	Upper secondary schools	Teaching experience varies from three to 30 years	Attained bachelor's or master's degree in geography education

The gap between academic geography and school geography

Knowledge transformation at the institutional level

Based on their self-evaluation in the survey, 68% of academic geographers, all teacher educators, 60% of current teachers and 30% of pre-service teachers participating in the study considered that they had a 'good' grasp of both academic geography and school geography[ii]. Among these, the vast majority (99 out of 102) acknowledged that the gap 'exists'; 17 respondents (7 academic geographers, 7 in-service teachers, 2 teacher educators and 1 pre-service teacher) stated that the gap is 'very obvious' (they selected the highest level in a 5-point Likert Scale). The responses indicated that the new curriculum is still 'unsatisfactory' in terms of keeping up with the discipline, despite some adjustments.

Two major themes regarding the gap were revealed at the institutional level of knowledge transformation through this study (see Table 4). The first gap is characterised by inadequate involvement of the disciplinary advancement. It was pointed out that the framework

of geography in the school curriculum does not adapt to its parent discipline's present structure. Additionally, the curriculum and textbook materials present insufficient advanced knowledge and findings to help students grasp geography concepts. This result is not exclusive to a single nation or area, and includes Finland, the Netherlands, the UK and the USA (see Béneker *et al.*, 2007).

The second major theme identified is insufficient support from the academic community, i.e. there is a lack of collaboration and communication between academic geographers and geography educators. Issues such as unreliable scientific diagrams, outdated information and inconsistent textbook organisation cannot be addressed exclusively by geography teachers in schools. A poor approach to geography taught simply via the prism of standardised testing does not remain a school issue, but rather one that requires transformation at the societal level. This might be due to the disparity between the secondary and postsecondary education systems. As pointed out by Hill and Jones (2010), on the one hand, the answers are seemingly provided by teachers and textbooks in schools, leaving little room for students to explore and comprehend alternative perspectives. On the other, the educational system in universities poses questions rather than providing definitive solutions (see also Sidaway and Hall, 2018).

Table 4: The gap between academic geography and school geography at the institutional level by theme and code, with sample quotes from survey participants.

Theme	Code	Example quote
Inadequate involvement of the disciplinary advancement	Outdated structure of geography	*'Geography is a tripartite discipline entailing physical geography, human geography and GIS. But the school curriculum organises geography into physical geography, human geography and regional geography, with inadequate introduction of GIS.' (Academic geographer)*

	Insufficient advanced knowledge	*'The materials in the curriculum and textbooks regarding the climate change issue are inadequate in helping students to understand this important but complex issue. New scientific discoveries and evidence should be introduced for students to make sense of why it happens and its impacts.' (In-service teacher)*
Insufficient support from the scientific community	Unreliable diagrams	*'The diagrams in the textbooks are not rigorous enough to make sense of the geographical processes. (Academic geographer)*
	Outdated information	*Many data in school textbooks are outdated.' (Academic geographer)*
	Inconsistent knowledge organisation	*'The content of school textbook is selected and organised based on its contribution to developing core competencies rather than based on the structure and logic of the discipline, resulting in content incoherence. Hence, I always struggle to supplement materials and reorganise the content in a way that makes sense to the students.' (In-service teacher)*
	Questionable approaches	*'The standardised answers of Gaokao missed many alternative approaches of the discipline and narrowed the teaching and learning in schools.' (Academic geographer)*

Knowledge transformation at the classroom level

More than half of the academic geographers (59%) and all the teacher educators surveyed expressed satisfaction with the geographical knowledge represented in the classrooms they visited. It is interesting to note that the majority of interviewees (80%) reflected that high-quality geography education is strongly dependent on the teachers' professional knowledge and skills. Teachers' misinterpretation of geographical knowledge, including concepts, principles and processes, would lead to a gap in classroom practice, as noted by one teacher educator:

'Teachers that follow a competencies-based curriculum like to conduct enquiry-based teaching with a variety of engaging real-world contexts

beyond the textbooks. This is a positive step, but regrettably, the lack of critical examination of newly introduced information and their misunderstanding of geographical knowledge often causes problems in teaching.' (teacher educator)

Those who took part in the survey were also asked to rate the extent to which 12 potential gaps (mentioned in prior studies including Maude (2017), Rawling (2018) and Butt (2019)) might exist between academic geography and school geography. As demonstrated in Figure 1, even though different participants perceived them differently, these gaps were all confirmed at the classroom level. The most serious gaps were advanced knowledge, approaches, methods, geographical thinking, and skills, which were in line with the codes developed from the qualitative data (see Table 5). Additional aspects of the gap (such as experiments and models), emerged from the interview data. At the classroom level of knowledge transformation, two key themes emerged, which are also evident at the institutional level, given that there is congruence between curriculum standards and teaching. The first concerned the approaches, methods and knowledge presented in geography classrooms by teachers, which do not adequately reflect the progressive and changing dynamics of the discipline. The second was the claim that there is a deficiency in the use of multiple geographical perspectives and the use of models as conceptual tools in teachers' daily teaching practice. These findings reflect the widespread problem that teachers often have in keeping up with current academic knowledge after graduating from higher education (see Hill and Jones, 2010).

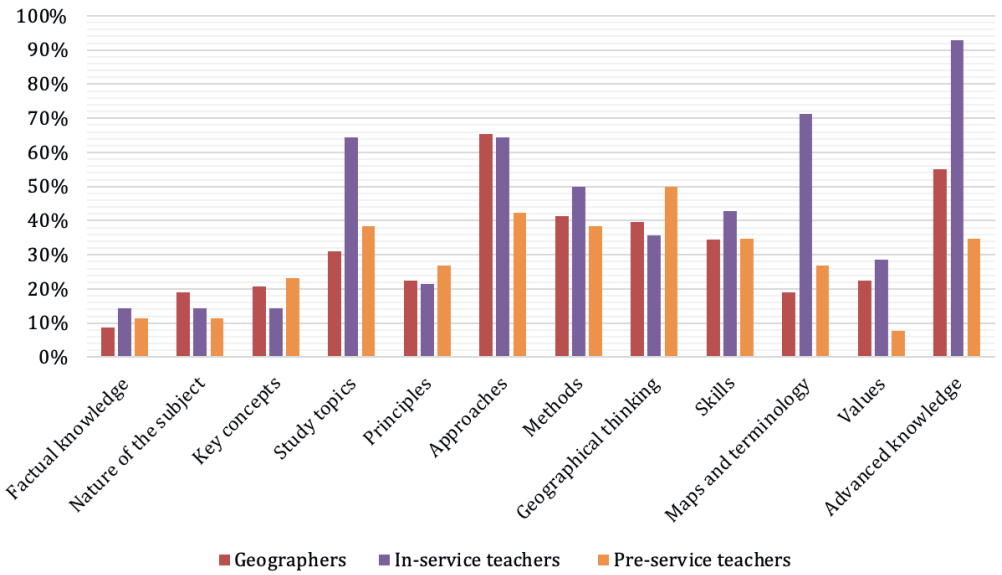


Figure 1: Assumed gap between academic and school geography in 12 specific aspects at the classroom level. Data from the survey of academic geographers, in-service and pre-service teachers.

Table 5: The most serious gaps between academic and school geography at the classroom level by theme and code, with sample quotes from survey participants.

Theme	Code	Example quote
Inadequate involvement of the disciplinary advancement	Approaches	*'Academic human geography has applied diverse and innovative approaches like humanistic, behavioural, and many kinds of 'post-' approaches from other disciplines to remedy the narrowness of the positivistic and quantitative approaches that human geography teaching in schools is still subject to.' (A geographer)*
	Methods	*'Geography research applies many methods like GIS techniques, experimentation, observation, fieldwork, interviews, etc., but in schools, the methodology is limited and far less rigorous than that in academic research when students conduct project-based studies.' (A pre-service teacher)*

	Advanced knowledge	*'The knowledge in the classrooms is limited by the given content in textbooks and teachers' knowledge, no matter how quickly the new geographical knowledge is developed by academia.' (A geographer)*
Insufficient support from the scientific community	Geographical thinking	*'If teachers go beyond the textbooks to find other materials, their explanation of the geographical phenomena will probably be problematic.' (A geographer)*
	Experiments and models	*'The experiments and models presented by teachers in classrooms are over-simplified, and idealised, and some are incompatible with the complex real situations.' (A teacher educator)*

Challenges in bridging the gap

About 95% of the participants in our survey argued there is a need to bridge the gap between the two domains in order to generate powerful geographical knowledge. However, they acknowledged the complex challenges to overcome the gap during the knowledge transformation processes. At the institutional level, the learning needs and career goals of the two sectors are different from one another. Academia, with its critical role in advancing research, is at the vanguard of knowledge creation; whereas schools, with their critical role in basic and general education, have the primary goal of educating students to become informed and active citizens of tomorrow with a minimum knowledge of the world (see Butt and Collins, 2018). Generally, teachers believed that they have little autonomy in determining their own practices in line with the academic geography agenda, owing to widespread obsession with standardised testing. Similarly, Hill and Jones's (2010) research indicates that teachers feel geography national curricula confine what they can teach, as this quote indicates:

> *'The systematic analysis of the distribution of cafés in a city, for instance, is deeply rooted in humanistic geography, including multiple perspectives such as well-being, justice, and sustainability. However, in an entrance exam question, students are simply required to identify the location of cafés in a*

city to get a grade point. This has undermined the intellectual basis of humanistic geography study.' (In-service teacher)

Additionally, the rates at which new knowledge is updated in school and university sectors differs greatly. It is difficult for national curriculum standards and school textbooks to keep pace with the rapid advancement of academic knowledge. Indeed, it is possible that the most up-to-date knowledge selected for the geography curriculum and textbooks is already outdated. This is because it takes a long time for new ideas in academia to spread to school education (Butt and Collins, 2018).

At the classroom level, it should be noted that some teachers have introduced sophisticated knowledge to extend students' horizons. However, this often results in difficulties in practice because of the constraints imposed by students' cognitive levels. It can be problematic for high school students, who have acquired a limited knowledge, to comprehend concepts and principles that are at a high level of abstraction, let alone fresh scientific discovery. Most teachers struggled with how to simplify geographical knowledge without distorting it, resulting in a lack of rigour in the teaching of geography. Some in-service teachers expressed a desire to participate in the academic community in order to broaden their comprehension of more sophisticated geographical concepts and ideas so that, consequently, they could advance their pedagogies (see the quote below). This finding provides direct evidence for the need for alliances between schools and universities in the endeavours of education and geography so that the benefits are shared by both (Finn *et al.*, 2022; Standish *et al.*, 2016).

'To keep my geographical knowledge up to date, I typically read journals and attend conferences to keep up with the latest research discoveries in the discipline of geography. Despite how fascinating it may be to gain new knowledge from academic sources, this does not mean that we (teachers) can

or should replace the information that is already embedded in the curriculum and textbooks. Teaching focuses on transmitting what we already know rather than offering new academic study discoveries. Students may even become more perplexed as a result of this practice. Hence, bridging the gap between academic geography and school geography in our daily teaching practice is extremely difficult.' (In-service teacher)

Conclusion

Based on the findings of this study, we conclude that there is a significant gap between academic geography and school geography through the lens of knowledge transformation at three different levels. First, this study adds to our knowledge of the gap between school geography as a subject and its 'parent' discipline in academic institutions. Insufficient attention to disciplinary development and a lack of support from the academic community are two of the most critical factors that contribute to widening the gap. In addition, this study demonstrates that the disparity in learning needs and career goals between schools and universities, as well as a lack of timely knowledge updating in schools and the cognitive limitations of students, all contribute to the difficulty in bridging the gap. This study also verifies the theoretical argumentation of knowledge transformation for gaining a better understanding of the gap issues experienced by a wide range of geography education agents and stakeholders, which is inspirational in exploring the gap issues in other contexts.

These results have implications for the practice of geography education in schools to fulfil the educational goals of developing powerful knowledge in the knowledge transformation processes. First, the gap at the institutional level must be taken into consideration by teacher educators and academic geographers when revising the curriculum standard and textbooks. Second, it is necessary for the academic community to engage and support teachers to renew their existing geographical knowledge and to strengthen the foundation of geography education.

Indeed, geography teachers are essential agents at the classroom level (Gong *et al.*, 2021), because their role is to teach by transforming knowledge rather than passing on it. Evidence from other researchers (e.g. Lambert *et al.*, 2015) indicates the extent to which teachers play an important role as curriculum makers. In particular, these findings recommend that teachers pay close attention to essential themes such as climate change, GIS, and humanistic approaches to geography, among others, to assist students in deepening their understanding of sophisticated geographical knowledge and to expand their geographical thinking.

In terms of limitations, the issue of whether the survey participants have a solid understanding of academic and school geography was based on selfevaluation. To compensate for this, we performed follow-up interviews to triangulate the results in more depth. However, future research should be mindful that participant judgments of the gap were based on individual understandings of the nature of academic and school geography and differed due to the professional position of the different groups of participants. (The study did not examine if and how their perspectives on the nature of geography differed.) Moreover, there is a large mismatch between how pre-service teachers are taught by geographers and how they are taught by geography teacher educators (Brooks, 2017). In our opinion, this is one of the gaps that needs to be closed, and is an area that warrants further exploration.

To summarise: geography knowledge is important to society, but the school curriculum does not always teach it that way. Our research stresses that the observed gaps between school and academic geography are detrimental to students' development of powerful knowledge and, consequently, to their development in the core competencies. Although there have been studies that suggest ways for stakeholders in academia and schools to collaborate (e.g. Butt and Collins, 2018; Finn *et al.*, 2022), which focus on promoting teachers' agency as curriculum makers (Gong *et al.*, 2021; Bustin, 2022), there is not enough evidence to show how students have been

made aware of powerful geographical knowledge. Thus, there is abundant room for future progress on the current topic.

References

Béneker, T., Sanders, R., Tani, S., Taylor, L. and van der Vaart, R. (2007) 'Teaching the Geographies of Urban Areas: Views and Visions', *International Research in Geographical and Environmental Education,* 16, 3, pp. 250–267. https://doi.org/10.2167/irgee210.0

Bonnett, A. (2003) 'Geography as the world discipline: connecting popular and academic geographical imaginations', *Area*, 35, 1, pp. 55–63. https://doi.org/10.1111/1475-4762.00110

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

Brooks, C. (2017) 'Pedagogy and identity in initial teacher education: developing a "professional compass"', *Geography*, 102(1), pp. 44–50. https://doi.org/10.1080/00167487.2017.12094008

Bustin, R. (2022) 'Teaching the geographies of the homeless: a GeoCapabilities approach', *Geography*, 107, 1, pp. 46–54. https://doi.org/10.1080/00167487.2022.2019497

Butt, G. (2019) 'Bridging the divide between school and university geography – "mind the gap!"' in Walkington, H., Hill, J. and Dyer, S. (ed) *Handbook for Teaching and Learning in Geography*. Cheltenham: Edward Elgar Publishing.

Butt, G. and Collins, G. (2018) 'Understanding the gap between schools and universities' in Jones, M. and Lambert, D. (eds) *Debates* in *Geography Education (2nd edition)*. Abingdon: Routledge.

Deng, Z. (2021) 'Powerful knowledge, transformations and Didaktik /curriculum thinking', British Educational Research Journal, 47, 6, pp. 1652–1674. https://doi.org/10.1002/berj.3748

Ferreira, J. (2018) 'Facilitating the transition: doing more than bridging the gap between school and university geography', *Journal of Geography in Higher Education*, 42, 3, pp. 372–383. https://doi.org/10.1080/03098265.2018.1437397

Finn, M., Hammond, L., Healy, G., Todd, JD., Marvell, A., McKendrick, JH., and Yorke, L. (2022) 'Looking ahead to the future of GeogEd: Creating spaces of exchange between communities of practice', *Area*, 54, pp. 41-51. https://doi.org/10.1111/area.12701

Gericke, N., Hudson, B., Olin-Scheller, C. and Stolare, M. (2018) 'Powerful knowledge, transformations and the need for empirical studies across school subjects', *London Review of Education*, 16, 3, pp. 428–444. https://doi.org/10.18546/LRE.16.3.06

Gong, Q., Brooks, C. and Duan, Y. (2021) 'A teacher's role in making a given knowledge curriculum into a powerful knowledge curriculum', *Geography*, 106, 1, pp. 39–48. https://doi.org/10.1080/00167487.2020.1862591

Goudie, A. (1993) 'Schools and universities – the great divide', *Geography*, 78, 4, pp. 338–339. http://www.jstor.org/stable/40572548

Hammond, L. (2019) 'Utilising the "production of space" to enhance young people's understanding of the concept of space', *Geography*, 104, 1, pp. 28–37. http://doi.org/10.1080/00167487.2019.12094059

Hill, J. and Jones, M. (2010) '"Joined-up geography": connecting school-level and university-level geographies', *Geography*, 95, 1, pp. 22–32. https://www.jstor.org/stable/40574787

Kinder, A. and Brace, S. (2021) 'The geography and education research group and school geography: problematics and possibilities', *Area*. https://doi.org/10.1111/area.12769

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. 723–735. https://doi.org/10.1080/00045608.2015.1022128

Liu, Y., Lu, D., Bao, J., Ye, C., Tang, M., Liu, Y., Zhao, Y., Feng, Z., Huang, X., Hao, Q., Huang, G., Wang, F., Wei, Z., Wang, L., Xie, Y. and Qian, L. (2018) 'How to revive geography: our reflection and practice', *Geographical Research*, 37, 6, pp. 1049-1069. https://kns.cnki.net/kcms/detail/detail.aspx?FileName=DLYJ201806002&DbName=CJFQ2018

Maude, A. (2016) 'What might powerful geographical knowledge look like?', *Geography*, 101, 2, pp. 70–76. https://doi.org/10.1080/00167487.2016.12093987

Maude, A. (2017) 'Applying the Concept of Powerful Knowledge to School Geography', in Brooks, C., Butt, G., and Fargher, M. (eds) *The Power of Geographical Thinking*. Cham: Springer International Publishing.

MoE PCR (2018) *Geography Curriculum Standards for Upper Secondary Schools (2017 edition)*. Beijing: People's Education Press.

Puttick, S. (2022) 'Geographical education I: fields, interactions and relationships', *Progress in Human Geography*, 46, 3, pp. 898–906. https://doi.org/10.1177/03091325221080251

Rawling, E. (2018) 'Place in geography: change and challenge' in Jones, M. and Lambert, D. (ed) *Debates* in *Geography Education (2nd edition)*. Abingdon: Routledge.

Sidaway, J.D. and Hall, T. (2018) 'Geography textbooks, pedagogy and disciplinary traditions', *Area*, 50, 1, pp. 34–42. https://doi.org/10.1111/area.12397

Standish, A., Hawley, D. and Willy, T. (2016) 'The London Geography Alliance: Re-connecting the school subject with the university discipline', *London Review of Education*, 14, 2, pp. 83-103. https://doi.org/10.18546/LRE.14.2.06

Stannard, K. (2003) 'Earth to academia: on the need to reconnect university and school geography', *Area*, 35, 3, pp. 316–322. https://doi.org/10.1111/1475-4762.00181

Wei, Z. and Zhu, X. (2018) *Explanation of Curriculum Standards for Senior Secondary Education: Geography*. Beijing: Higher Education Press.

Yates, L. and Collins, C. (2010) 'The absence of knowledge in Australian curriculum reforms', *European Journal of Education*, 45, 1, pp. 89–102. https://doi.org/10.1111/j.1465-3435.2009.01417.x

Young, M. (2008) 'From Constructivism to Realism in the Sociology of the Curriculum', *Review of Research in Education*, 32, 1, pp. 1–28. https://doi.org/10.3102/0091732X07308969

Young, M. (2013) 'Overcoming the crisis in curriculum theory: a knowledge-based approach', *Journal of Curriculum Studies*, 45, 2, pp. 101–118. https://doi.org/10.1080/00220272.2013.764505

Young, M., Lambert, D., Roberts, C. and Roberts, M. (2014) *Knowledge and the Future School: Curriculum and social justice*. London: Bloomsbury.

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

[i] The electronic questionnaire survey was disseminated to the specialised communicating groups in social media platforms (i.e., WeChat and QQ), to reach out to geographers, pre-service teachers, and teacher educators who are in various normal universities in China, as well as in-service teachers who mostly graduated from normal universities.

[ii] At the outset of the questionnaire survey, we asked participants to rate their knowledge of academic geography and school geography. To what degree do participants have a solid understanding of both fields was based on their self-evaluation.

II

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GeoCapabilities Approach to Climate Change Education: Developing an Epistemic Model for Geographical Thinking

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ABSTRACT

Multiple perspectives on geographical thinking are lacking in the teaching of climate change in school geography. This study establishes an epistemic model through a co-construction design to support geography teachers' curriculum making with respect to climate change. We developed the preliminary model with four main geographical perspectives, including natural scientific, humanistic, social scientific, and posthuman perspectives, by drawing on studies in academic geography. Based on interviews with nine geography education researchers who have been involved in the GeoCapabilities project, we examined the educational potentials of multiple geographical perspectives in developing student's capabilities to react to climate change.

KEYWORDS

Geographical thinking; climate change; epistemic model; GeoCapabilities

Introduction

As climate change has become a pressing global environmental crisis, school education is increasingly focusing on how best to transmit relevant knowledge to the next generation in a way that encourages young people to engage with the issue. However, recent research has shown that young people's understanding of climate change may be deficient (Rousell and Cutter-Mackenzie-Knowles 2020) and thus ineffectively affect their attitudes and behaviors (Stoeth and Carter 2022). Possible reasons concern the narrowness of climate change education as well as teachers' insufficient understanding of the issue, both of which relate climate change mainly to the natural sciences (Cantell et al. 2019). To unpack the complexity of the issue and evoke learners' values and actions, researchers are increasingly emphasizing the need to include insights from the social sciences and humanities as part of a cross-disciplinary approach to climate change education (Siegner and Stapert 2020; Sund and Gericke 2020). Given that school geography is one of the main channels to teach climate change, this article calls for an appreciation of the multi-perspective capacity of geographical thinking to provide students with a more comprehensive understanding of climate change.

Geography is a field of study with a specific focus on human-environmental relationships that uniquely straddles the divide between the natural, human, and social sciences, thus offering the possibility to provide a more holistic approach to understanding climate change (Taylor and O'Keefe 2021). For this reason, the teaching of climate change is often associated with geography education in many countries (e.g., Singapore, see Chang and Pascua 2017a; Finland, see Tani 2022). However, scholars have argued that teachers do not have enough awareness of many possible geographical perspectives, causing them to mainly highlight climate change as a physical geographical term (Cantell et al. 2019; Waldron et al. 2019). Furthermore, despite receiving more attention, pre- and in-service teachers can still misunderstand the natural scientific processes of climate change (Papadimitriou 2004; Ratinen, Viiri, and Lehesvuori 2013). Due to the crucial role played by teachers as curriculum makers, their understanding of climate change impacts their potential to develop students' capabilities to think critically about the changing human-environmental relationship and assume a greater sense of environmental and global responsibility (Lambert, Solem, and Tani 2015). Therefore, it is important to enhance teachers' geographical thinking to better support their curriculum making (Mitchell et al. 2022).

Developing teachers' geographical thinking not only includes helping them make sense of geographical thinking, but also includes knowing how geographical thinking can contribute to young people's development. Many recent efforts have focused on supporting geography teaching by emphasizing a conceptual understanding of geographical topics (e.g., Jankell, Sandahl, and Örbring 2021; Maude 2022; Mitchell 2022). However, little research attention has been paid to the multiple geographical perspectives that underpin and shape a comprehensive understanding of various geographical concepts and issues. To fill this research gap and discuss teachers' curriculum making in relation to the specific topic of climate change, the main aims of this study are twofold: first, unpacking the multiple perspectives of geographical thinking on climate change through developing an epistemic model; and second, exploring the educational

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potential of the geographical perspectives by gaining insights from the experts involved in the GeoCapabilities project (Lambert, Solem, and Tani 2015).

In the following section, we begin with a literature review of multi-perspective geographical thinking, the ideas informing the GeoCapabilities approach, and prior studies on climate change as a topic of focus in geography education. We then establish a preliminary model for thinking about climate change geographically *via* four main geographical perspectives, by drawing on studies on the human-environmental relationship in the field of academic geography. After introducing the co-construction design used to develop the model, we discuss the interviews conducted with researchers for examining the model. In addition to explaining the contributions of multi-perspective geographical thinking to the development of young people's capabilities in responding to climate change, this study supports geography teachers in curriculum making by providing an epistemic model for presenting a holistic geographical approach.

Literature review

Geographical thinking on climate change: The potential of multiple perspectives

Geography offers a powerful way of thinking about the world, derived from its integrated approach, broad theme of study, and rich conceptual understanding (Morgan 2013). In bridging between natural, human, and social sciences, geography studies the relationship between people and the environment, which has been central to the history of geographical thought despite the paradigm shifts and different schools of thought that have emerged over the years (Cresswell 2013). The integrated nature of geographical thinking enriches possibilities to understand such key concepts as *space*, *place*, *scale*, and *environment* (Morgan 2013). For instance, Freeman and Morgan (2014) have argued that a proper balance of natural scientific (focus on spatial and objective aspects with a positivist approach), humanistic (focus on individual, personal, subjective aspects), and social scientific (focus on socio-political processes) perspectives can offer teachers a better way to inform students about the concept of *place*. Likewise, various epistemological perspectives can shape a holistic understanding among students of the *human-environmental relationship* as a key concept as well as a core component of geography (Holt-Jensen 2018). Apart from the three basic perspectives, another emerging stream of thought—the posthuman perspective—has made a productive contribution to current geographical studies by challenging and shifting the previous anthropocentric perspectives to a focus on more-than-human agency in thinking about the human-environmental relationship (Falcon 2023; Greenhough 2014; Miele and Bear 2022).

The synthesis of diverse perspectives places geography fruitfully at the center of human-environmental issues, in particular climate change (Taylor and O'Keefe 2021). In addition to seeing climate change as in physical geography, geographers connect climate change with social processes and cultural meanings across different scales (Finn 2021). The various ways of geographical thinking can provide teachers with abundant resources to instruct students about climate change, which is an important topic in school geography. However, in light of the knowledge transformation from academic discipline to school subject (Deng 2021), it is necessary to know what kinds of geographical perspectives can best be adapted to school teaching in a way that matches educational purposes, which serves as the starting point for this study. It should be acknowledged that definitions vary greatly regarding educational aims in different contexts. In this study, we do not try to downplay the differences and propose a universal scheme of incorporating certain types of geographical perspectives into school teaching. Instead, we discuss the educational potential of plural geographical perspectives, which can shed light on what knowledge to select and present to students when school geography teachers engage in curriculum making on the topic of climate change.

GeoCapabilities approach: Unpacking the educational contribution of geographical thinking through teachers' curriculum making

In focusing on climate change as an issue in geography education, we apply the ideas of GeoCapabilities, which is an approach used to explore the contribution that geography education offers for young people's development. Applying Amartya Sen and Martha Nussbaum's educational capabilities framework (Nussbaum 2013; Nussbaum and Sen 1993), the GeoCapabilities approach focuses on the educational outcomes that young people can be and do in order to live and thrive in the future (Lambert, Solem, and Tani 2015; Mitchell 2022). Furthermore, the GeoCapabilities approach, which is also informed by Michael Young and Johan Muller's theory of powerful knowledge (Young 2009; Young and Muller 2014), emphasizes the significant role of geographical knowledge in the development of human capabilities. Based on a social realist approach to knowledge, its proponents argue that the disciplinary knowledge produced and validated by specialized communities is powerful because of its very characteristics (striving for objectivity, reliability, fallibility, and testability) as well as the intellectual power offered to students (Maude 2016). The international GeoCapabilities project has brought together an array of research convincingly demonstrating that geographical knowledge and geographical thinking are powerful tools for developing young people's capabilities, such as their ability to think about themselves in the world, about the changing relationship human beings have with the environment, and about assuming a sense of environmental and global responsibility (e.g., Béneker and van der Vaart 2020; Lambert and Solem 2017; Lambert, Solem, and Tani 2015; Maude 2016). These capabilities are inextricably connected with how to live a good life within the context of climate change, developed through thinking about climate change geographically (Mitchell 2022).

Students' access to the powers of geographical thinking relies on the professional practices adopted by geography teachers, who are regarded as curriculum makers in the GeoCapabilities approach (Lambert, Solem, and Tani 2015). With teacher's agency highlighted, teachers are encouraged to

make their own critical decisions about what and how to teach based on their specialized geography knowledge and knowing their students' needs. Therefore, engaging with the discipline of geography becomes a central task in teachers' professional development and constitutes a core component of their teaching (Mitchell et al. 2022). Evidence indicates that teachers' curriculum making benefits notably from their collaboration with academic geographers, who help teachers update their knowledge and think geographically (Mitchell and Béneker 2022). However, a lack of support from the academic community is still a crucial problem in bridging the gap between academic geography and school geography (He, Tani, and Yang 2022), mainly due to the epistemic difficulty of engaging with sophisticated disciplinary knowledge and the practical barriers to successfully organizing such collaborative efforts (Hill and Jones 2010). Therefore, in addition to informing teachers about recent trends in academic geography as a means of broadening their professional horizons, it is necessary to provide teachers with a scaffold for more easily accessing academic geography and supporting their choice of what to include when engaging in curriculum making. In this regard, we propose an epistemic model for presenting the main perspectives for thinking about climate change geographically, which might also serve as an applicable tool for understanding various geographical concepts and issues in a holistic geographical manner.

Climate change education in school geography: Insufficient engagement in geographical thinking

Climate change education often takes place within the geography curriculum in many countries, focusing especially on geography's relational understanding of the natural and social dimensions of climate change (Dawson et al. 2022). The content of climate change in school geography often involves studying its causes and impacts as well as solutions to the resulting problems, characterized by a disciplinary analysis of the interactions between humans and the environment (Chang 2014; Dawson et al. 2022). Despite the strong emphasis on an interdisciplinary approach, it might be questioned whether the multiple perspectives of geographical thinking are adequately recognized and presented in teaching. For instance, some contexts focus on teaching about climate change solely within the context of physical geography, approaching the issue from a natural scientific standpoint (Cantell et al. 2019). While this approach is essential for fostering students' science literacy and dispelling misconceptions related to climate change (Chang and Pascua 2017b; McCaffrey and Buhr 2008; Ratinen 2016), the integral human or social dimension necessary for comprehending this complex human-environmental issue often receives insufficient attention in teaching (Waldron et al. 2019). Likewise, teachers might also fail to address the emerging posthuman understanding in contemporary geography. To present a more holistic geographical approach to understanding and teaching about climate change, this study develops an epistemic model grounded in disciplinary thinking and explores its educational potential.

The preliminary epistemic model

A review of the existing literature revealed multiple perspectives on geographical thinking, each of which might help students understand complex issues and develop their capabilities. We propose an epistemic model for supporting teachers' curriculum making. Drawing on contemporary geographical studies on the human-environmental relationship, we highlight four perspectives important for understanding climate change, namely natural scientific, humanistic, social scientific, and posthuman perspectives, which constitute the preliminary model (see Figure 1). Drawing on Freeman and Morgan (2014) three-lamp model for comprehending the concept of *place*, this epistemic model also employs a metaphor suggesting that the four perspectives are like lamps that could help illuminate a more holistic geographical thinking. Table 1 illustrates how each lens makes it possible to understand the human-environmental relationship and, in turn, sheds light on climate change in different ways.

Different ontologies and epistemologies relating to humans, the environment, and their relationship with the four perspectives shape distinct understandings of climate change. The four perspectives on the human-environmental relationship are embedded in the paradigm shifts of modern geographical thought, from de-humanized to anthropocentric and currently anti-anthropocentric. Despite the different theoretical underpinnings and critical arguments, all four geographical perspectives have their own values and serve as tools for geographers to understand the diversity and complexity of the world (Cresswell 2013). The tensions between the different perspectives lead to the question of whether and how they can benefit the geography taught in schools and enhance the epistemic quality of climate change education. To examine the educational

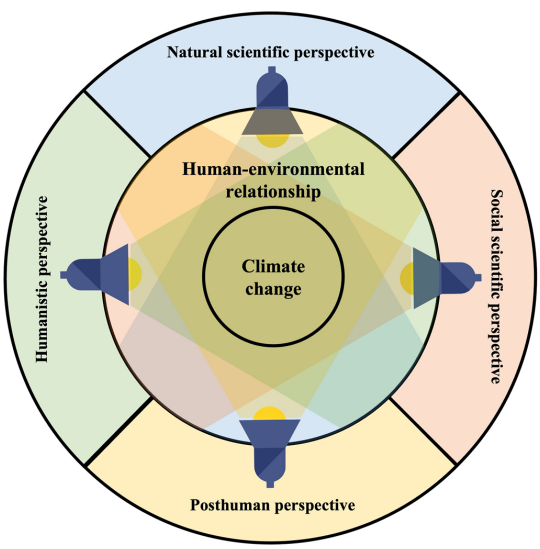


Figure 1. The preliminary epistemic model for thinking about climate change geographically (source: the authors).

Table 1. Understanding climate change from different geographical perspectives.

Geographical perspectives	Understanding human-environmental relationship (sample views on climate change)
Natural scientific perspective	Both physical and human elements are regarded as objects that can be observed and measured by scientific methods, aiding in problem-solving. (e.g., mitigating climate change by reducing greenhouse gases)
Humanistic perspective	Focusing on individual experience and human subjectivity—how people attach their own meanings to the environment. (e.g., reflecting on the human condition and values based on responses to climate change)
Social scientific perspective	Focusing on social justice issues from the standpoint of different individuals, groups, and societies, especially in terms of different identities based on socio-economic background, gender, race, age, and body abilities, to name a few, in their relationship with the environment. (e.g., criticizing social justice issues among different people in climate policymaking)
Posthuman perspective	Challenging the separation between humans and the environment; engaging with the materiality and agency of non-human entities; tracing relations in the environment network. (e.g., seeing climate change as a hybrid and more-than-climate assemblage where humans and non-humans are mutually implicated in, constitutive of, and vulnerable to climate change; extending care to more-than-human strangers, such as multispecies, in cataclysmic times; adapting and learning to be affected by an unruly planet)

potentials of the four geographical perspectives and improve the preliminary model, we conducted a co-construction study design, which is introduced in the following section.

Methods

Study design: Co-construction of an epistemic model

In alignment with the main idea underpinning the GeoCapabilities approach, which aims to unravel the educational potential of disciplinary thinking in school geography teaching, we establish and adhere to a four-step co-construction design to develop the epistemic model for thinking climate change geographically:

- ***Step 1: Developing the preliminary model by thinking geographically***
  Draw upon academic insights regarding the human-environmental relationship within the geography discipline to establish the preliminary epistemic model. This is a disciplinary-oriented preliminary model that represents the geographical understanding of climate change.
- ***Step 2: Interviews with experts in the GeoCapabilities perspective***
  Conduct interviews with geography education researchers who subscribe to the GeoCapabilities viewpoint and collect their views on important geographical thinking for students to better understand climate change in an open manner.
- ***Step 3: Interaction with experts to reflect on the preliminary model***
  Present the preliminary model to the interviewees. Reflect on their geographical thinking in the preliminary model. Discuss the similarities and differences between their original opinions and the preliminary model.
- ***Step 4: Examining the educational potential of the reflected model***
  Anticipate the capabilities that can be developed through shared geographical thinking about climate change in the reflected model, which balances disciplinary and educational perspectives.

Data collection

To examine the educational potential of the geographical perspectives based on the GeoCapabilities approach, we conducted semi-structured, in-depth interviews with nine academic experts involved in different phases of the GeoCapabilities project. Two of the experts were school-based researchers and the others were university-based researchers. The recruited interviewees were from different countries: Australia, China, Czechia, Finland, the Netherlands, Sweden, the UK, and the USA. The international nature of the data collection was compatible with the aim of the project: to communicate the purposes of school geography internationally (Lambert, Solem, and Tani 2015). As geography education researchers, the participants were able to provide rich understandings of both the geography discipline and school geography in their own contexts.

The interviews were guided by two main questions: (1) What kinds of geographical perspectives are important for understanding climate change? (2) What kind of contribution can those geographical perspectives offer for young people to develop their capabilities to react to climate change? The interviews took place and were recorded in Microsoft Teams, lasting from 50 to 90 min. The interview data were automatically transcribed in Teams during recording and subsequently collated by the first author to ensure accuracy in wording for further analysis.

Data analysis

The data analysis was guided by Braun and Clarke (2006) six phases of thematic analysis: familiarizing oneself with the data; generating initial codes; searching for themes; reviewing the themes; defining and naming themes; and producing reports. To facilitate the different steps involved in co-constructing the epistemic model, we included both inductive (data-driven) and deductive (pre-existing frame-based) analysis. At the beginning of the interviews, participants were asked about the geographical perspectives they deemed important for understanding climate change. Their responses reflected diverse ways of structuring geographical thinking, influenced by their epistemological perspectives. To identify themes from their original responses, we initially applied an inductive approach. Subsequently, we employed a deductive approach to explore which

geographical perspectives, evident in the preliminary model, were valued by the participants, with the preliminary model serving as an analytical framework. The interactive step in the interviews proved beneficial in minimizing misunderstandings between researchers and participants. Additionally, we conducted inductive analysis to generate themes regarding participants' views on the capabilities that can be developed from thinking geographically *via* different perspectives.

Results

The valued aspects of geographical thinking about climate change

Four main themes were generated based on participants' geographical thinking about climate change before the preliminary model was presented. The geographical perspectives, as the focus of this study, were implicated in their answers (see Table 2).

The first theme focuses on the facts relevant to climate change, such as climate data and climate events related to the natural and social environment. Natural scientific facts concern the changing atmosphere, including warming temperatures and related components. Changes to landscapes and natural disasters were described in some of the interviews. Additionally, some interviewees also mentioned important climate-related social issues, including climate refugees and the difficult intergovernmental negotiations to address climate change.

The second theme, which concerns the natural and social processes of climate change, was spotlighted in most of the interviews. This theme directs attention to a deeper explanation for why climate change is occurring and how climate change impacts humans and the environment, which involves substantive knowledge of physical and human geography. Most of the interviewees stressed the understanding of the physical processes of greenhouse effects, which scientists regard as the direct reason for human-induced climate change. Adopting a deeper focus, interviewees also emphasized the social reasons and climate justice issues. They generally acknowledged that any effort to assess the responsibilities of different countries needs to account for historical developments and current economic relationships among different nations and not just provide intuitive data about greenhouse gases emission. Additionally, many considered the political economic explanation for climate change, which situates climate change in the grant narrative of capitalist development.

The third theme involves a set of geography concepts. Most interviewees regarded the *human-environmental relationship* as the most important concept for understanding climate change in a geographical way. This suggests a shared understanding that climate change involves a complex interplay of natural processes and societal dynamics, underscoring geography's unique role in "synthesizing and connecting physical systems and human systems" (P3). In addition, they highlighted the notion of *place* because it illustrates the fact that "climate change actually happens in certain places in the world" (P1) and that the effects and solutions vary in different places (P7, P9). Other concepts, such as *space*, *scale* (local and global), and *time* (development or change), were also mentioned as reflecting the spatial and temporal aspects of climate change.

The final theme relates to the solutions and values in terms of reacting to climate change. In pushing past straightforward solutions, such as reducing greenhouse gases through specific actions, the interviewees engaged with

Table 2. Interviewees' ideas on geographical thinking about climate change, colored based on authors' analysis (blue: natural scientific perspective; green: humanistic perspective; red: social scientific perspective; yellow: posthuman perspective).

Themes	Codes
Factual phenomena, data, and events related to climate change	Atmospheric changes (global distribution of rising temperatures and CO2) (P1, P4, P6)
	Changing landscapes and natural disasters related to climate change (e.g., melting glaciers and rising sea level) (P4, P5, P7, P9)
	Vulnerable people (climate refugee / immigrants) because of climate change (P1, P9)
	It is difficult to reach agreements about climate change among different countries based on intergovernmental negotiations (P1, P2, P6)
Explanation of the processes of climate change	Explaining the physical processes of climate change, i.e., increasing levels of greenhouse gas pollution, by learning about physical geography, meteorology, earth system science, and climatology (P1, P2, P3, P4, P6, P7, P9)
	Explaining the social processes underpinning climate justice issues, e.g., different historical responsibilities, political conflicts, and economic relationships among different countries (P1, P2, P3, P4, P6, P7, P8, P9)
	Providing the political economic reasons (capitalism) for climate change (P3)
Relevant geography concepts for understanding climate change	Human-environmental (nature-society) relationship / interactions (P1, P3, P4, P5, P6, P8, P9)
	Place (P1, P3, P6, P7, P8)
	Space (P1, P5, P8)
	Scale (local and global) (P3, P5)
	Time and development / change (P5, P9)
Solutions and values for reacting to climate change	Pay attention to local, indigenous, minority, or ethnic knowledge and experiences with climate change (P3, P7)
	Promoting survival knowledge to react to possible disasters in local areas (P9)
	Addressing climate change requires global collaboration (P1)
	Providing hope that individual agency can make a difference in dealing with climate change (P1, P2, P5)
	Foregrounding the role of individual moral actions and behaviors in mitigating greenhouse gas emissions (e.g., food and transportation choices) (P2, P5)
	Showing care and empathy for the surrounding environment, knowing how other species change and adapt to climate change (P2, P3, P9)
	Discerning the differences between fact, fiction, and opinions about climate change (P3, P6, P7)
	Becoming aware of the social justice issues underlying climate change, e.g., responsibilities and vulnerabilities of various countries (P1, P2)

broader concerns ranging from the individual level to the global level. Some key phrases, such as local knowledge, hope, international collaboration, empathy, discernment, and justice, indicated that participants' main reactions to climate change derived from their geographical thinking. Although many emphasized the regional differences of climate change, as they did with the previous themes, only two interviewees specifically highlighted the values of local knowledge in addressing climate change as well as accounting for young people's local experiences. Similarly, another interviewee valued the need for practical survival knowledge to cope with possible disasters due to climate change on a local scale. Additionally, some interviewees believed that an attitude of hope should be conveyed together with geographical thinking, given that individuals can have positive influences based on a holistic understanding of climate change. This hope should also be based on various actions, values, and moral standpoints that could be promoted, including intergovernmental collaboration, individual agency, caring for the environment and multiple species, exhibiting critical judgment about claims regarding climate change, being aware of climate justice issues, and engaging in political participation.

In sum, participants emphasized knowing the facts, processes, concepts, and solutions and values when thinking about climate change from a geographical standpoint. The four themes echo the threefold arrangement of powerful geographical knowledge proposed by Lambert, Solem, and Tani (2015), which include possessing: a deep descriptive world knowledge (facts); a critical conceptual knowledge that has explanatory power and systematicity, providing a relational understanding of people living on the planet (processes and concepts); and a propensity to think through alternative social, economic, and environmental futures in specific place and locational contexts (solutions and values).

The valued geographical perspectives in the preliminary model

According to our analysis, the participants' initial responses were dominated by the natural scientific and social scientific perspectives on geographical thinking. They paid exclusive attention to the natural and social scientific perspectives in the themes dealing with facts and explanations for climate change processes, while integrating and extending the geographical perspectives in the theme discussing solutions and values. Their responses did not straightforwardly indicate which specific perspective related to the theme of relevant geography concepts because the understanding of those concepts can involve different perspectives, whereas participants merely provided a general description of these ideas in the interviews.

In the interactive step, when the participants were asked to reflect on their original opinions after given the preliminary model, most of them thought that their original views were included in the model, mainly involving natural scientific, humanistic, and social scientific perspectives, but lacking posthuman perspective. The absent posthuman perspective was due to their lack of familiarity with the relatively fresh approach, which they also acknowledged. Nevertheless, after the authors' explanation, the participants then provided more insights and clearly saw the educational potential of the approach. Seven of the interviewees commented that the ideas from posthuman perspective are interesting and important complement to their original thinking and to school geography with respect to understanding climate change, given that it could help young people realize and problematize the predominant human-centered mindset in the human-environmental relationship and rethink the agency and rights of non-humans (e.g., P9). A mismatch can be found between participants' assertions and the authors' identifications (see Table 2) in terms of the humanistic perspective. This mismatch can be explained, as elicited in the interactions, by the fact that some participants misconceived humanistic perspective as human geography which is one of the sub-disciplines focusing on the broad influence of humans. After gaining a shared understanding of the geographical perspectives involved in the preliminary model, the interaction ended up with the participants' appreciation for the model and acknowledging the significant roles played by diverse geographical perspectives in helping young people understand climate change. In other words, the perspectives included in the preliminary epistemic model were examined by the participating geography education researchers.

Geographical perspectives and capabilities development

From the perspective of the GeoCapabilities approach, the participants highlighted how geography education contributes to young people's capabilities to think, to be, to do, and to live in the world, which guided them to consider the educational potential of the epistemic model. There were two nuanced ways of response: three of them tried to unpack the potential of each perspective and came up with specific capabilities at addressing climate change (P1, P2, P4), while the others preferred to talk about the generic capabilities that students develop if equipped with all the geographical perspectives.

The first type of participants provided nuanced insights into how each perspective contributes to students' understanding of climate change. The natural scientific perspective can equip young people with necessary scientific knowledge and data capacities to understand and articulate the intricacies of climate change, including phenomena like the greenhouse effect and other pertinent data, such as rising temperature, ice melting, changing sea level, and precipitation (P2). This geographic lens further facilitates the transforming of abstract climate data into tangible experiences by immersing students in real-world locations through a spatial perspective (P1, P4). For instance, the approach enables students to witness the natural hazards due to climate change in real places, such as the disappearance of islands due to rising sea levels (P1). In this sense, young people can develop a deeper understanding of the environmental challenges posed by climate change. The humanistic perspective fosters young people's awareness of individual agency, empowering them to recognize their capacity for having positive or negative influences on the world. For example, students may put their eco-friendly values into practice, such as choosing

trains over planes or buses over cars (P2). The social scientific perspective encourages deep reflection on the political and social justice dimensions of climate change. Students could engage in analyzing policies, participate in debates on environmental justice, or advocate for sustainable practices in their communities (P1, P2, P4). Despite its novelty to the participants, the posthuman perspective has the potential to evoke empathy in young minds for the more-than-human lives affected by climate change, such as caring about the survival and adaptation of other species in the changing environment (P2).

The other interviewees believed that employing the four perspectives in geographical thinking leads to two generic outcomes, oriented more toward students' ultimate development and capable of being transformed into capabilities for reacting to climate change. The first generic outcome is critical thinking. When tackling complex issues like climate change through diverse geographical perspectives, students encounter a variety of voices and viewpoints, fostering an awareness of the multitude of interests involved. Instead of passively absorbing information in school textbooks or on social media, students armed with multiple perspectives can independently assess and analyze existing ideas. For instance, they may critically evaluate the extensive amount of information about climate change by questioning the sources, objectivity, and potential representation of specific interest (P3, P6, P7). Additionally, they can holistically analyze climate change questions, such as connecting the rise in CO_2 levels to natural scientific knowledge about the atmosphere, social scientific concerns regarding conflicts of interest between countries over fossil resources, and environmental values from a humanistic perspective (P8). Corresponding to the first outcome, the second one relates to the freedom and agency of young people, aligning with the educational goal in the GeoCapabilities approach. This freedom and agency encompass not only the ability to think critically but also to take action, live in a way that aligns with their values, and express their thoughts about, knowledge of, and understanding of the issues. For instance, the interviewees expressed an appreciation for students actively engaging in climate policy making, making their voices heard, and proposing solutions (P3).

Discussion

It is intriguing that the geography education researchers participating in this study gave differing amounts of attention to each perspective in the epistemic model, even though they valued all perspectives' roles. They privileged the natural and social scientific perspectives over the other two in their geographical thinking about climate change. This finding is in line with a study by Hall and Moore-Cherry (2022), which found that the applied (mainly natural scientific) and critical (mainly social scientific) perspectives are valued in geography education with respect to informing students to best serve society and act against structures of injustice. Since there is a commonly oversimplified binary of applied and critical perspectives in geography, it was reasonable to assume the less attention paid to the humanistic and posthuman perspectives, which constitute the "shades" or "overlaps" between the applied-critical division (Hall and Moore-Cherry,2022 2). This uneven attention to the geographical perspectives could not be limited just to teach climate change but common in the arena of geography education generally. Despite rare efforts by some to focus on cultural geographies and explore how humanistic and posthuman perspectives can contribute to the way powerful knowledge is formulated in higher education (Waight 2021), this study calls for a further exploration of these two infrequent perspectives at the school level.

Another interesting finding from the interviews in this study is that geographical perspectives, though important, are often not specified in discussions on geographical thinking. To our knowledge, as well as evidenced by this study, geographical thinking is often related to broad and inclusive geographical concepts, such as *place*, *space*, *scale*, and *human-environmental relations* (Fögele 2017; Lambert and Morgan 2010; Maude 2022), which account for teaching in practice (Jankell, Sandahl, and Örbring 2021). Indeed, while it is important to provide students with a conceptual understanding of geography, it is also crucial to notice that different perspectives fundamentally shape various understandings of geographical concepts. This applies not just to the *human-environmental relationship* articulated in this study but also other key concepts as well, like *space* and *place* (Hubbard and Kitchin 2011). By neglecting the underlying perspectives, teachers run the risk confining students to a narrow understanding of concepts and their application to specific issues, such as climate change. This study underscores a challenge in geography education in terms of keeping pace with the evolving nature of the discipline. The examined epistemic model offers potential support to geography teachers as a scaffold for understanding geographical thought, reflecting on their pedagogic practices, and applying them to discussions about *human-environmental relationship*, climate change, and other relevant topics. However, it is important to note that the epistemic model is by no means exhaustive, but rather could be developed further for specific educational purposes. The development of the epistemic model through a co-construction design will also inspire exploration of geographical thinking with respect to topics beyond just climate change and concepts extending beyond the *human-environmental relationship*.

Finally, the limitations of this study warrant mentioning. First, the articulation of the four geographical perspectives in the epistemic model is mainly based on our review of the existing English literature, which might exclude knowledge from other sources in different languages. The reason that the participants expressed general appreciation for the model is probably that they have been deeply engaged with the English-based research, whether from the standpoint of academic geography or school geography. Considering the ongoing de-colonizing discourse in academic geography as well as the climate change studies (Radcliffe 2022; Johnson, Parsons, and Fisher 2022), the outcome of this study, that is, the four-perspective model, should be treated with criticality. However, we recommend repeating the co-construction steps to examine and improve the model in accordance with the

study design discussed in this paper. The co-constructers need not be exclusively geography education researchers, but may also include other experts involved in geography education, such as geographers, geography teachers, and geography learners in schools and elsewhere. The second limitation is that this study has not delved into the practical implementation and validation of the proposed model in a classroom setting, leaving room for further exploration and application. To address this gap, we propose several tangible strategies for integrating the model into educational practices: organizing professional development workshops for geography teachers to familiarize them with the model; encouraging teachers to engage in the co-construction and refinement of the model; collaborating with teachers to integrate the model into the existing teaching framework by generating teaching recourses; and collecting feedback from both teachers and students after classroom implementation and addressing the possible challenges. We argue that, with these proposed strategies, the most important and main contribution of this study is that it provides support for the choices made by teachers in the classroom. This is especially crucial given the premise of the GeoCapabilities project that teachers, as curriculum makers, are expected to make critical decisions based on their knowledge of the discipline and the students.

Conclusion

This study has examined the contributions of the multiple perspectives in geographical thinking to climate change education and develops an epistemic model for understanding climate change from geographical perspectives. This model extends the epistemic scope of current climate change education in school geography and responds to calls for a more holistic understanding of the complex issue. In addition to the predominantly natural scientific perspectives in pedagogical practice, the humanistic, social scientific, and posthuman perspectives on the human-environmental relationship also play valuable roles in helping young people understand climate change and develop their capabilities for addressing it. Introducing the plural geographical perspectives in a school setting is significant not only because each perspective has particular value related to climate change, but also because they empower young people to think critically and realize their freedom for long-term development as knowledge agents.

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There is no conflict of interest in this article from any of the authors.

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References

Béneker, T., and R. van der Vaart. 2020. The knowledge curve: Combining types of knowledges leads to powerful thinking. *International Research in Geographical and Environmental Education* 29 (3):221–31. doi:10.1080/10382046.2020.1749755.

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

Cantell, H., S. Tolppanen, E. Aarnio-Linnanvuori, and A. Lehtonen. 2019. Bicycle model on climate change education: Presenting and evaluating a model. *Environmental Education Research* 25 (5):717–31. doi:10.1080/13504622.2019.1570487.

Chang, C. H. 2014. *Climate change education: Knowing, doing and being*. New York: Routledge.

Chang, C. H., and L. Pascua. 2017a. The curriculum of climate change education: A case for Singapore. *The Journal of Environmental Education* 48 (3):172–81. doi:10.1080/00958964.2017.1289883.

Chang, C. H., and L. Pascua. 2017b. Geographical thinking and its role in climate change education: The case of Singapore. In *The power of geographical thinking*, ed. C. Brooks, G. Butt, and M. Fargher, 91–102. Cham: Springer.

Cresswell, T. 2013. *Geographic thought: A critical introduction*. Chichester: Wiley-Blackwell.

Dawson, V., E. Eilam, S. Tolppanen, O. B. Z. Assaraf, T. Gokpinar, D. Goldman, G. A. P. E. Putri, A. W. Subiantoro, P. White, and H. W. Quinton. 2022. A cross-country comparison of climate change in middle school science and geography curricula. *International Journal of Science Education* 44 (9):1379–98. doi:10.1080/09500693.2022.2078011.

Deng, Z. 2021. Powerful knowledge, transformations and *didaktik*/curriculum thinking. *British Educational Research Journal* 47 (6):1652–74. doi:10.1002/berj.3748.

Falcon, J. 2023. Toward a critical posthuman geography. *Cultural Geographies* 30 (1):19–34. doi:10.1177/14744740221110579.

Finn, M. 2021. Visualising climate change. *Geography* 106 (3):114–5. doi:10.1080/00167487.2021.1987644.

Fögele, J. 2017. Acquiring powerful thinking through geographical key concepts. In *The power of geographical thinking*, ed. C. Brooks, G. Butt, and M. Fargher, 59–73. Cham: Springer.

Freeman, D., and A. Morgan. 2014. Teaching about places. *Teaching Geography* 39 (3):94–8. doi:10.2307/26455133.

Greenhough, B. 2014. More-than-human geographies. In *The SAGE handbook of human geography*, ed. R. Lee, N. Castree, R. Kitchin, V. Lawson, A. Paasi, C. Philo, S. Radcliffe, S. M. Roberts, and C. WJ. Withers, 94–119. London: Sage Publications.

Hall, T., and N. Moore-Cherry. 2022. Negotiating applied and critical perspectives within the geography curriculum. *Journal of Geography in Higher Education* 46 (4):489–94. doi:10.1080/03098265.2022.2119475.

He, Y., S. Tani, and Y. Yang. 2022. Exploring the gap between academic geography and school geography: Knowledge transformation of the competencies-based curriculum making in China. *Geography* 107 (3):128–36. doi:10.1080/00167487.2022.2114162.

Hill, J. L., and M. Jones. 2010. 'Joined-up geography': Connecting school-level and university-level geographies. *Geography* 95 (1):22–32. doi:40574787. doi:10.1080/00167487.2010.12094279.

Holt-Jensen, A. 2018. *Geography: History and concepts*. London: Sage Publications.

Hubbard, P., and R. Kitchin (eds.). 2011. *Key thinkers on space and place*. Thousand Oaks, California: SAGE.

Jankell, L. D., J. Sandahl, and D. Örbring. 2021. Organising concepts in geography education: A model. *Geography* 106 (2):66–75. doi:10.1080/00167487.2021.1919406.

Johnson, D. E., M. Parsons, and K. Fisher. 2022. Indigenous climate change adaptation: New directions for emerging scholarship. *Environment and Planning E: Nature and Space* 5 (3):1541–78. doi:10.1177/25148486211022450.

Lambert, D., and J. Morgan. 2010. *Teaching geography 11-18: A conceptual approach*. Maidenhead: McGraw Hill/Open University Press.

Lambert, D., and M. Solem. 2017. Rediscovering the teaching of geography with the focus on quality. *Geographical Education* 30:8–15. doi:Eric.ed.gov/?id=EJ1164289.

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

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

Maude, A. 2022. Using geography's conceptual ways of thinking to teach about sustainable development. *International Research in Geographical and Environmental Education* 32 (1):4–19. doi:10.1080/10382046.2022.2079407.

McCaffrey, M., and S. M. Buhr. 2008. Clarifying climate confusion: Addressing systemic holes, cognitive gaps, and misconceptions through climate literacy. *Physical Geography* 29 (6):512–28. doi:10.2747/0272-3646.29.6.512.

Miele, M., and C. Bear. 2022. Geography and posthumanism. In *Palgrave handbook of critical posthumanism*, ed. S. Herbrechter, I. Callus, M. Rossini, M. Grech, M. de Bruin-Molé, and C. J. Müller, 749–72. Cham, Switzerland: Springer International Publishing.

Mitchell, D. 2022. GeoCapabilities 3—Knowledge and values in education for the anthropocene. *International Research in Geographical and Environmental Education* 31 (4):265–81. doi:10.1080/10382046.2022.2133353.

Mitchell, D., and T. Béneker. 2022. Expanding students' concept of 'home. In *Children, education and geography: Rethinking intersections*, ed. L. Hammond, M. Biddulph, S. Catling, and J. H. McKendrick, 182–97. Abingdon: Routledge.

Mitchell, D., M. Hanus, T. Béneker, M. Biddulph, C. Leininger-Frézal, L. Zwartjes, and K. Donert. 2022. Enhancing teachers' expertise through curriculum leadership—lessons from the geocapabilities 3 project. *Journal of Geography* 121 (5–6):162–72. doi:10.1080/00221341.2022.2149838.

Morgan, J. 2013. What do we mean by thinking geographically? In *Debates in geography education*, ed. D. Lambert, and M. Jones, 273–81. Abingdon: Routledge.

Nussbaum, M. 2013. *Creating capabilities: The human development approach*. Cambridge: Harvard University Press.

Nussbaum, M., and A. Sen. 1993. *The quality of life*. Oxford: Oxford University Press.

Papadimitriou, V. 2004. Prospective primary teachers' understanding of climate change, greenhouse effect, and ozone layer depletion. *Journal of Science Education and Technology* 13 (2):299–307. doi:10.1023/B:JOST.0000031268.72848.6d.

Radcliffe, S. 2022. *Decolonizing geography: An introduction*. Cambridge: Polity Press.

Ratinen, I., J. Viiri, and S. Lehesvuori. 2013. Primary school student teachers' understanding of climate change: Comparing the results given by concept maps and communication analysis. *Research in Science Education* 43 (5):1801–23. doi:10.1007/s11165-012-9329-7.

Ratinen, I. 2016. Primary student teachers' climate change conceptualization and implementation on inquiry-based and communicative science teaching: A design research, PhD diss., Univeristy of Jyväskylä.

Rousell, D., and A. Cutter-Mackenzie-Knowles. 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):191–208. doi:10.1080/14733285.2019.1614532.

Siegner, A., and N. Stapert. 2020. Climate change education in the humanities classroom: A case study of the lowell school curriculum pilot. *Environmental Education Research* 26 (4):511–31. doi:10.1080/13504622.2019.1607258.

Stoeth, A. M., and K. Carter. 2022. Climate change summit: Testing the impact of role playing games on crossing the knowledge to action gap. *Environmental Education Research* 29 (12):1796–813. doi:10.1080/13504622.2022.2129043.

Sund, P., and N. Gericke. 2020. Teaching contributions from secondary school subject areas to education for sustainable development – a comparative study of science, social science and language teachers. *Environmental Education Research* 26 (6):772–94. doi:10.1080/13504622.2020.1754341.

Tani, S. 2022. Climate change and geography education: Could young people's geographies and powerful disciplinary knowledge make a change? In *Il Cammino Di Un Geografo, Un Geografo in Cammino: Scritti in Onore Di Gino De Vecchis*, ed. R. Morri, D. Pasquinelli d'Allegra, and C. Pesaresi, 160–72. Milan: Franco Angeli.

Taylor, P. J., and P. O'Keefe. 2021. In praise of geography as a field of study for the climate emergency. *The Geographical Journal* 187 (4):394–401. doi:10.1111/geoj.12404.

Waight, E. 2021. What can cultural geography offer to the employability agenda? A reflection on powerful knowledge. *Journal of Geography in Higher Education* 46 (4):516–22. doi:10.1080/03098265.2021.1957801.

Waldron, F., B. Ruane, R. Oberman, and S. Morris. 2019. Geographical process or global injustice? Contrasting educational perspectives on climate change. *Environmental Education Research* 25 (6):895–911. doi:10.1080/13504622.2016.1255876.

Young, M. 2009. Education, globalisation and the 'voice of knowledge'. *Journal of Education and Work* 22 (3):193–204. doi:10.1080/13639080902957848.

Young, M., and J. Muller. 2014. On the powers of powerful knowledge. In *Knowledge and the future of the curriculum*, ed. B. Barrett and E. Rata, 41–64. London: Palgrave Macmillan UK.

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Recontextualising urban geography in Chinese upper secondary schools: The role of teachers' disciplinary knowledge

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Abstract

This paper investigates how teachers' disciplinary knowledge shapes their recontextualisation practices for promoting powerful knowledge in classrooms. Situated within the context of geography education in China, this study employs a qualitative case study methodology to examine the recontextualisation of urban geography by four upper secondary school teachers with diverse academic backgrounds. Through a comprehensive analysis of teacher interviews, classroom recordings and teaching-related documents, this study uncovers and explains the variations in recontextualisation practices among the case teachers. The findings reveal that despite the dominant role of official curriculum materials, teachers maintain agency in recontextualising their disciplinary knowledge. Variations in understanding of the discipline directly influence whether, what and how much knowledge is recontextualised by teachers. Additionally, this study highlights the crucial role of teachers' motivational factors in shaping their recontextualisation practices. These factors include intrinsic motivation, characterised by a positive attitude towards and interest in disciplinary knowledge and awareness of external challenges, such as the perceived demandingness of assessments and the inadequacy of curriculum materials. Understanding these dynamics provides valuable insights for enhancing powerful-knowledge-rich curriculum making and teachers' professional knowledge.

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KEYWORDS
curriculum making, powerful knowledge, recontextualisation, urban geography

INTRODUCTION

The role of disciplinary knowledge in school curricula has received increasing attention in recent years, especially associated with debates on 'powerful knowledge' (Young, 2013a; Young et al., 2014; Young & Muller, 2013). Grounded in social realism, disciplinary knowledge—produced and validated within academic disciplines—is believed to be powerful because it is reliable, fallible and testable. It empowers young people to better understand the world and think beyond their everyday experiences to envisage alternatives (Young, 2013b; Young et al., 2014). Curriculum scholars have argued for a knowledge-rich curriculum to develop human powers (Deng, 2022). The idea of powerful knowledge has been embraced by a growing cohort of subject specialists, especially not only in geography (Béneker, 2018; Gericke et al., 2022; Maude, 2016). Notably, the influential GeoCapabilities approach advocated by geography educators links the discipline of geography to the development of young people's capabilities and emphasises teachers' role in curriculum making (Béneker et al., 2024; Lambert et al., 2015).

To unlock the educational potential of disciplinary knowledge in school teaching, it is crucial to understand the relationship between academic disciplines and school subjects. Bernstein's (1990, 2000) pedagogic device is a remarkable framework, among others, for understanding the complex process by which disciplinary knowledge is recontextualised into curriculum and classroom teaching. There is growing interest in discussing and highlighting the role of teachers, as curriculum makers, in recontextualising disciplinary knowledge, rather than merely reproducing and delivering curriculum (Béneker et al., 2024; Healy, 2024; Hordern, 2021; Khawaja & Puustinen, 2022; Kitson, 2020).

Nonetheless, teachers' involvement in the recontextualisation process is closely tied to specific educational and disciplinary contexts. In settings where teachers enjoy considerable autonomy, teachers play active roles as recontextualisation agents (e.g. Finland, see Khawaja, 2024). However, these roles may be diminished in tightly regulated environments where the official recontextualisation field (ORF)—manifested in national curricula and formal assessments—prevails (Bernstein, 2000; Kitson, 2020). However, this assumption about tightly regulated contexts has yet to be tested, as much of the existing research on teachers' recontextualisation focuses on decentralised educational systems in the Global West (Healy, 2024; Khawaja & Puustinen, 2022; Kitson, 2020).

In terms of disciplinary variations, a study conducted in England found notable differences between teachers from different subjects: While physics and history teachers were able to recontextualise knowledge from their respective disciplines, geography teachers encountered challenges in doing so (Kitson, 2020). This difficulty arose from the breadth and hybrid nature of geography, which leads to a lack of a clear and unified epistemology within the discipline (Kitson, 2020; Liu et al., 2022). Consequently, the recontextualisation of geography by teachers may involve more dynamics than in other disciplines, depending on how geography teachers understand geography as an academic discipline. These disciplinary understandings vary across individual teachers with different academic backgrounds, such as their majors and degree levels (Miao, 2024). In this study, individual teachers' understanding of and expertise in the discipline is referred to as teachers' disciplinary knowledge. Despite some research on geography teachers' recontextualisation (Healy, 2024; Kitson, 2020), how

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teachers' varying disciplinary knowledge shapes their recontextualisation remains insufficiently explored.

The lack of empirical evidence regarding teachers' recontextualisation in highly regulated contexts and the intriguing dynamics within the recontextualisation of geography form the basis of this study's focus. As such, this study is situated within the geography education in the Chinese context, a setting characterised by distinct sociopolitical conditions and state control over knowledge recontextualisation from the contexts of previous studies. Focusing on the teaching of 'urban geography' in upper secondary compulsory human geography, this study aims to examine how teachers with varying academic backgrounds recontextualise disciplinary knowledge. It is assumed that these differing academic backgrounds will bring diverse disciplinary knowledge and understandings, and subsequently influence their recontextualisation. Meanwhile, the Chinese context is beneficial for this study because of the diverse backgrounds of Chinese geography teachers, ranging from initial teacher education (ITE) to various specialised fields within academic geography, such as geomorphology, urban geography, economic geography and others.

Building on Bernstein's recontextualisation, this study examines the following research questions: (1) To what extent do teachers recontextualise disciplinary knowledge in their teaching? (2) What is the role of teachers' disciplinary knowledge in their recontextualisation? These empirical insights from the context of Chinese geography education not only theoretically contribute to a deeper and broader understanding of teachers' roles in the knowledge recontextualisation process, but also provide practical implications for developing a powerful knowledge-rich curriculum and informing the professional knowledge needed by teachers, which could also be extended to other school subjects.

THEORETICAL BACKGROUND

Young (2013a) argued that the best way to organise a powerful-knowledge-led subject is through the recontextualisation of its parent academic discipline. Bernstein (2000) conceptualised recontextualisation as a process of selecting, appropriating, relocating and refocusing disciplinary knowledge into educational contexts (p. 33). This complex process is encapsulated in the pedagogic device (Bernstein, 1990, 2000), which outlines various stages and agents involved in knowledge recontextualisation and serves as an analytical instrument to reveal power dynamics amid specific contexts.

Taking the context of this study into account, the pedagogic device begins in the field of *production*, where geographical knowledge is produced by academic geographers in universities and research institutions. Next, in the *field of recontextualisation*, some disciplinary knowledge is selected and adapted to align with educational goals in the school subject. This field comprises two subfields: The ORF, dominated by the state and its selected agents and ministries (Bernstein, 2000, p. 33), which is manifested in the national curriculum and formal assessments (i.e. Gaokao) in China; and *the* pedagogic recontextualisation field (PRF), which includes textbooks, teacher training institutions and education-related media (Bernstein, 2000; Khawaja, 2024; Krause et al., 2025; Singh, 2002). Finally, in the *field of reproduction*, teachers enact the curriculum, and students acquire geographical knowledge in classrooms.

Importantly, the pedagogic device is an arena of struggle among agents with differing interests and levels of autonomy in shaping what knowledge is taught and learned (Bernstein, 2000). In particular, the ORF often dominates the PRF and constrains other agents' choices. However, in practice, control mechanisms vary across contexts, and teachers may retain substantial autonomy in determining content for teaching (Hordern, 2021).

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This study builds on the growing recognition that teachers are not passive reproducers of curriculum knowledge but active agents in recontextualisation (Healy, 2024; Hordern, 2021; Khawaja & Puustinen, 2022; Kitson, 2020). Furthermore, in the pursuit of a powerful knowledge-rich curriculum, teachers are positioned as curriculum makers who recontextualise disciplinary knowledge and connect it meaningfully to students' development (Krause et al., 2025; Lambert et al., 2015). Teachers' recontextualisation holds the potential to transcend the constraints imposed by the ORF and the PRF, enabling students to access powerful knowledge and envisage alternatives (Puustinen & Khawaja, 2021). In geography education, this role has been developed through the international GeoCapabilities project (Béneker et al., 2024; Lambert et al., 2015), which frames teachers as professional actors who make conscious, considered choices by identifying powerful geographical knowledge from the academic discipline, rather than simply delivering the prescribed curriculum (Mitchell, 2022).

The above theoretical foundation of knowledge recontextualisation and teachers' role in this process is encapsulated in Figure 1, which guides the study design for examining and explaining teachers' recontextualisation practices.

METHODS

Research design and participants

This study employed a case study design, which has been effectively used in previous research on teachers' recontextualisation (Healy, 2024; Khawaja & Puustinen, 2022; Kitson, 2020). Case study enables the detailed examination of real-life, contemporary cases within their natural conditions over time (Creswell & Poth, 2016) and thus can offer rich and in-depth insights into teachers' recontextualisation practices. Furthermore, a multiple case study approach was adopted to facilitate a holistic comparison across different cases (Yin, 2018). This comparative analysis is crucial for discerning variations and possible patterns in recontextualisation, aligning with the study's aim to uncover the potential impacts of teachers' disciplinary knowledge.

To ensure comparability among cases, the first selection criterion focused on recruiting teachers enacting the same teaching module of ‘urban geography’ in upper secondary

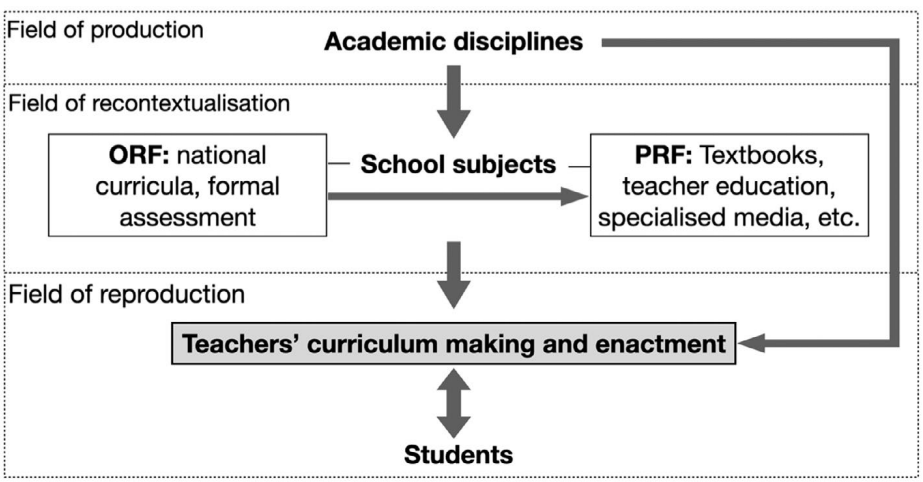


FIGURE 1 Conceptual framework of knowledge recontextualisation.

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compulsory human geography. The second key criterion was to ensure variations in teachers' disciplinary expertise by recruiting teachers with and teachers without specific disciplinary expertise in urban geography, discernible through their educational backgrounds and academic experience. To find participants capable of providing in-depth and informative insights—a principle of effective case studies—the recruitment process began within the researcher's network and expanded through snowball sampling as network informants recommended additional participants.

Ultimately, four geography teachers were selected—Alice, Bella, Chris and David (pseudonyms)—who agreed to participate voluntarily and provide the necessary data. The participants displayed the intended variation in educational background: Three teachers possessed varying levels of expertise in urban geography, while one teacher merely had a background in ITE, as detailed in Table 1. All participants were early-career teachers with less than 5 years of teaching experience, working in four different cities in two provinces (G and J). This can be considered a typical recruitment outcome considering the researcher's network. This case study approach prioritised depth and relevance over representativeness, acknowledging that the selected teachers, characterised by two types based on whether they possessed urban geography expertise, were not representative of all conditions of geography teachers in China.

Data collection

To gain a comprehensive understanding of teachers' recontextualisation, this study collected multiple types of data from each teacher, including lesson recordings, interviews and teaching-related documents such as lesson slides and lesson plans. Utilising diverse data sources not only enriches the depth of the analysis but also increases the trustworthiness of the research findings. Additionally, as participating in the study involved increased workloads and time commitments for the case teachers, and because different schools may have had varying regulations on data sharing, there was a risk that not all the desired data could be obtained. A combination of multiple data sources can compensate for any such gap in data completeness. All data were obtained with the participants' consent and were ethically approved, ensuring adherence to data protection and privacy standards. Data from all participants were collected concurrently and remotely in March–April 2024, as it was not

TABLE 1 Participants and data.

Participants	Academic background	Data source
Alice	Bachelor and master: geography education (ITE programmes)	Complete classroom video recordings, interview, lesson slides
Bella	Bachelor: human geography and urban/rural planning Master: human geography (specific area: population geography and urban geography)	Complete classroom video recordings, interview, lesson plans (general outline) and lesson slides
Chris	Bachelor: human geography and urban/rural planning Master: human geography (specific area: land use and ecosystem services)	Incomplete classroom audio recordings, interview and lesson slides
David	Bachelor: human geography and urban/rural planning Master: geography education (ITE programme) (kept studying urban geography and published some research papers)	Incomplete classroom audio recordings, interview, lesson plans (word-for-word teaching scripts) and lesson slides

feasible for the researcher to travel to different cities during the period when most schools were teaching the same module. The data collected from each participant are detailed in Table 1.

Classroom observations

Classroom observation was the key method to examine teachers' recontextualisation practices. The focus of the observations was on teachers' organisation of knowledge in their lessons. Accordingly, the participants were requested to record all lessons on their teaching of 'urban geography' in video or audio to facilitate the researcher's observations. The number of lessons within this module ranged from three to six, depending on the teaching plans at different schools, with each lesson lasting 40 min under normal teaching conditions. Despite the intention to observe all lessons, practical constraints resulted in incomplete recordings from two participants. Nonetheless, these gaps were effectively bridged by their submitting lesson slides and plans for the remainder of the lessons. This was validated by a brief post-teaching inquiry, which confirmed that their lessons had been largely consistent with their detailed teaching scripts and lesson slides.

Interviews

Each teacher participated in a pre-lesson semi-structured interview designed to elicit their intentions underlying their classroom practices. Drawing on recontextualisation theory, the interviews explored teachers' understanding of the discipline, views on the subject and content, and lesson planning. Each interview lasted between 30 and 60 min and was recorded and transcribed for analysis.

Teaching-related documents

The teaching-related documents collected included lesson slides, lesson plans, curriculum documents and the textbooks used by the teachers. Lesson slides, which are commonly used alongside textbooks, serve multiple functions in the classroom. They structure content delivery, emphasise key points and provide visual aids for facilitating teachers' instruction. These slides can assist researchers in observing teachers' selection, sequencing, pacing and appropriation of knowledge. All the participants provided slides for the whole of their lessons. Similarly, lesson plans provide another resource to understand teachers' knowledge organisation. Although it is standard practice to prepare lesson plans before teaching, the level of detail of these plans can vary widely among teachers, influenced by their schedules and experience. For example, David prepared detailed, word-for-word scripts of his lessons and Bella created only generalised outlines, while the other two teachers did not write lesson plans at all. Additionally, the study material included the national curriculum document and two versions of textbooks that the participants used, including People's Education Press and Hunan Education Press.

Data analysis

This study employed qualitative content analysis to manage and interpret the extensive data collected from multiple sources. Qualitative content analysis can systematically unpack the

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meaning of qualitative materials by classifying them into categories (Schreier, 2012). The primary steps in qualitative content analysis involve building the coding frame, namely categories, and segmenting the materials into coding units (Mayring, 2022). In this study, the coding categories were mainly theory-driven and further refined through analysing the data. The materials were segmented using thematic criteria, such as teaching themes.

Analysis for research question 1

To examine the extent to which the teachers recontextualised disciplinary knowledge, lesson recordings and teaching documents were analysed. The extensive data were segmented into smaller, more manageable coding units based on teaching themes in the textbooks, given that all participants taught with the themes. The analysis comprised three main steps:

Categorising knowledge sources

First, the analysis focused on the sources of knowledge presented in the teachers' lessons to identify whether the knowledge was from the prescribed knowledge in the textbooks, the teachers' own disciplinary knowledge beyond the textbooks, or other sources. This categorisation was informed by both recontextualisation theory and emergent patterns in the data.

Evaluating strength of knowledge sources usage

Second, the degree to which teachers utilised different knowledge sources was evaluated on a four-level scale: strong use (+++), moderate use (++), light use (+) and no use (−), to provide a visual representation of the complexity of knowledge use in the lessons. The evaluation primarily focused on the quality, depth and impact of knowledge integration rather than solely adhering to quantitative measures like time allocation. Detailed rating criteria and illustrative examples are provided in Appendix A. To enhance the reliability of the categorisation and evaluation, repeated coding was conducted.

Examining powerful knowledge

Third, based on the use of various knowledge sources, the analysis further focused on teachers' use of their disciplinary knowledge and examined the extent to which it imparted geographical thinking and powerful knowledge. Here, the aim was to determine whether teachers meaningfully recontextualised disciplinary knowledge and to identify their role in this process. Powerful geographical knowledge is defined as extending beyond a fixed set of given content to deepen students' geographical thinking and expand their perspectives beyond their own experiences (Bouwmans & Béneker, 2018). The analysis was guided by the widely acknowledged categories of powerful geographical knowledge (Lambert et al., 2015; Maude, 2016) and the core competencies of geography as a school subject in China, which align with powerful geographical knowledge (He et al., 2022). These three perspectives of powerful geographical knowledge are presented in Table 2.

Analysis for research question 2

Next, the interview data were analysed to explain participants' recontextualisation practices. Their understanding of the discipline and their views on the school subject, shaped by their different academic backgrounds, were linked to their teaching practices to shed light on how their disciplinary knowledge influences their recontextualisation practices.

TABLE 2 Three perspectives of powerful geographical knowledge.

Perspectives	Categories of powerful geographical knowledge
Lambert et al. (2015)	A deep descriptive world knowledge. (L1) A critical conceptual knowledge that has explanatory power and systematicity, providing a relational understanding of people living on the planet. (L2) A propensity to think through alternative social, economic, and environmental futures in specific place and locational contexts. (L3)
Maude (2016)	New ways of thinking about the world; meta-concepts (e.g. place, space, environment) to enhance geographical thinking. (M1) Knowledge that provides students with powerful ways to analyse, explain and understand the world. (M2) Knowledge that gives students some power over their own geographical knowledge; how knowledge is developed and tested in the discipline. (M3) Knowledge that enables young people to follow and participate in debates on significant local, national and global issues. (M4) Knowledge of the world. (M5)
Chinese geography core competencies (He et al., 2022; MoE PRC, 2017)	Awareness of human-nature relations. (C1) Ability to think in a systemic approach. (C2) Ability to analyse places in terms of characteristics, scale, and connections. (C3) Ability to conduct geographic enquiries. (C4)

FINDINGS

To what extent do teachers recontextualise disciplinary knowledge in their teaching?

Various sources of knowledge presented in teachers' lessons

The knowledge presented in participants' lessons drew from four main sources (see Table 3). Textbook knowledge served as a dominant source. All the teachers thoroughly covered its prescribed themes, explanations of concepts, geographical reasoning and interpretations of geographical phenomena. The three teachers with backgrounds in urban geography made further interpretations beyond the textbooks by leveraging their disciplinary expertise, while Alice made no additions and changes to the textbooks. Bella deepened the understanding of urbanisation beyond the socio-economic perspective described in the textbook by incorporating insights from her previous research on population movements and urban geography. Chris supplemented lessons with materials about local urban planning and development, which were his area of expertise. Notably, David enriched his explanations by introducing relevant theories and up-to-date academic research in urban geography, drawing on his systematic understanding and continuous engagement with the area. Additionally, David reorganised the content based on the logical progression of the university textbook rather than adhering to the knowledge sequence in the textbook. Further details on how these teachers recontextualised their disciplinary knowledge beyond the textbooks are provided in the next section.

Examples and cases, which could be seen as forms of everyday knowledge, were important components in all participants' lessons. While textbooks offered rich examples and cases to illustrate the knowledge, each teacher supplemented these with additional external examples, including local examples that relevant to their students' experience and other appropriate examples. Notably, the teachers who extended their lessons more significantly

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TABLE 3 Sources of urban geography knowledge presented in participants' lessons.

Themes	Textbook[a]	Source[b]	Degree[c]: By participant (textbook used)			
			Alice (H)	Bella (P)	Chris (P)	David (H)
Spatial structures in urban areas						
Land use	H	T	++	−	−	+
		D	−	−	−	−
		L	+	−	−	−
		E	+++	−	−	−
Spatial structures	P, H	T	+++	+++	+++	++
		D	−	−	+	−
		L	−	++	++	+++
		E	+++	++	++	+++
Factors of spatial structures	P, H	T	+++	+++	+++	++
		D	−	−	−	+++
		L	+	−	+	−
		E	+	+	+++	+++
Proper spatial utilisation	P, H	T	+++	+++	+++	+
		D	−	−	+	+
		L	−	−	−	++
		E	+	+	+++	+++
Location analysis	H	T	++	−	−	+
		D	−	−	−	++
		L	−	−	−	++
		E	+++	−	−	+++
Urbanisation						
Meaning and mechanism	P, H	T	+++	+++	+++	+++
		D	−	++	−	+
		L	+	−	+++	+++
		E	+++	+	+++	+++

(Continues)

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TABLE 3 (Continued)

Themes	Textbook[a]	Source[b]	Degree[c]: By participant (textbook used)			
			Alice (H)	Bella (P)	Chris (P)	David (H)
International/regional difference in urbanisation	P, H	T	+++	+++	+++	+++
		D	−	−	−	+
		L	−	−	+	−
		E	−	−	+++	+++
Impacts of urbanisation	P, H	T	+++	+++	+++	+
		D	−	−	−	+
		L	−	−	++	−
		E	+	−	+++	+++
GIS in urban management	P	T	−	+++	+++	−
		D	−	−	−	−
		L	−	−	++	−
		E	++	−	+++	−
Regional cultures and urban landscapes						
Regional cultures and urban landscapes	P, H	T	+++	+++	++	+
		D	−	−	−	+++
		L	−	−	++	++
		E	++	+	+++	+++
Regional cultures in urban landscapes	P, H	T	+++	+++	+++	+
		D	−	+	−	+++
		L	−	−	−	++
		E	+	+	++	+++

[a]P: People's Education Press; H: Hunan Education Press.

[b]T: Knowledge provided in textbook; D: Teachers' disciplinary knowledge beyond textbook; L: Local cases relevant to students' experiences and everyday knowledge; E: Extension knowledge beyond T, D and L (e.g. other examples, cases and data).

[c]+++: Strong use; ++: Moderate use; +: Light use; −: No use.

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with their disciplinary knowledge tended to rely less on textbook cases and provided more external examples.

Geographical thinking and powerful knowledge in teachers' recontextualisation

The recontextualisation of disciplinary knowledge by the teachers with urban geography backgrounds enhanced geographical thinking and introduced powerful knowledge (link to Table 2) in different ways and degrees. Among them, Chris's efforts were the least impactful, Bella contributed moderately, while David demonstrated the most substantial engagement with powerful knowledge and enabled students to envisage alternatives.

Chris's recontextualisation was mainly the use of specialised map knowledge about urban planning from different cities as real-world evidence to illustrate urban spatial structures and the proper use of urban spaces. While these maps provided extra descriptive knowledge of the real world (L1), they did not explicitly offer explanatory power or introduce new ways of geographical thinking.

Bella displayed a modest recontextualisation of disciplinary knowledge, providing students with more geographical perspectives to systemically understand human–environmental relations (L2, M2, C1 and C2). A clear example was her teaching on the mechanism of urbanisation. While the textbook explained urbanisation as both a consequence and a driver of social and economic development, Bella further offered another perspective from population mobility. She introduced the 'push-pull theory', explaining that 'people are pushed from rural areas due to poorer economic and environmental conditions, and pulled to urban areas by social well-being', which she argued 'fundamental to understanding urbanisation'. Additionally, Bella added the climate perspective for explaining architectural patterns in her teaching of regional cultures in urban landscapes.

David was the most active teacher in engaging with academic geography, recontexualising not only its end products, but also the process of knowledge production. He frequently challenged 'the textbook's traditional and static viewpoints', and enriched with diverse perspectives from geographers across different countries and periods (L2, M2, M3 and C2). For instance, when teaching the factors influencing urban spatial structures, he began with the textbook's explanation on land and transportation costs, but criticised this as 'simplistic for neglecting the social aspects of urban spaces'. He then introduced perspectives such as the human ecology, which focuses on the 'spatial occupation of different social groups', and postmodernist views, highlighting 'the complexity and diversity of contemporary urban structures'. David's narrative on the evolution of geographical knowledge was also along with original case studies from cities in America, Europe, and Asia (L1, M3 and M5), showing 'how geographers addressed new problems when old theories fell short' (M3 and C4). Similarly, he restructured the teaching of regional cultures and urban landscapes, criticising 'the textbook's traditional and static view on landscapes and cultures'. Instead, he introduced ideas from radical cultural geography, emphasising 'the roles of different human stakeholders in shaping and evolving landscapes' (L2, L3, M2, M3, C1 and C2). Using local real-world cases, he encouraged students to consider the future of their hometown (M4). Throughout his teaching, he highlighted how and who produced the geography knowledge by introducing notable geographers and their studies, such as Von Thunen's location theory and Ray Northam's S-shaped urbanisation curve (M3), which were absent from the textbook. David also enriched his teaching resources with up-to-date urban geography research, providing new insights into cities worldwide, past and present (L1, M3, C4 and M5), and illustrating how 'urban geography can enhance understanding and influence societal change' (L3, M4 and C4).

What is the role of teachers' disciplinary knowledge in their recontextualisation?

Evidently, the practice of recontextualisation varies between teachers with different disciplinary backgrounds. According to their perceptions of the academic discipline and school subject, their disciplinary knowledge played a crucial role in shaping whether, what and how much they recontextualised. An unexpected finding is that their disciplinary knowledge was closely intertwined with internal and external motivating factors that ultimately drove their recontextualisation practices.

The role of teachers' disciplinary knowledge

The teachers' disciplinary knowledge of urban geography varied, as evidenced by their study experience and their understanding of the discipline. Bella and David possessed the most academic experience in the field of urban geography. While Bella had studied urban geography during both her bachelor's and master's degrees, David was the most advanced, with the most publications contributing to knowledge production and ongoing engagement in the field. Chris had majored in urban planning during his bachelor's studies, focusing more on practice than theory. By contrast, Alice possessed no additional study experience beyond the compulsory urban geography course in her ITE programme.

While the teachers shared similar understanding of geography, their views on urban geography as a subdiscipline varied. They emphasised geography's holistic thinking and multi-perspective approach to the relationship between humans and the environment, but only David highlighted the concept of *space* as the key to geographical thinking that 'distinguishes geography from other disciplines'. When it came to urban geography, Alice focused on its practical aim 'to uncover, analyse, and solve problems, predict future trends, and inform policy-making'. Bella described it as 'the study of the spatial distribution of cities and their elements'. Chris saw it as a theoretical field that 'informs urban planning practice'. Despite their different perspectives, their combined responses align with the definition of urban geography in the university textbook (Xu et al., 2022). By contrast, David described urban geography from a historical lens, embedding it within the development of geography as an academic discipline. Consistent with his emphasis on the concept of *space*, he argued that 'urban geography applies the spatial perspective in studying cities, which has been evolving over time'. He then explained his perspective in more detail:

> Geographers' understanding of space progressed through several key phases: from the quantitative revolution (focusing on material and physical space), to the humanistic and behavioral turn (focusing on representational and mental space), and then to the critical, postmodern, and relational perspectives (focusing on lived and experiential space). This evolution has influenced the development of urban geography, shaping its theories and methods. Early approaches included simple models of urban growth and spatial organisation, which evolved into mathematical and scientific approaches covering the hierarchical relationships between cities. Later, humanistic and critical approaches emerged, emphasising subjective experiences, behavioral aspects, and political-economic processes. Currently, urban geography embraces postmodern, global, and environmental perspectives, recognising the complexity, diversity, and interconnectedness of urban spaces.

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In addition, David argued that it was 'important to embed contexts in the understanding of these urban geography theories and apply them to local contexts carefully'.

The participants' academic backgrounds and their varied understanding of urban geography were consistent with their recontextualisation practices, including whether, what and how much they recontextualised knowledge in their lessons. Alice, who had not specialised in urban geography, made no effort to recontextualise. In turn, Bella, whose research had focused on the population aspect of urban geography, recontextualised this expertise to explain urbanisation. Chris, who had specialised in urban planning at a practical level, recontextualised urban planning map knowledge in his lessons. David, who possessed the broadest and deepest disciplinary knowledge of urban geography, significantly recontextualised multiple geographical approaches and knowledge developments.

Teachers' motivational factors intertwined with their disciplinary knowledge

The possession of disciplinary knowledge alone did not determine the teachers' recontextualisation practices; rather, their attitudes towards the discipline and the school subject revealed important motivating factors for these practices. Such factors included their intrinsic motivation and awareness of external challenges, which were intertwined with their disciplinary knowledge and together shaped their recontextualisation practices.

The teachers' intrinsic motivation for recontextualisation comprised their interest in and positive attitude towards disciplinary knowledge and their expertise in urban geography for teaching. Alice, with only ITE backgrounds, expressed her motivation to 'follow disciplinary developments to supplement and enhance teaching'. Among the teachers with backgrounds in urban geography, David expressed a positive attitude towards his disciplinary expertise, stating that it was 'beneficial for creating curriculum artefacts and enhancing geographical thinking'. He also noted a desire to convey the knowledge to students as he found it 'very interesting'. By contrast, Bella and Chris had less positive attitude. Bella felt that her academic experience 'did not significantly help, as the teaching focused mainly on the curriculum materials', while Chris remarked that his background in urban planning 'only helped him understand the prescribed subject knowledge'.

The external motivating forces were teachers' awareness of the challenges of formal assessments (i.e. Gaokao) and the inadequacy of the official curriculum materials (i.e. the national curriculum and textbooks). Among these, the Gaokao examination played a fundamental role in shaping their teaching. While teachers believed the exams could assess geographical thinking and competencies, they highlighted the challenge of exams due to the increasing engagement with academic geography in the tasks and moving beyond direct textbook materials. Particularly, participants from G province (David, Alice and Chris) described the Gaokao exams were like 'guessing games', characterised by complex real-world tasks, numerous plausible explanations, yet limited acceptable answers. While Bella found the exams in her province (J) relatively manageable, she noted the importance of enhancing students' holistic geographical thinking as it was 'a key aspect tested in the exams'.

The perceived inadequacy of curriculum materials for the demanding exams was the other challenge for some participants. For example, Chris felt the textbooks lacked 'inquiry cases for cultivating students' analytical and problem-solving skills', prompting him to incorporate numerous external cases and tasks. David criticised the textbook knowledge for 'being too simplistic and poorly structured', which he believed hindered 'the development of advanced geographical thinking and the ability to address complex real-world issues'. Therefore, he incorporated current academic thinking into his lessons, such as highlighting the logical connections between pieces of knowledge and including up-to-date geographical perspectives from academic geography to better understand urban development.

These identified motivating factors varied among the case teachers, intertwining with their disciplinary knowledge and shaping their different practices. David, with deep disciplinary knowledge and driven by all the motivating factors, engaged in the greatest degree of recontextualisation. In Bella's case, despite low intrinsic motivation, her awareness of the exam demands motivated her to recontextualise knowledge using her expertise. Both recontextualisation aimed to adapt and enhance deficient curriculum materials to better prepare students for the complexities of geography as both an academic discipline and an examination subject. Chris, who had low intrinsic motivation and dissatisfaction with textbooks which did not focus on knowledge, failed to engage in obvious recontextualisation. And Alice, despite high intrinsic motivation, did not engage in recontextualisation, possibly due to limited disciplinary knowledge and a lack of critical views on the curriculum materials. Notably, the perceived challenge of the exams was a shared motivation for all participants; however, whether they ended up recontextualising was highly depending on their capacity, that is, their disciplinary knowledge. As David noted, the challenging Gaokao exams served as 'a bridge between academic geography and school geography', but the curriculum materials provided 'lack of support, leaving geography teachers to fill the gap with their disciplinary knowledge'.

CONCLUSION AND DISCUSSION

Conclusion

This study systematically analysed and explained the practices of recontextualising urban geography employed by four Chinese geography teachers with different disciplinary expertise. It complements existing research on teachers' recontextualisation and deepens the understanding of this process within the discipline of geography. The research uncovered the variations in recontextualisation practices among teachers within the same subject. It founds that whether, what and how much teachers recontextualise disciplinary knowledge is significantly influenced by their differing understandings of the discipline. Additionally, this study identified the important role of teachers' motivational factors in their recontextualisation practices. The first factor was intrinsic motivation, characterised by their positive attitudes towards disciplinary knowledge in teaching and a personal interest in that knowledge. The second factor involved the awareness of external challenges, such as the difficulty of examinations and the inadequacy of curriculum materials.

Teachers' recontextualisation role in a highly regulated context

The findings show that while the ORF and the PRF dominated curriculum making, the teachers still exercised agency in shaping the curriculum that students receive. This adds to our knowledge about teacher agency in a highly regulated context and further supports the argument of teachers' role as recontextualisation agents and the existence of 'teacher recontextualising field (TRF)', as evidenced in decentralised educational systems (Healy, 2024; Hordern, 2021; Khawaja & Puustinen, 2022; Kitson, 2020). In this study, the teachers did not bypass the curriculum or remake content independently, but recontextualised knowledge in ways that met the ORF demands, particularly in developing competencies or powerful knowledge as the outlined goals in the curriculum and exams. This fits Deng's (2022) argument that a knowledge-rich curriculum is made across policy, institutional and classroom levels, with teachers transforming the purpose and content of the official curriculum. The TRF occurring in this process thus serves educational goals, rather than simply recontextualising disciplinary knowledge.

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Teachers' knowledge for meaningful recontextualisation

The role of teachers' disciplinary knowledge in recontextualisation has received limited attention in the literature, despite its importance in subjects like geography with horizontal structure. As this study shows, the discipline is understood differently by geography teachers. Teachers' varying academic backgrounds brought different expertise, and their disciplinary knowledge significantly influenced or limited whether, what, and how much they recontextualised in the classroom.

Notably, teachers' recontextualisation does not always result in powerful knowledge. When teachers focus solely on delivering factual knowledge without considering its underlying power (Talbot, 2023), they present only the discipline's end product. Consequently, students miss out on learning how knowledge is created and evaluated, leaving them without tools to challenge knowledge produced by the powerful (Puustinen & Khawaja, 2021). This highlights the need for teachers to possess not only disciplinary knowledge but also educational knowledge, which enables them to connect the disciplinary knowledge to broader educational meanings (Deng, 2022).

This study further revealed that while possessing strong disciplinary knowledge is important, it does not automatically lead teachers to recontextualise without various internal and external motivating factors. These motivating factors also reflect the need of teachers' educational knowledge in two ways. First, they need to connect their internal motivation with an understanding of the power/education meanings of what they recontextualise, as discussed. Second, their external motivation comes from the understanding of the educational system, especially how knowledge is recontextualised into the school subject (often through the ORF and the PRF) to serve educational aims within the broader system (Hordern, 2021; Puustinen, 2022). Such educational knowledge, often developed through ITE, enables teachers to critically reflect on the curriculum and recognise both the need and their space for recontextualisation.

The disparity between David and the other case teachers in this study illustrates the significance of the dual base of disciplinary and educational knowledge. David's extensive expertise in urban geography and his educational experience from ITE probably allowed him to recognise the power of disciplinary knowledge and critically evaluate the school curriculum, empowering him to act as effective agents of recontextualisation. By contrast, the others who lacked either disciplinary expertise or ITE training demonstrated less pronounced recontextualisation practices or outcomes.

These findings have important implications for teacher education, which should provide teachers with both disciplinary and educational knowledge to support their meaningful recontextualisation. They are particularly relevant to contexts like China, where schools recruit university-educated teachers without ITE. While these teachers bring valuable disciplinary expertise, the absence of ITE may potentially limit their ability to promote powerful knowledge in their teaching practices.

Study limitations and future directions

This study has some limitations that suggest directions for future research. Methodologically, it is based on a small sample of teachers, which may reflect biases linked to specific classroom contexts. Although all participants operated the same teaching module within the same curriculum framework, differences in student needs may have influenced pedagogical decisions that were not fully explored. While small samples suit in-depth qualitative inquiry, further studies across diverse contexts (e.g. countries, schools, subjects and teacher profiles) are needed to validate and refine theoretical understandings of recontextualisation. In addition, this study relied solely on pre-lesson interviews to explain teachers' practices. While this aligned with the focus on capturing teachers' intentions and curriculum reasoning

without the influences of teaching outcomes, the absence of post-lesson interviews limited opportunities for teachers to reflect on and interpret their enacted practices, which is an aspect to be addressed in future case study research.

Finally, while this study explores teachers' recontextualisation practices with the focus on their disciplinary knowledge, the findings also suggest that the teachers' knowledge selection was shaped by students, such as connecting disciplinary knowledge to students' experiences (see Table 3). Although student influence was not the primary focus of this study, it represents a critical dimension for understanding how recontextualisation unfolds in practice in future study. Bernstein's (1990) concepts of *framing* (control over knowledge selection, organisation and pacing) and *classification* (boundaries between types of knowledge) may offer valuable tools for analysing teachers' recontextualisation from the pedagogical perspective, which would require a study design more focused on classroom discourse.

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There is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data used and analysed are available on reasonable request from the author for data requests.

ETHICS STATEMENT

BERA ethical guidelines were followed in the conduct of the study.

CONSENT TO PARTICIPATE

Informed consent was obtained from all individual participants included in the study.

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REFERENCES

Béneker, T. (2018). *Powerful knowledge in geography education. (inaugural lecture)*. Utrecht University.

Béneker, T., Bladh, G., & Lambert, D. (2024). Exploring 'future three' curriculum scenarios in practice: Learning from the GeoCapabilities project. *The Curriculum Journal*, *35*(3), 396–411. https://doi.org/10.1002/curj.240

Bernstein, B. (1990). *Class, codes and control: The structuring of pedagogic discourse* (Vol. *2*). Routledge.

Bernstein, B. (2000). *Pedagogy, symbolic control, and identity: Theory, research, critique* (Vol. *5*). Rowman & Littlefield.

Bouwmans, M., & Béneker, T. (2018). Identifying powerful geographical knowledge in integrated curricula in Dutch schools. *London Review of Education*, *16*(3), 445–459.

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage Publications.

Deng, Z. (2022). Powerful knowledge, educational potential and knowledge-rich curriculum: Pushing the boundaries. *Journal of Curriculum Studies*, *54*(5), 599–617.

14693704, 0, Downloaded from https://bera-journals.onlinelibrary.wiley.com/doi/10.1002/curj.336 by Yujing He - University Of Helsinki , Wiley Online Library on [26/05/2025]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Gericke, N., Hudson, B., Olin-Scheller, C., & Stolare, M. (2022). Researching powerful knowledge and epistemic quality across school subjects. In *International perspectives on knowledge and curriculum: Epistemic quality across school subjects*. Bloomsbury Publishing.

He, Y., Tani, S., & Yang, Y. (2022). Exploring the gap between academic geography and school geography: Knowledge transformation of the competencies-based curriculum making in China. *Geography*, *107*(3), 128–136.

Healy, G. E. (2024). Rendering visible teachers' intellectual work: An examination of the recontextualisation of knowledge through geography teachers' professional practice. PhD dissertation, University College London.

Hordern, J. (2021). Recontextualisation and the teaching of subjects. *The Curriculum Journal*, *32*(4), 592–606.

Krause, U., Rawlings Smith, E., Flajšhans Nedbalova, R., He, X., He, Y., Ito, N., Milaras, M., Yang, N., Hanus, M., & Béneker, T. (2025). The barriers and enablers of curriculum thinking and teacher agency in geography education: A multinational study. *International Research in Geographical and Environmental Education*, 1–17. https://doi.org/10.1080/10382046.2025.2466160

Khawaja, A. (2024). Historical literacy in Finnish primary classrooms: Teaching history or things about the past? PhD dissertation. University of Helsinki, Helsinki Studies in Education, 178.

Khawaja, A., & Puustinen, M. (2022). Recontextualising history in primary school: Discourses in the classroom. *History Education Research Journal*, *19*(1), 7.

Kitson, A. (2020). Teachers as recontextualisation agents: A study of expert teachers' knowledge and their role in the recontextualisation process across different subjects. PhD dissertation, University College London.

Lambert, D., Solem, M., & 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), 723–735.

Liu, W., Cheng, H., & Han, X. (2022). Rebuilding geography for the 21st century through disciplinary reunification and social engagement. *Environment and Planning F*, *1*(1), 114–124.

Maude, A. (2016). What might powerful geographical knowledge look like? *Geography*, *101*(2), 70–76.

Mayring, P. (2022). *Qualitative content analysis: A step-by-step guide*. Sage.

Miao, X. (2024). Geography curriculum making in shanghai: Teacher agency in times of change. PhD dissertation, University of Stirling.

Mitchell, D. (2022). GeoCapabilities 3—Knowledge and values in education for the Anthropocene. *International Research in Geographical and Environmental Education*, 3*1*(4), 265–281. https://doi.org/10.1080/10382046.2022.2133353

MoE PRC. (2017). *Geography curriculum standards for upper secondary schools*. People's Education Press.

Puustinen, M. (2022). Teacher education and history teachers' powerful professional knowledge. In *International perspectives on knowledge and quality: Implications for innovation in teacher education policy and practice* (pp. 45–62). Bloomsbury Publishing plc.

Puustinen, M., & Khawaja, A. (2021). Envisaging the alternatives: From knowledge of the powerful to powerful knowledge in history classrooms. *Journal of Curriculum Studies*, *53*(1), 16–31.

Schreier, M. (2012). *Qualitative content analysis in practice*. Sage.

Singh, P. (2002). Pedagogising Knowledge: Bernstein's theory of the pedagogic device. *British Journal of Sociology of Education*, *23*(4), 571–582. https://doi.org/10.1080/0142569022000038422

Talbot, D. (2023). Knowledge, knowers, and power: Understanding the 'power' of powerful knowledge. *Journal of Curriculum Studies*, *55*(6), 633–645.

Xu, X., Zhou, Y., & Ning, Y. (2022). *Urban geography* (3rd ed.). Higher Education Press.

Yin, R. K. (2018). *Case study research and applications* (Vol. *6*). Sage.

Young, M. (2013a). Overcoming the crisis in curriculum theory: A knowledge-based approach. *Journal of Curriculum Studies*, *45*(2), 101–118.

Young, M. (2013b). Powerful knowledge: An analytically useful concept or just a 'sexy sounding term'? A response to John Beck's 'powerful knowledge, esoteric knowledge, curriculum knowledge'. *Cambridge Journal of Education*, *43*(2), 195–198.

Young, M., Lambert, D., Roberts, C., & Roberts, M. (2014). *Knowledge and the future school: Curriculum and social justice*. Bloomsbury Publishing.

Young, M., & Muller, J. (2013). On the powers of powerful knowledge. *Review of Education*, *1*(3), 229–250.

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APPENDIX A

Evaluation criteria for strength of knowledge sources usage in teachers' lessons.

Based on the prior analysis, four types of knowledge sources emerged: knowledge provided in textbooks (T), teachers' disciplinary knowledge (D), local cases relevant to students' experiences and everyday knowledge (L) and extension knowledge beyond T, D and L (E).

A four-level scale was employed to further analyse the degree to which teachers used these knowledge sources: strong use (+++), moderate use (++), light use (+) and no use (−). This evaluation prioritises the quality and depth of knowledge use over strict time measurements, considering many contextual factors could influence the time spent on the instruction of a theme. The rating criteria vary among different knowledge sources, particular between textbook knowledge and the other three sources, considering different expectations for coverage in the Chinese context. While most of the textbook content is expected to be covered by teachers, the other sources (D, L and E) are regarded as optional and flexible materials. Thus, full coverage of T is rated as 'strong use (+++)', while some pieces of additional but impactful D, L and E could be also rated as 'strong use (+++)' if they provide an alternative perspective or challenge the T. However, the strength of a source's use is often, but not always, associated with the time devoted to it.

For example, in a given teaching theme ('Meaning and mechanism' of 'Urbanisation'), the teacher Bella spent approximately 10 min thoroughly covering all the textbook content, and she was thus given a strong use (+++) rating for T. She dedicated 3 min to introducing an alternative, significant disciplinary perspective, which was rated as moderate use (++) for D. Despite the brief time allocation for D, it received a higher rating than might be expected due to the depth of the content, its significant impact on student understanding and its effective integration into the lesson.

The complete set of rating criteria is provided in the following table:

Level	Criteria[a]
Knowledge provided in textbook (T)	
Strong use (+++)	Cover all textbook content Accurately represent and elaborate on textbook content Use textbook as primary source
Moderate use (++)	Partially cover textbook content Selectively represent and elaborate on textbook content Replace some textbook content with other sources
Light use (+)	Briefly touch on textbook content Use more other sources than textbook
No use (−)	Skip all the textbook content
Teachers' disciplinary knowledge beyond textbook (D)	
Strong use (+++)	Supplement with significant disciplinary knowledge Challenge textbook knowledge and provide alternative perspectives Use disciplinary knowledge beyond textbook as primary source
Moderate use (++)	Add some disciplinary knowledge beyond textbook Provide additional explanations or perspectives beyond textbook Incorporate personal expertise relevant to textbook knowledge
Light use (+)	Add minor supplementary information from discipline Slightly incorporate personal expertise
No use (−)	No extra disciplinary knowledge beyond textbook

Level	Criteria[a]
Local cases relevant to students' experiences and everyday knowledge (L)	
Strong use (+++)	Supplement extensive local cases beyond textbook's cases Replace most textbook's cases with local cases Connect the knowledge with local experiences frequently Deeply focus and elaborate on local cases
Moderate use (++)	Supplement several local cases in addition to textbook's cases Replace parts of textbook's cases with local cases Connect the knowledge with local experiences occasionally Provide some explanations of local cases
Light use (+)	Briefly mention one or two local examples Provide slight explanations of local examples
No use (−)	Not mention local cases or examples beyond textbook
Extension knowledge beyond T, D and L (e.g. *other examples, cases and data*) (*E*)	
Strong use (+++)	Supplement extensive information beyond T, D and L Replace most textbook's cases with other cases beyond E Connect the knowledge with other examples frequently Deeply focus and elaborate on other cases beyond E
Moderate use (++)	Supplement some information beyond T, D and L Replace parts of textbook's cases with other cases beyond E Connect the knowledge with other examples occasionally Provide some explanations of other cases
No use (−)	Not mention extension knowledge beyond T, D and L

[a] A rating level is assigned when the observed usage meets one of the criteria for that level.

When interpreting these ratings, source-specific baselines and the comparison approach should be considered. Textbook knowledge carries a strong baseline (+++), as teachers are expected to cover most of this material. By contrast, other sources have a no use (−) baseline, indicating their optional nature in instruction. Therefore, comparisons should be made across teachers for the same knowledge source (e.g. comparing strength of usage of T between two teachers is advisable). However, comparing different knowledge sources for a single teacher (e.g. comparing one teacher's use of T vs D) is not advisable due to differing baselines and expectations.

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