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Guest Editors:

Dr Neli Heidari
Dr Uwe Krause
Dr Susan Caldis
Prof. Tine Beneker

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Dr Alexandros Bartzokas-Tsiompras

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Research Article

Reimagining Assessment for a Future 3 Curriculum: Principles and Insights from Geography

Emma Rawlings Smith ¹✉ & Uwe Krause ^{2,3}

¹ AQA, Manchester, United Kingdom

² Fontys University of Applied Sciences, Tilburg, The Netherlands

³ Ege University, Izmir, Türkiye

✉ Correspondence: emma.smith@aqa.org.uk

Abstract: A future-orientated liberatory curriculum has the potential to equip children and young people with the knowledge, understanding and capabilities needed to understand and navigate our complex and rapidly changing world. This is only possible if we support students to develop intellectually powerful ways of thinking, understanding, analysing, explaining and finding out, paired with complementary assessment practices. Much existing literature on powerful knowledge is focused on curriculum thinking (what should be taught) rather than on assessment (how learning is measured). This is a significant omission, given the powerful influence of assessment on curriculum enactment and classroom practice. This theoretical paper identifies persistent tensions between curriculum intentions that emphasise conceptual understanding, relational thinking and epistemic engagement and assessment regimes that prioritise coverage, predictability and measurability. Next, it contends that for a Future 3 curriculum to be fully realised, assessment practices must be re-imagined, recognising complex disciplinary performances rather than isolated forms of propositional knowledge. The paper concludes by outlining seven key principles for assessment design aligned with Future 3 curriculum thinking and illustrates these through examples drawn from upper secondary geography across international education systems.

Keywords: assessment; Future 3 curriculum; epistemic access; powerful disciplinary knowledge; teacher agency

Highlights:

- Curriculum and assessment systems shape access to powerful disciplinary knowledge in geography education.
- Seven design principles are presented that align future 3 curriculum and assessment.
- International insights are used to evidence how Future 3 assessment can be realised.

1. Introduction

There is a growing body of literature on Young's (2007) concept of powerful knowledge, understood as intellectually powerful ways of thinking, understanding, analysing, explaining and finding out (Maude, 2016), which seeks both to further theorise the concept and demonstrate how it can underpin curriculum making (Béneker et al., 2024; Bustin, 2019; Maude, 2020). However, far less attention has been given to how such knowledge might be meaningfully assessed in secondary education. Building on a discussion of what *can* and *should* be assessed and the inherent tensions between curriculum thinking and assessment, the paper advances seven key principles for the design of powerful assessment, before illustrating these through examples drawn from upper secondary geography practice worldwide.

2. Literature Review

2.1 What can and should be assessed in a secondary school education?

The question of what can be assessed in secondary schooling draws attention to the breadth of knowledge, forms of thinking and practices that education seeks to develop. From a social realist perspective, this encompasses access not only to propositional knowledge but also to the epistemic practices that enable learners to engage with knowledge beyond everyday experience (Young, 2007; Young & Muller, 2010). In this paper, epistemic knowledge refers to understanding the norms, criteria and processes through which disciplinary knowledge is developed, justified, revised and communicated. Epistemic practices, by contrast, refer to the enactment of these processes through activities such as collecting evidence, constructing explanations, evaluating claims and communicating findings (Maton, 2014). In practice, however, assessment systems tend to privilege what is most readily measurable, placing a disproportionate emphasis on factual recall and lower-order cognitive demand (Wertheim et al., 2013), rather than on more complex demonstrations of understanding and reasoning. Drawing on Bernstein's (2000) pedagogical device, this narrowing can be understood to reflect the operation of strong evaluative rules within the official recontextualising field—the state-controlled arena in which decisions are made about what counts as legitimate subject knowledge in education. As knowledge is recontextualised from disciplinary contexts into school curriculum and assessment, it is selectively transformed in ways that constrain what can be recognised and valued (Hordern, 2021). These processes sit in tension with curriculum ambitions that foreground powerful disciplinary knowledge (PDK) as intellectually powerful ways of thinking and working within a subject (Bendl et al., 2025; Maude, 2016). As a result, although a broad range of learning outcomes may be assessable in principle; the conditions of high-stakes assessment significantly delimit which forms of knowledge and skills are acknowledged in practice. Assessment alone does not determine curriculum enactment; school cultures, accountability structures, professional norms and wider societal expectations also shape what is taught and valued in our schools.

The question of what should be assessed is therefore a matter of educational purpose rather than technical feasibility alone. Drawing on Biesta's (2015) distinction between *qualification*, *socialisation* and *subjectification*, assessment decisions necessarily prioritise certain purposes of education, while marginalising others. *Qualification* involves access to PDK and the distinctive ways of thinking and doing through which that knowledge is produced and used; *socialisation* involves induction into shared social and disciplinary discourses and practices; and *subjectification* concerns the formation of students as ethical and political subjects in relation to complex socio-ecological issues (Biesta, 2022). There is clear evidence to suggest that assessment can support qualification and aspects of socialisation at all educational stages, particularly where assessment practices emphasise conceptual understanding and disciplinary reasoning (Wertheim et al., 2013), although the complexity of knowledge and depth of understanding involved would typically increase over time (Winch, 2013). By contrast, attempts to assess subjectification risk reducing it to performative proxies, undermining its existential and educational significance. As Biesta (2015) argues, subjectification cannot be directly measured without being distorted; it is better understood as something education makes possible rather than something it produces (Biesta, 2022). Consequently, teachers should focus on the assessment of disciplinary understanding and recognise that some of the most valuable outcomes of education cannot, and should not, be formally assessed.

2.2 The relationship between curriculum thinking and assessment

To examine the relationship between curriculum thinking and assessment, Young and Muller's (2010) three scenarios for the future of education provides a useful analytical lens. The three futures heuristic helps 'distinguish qualities of curriculum thought' (Béneker et al., 2024, p. 396) and illuminates how different curriculum futures implicitly align with distinct knowledge and assessment practices. By analysing assessment through a three futures lens, we can better understand the enabling or constraining powers of particular curriculum and assessment approaches and identify those that best serve disciplinary integrity, epistemic quality and the wider purposes of geography education.

Prior to examining the three scenarios, it is important to recognise that curriculum and assessment do not operate as a single, coherent entity. Following van den Akker's (2003) distinction between different curriculum representations (e.g. intended, implemented and attained curriculum), assessment can be understood as a distinct layer of the attained curriculum, while simultaneously operating as a structuring force within the wider educational system. In practice, alignment between these curriculum layers is often partial or absent at a systemic level. As Biggs (1996) has argued, misa-

alignment between curriculum aims, teaching activities and assessment can significantly constrain what is learned. Consequently, even when curriculum reforms promote a particular future orientation, assessment practices may continue to reflect the logic of an alternative future scenario.

In a Future 1 scenario, assessment is aligned with a traditional curriculum model in which geography is conceived primarily as a body of canonical content to be transmitted, reproduced and assessed. The emphasis falls on factual knowledge, terminology, place knowledge and routine procedures, with success measured through students' ability to recall what has been taught (Young & Muller, 2010). Assessment formats might typically include short-answer questions, closed-response items, structured tasks and high-stakes summative examinations that reward accuracy and coverage of prescribed content. Although in some contexts these may also involve extended responses requiring the recall and organisation of larger bodies of knowledge. In a Future 2 scenario, with its 'over-socialised' concept of knowledge, there is a shift to assessing competencies, skills and learner-centred outcomes. Assessment in this scenario privileges inquiry, collaboration and problem-solving; characteristics commonly associated with progressive curricular approaches, such as those associated with the pre-2013 geography National Curriculum in England (Young & Muller, 2010). While these are important dimensions of geography education, there is a risk that assessment becomes de-disciplinary, privileging generic skills over PDK, with success judged in terms of process or common sense, rather than the acquisition and application of deep geographical understanding.

2.3 Enabling powers of powerful assessment

We argue that a powerful assessment approach must be grounded in powerful curriculum foundations, that enable learners' progression towards increasingly abstract and generalisable forms of understanding. In this way, it cultivates specialised ways of thinking, analysing, inquiring, explaining and generating insight (Maude, 2017), while recognising knowledge as fallible, contestable and provisional. In this sense, powerful knowledge is not a body of content, nor generic skills detached from subject matter but a deeper, conceptually underpinned knowledge of the world. Building on this, PDK can be understood as the integration of substantive and conceptual knowledge into more systematic forms of understanding, alongside insight into how such knowledge is produced, communicated and contested (Béneker, 2018). This means engaging with disciplinary ways of knowing, the specialised language through which knowledge is constructed and the societal debates within which disciplinary knowledge is mobilised and given meaning (van Beveren et al., 2025).

PDK, therefore, is not only epistemic but also inherently social and discursive. This broader understanding links well to Biesta's (2015) three domains of educational purpose and serves as a reminder that school subjects, such as geography, are not only rooted in a parent discipline but are also situated within a specific socio-economic context that offers an important lens through which to consider the broader purposes of education for young people here or there. Framed in this way, a Future 3 curriculum has far greater potential to support students' engagement with disciplinary complexity, while also equipping them with the conceptual and epistemic resources needed to participate meaningfully in societal debate and to navigate an increasingly complex and rapidly changing world (Rawlings Smith et al., 2026). PDK contributes to qualification by providing a measure of the extent to which students are taught how to access disciplinary ways of thinking as an induction into disciplinary and societal discourses and a precursor to (possible) university study. It also contributes to subjectification by opening spaces in which students can position themselves in relation to knowledge and competing perspectives. Importantly, such processes cannot be reduced to predefined learning outcomes, as they emerge through the interaction between knowledge, context and the learner's own meaning-making processes (Biesta, 2020).

This immediately raises the question: What forms of assessment can make such epistemic, social and subjectifying dimensions of learning visible and valued? If assessment remains limited to the measurement of predefined outcomes, particularly in high-stakes formats, it risks reducing PDK to what can be easily codified and reproduced. A Future 3-oriented approach to assessment therefore requires a broader conception, one that recognises the complexity of knowledge, the openness of meaning-making processes and the importance of engaging with the 'discursive gap'—that is, the emergence of multiple legitimate interpretations and solutions as disciplinary knowledge becomes more conceptually complex when students work with PDK in practice (Bernstein, 2000, p. 30; Maton, 2014). Before we explore the forms of assessment that would meaningfully align with a Future 3 curriculum, we will first explore the tensions in many current systems which aim towards a Future 3 curriculum but tend instead towards more traditional (Future 1) forms of assessment.

2.4 Tensions between a Future 3 curriculum and high-stakes assessment in secondary geography education

Empirical research demonstrates that in geography it is possible to assess substantive knowledge, disciplinary concepts, spatial reasoning and selected geographical practices such as enquiry, interpretation and evidence-based explanation (Bijsterbosch et al., 2017; Lane & Bourke, 2019). Nevertheless, persistent tensions remain between aspirations for a Future 3 curriculum underpinned by PDK and the structural demands of high-stakes assessment in upper secondary education. Drawing again on Bernstein's (2000) pedagogic device, these tensions can be understood as systemic contradictions operating across the fields of knowledge production, recontextualisation and reproduction. Even where policy discourse gestures towards disciplinary rigour, higher-order thinking and epistemic access, assessment systems frequently constrain the curricular and pedagogical conditions required for Future 3. This contradiction is evident in previous iterations of England's GCE Geography specifications, where a heavy weighting on Assessment Objective 1 reinforced Future 1 tendencies by privileging content coverage (AQA, 2011). Although these specifications reference generic skills such as communication and problem-solving, their absence from assessment objectives meant they were neither systematically assessed nor valued.

At the level of the official recontextualising field, Future 3 curriculum intentions rely on policy signals that emphasise conceptual and epistemic knowledge, yet high-stakes assessments continue to prioritise specification-driven coverage and measurability. Consequently, examination specifications often function as de facto curriculum frameworks, reducing teacher agency to decide what and how to teach. Comparable pre-shadowing effects have been observed elsewhere, including in China, the Netherlands, Japan and South Africa (Krause et al., 2025). From a Bernsteinian perspective, high-stakes assessment and regulatory oversight can be understood to produce strong framing, in which tight control over the selection and sequencing of the curriculum and the fast pace of lessons to 'get through' content, shapes the professional practice of teachers in powerful ways (Maton, 2014; Rawlings Smith & Kinder, 2022). Within the pedagogic recontextualising field, textbooks, past exam papers and assessment resources further influence a teacher's classroom practice (Catling & Lee, 2017). Where these artefacts model lower-order responses (e.g. short-answer tasks, restricted source interpretation, or fragmented case-study recall), geography is positioned as inert content rather than a living discipline grounded in conceptual and methodological coherence. In such contexts, assessment success is more closely associated with the recall and reproduction of prescribed content than with the capacity to reason geographically, apply conceptual understanding, or engage in disciplinary forms of inquiry (Maude 2017). This constrains the development of PDK, which depends on learners engaging with geographical concepts such as scale, place, space, system and interconnection in increasingly abstract and relational ways (Maude, 2020).

The cumulative pressures of inspection systems, accountability metrics and performance tables reinforce a risk-averse culture. Under these conditions, teachers give limited time for geographical enquiry and fieldwork and instead adopt instrumental pedagogies that prioritise examinable performance rather than cultivate students' capacity for geographical thinking, explanation and argumentation (Bendl et al., 2025). This can reduce geography to an examination technique rather than a disciplinary lens for interpreting complex global issues in our rapidly changing world (Jackson, 2006). Consequently, there is misalignment between the aspirational language of national curricula, which frequently gestures toward Future-3 elements (e.g. critical thinking, sustainability and global competence) and the restrictive affordances of assessment systems (Lane & Bourke, 2019).

Taken together, these dynamics reveal a structural contradiction: Future 3 curricula seek to democratise access to PDK, yet high-stakes summative assessments continue to privilege what is easily measurable rather than what is educationally meaningful. The challenge for geography education is therefore not simply to revise assessment formats, but to reimagine assessment architectures so that they support, rather than compromise, disciplinary integrity. This requires rebalancing the pedagogic device by loosening the framing power of examinations, strengthening teachers' curriculum-making agency and foregrounding assessment practices that value conceptual understanding, relational reasoning and authentic geographical enquiry. Such changes would better align assessment systems more closely with the epistemic aims of a Future 3 curriculum and enhance students' opportunities to develop the forms of geographical thinking needed to engage with an increasingly complex and uncertain world.

2.5 The didactic dimension: Powerful knowledge is learned before it is assessed

If PDK is to be realised in school geography, the key question is not only what such knowledge entails, but how students are enabled to engage with it. The 'power' of PDK lies in the capacity to work with the complexity of spatial

problems, rather than in the accumulation of facts or ideas. As Ritchhart et al. (2011, p. 10) argue, “Students may be doing more learning about the subject than learning to do the subject. To develop understanding of a subject area, one has to engage in authentic intellectual activity. That means solving problems, making decisions and developing new understanding using the methods and tools of the discipline”. This places didactic demands on task design: tasks need to structure students’ engagement with knowledge in ways that promote deeper thinking. Research highlights that it is not the visible organisation of instruction but the quality of students’ cognitive engagement with content that is decisive for learning outcomes (Krause et al., 2024). Tasks that are cognitively demanding, that require the integration and application of knowledge and that stimulate reflection on both content and process, are central to such learning processes (Mehren & Mehren, 2020). Within geography education, this is reflected in pedagogical approaches that structure learning as a staged process. In the Anglophone context, Roberts (2023a) conceptualises geography enquiry as a pedagogical approach that creates a ‘need to know’, organises learning around meaningful questions and engages students in working with evidence, reasoning and reflection. In the German tradition, Hoffmann’s (2021) model of Lernaufgaben similarly emphasises sequenced learning processes. In Hoffman’s model, students are guided from an initial engagement with a relevant problem, through phases of analysis and knowledge construction, towards the development and discussion of a learning product, followed by reflection and transfer. Despite differences in terminology and design, both approaches share a focus on sustained engagement with complex issues, the integration of disciplinary perspectives with students’ own experiences and the importance of allowing space for exploration, provisional understanding and learning from errors. These examples serve as a reminder that if geography education aims to realise the potential of PDK, beyond what counts as powerful knowledge and the ways in which students develop it (Roberts, 2023b), attention must also be given to the most appropriate forms of assessment that capture students’ learning progression and performance (Lane & Bourke, 2019). Before examining what assessment might look like in a Future 3 curriculum, we first consider how students might gain access to, and engage with, PDK (Winch, 2013).

2.6 Future 3 curricula require epistemic access

A Future 3 curriculum is defined by its commitment to providing students with epistemic access to PDK, enabling their progression through increasingly specialised and abstract forms of knowledge. This goes beyond mere exposure to content, requiring structured processes of epistemic ascent through which learners develop more powerful ways of knowing within the subject (Winch, 2013). Such processes can be understood as a movement towards more abstract, systematic and conceptually organised forms of knowledge. Importantly, this is not a linear progression. Rather, learning involves a continuous movement between more context-dependent, experiential forms of knowledge and more generalised, conceptually structured understandings (Vernon, 2021). Maton’s (2014) concepts of semantic gravity and semantic density help to make this movement visible: students need to learn not only to relate knowledge to concrete contexts, but also to condense and reorganise meanings into more complex conceptual structures. In this process, the ability to articulate knowledge becomes crucial. As Bernstein (2000) argues, access to disciplinary knowledge depends not only on what students know, but on whether they have access to the realisation rules that enable them to express and communicate their understanding in legitimate ways. From this perspective, epistemic access involves more than participation in a domain of knowledge; it involves learning how to work with, represent and communicate increasingly complex forms of disciplinary knowing, including an understanding of how such knowledge is ‘systematically revisable’ (Moore, 2007). This also entails recognising that the relationship between parent disciplines and school subjects is neither direct nor straightforward, given the necessary processes of selection, reduction and transformation through which disciplinary knowledge is recontextualised and enacted in practice (Hordern, 2021).

3. What might assessment look like in a Future 3 curriculum?

If a Future 3 curriculum aims to provide epistemic access to PDK, Future 3 assessment must move beyond testing what is easily measurable, reliable and comparable at scale and instead recognise complex disciplinary performance.

Drawing on existing assessment research and a theoretical synthesis of Future 3 curriculum thinking, an initial analytical frame was established and then brought into dialogue with assessment practices across four jurisdictions (North Rhine-Westphalia (NRW), Singapore, Peru and France) with which the author team were familiar. These cases were selected for their variation in assessment architectures, degrees of centralisation and assessment formats. Through cross-case comparison, key Future 3—orientated design features were identified and abstracted into a set of principles

conceived as mutually reinforcing design commitments rather than discrete features to be implemented in isolation. We argue that assessment is correspondingly strengthened when these principles operate in combination, enabling more robust evaluation of students' engagement with the epistemic practices and conceptual complexity of geography. While grounded in these cases, the principles are not intended as inductive generalisations, but offered as a transferable conceptual framework, whose relevance to other contexts depend on the extent to which similar epistemic aims and structural conditions are in place. These principles will first be introduced, before we provide examples of where they are being enacted.

3.1 A coherent model of assessment for a Future 3 curriculum

A Future 3 curriculum can be understood as oriented towards epistemic access to PDK: not simply knowing subject content but understanding how disciplinary knowledge is produced, contested and applied. Assessment within such a curriculum therefore needs to be designed to recognise complex disciplinary performance, rather than privileging what is most easily measured or standardised. While the model presented in Figure 1 is intended to be applicable across subject areas, in this paper, each principle is realised through a geographical lens. Taken together, the model comprises seven interrelated design commitments that operate across task design, assessment formats, classroom culture and system-level alignment. By interrelated, we mean that these commitments are dynamically connected, influencing and shaping one another and are not easily separable but function in a mutually reinforcing, synergistic relationship.

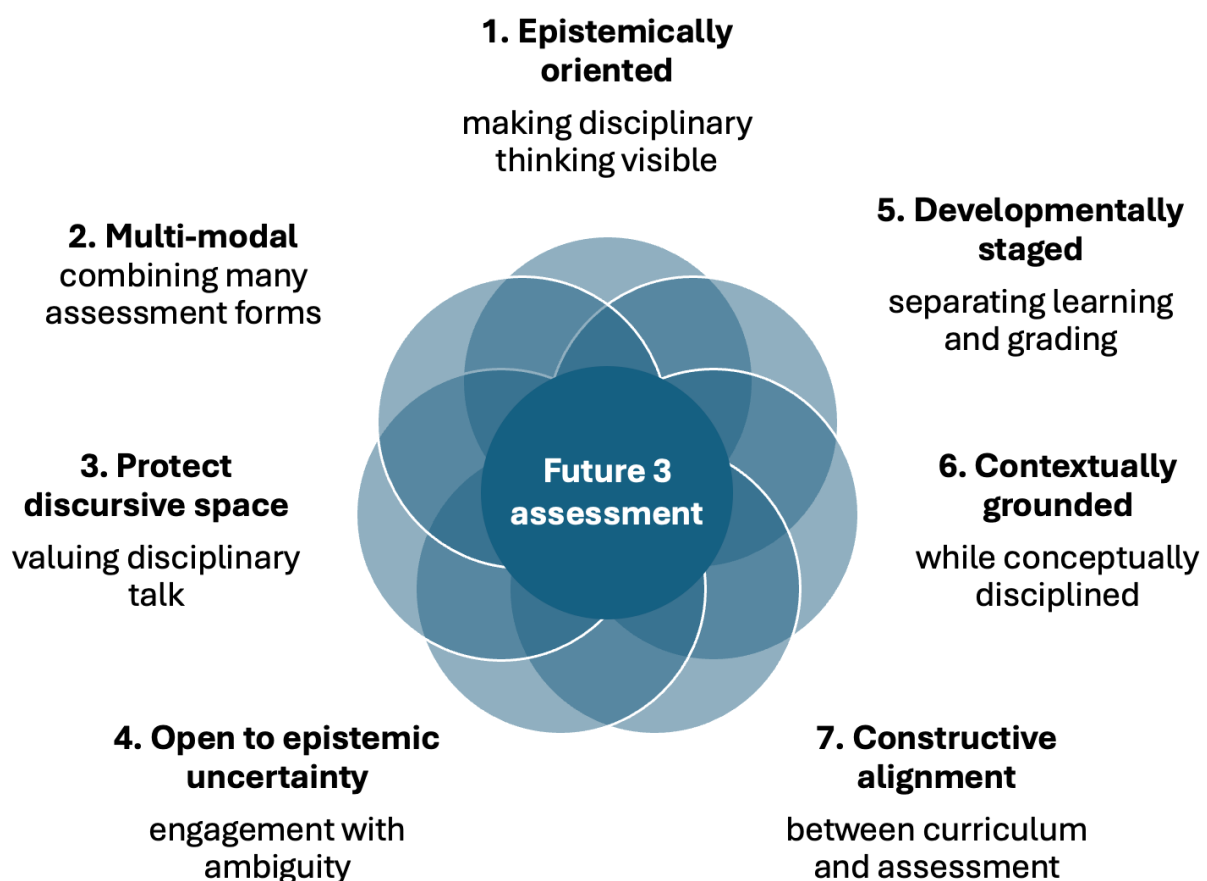


Figure 1. Design principles for Future 3 assessment

(1) Making disciplinary thinking visible. At the heart of a Future 3 assessment system is the assessment of complex disciplinary performance. Rather than fragmenting higher-order thinking into discrete sub-skills, assessment tasks are designed to require students to engage with complex disciplinary problems, integrate multiple sources, apply conceptual frameworks and arrive at justified evaluative judgements. (van Beveren et al., 2025). The central aim in geography

is to make geographical reasoning visible: how students select evidence, mobilise concepts, weigh alternatives and justify conclusions under conditions of uncertainty (Hoffmann, 2021). Structured source-based tasks that culminate in evaluative judgement, such as those used in NRW, demonstrate how disciplinary reasoning can be made visible and valued even within formal examination contexts.

(2) A multi-component assessment architecture. No single assessment format can adequately capture PDK. A Future 3 system therefore needs to combine multiple, complementary components, typically including external examinations, internally assessed coursework or inquiries, extended independent investigations and forms of oral participation or presentation (Krause et al., 2021). Each component foregrounds different dimensions of disciplinary capability and together they offer a more valid representation of students' understanding than single-format, exam-only models. However, including teacher-assessed components raises particular concerns in summative contexts. Differences in how teachers interpret and apply criteria may affect the comparability of final grades, requiring shared criteria and appropriate professional support. At the same time, increased standardisation may restrict teachers' professional judgement (Ketonen & Nieminen, 2026). Nevertheless, international evidence suggests that systems combining internal and external assessment are better able to recognise complex competences than those relying solely on high-stakes exams (Lane & Bourke, 2019).

(3) Protection of discursive and epistemic space. A defining feature of a Future 3 curriculum is that students are expected not only to analyse disciplinary ideas but also to articulate, defend and revise positions in relation to them. Assessment must therefore protect discursive space within the system. Oral assessments, structured dialogue and presentation-based components, well established in some systems (e.g. Germany), formally recognise disciplinary talk, subject-specific language and argumentation as legitimate and assessable performances (Ministerium für Schule und Weiterbildung NRW, 2014). In doing so, assessment supports qualification and socialisation and creates indirect conditions for subjectification, ensuring that learning is not reduced solely to written, time-pressured outputs.

(4) Structured openness to epistemic uncertainty. Engagement with ambiguity, competing interpretations and bounded contestability is central to the development of PDK (Maton, 2014; Moore, 2007). Future 3 assessment must therefore allow more than one defensible response, provided that reasoning is conceptually rigorous and well justified. Validity is prioritised over narrow reliability, with assessment criteria focusing on the quality of reasoning, use of evidence and coherence of argument, rather than conformity to prescribed conclusions. Openness is structured rather than arbitrary, with students assessed against shared disciplinary standards while being rewarded for engaging productively with complexity rather than avoiding it.

(5) Separate learning phases from constant grading. To sustain epistemic curiosity and deep engagement, a Future 3 assessment system distinguishes between exploratory learning phases and summative certification moments. This reduces continuous performance pressure and allows uncertainty, experimentation and provisional understanding to play a productive role in learning processes (Hoffmann, 2021). Teachers are able to create protected epistemic space for enquiry and sense-making, alongside fewer, carefully designed summative assessments. Such an approach counters cultures of over-assessment that risk instrumentalising learning and narrowing students' engagement with disciplinary ideas.

(6) Conceptual equivalence with local meaning. Future 3 assessment recognises that disciplinary knowledge is always learned through particular contexts, without collapsing disciplinary understanding into experience. Tasks may therefore be situated within contexts that are meaningful to learners, while maintaining conceptual equivalence across different settings. That is, although surface features may differ, they sustain a consistent underlying epistemic demand and draw on the same disciplinary principles and criteria for legitimate knowledge (Bernstein, 2000; Maton, 2014). Given the discursive gap, where increasing complexity allows for multiple legitimate interpretations, assessment must engage this plurality while maintaining shared disciplinary standards. Context thus functions as a conceptual launchpad rather than a curricular destination. Through engagement with specific cases, students are expected to interrogate broader concepts, methods and analytical frameworks, developing increasingly abstract and generalised forms of disciplinary understanding (Maton, 2014; Vernon, 2021).

(7) System-level constructive alignment. Finally, Future 3 assessment cannot function as an isolated classroom innovation. Constructive alignment is required across curriculum aims, task design, internal assessment practices and high-stakes certification (Biggs, 1996). Misalignment, such as curricula that foreground enquiry and conceptual understanding paired with recall-focused examinations, systematically undermines epistemic aims. A Future 3 assessment

system therefore treats alignment as a design principle, ensuring that what is valued in curriculum documentation, classroom practice and certification decisions is epistemically coherent.

Taken together, these principles do not constitute a blueprint for assessment reform, but a conceptual framework for designing assessment systems that align with the epistemic and educational aims of a Future 3 curriculum. They foreground assessment as a normative and pedagogical practice, one that shapes how knowledge is taken up and worked with, rather than as a purely technical instrument of measurement.

3.2 What might this look like for school geography?

In school geography, these seven Future 3 assessment principles can be coherently realised through long-established signature pedagogies that foreground the distinctive nature of geographical knowledge and ways of knowing. Geographical enquiry provides a central organising framework through which disciplinary thinking is made visible, requiring students to frame questions, work with diverse forms of evidence, apply key concepts such as scale, place, interconnection and system and arrive at reasoned judgements about complex socio-environmental issues (Roberts, 2023a). A stronger emphasis on geographical enquiry would better align assessment with complex disciplinary performance by integrating knowledge, reasoning and evaluation rather than fragmenting learning into isolated skills (Roberts, 2023b).

Fieldwork also plays an important role in supporting a multi-component assessment architecture and preserving discursive and epistemic space. By generating primary data through collaborative investigation, fieldwork creates authentic contexts for disciplinary dialogue, argumentation and reflection. In doing so, it engages students with uncertainty, partial evidence and competing interpretations, while supporting the development of judgement under real-world conditions. Place-based education also supports the development of disciplinary reasoning by using local places as epistemic entry points rather than curricular endpoints (Rawlings Smith & Pike, 2023), enabling students to move between situated experience and more abstract geographical concepts and explanations (Béneker & van der Vaart, 2020). This provides a greater opportunity for students to show their geographical thinking and connect disciplinary concepts to real-world experience, allowing multiple defensible interpretations, while maintaining epistemic rigour.

Together, enquiry, fieldwork and place-based education exemplify how assessment in geography can be constructively aligned with curriculum aims and pedagogy, supporting qualification through access to powerful geographical knowledge, socialisation into disciplinary practices and discourses and the creation of spaces in which subjectification may emerge. In this way, geography offers a rich illustration of how a holistic Future 3 assessment system can sustain disciplinary integrity while equipping students to engage meaningfully with a complex and changing world.

4. Assessment for a Future 3 geography curriculum: International examples

Across German federal states, assessment practices illustrate how disciplinary performance (Principle 2) is recognised beyond written examinations. While students receive grades for formal written work (including, in upper secondary, high-stakes examinations), a separate and equally weighted component evaluates their ongoing contributions to classroom work. This does not refer to behaviour, but to the quality of observable performances across a range of formats, including oral contributions, presentations, short written tasks, and other forms of independent and collaborative work. Importantly, this component is explicitly framed in terms of the development of subject-specific competences, encompassing not only knowledge but also analytical, evaluative and communicative capacities and is assessed through both continuous observation and more focused moments of evaluation (Ministerium für Schule und Weiterbildung NRW, 2014). In this sense, assessment extends beyond the measurement of outcomes in controlled settings and begins to capture how students engage with geographical knowledge in practice. In some contexts, this is further strengthened using explicit criteria for oral participation and self-assessment, making visible what counts as a 'legitimate' contribution in disciplinary terms and supporting students in recognising and developing these expectations themselves (Principle 3). Therefore, its significance for a Future 3 geography curriculum lies less in separating learning and assessment than in broadening what counts as disciplinary performance.

In Germany's North Rhine-Westphalia, high-stakes geography examinations are explicitly designed around material-based argumentation, requiring students to move beyond information retrieval towards structured analysis and

evaluation (Principle 1). This reflects a strong degree of curricular alignment (Principle 7): higher-order thinking is embedded not only in curriculum aims, but also in the prescribed structure of school-based and high-stakes examinations, the use of a taxonomy of performance levels and clearly defined operators (command words) that specify expected forms of reasoning. Examination tasks typically require students to interpret and synthesise multiple sources, construct coherent arguments and take substantiated positions on complex spatial issues. In this way, assessment is deliberately structured to support and make visible students' engagement with complexity (Principle 4), rather than to reward the reproduction of isolated knowledge (Krause, 2025; Ministerium für Schule und Weiterbildung des Landes Nordrhein-Westfalen, 2014).

In the French context, assessment may take the form of a croquis or cartographic representation of a contemporary issue. In the Concours de Cartographie d'Actualité, students are required to transform a journalistic text into a structured spatial representation, organising information into a coherent legend and making explicit the underlying geographical problem (Principle 6). This process requires students to select, interpret and synthesise information and to translate it into a spatial argument. The centrality of the map compels students to engage in spatial analysis and evaluation, as they must make choices about scale, representation and the relationships between phenomena. In this sense, assessment is not limited to reproducing knowledge but involves constructing and communicating a geographical interpretation of a complex issue through the language of cartography (www.concourscarto.com).

In Singapore, the push to educate students for the twenty-first century has been a key driver of major policy reforms over the past two decades. This has led the Ministry of Education to promote a holistic vision of education, systematically embedding core values and 21st Century competencies (the 4Cs of critical thinking, communication, collaboration and creativity) across the curriculum (Principle 4) to better prepare students for the future (MoE, 2023). While the development of academic and disciplinary knowledge (with a strong emphasis on the national context) remains important (Principle 6), there is a growing emphasis on enabling students to find meaning and purpose (*telos*) through the cultivation of a wider repertoire of excellence (*arete*), extending beyond narrowly defined performance measures (Ng & Chua, 2023). Within geography, curriculum space has accordingly been created for enquiry and fieldwork to support the development of disciplinary reasoning through analysis, judgement and decision-making (MoE, 2023). This reflects a context in which strong classification is maintained, while pedagogy is oriented towards epistemic engagement, supporting students' access to PDK through engagement with geographical practices (Principle 1).

In Peru, the absence of high-stakes geography examinations at the end of secondary education situates assessment within classroom practice rather than external accountability systems. Student progression is determined through school-based judgements aligned to nationally defined, competence-referenced performance descriptors (Principle 5). This privileges students' capacity to conduct geographical enquiry, interpret evidence, analyse spatial relationships and draw conclusions rather than focusing on the reproduction of standardised content. It also enables teacher agency by positioning teachers as interpreters of national standards, responsible for designing enquiries, selecting contextually relevant geographical problems and exercising professional judgement about progression. Evidence suggests that competence-based, low-stakes assessment systems expand teachers' role in curriculum making (Tran & O'Connor, 2024). As in comparable systems without terminal examinations, teachers' epistemic responsibility is central to sustaining disciplinary integrity, with assessment operating as a professional rather than technicist practice (Ketonen & Nieminen, 2026).

5. Discussion: Implications for assessment design in a Future 3 curriculum

Our central argument is that assessment is not a neutral add-on to curriculum, but a constitutive part of the curriculum system itself (Bernstein, 2000; van den Akker, 2003). Assessment practices do not merely measure what has been taught; they shape what counts as legitimate knowledge, influence pedagogical priorities, and signal to teachers and students alike what is valued in a subject (Biggs, 1996; Bijsterbosch et al., 2017). Taken together, the preceding discussion suggests that a Future 3 curriculum oriented towards PDK cannot be realised through assessment logics that remain anchored in Future 1 assumptions about knowledge as static, enumerable and easily measurable. Consequently, we need to think more holistically about what legitimate knowledge should be taught AND assessed. As Biesta (2015, 2022) argues, this is inevitably a question of educational purpose. While advances in digital assessment and artificial intelligence may extend what is operationally assessable, they do not resolve the underlying normative question of what ought to be made visible and valued. Through a Future 3 lens, assessment must prioritise disciplinary understanding

and reasoning, while recognising that not all valuable educational outcomes, particularly those associated with subjectification, can or should be formally assessed without distortion.

The international examples illustrate that Future 3-aligned assessment is best understood as the evaluation of complex disciplinary performance, rather than fragmenting geographical thinking into isolated sub-skills or proxy measures of learning. In practice, this requires assessment tasks that integrate substantive content, conceptual frameworks and epistemic practices in ways that reflect how knowledge is produced and contested (Bernstein, 1999). Designing and judging such performances is not a technicist exercise; it depends on subject-specific expertise and professional judgement (Maton, 2014). This reinforces the importance of teachers as curriculum-makers and as assessors, rather than mere implementers of externally specified tasks (Krause et al., 2024; Tran & O'Connor, 2024).

A second implication concerns the relationship between learning and assessment. Powerful knowledge must be learned before it can be meaningfully assessed. Epistemic access requires more than exposure to content; it depends on carefully sequenced opportunities for epistemic ascent, supported through cognitively demanding tasks, subject-specific language and structured opportunities for sense-making (Maton, 2014; Winch, 2013). Assessment systems that emphasise constant grading risk undermining these processes by collapsing learning into performance. A Future 3 assessment architecture therefore benefits from a principled separation between phases of learning and moments of certification, allowing uncertainty, experimentation and partial understanding to function productively within the curriculum (Hoffmann, 2021).

A further implication is that language and representation emerge as central to valid assessment in geography. Whether through extended writing, oral argument, cartographic representation, or multimodal forms, assessment must recognise that geographical understanding is realised through specific disciplinary languages and conventions (Béneker & van der Vaart, 2020; Bernstein, 2000). Protecting discursive space within assessment systems, though, for example, oral components or structured dialogue, supports both qualification and socialisation, while creating indirect conditions for subjectification without attempting to measure it directly (Biesta, 2015).

Finally, the international examples indicate that no single assessment instrument can adequately capture PDK. A valid Future 3 assessment system therefore requires multiple, complementary components, combining external examinations with internally assessed enquiries or performances (Krause et al., 2025). International evidence suggests that such plural architectures are better able to represent disciplinary complexity, although they remain contingent on local policy traditions, accountability cultures and high levels of trust in teacher judgement (Lane & Bourke, 2019).

Constructive alignment is fundamental to ensuring coherence across curriculum, pedagogy and assessment (Biggs, 1996). Misalignment, such as concept-rich curricula coupled with recall-focused examinations, systematically undermines epistemic aims (Krause, 2025). Crucially, alignment cannot be achieved solely through examination reform; it requires system-level redesign that attends to the interactions between curriculum intentions, pedagogical practices, assessment formats, grading criteria and school accountability mechanisms. Even where such conditions are made possible within tightly regulated systems, teacher agency remains a key mediating factor in how assessment is interpreted and enacted in the classroom (Ketonen & Nieminen, 2026; Tran & O'Connor, 2024).

6. Concluding thoughts

This paper has argued that assessment plays a decisive role in whether PDK can be meaningfully realised within a Future 3 geography curriculum. While policy discourse increasingly references conceptual understanding, higher-order thinking and epistemic engagement, assessment systems often continue to privilege what is predictable, comparable and easily measured. The resulting misalignment risks reducing geography to examination technique, rather than sustaining it as a discipline for understanding and engaging with an increasingly complex, uncertain and contested world (Jackson, 2006; OECD, 2019). Our principles and international examples demonstrate that Future 3-aligned assessment is possible but always partial and context-dependent. There is no single transferable model and reform trajectories are shaped by national traditions, governance structures and accountability demands. Nevertheless, we show that assessment systems can be designed to recognise disciplinary reasoning, protect discursive space and value engagement with uncertainty, provided that assessment is treated as a core curriculum concern rather than a technical afterthought. Ultimately, the challenge lies not simply in innovating item formats, incorporating new technologies, or adding coursework components but in rethinking assessment in relation to the broader purposes of education. Assessment should be understood as a normative practice that influences how knowledge is framed, communicated and worked with in classrooms. If it is to support students to engage with PDK, assessment needs to shape classroom knowledge practices in

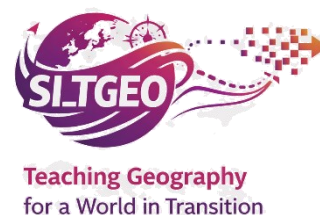
ways that sustain disciplinary integrity while leaving space for students to encounter knowledge and themselves, in meaningful and responsible ways. In this sense, it should function as an enabling force that expands, rather than narrows, the educational possibilities available to young people in preparation for the next stage of their lives.

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Contribution to the Special Issue Topics: This article contributes to the themes of powerful geographical knowledge and navigating epistemic uncertainty and complexity. It argues that realising a Future 3 curriculum depends on assessment practices that align with its aims and examines what such assessment might look like. It proposes seven design principles that recognise disciplinary reasoning, epistemic engagement, complexity and multiple legitimate interpretations and illustrates these through international examples.

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