Geography for secondary

Designing a coherent geography curriculum for 11-16 year olds

Planning for pupil progress in the use of Ordnance Survey maps

David Gardner

Third edition

Ordnance Survey

Contents

We would like to thank all the contributors who have added their ideas and thoughts to this guidance

The 2021 2nd edition of 'Planning for Progress in the use of OS maps' was a response to new GCSE's and a new Ofsted (2017) Education Inspection Framework (EIF) with a focus on the quality of a school's curriculum, and how planning for progress in the use of Ordnance Survey maps can be embedded in it. Since this time Ofsted has conducted a great number of school inspections using this EIF. In 2021 Ofsted published a research review for geography, and in 2023, a geography subject report 'Getting our Bearings', which both highlighted discoveries about the quality of the geography curriculum in schools in England. The latter acknowledges 'there have been many recent improvements to the geography curriculum in most schools.'

The Geographical Association have also made a significant contribution to an understanding of a quality geography curriculum with the publication of 'A framework for the school geography curriculum', (2022). The GA explains on its website that 'the framework sets out the nature of the school subject, its disciplinary foundations and the significant features of geography that should underlie any geography curriculum or set of curriculum requirements at national level.' It's aim is to support the design of high-quality geography curricula, wherever and whenever national requirements are being reformed. The framework draws on the knowledge and expertise of a wide range of practitioners, researchers and curriculum thinkers in geography education."

The document provides an excellent starting point for designing a coherent and sequenced geography curriculum.

This new edition of 'Designing a coherent geography curriculum for 11-16 year olds, planning for pupil progress in the use of Ordnance Survey maps' integrates many of the findings and ideas outlined in the documents already mentioned, to offer further guidance and support for schools.

In particular, it is a response to Ofsted geography subject report findings (2023) about procedural knowledge in the geography curriculum:

"Procedural knowledge (the knowledge of how to use geographical skills) was rarely planned for in the same way as substantive knowledge (established facts about the world). Leaders had not identified when to teach different aspects of procedural knowledge or how pupils would have the opportunity to practise using it to become more skilled in applying it. Geographic information systems (GIS) were not on most secondary schools' curriculums, despite being part of the national curriculum at this phase."

This Ofsted report made the following recommendations in terms of this area for development:

Schools should:

Plan procedural knowledge into their curriculum in the same way as they do substantive knowledge, so that pupils make progress in their ability to use different geographical skills. In secondary schools, this should include the use of GIS.

Other organisations:

Organisations (such as ITE providers, exam boards and subject associations/bodies) and policy makers should: offer subject-specific CPD in areas such as using GIS, planning and carrying out fieldwork and teaching procedural knowledge.

This 3rd edition of planning for pupil progress in the use of Ordnance Survey map, in particular, offers such subject specific support for planning and teaching procedural knowledge and use of GiS, as part of a coherent and sequenced 11-16 geography curriculum.

David Gardner, December 2024

Who is Ordnance Survey?

Ordnance Survey is Great Britain's national mapping service.

The GA's manifesto for geography, 'A different view' (2009) refers to the idea of 'Living Geography', explaining that it "brings contemporary context and real world enquiry to the curriculum." (p 13)

https://www.geography.org.uk/GA-Manifesto-for-geography

A school's curriculum intent could embed this philosophy. There's an echo of this idea in the first sentence of the DfE National Curriculum Geography's purpose of study statement:

> "A high-quality geography education should inspire in pupils a curiosity and fascination about the world and its people that will remain with them for the rest of their lives."

In a curriculum where 'Living Geography' and 'inspiring in pupils curiosity and fascination about the world' are part of the intent, then time spent exploring with students who OS is – what they do, their history, and how their maps are used – is a great way to spike pupil's curiosity, and give map skills a real-world context.

The Ordnance Survey website

The About section of the website is a good place to start.

This explains how OS work with government, businesses and internationally.

The history of the OS, provides a video clip and timeline explaining how the organisation was founded and developed.

230 year ESRI Arc GIS story map, provides an overview of the history of the OS.

The significance of maps in our everyday lives

Patrick Wiegand (2006) in his excellent book 'Learning and Teaching with Maps' highlights the growing importance and interest in maps, across society.

> "Locational knowledge has pervaded most aspects of everyday life so that few serious leisure time aviators, boaters, motorists and walkers are unaware of the benefits of Global Positioning System (GPS) receivers for satellite navigation." p1

People's fascination with maps should not be underestimated. Many people collect antique, vintage and quirky maps. Old school hanging maps are now sold in trendy designer furniture stores, and maps on gifts and homewares are proving increasingly popular.

Maps help quench people's thirst for knowledge about places. Mike Parker in his book Map Addict sums it up well in his introduction:

> "Maps not only show the world, they lubricate its easy movement. On an average day, we consult them dozens of times, often almost unconsciously; checking the AA road atlas or the satnav, scanning the tube and bus map, doing a quick search online..... watching the weather forecast; visiting a theme park or stately home, conference centre or industrial estate, catching up on the news, booking a holiday or a hotel." p9

Ramblers, walkers, cyclists and tourists are all avid customers of OS maps. This fascination can be stimulated in the geography classroom and built upon to explain how and why maps and spatial data are used by so many organisations and businesses today. Maps are used by people for work and leisure. They are an important tool to support everyday life.

Maps help:

- Planners to decide where a new road or a new housing estate should be built.
- A home-delivery pizza company trying to make sure that our pizza gets to us whilst it's still hot.
- Tourists to travel to a resort or ramble through a National Park, or trying to get across London by tube train.
- Cyclists out on their mountain bikes finding a way over a large hill.
- Motorists planning and following a route or a car journey.
- Young people at a theme park trying to find the new ride they've seen advertised.
- A supermarket using data and GIS to track the catchment area and requirements of its customers.

It's important these real-life applications of maps and GIS are embedded in teaching to bring learning to life and demonstrate the importance of maps to pupil's lives now, and in their futures.

The Ofsted Education Inspection Framework focus on the quality of education in the curriculum.

One of the first indicators of new Ofsted focus came when Her Majesty's Chief Inspector, Amanda Spielman, commissioned a major research study into the curriculum (Ofsted, 2017). The goal of this research was to make sure Ofsted could assess – in a valid and reliable way – the 'quality of education' on offer in schools, with a welcome and radically new focus on the curriculum itself. Spielman (Ofsted, 2017a) launched her commentary on phase one of Ofsted's curriculum research with a bold statement:

> "At the very heart of education sits the vast accumulated wealth of human knowledge and what we choose to impart to the next generation: the curriculum ... Without a curriculum, a building full of teachers, leaders and students is not a school. Without receiving knowledge, students have learned nothing, and no progress has been made – whatever the measures might indicate. This is why exams should exist in the service of the curriculum rather than the other way round."

Ofsted's research (2019) used a working definition of the curriculum, which recognises that it passes through different states: how it's conceived, taught, and how students experience it. Thus:

> "The curriculum is the substance of what is taught. It is a specific plan of what pupils need to know and should be able to do. The curriculum shapes and determines what pupils will get out of their educational experience. It is distinct from pedagogy, which is how the curriculum is taught. And, it is distinct from assessment, which is a means of setting out the desired outcomes we wish pupils to achieve and evaluating whether they have achieved those outcomes." (p. 4)

The working definition of curriculum that emerged was:

> "The curriculum is a framework for setting out the aims of a programme of education, including the knowledge and understanding to be gained at each stage (intent); for translating that framework over time into a structure and narrative, within an institutional context (implementation), and for evaluating what knowledge and understanding pupils have gained against expectations (impact/ achievement)."

The three I's – intent, implementation and impact – are similar to the three curriculum questions used in the first edition of this Ordnance Survey (OS) curriculum guidance:

- What are you trying to achieve?
- How will you organise the learning?
- How well are you achieving your aims?

Alan Kinder and Paula Owens were both members of an Ofsted geography reference group that worked throughout the summer term of 2019. The aim was to help devise training guidance for Ofsted inspectors, so they would be better equipped to apply the new framework to inspect the quality of geography education in schools. Kinder and Owen have used this experience to write an invaluable article (2019), published in GA journals, Teaching Geography and Primary Geography, to provide an overview of the interconnected steps involved in the curriculum:

> "Subject leaders should note that, overall, the EIF is built around the idea of the connectedness of curriculum, teaching, assessment and standards. In that sense, it echoes the GA's take on curriculum making, which suggests that effective teaching draws on the rich resources offered by the subject discipline, specialist pedagogies and students' own experiences.'" (p. 99)

The article includes an excellent overview diagram, reproduced here, to illustrate this thinking, by showing how curriculum intent, implementation and impact – the 'three Is' – interconnect around the process of curriculum making. Curriculum development, design or making is an ongoing process driven by questions. A number of important questions relating to each of the three I's are helpfully included in the diagram.

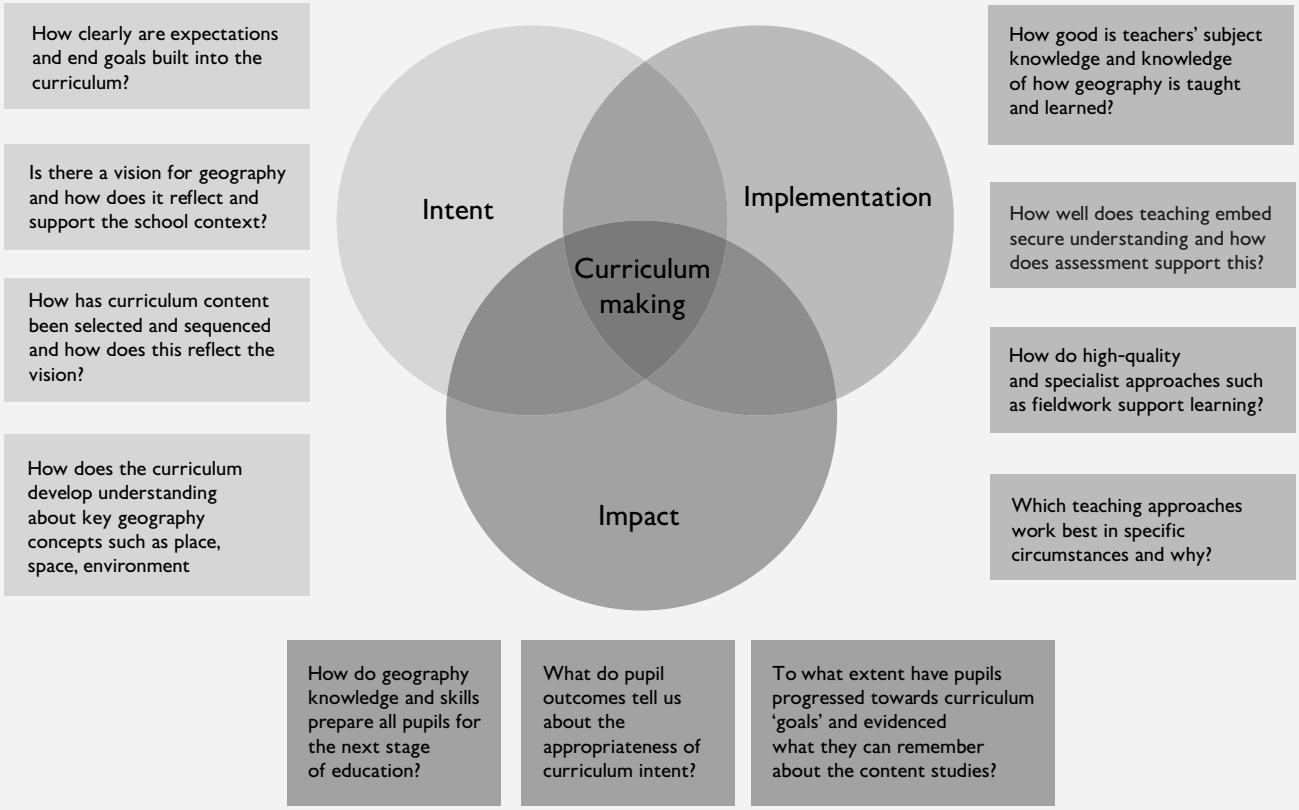


Figure 1: key questions link intent, implementation and impact around the notion of curriculum making.

Adapted from Kinder and Owen (2019)

This guidance uses the Ofsted ideas of curriculum and the three stages intent, implementation and impact, linked to the questions identified in Figure 1 to support schools to plan for procedural knowledge within a coherent and sequenced geography curriculum 11-16 with pupil progress in mind.

Towards a curriculum design process

The former, Qualifications and Curriculum Authority (2008) developed guidance for a process of 'disciplined curriculum innovation' built around three curriculum questions:

- What are you trying to achieve?
- How will you organise learning?
- How will you know when you're achieving your aims?

Gardner (2021) has adapted this process to establish a curriculum design approach for a coherent 11-16 geography curriculum, that underpins guidance in 'Planning your coherent 11-16 geography curriculum: a design toolkit' published by the GA. The three I's of the Ofsted definition of curriculum, and EIF, form the arrows on the outside of the circular process to demonstrate their interconnected nature. This process is shown in Figure 4 identifying a seven-stage process. This is designed to aid the development of an ambitious and coherently planned curriculum that clearly supports the intent, sequenced towards cumulatively sufficient knowledge and skills for future learning and employment.

Fig 2 The curriculum design process source: Gardner, D (2021) 'Planning your coherent 11-16 geography curriculum: a design toolkit' published by the GA, (p. 60)

This guidance will use the curriculum design process shown in Fig 4, to support you to develop plan for progression in using Ordnance Survey maps, as part of your sequenced and coherent geography curriculum 11-16. It integrates many of the ideas and design tools provided in Planning your coherent 11-16 geography curriculum : a design toolkit (see next page)

'Planning your coherent 11-16 geography curriculum: a design toolkit' published by the GA

This book consists of three distinct but interconnected sections, on curriculum design theory, guidance and practice. The first three chapters provide an overview of the evolution of the concept of curriculum in an education system controlled by central government. The impact this has had on school's perception of the concept of curriculum is explored. A summary is provided of the ideas and approaches to curriculum, developed by the geography education community and Ofsted, in response to the evolving phases of this control, and its impact on schools. The guidance section of the book introduces and explains a seven-step curriculum design process. The practice section provides five case studies of how schools have approached the opportunities, provided by Ofsted and the 2014 curriculum review, in highlighting the role of the teacher in curriculum enactment, identified by Spielman (2017) as 'the real substance of education.' All three sections of the book provide a wide range of design tools and activities to support geography departments in planning a coherent 11-16 geography curriculum.

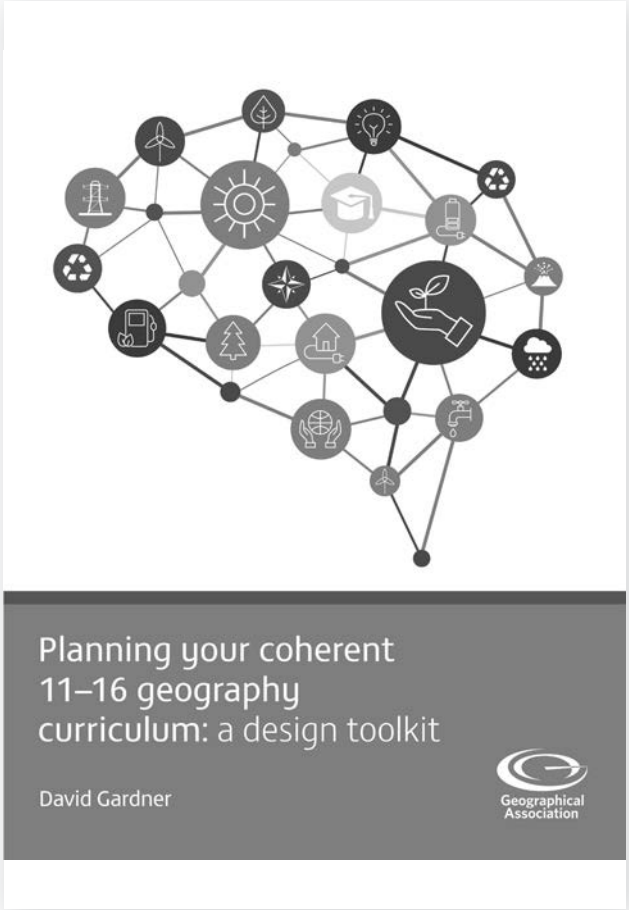


Fig 3 cover of book: Planning your coherent 11-16 geography curriculum: a design toolkit

Curriculum intent - what are you trying to achieve?

Curriculum design process - Stages 1-4

Heather Fearn, senior Curriculum HMI outlines the Ofsted thinking about curriculum intent in an Ofsted blog, Busting the 'intent' myth (2019) :

> 'Intent is about what leaders intend pupils to learn. It's as simple as that. Intent is everything up to the point at which teaching happens ...all the curriculum planning ...what do you want pupils to know? ... Does it contain the right knowledge in the right order? Is the curriculum providing pupils with the building blocks of what they need to know and be able to do to succeed in each subject? So, when we're talking about intent, we're talking about how ambitious, coherently planned and sequenced, how broad and balanced and inclusive the curriculum is. That's all in a school's curriculum planning, up until the point that a teacher teaches the curriculum.'

The Ofsted EIF makes clear the importance of this strategic thinking, in judgements inspectors will make about the curriculum, in particular:

- leaders take on or construct a curriculum that is ambitious and designed to give all learners, particularly the most disadvantaged and those with special educational needs and/or disabilities (SEND) or high needs, the knowledge and cultural capital they need to succeed in life

- the provider's curriculum is coherently planned and sequenced towards cumulatively sufficient knowledge and skills for future learning and employment

Ofsted curriculum research (2018) acknowledged the importance of subject knowledge. As a result, from April 2021, Ofsted began publishing a series of documents, coordinated and led by the HMI subject leads including:

Research reviews: which collate available research evidence about a high quality education in each subject. Geography research review published in 2021. https://www.gov.uk/government/publications/research-review-series-geography

Subject reports: designed to inform the education community, what inspection evidence, particularly deep dives. The geography subject report 'Getting our bearings' was published in 2023. https://www.gov.uk/government/publications/subject-report-series-geography/getting-our-bearings-geography-subject-report#geography-in-secondary-schools

Ofsted (2021) envisage that these reviews, and reports for each subject, will provide a shared understanding of high-quality education for each subject, what they call the 'conception of subject quality.' Ofsted believe the reviews outline subject-specific principles that can be used by inspectors to conduct deep dives in schools. The research reviews, therefore, provide an idea of what Ofsted are looking for in terms of a high-quality subject curriculum, making them a significant starting point for designing a coherent 11-16 geography curriculum.

Disciplinary and substantive knowledge

The GA Manifesto for geography : A different view (2009) compared geography to a language that provides a way of thinking about the world. It goes on to explain that you need vocabulary to speak the language, but that languages also have grammar, rules, concepts and procedures which are used to construct meaning. The grammar of geography is its big ideas and procedures (skills) , the disciplinary knowledge, which help us organise and attach significance, understanding to the vocabulary, the substantive knowledge.

The Ofsted geography research and review (2021) attempted to demonstrate the relationship between substantive and disciplinary knowledge as a diagram.

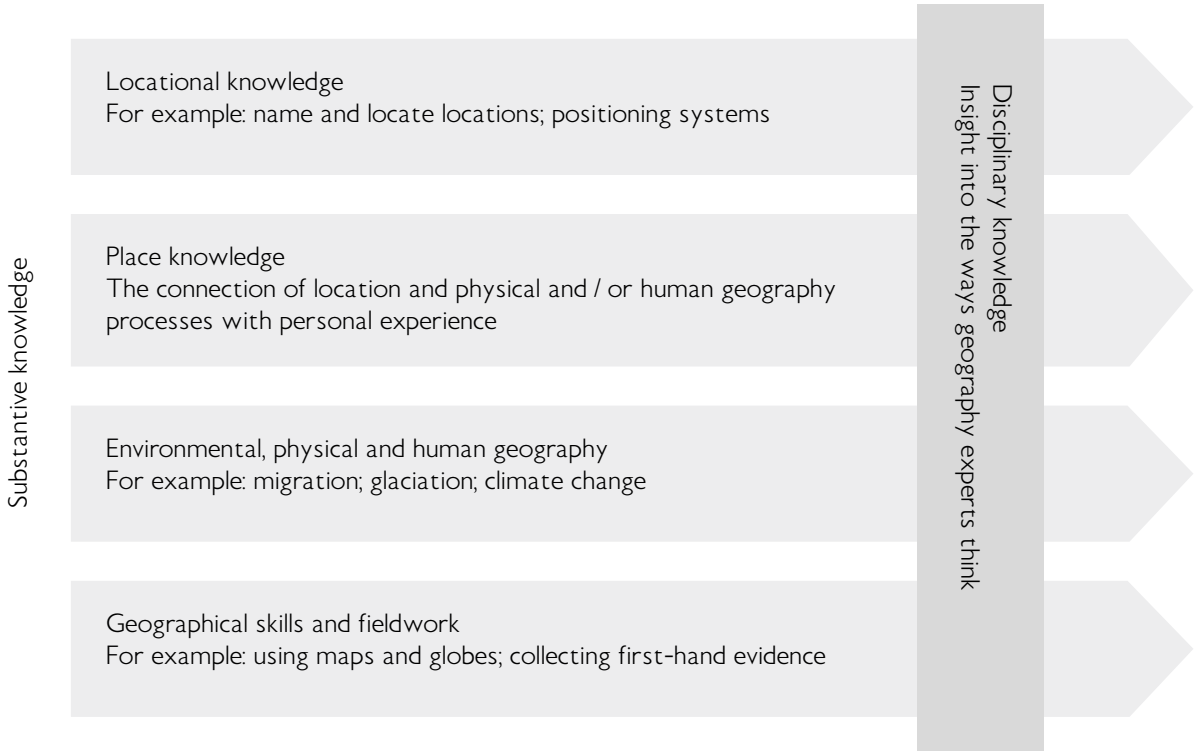


Fig 4

The GA's curriculum framework (2022) expands on this relationship. This framework represents a very helpful starting point for constructing a school geography curriculum. It outlines the nature of geography as a school subject. The ambition for this framework is to "ensure that any curriculum incorporating its principles will have the disciplinary power to help young people make sense of the world geographically and to play their part as citizens" (p17). The framework clearly explains the differences and purposes of disciplinary and substantive knowledge.

It identifies three components of disciplinary knowledge :

geographical key concepts (knowing that – how geographers think and know **-thinking like a geographer**)	geographical practice or procedural knowledge (knowing how – how geographers find out **–working like a geographer**),	geographically application – knowing how to apply – how geographers apply knowledge **-making use of geography**)

Geographical practice includes skills - how to use geographical data including maps, as part the methods and approaches of geographical enquiry.

The framework explains substantive knowledge as:

"The full range of contextual and specific knowledge of the world around us (often called world knowledge) including locational knowledge; tangible features such as rivers, mountains, cities, countries and landscapes; also more abstract features such as economic systems, community beliefs, everyday practices and imaginative place representations" (p4)

The Ofsted research review for geography (2021) also highlights these two types of knowledge:

"The geography curriculum in schools identifies the knowledge and skills that pupils are to learn. Like many subjects, knowledge in geography can be organised into 2 forms:

- Substantive knowledge sets out the content that is to be learned...
- Disciplinary knowledge considers how geographical knowledge originates and is revised. It is through disciplinary knowledge that pupils learn the practices of geographers."

Designing a geography curriculum requires careful consideration of the relationship between substantive and disciplinary knowledge. This is helpfully explained in the GA's curriculum framework, in terms of

> "Using substantive knowledge alongside a growing understanding of geographical concepts and a developing competence in geographical practice and application is what gives learners the capability to think and work like geographers, rather than just accumulating world knowledge. This is because knowledge of the world must be shaped by disciplinary approaches in order to become geographical knowledge.... [a school curriculum]must make sure that learners make progress in their disciplinary understanding and competence as well as in their substantive world knowledge. " (p6)

This idea is amplified in the Ofsted subject report Getting your bearings (2023) in the Secondary section

Summary of the research review relevant to selecting what to teach

"Leaders need to identify both the content (substantive knowledge) to be taught and the knowledge of relationships that enable pupils to understand how ideas are connected (disciplinary knowledge). Pupils' combined appreciation of both substantive and disciplinary knowledge can be described as geographical understanding."

Designing a geography curriculum with progression in mind

A geography curriculum must make sure that learners make progress in their disciplinary understanding and procedural knowledge as well as in their substantive world knowledge. Establishing such a curriculum, therefore, requires clear thinking about the notion and nature of progression in geography and its implications for curriculum design.

Daugherty (1996) makes clear a curriculum should be designed to best support students to learn and make progress.

'The idea of progression is implicit in any discussion of the nature of the learning we hope students will engage in. If we did not hope that our students would, in some sense, progress we would have no foundation on which to construct a curriculum or to embark on the act of teaching. It is ... a daunting prospect to look across the whole of the period of formal geography teaching in schools and colleges and to ask what concept of progression, implicit or explicit, is informing the design of the curriculum.' (P195)

Considering the concept of progression in geography is best achieved where teachers, and students have a clear idea of what getting better at geography looks like, as well as, a vision of what a curriculum is intending pupils to achieve and be able to know, understand and do at the end of it.

Trevor Bennetts, neatly captures the essentials of the idea of progression and its implications of curriculum design and teaching as a whole in his important article "The Links between Understanding, Progression and Assessment in the Secondary Geography Curriculum" (2005)

"The concept of progression focuses on the advances in students' learning, over a period of time. It is, therefore, a fundamental idea for planning the structure of a curriculum and for the assessment of students' attainments. "p157

Bennetts went on to explain what he meant by this,

> "Progression permeates.... the whole enterprise of education, and has implications for many key elements in curriculum planning and implementation: the specification of learning targets; the selection of content and activities; the design of learning materials; the interaction between teachers and students; the assessment and reporting of students' learning; and the evaluation and revision of teaching programmes and strategies. While the idea of progression is especially applicable to advances in the quality of students' learning, it can also be applied to the design of courses which are intended to bring about such advances. " p157

Bennetts (1995) makes an important point, in terms of the significance of connecting learning for the student in terms of designing a coherent curriculum.

"Planning for progression should, therefore take account of the past, present and future : what pupils have already experienced and achieved; what they can reasonably be expected to do at the time; and what will best serve their future needs." (P76)

A curriculum, therefore, should be planned and sequenced so that the content and learning activities will facilitate advances in geographical understanding and skills, always building on the foundations established in prior learning. It is important that the teacher relates present learning to past and future learning, and also the vision of what the curriculum is trying to achieve stated in the curriculum vision statement. The rate of progress expected should be related to the students' developing capabilities and their maturity. At the core of such understanding is the dynamic interrelationship between disciplinary and substantive knowledge.

The GA has identified five broad dimensions of progress, which as shown in the table, link directly to the aims of National Curriculum geography, as well as the key elements of the GA's curriculum framework. These three elements help indicate what it means to get better at geography. They provide essential support for designing a curriculum with progress at its heart.

Fig 5 Five dimensions of progress in geography, GA

Geography National Curriculum aims	The elements of geography in GA curriculum framework	The GA's five dimensions of progress
Contextual world **knowledge** of locations, places and geographical features.	**Substantive knowledge** **Knowing like a geographer** Contextual and specific knowledge of the world, including locational knowledge, and features such as rivers, mountains, cities, countries, landscapes	Demonstrating greater fluency with world knowledge by drawing on increasing breadth and depth of content and contexts.
Understanding of the conditions, processes and interactions that explain geographical features, distribution patterns, and changes over time and space.	**Disciplinary knowledge** **Thinking like a geographer** Key concepts Place, Space, Earth systems, environment Organising concepts Time, Scale, Diversity, Interconnection, Interpretation **Geographical application** Learners apply their growing geographical understanding to everyday and lived experiences.	Extending from the familiar and concrete to the unfamiliar and abstract. Making greater sense of the world by organising and connecting information and ideas about people, places, processes and environments.
Competence in **geographical enquiry**, and the application of **skills** in observing, collecting, analysing, evaluating and communicating geographical information.	**Disciplinary knowledge** **Geographical practice** **Working like a geographer** Involves a linked set of processes of enquiry : asking questions, collecting and using qualitative, and quantitative geographical data, analysing, interpreting, evaluating, problem-solving, decision-making, drawing conclusions Maps are an essential component of the practice of geography.	Working with more complex information about the world, including the relevance of people's attitudes, values and beliefs. Increasing the range and accuracy of pupils' investigative skills, and advancing their ability to select and apply these with increasing independence to geographical enquiry.

Progression takes place over a number of timescales: across a sequence of lessons; a year; a key stage. Progress in geographical learning is not achieved by just accumulating geographical knowledge. Progression can be seen more as an interconnected web of knowledge, ideas and capabilities. This involves the development of geographical thinking, and demonstrating the capability to see geographical relationships and make connections between geographical phenomena. Progression is shown by a pupil evolving greater fluency of understanding in different and more complex situations.

Gardner (2021) summarised the significance of GNC aims and ideas about progression

"As curriculum developers, therefore, we need to plan for progression that sequentially links units of work to:

What we want students to know (substantive knowledge)

With

What we want students to understand (disiplinary knowledge conceptual understanding)

With

What we want students to be able to do (disciplinary knowledge/ procedural knowledge - geographical skills and enquiry)"

(p37)

A sequenced and coherent geography curriculum

Three phases of Ofsted curriculum research led to a focus on curriculum coherence and sequencing as important indicators of a quality curriculum in the Education Inspection Framework (2019).

https://www.gov.uk/government/publications/education-inspection-framework/education-inspection-framework-for-september-2023

https://www.gov.uk/government/publications/curriculum-research-assessing-intent-implementation-and-impact

This is demonstrated in the following descriptor for a quality curriculum in the framework, in terms of curriculum intent:

- the provider's curriculum is coherently planned and sequenced towards cumulatively sufficient knowledge and skills for future learning and employment

Gardner (2021) clarifies the significance of this Ofsted descriptor:

'This focus on sequencing the introduction and development of content, concepts and skills in a co-ordinated, logical order is vitally important. If students are to progress towards cumulative knowledge and skills, in an efficient and effective manner, they need a carefully planned curriculum with clear stepping stones for intended progress. " (p49)

Bennetts (2005) makes a helpful definition of sequencing a curriculum.

> 'Sequence, in the context of the curriculum, is essentially about the order in which content and activities are introduced and organised. While a sequence of some sort is inevitable within any curriculum, progression in learning is not an inevitable outcome." (P113)

The Ofsted geography research review attempts to clarify the significance of a sequenced curriculum, with progress in mind:

> "By learning each component in an ordered way and appreciating how one component relates to another, pupils gain a composite knowledge of a geographical process or phenomenon... Typically, the curriculum organises and repeats substantive and disciplinary knowledge in ways that show pupils how each component fits together and how each composite idea fits with others. Through this, pupils gain a secure grasp of well-connected pieces of knowledge and consequently know more, remember more and are able to do more, thus making good progress in the subject."

Curriculum coherence requires deep thought about connectivity, combining substantive and disciplinary knowledge to work towards the creation of a narrative of the world, supporting pupils to progress towards an end goal, the vision created and shared with pupil, see the curriculum vision for Hodder Education Progress in Geography page 59 and the Geography Department at Westminster City School page 65.

Designing your curriculum creating a progression model

The GA published in 2023 'Guidance on progression and assessment in geography written by John Hopkin with David Gardner and the GA Assessment and Examinations Special Interest Group. This guidance connects GA guidance on aspects of achievement, dimensions of progress and benchmarks in geography. It is based on a clear vision of what it means to make progress in geography, anchored by age-specific national expectations for pupils aged 7 – 16 years. This guidance aims to support teachers in planning a geography curriculum that is ambitious, coherently planned and sequenced, and which enables high standards for their pupils. In other words, it supports teachers, to show how they connect the intent, implementation and impact of their geography curriculum.

The framework for progression has used the aims of the geography National Curriculum as three aspects of achievement, which can act as 'progression strands' around which you can design your curriculum.

These aims / aspects of achievement / progression strands are:

- Contextual world knowledge of locations, places and geographical features.
- Conceptual Understanding of the conditions, processes and interactions that explain features, distribution patterns, and changes in places over time and space.
- Competence in geographical enquiry, and the application of skills in observing, collecting, analysing, evaluating and communicating geographical ideas and information.

The strands underpin achievement and progress, and help bring a sense of coherence to learning geography. They naturally progress and interconnect with the aims and Assessment Objectives for geography at GCSE, thus forming the basis for planning a coherent 11-16 geography curriculum.

Benchmark expectations

The GA has developed age-related benchmark statements for 7, 9, 11, 14 and 16 years. These statements are based explicitly on the three progression strands, providing a 'map' of the 'expected' geographical achievement up to and including GCSE (See Fig 10). They are by necessity quite generalised – and always open to some debate and refinement. But they are a good starting point for teachers to use in their planning. Fig 6 shows the benchmark statements for geographical enquiry and skills, these benchmark statements provide a useful guide for planning for progress in procedural knowledge, in particular, for progress in the use of OS maps.

Competence in geographical enquiry, and the application of skills in observing, collecting, analysing, evaluating and communicating geographical information

Increasing the range and accuracy of pupils' investigative skills and advancing their ability to select and apply these with increasing independence to geographical enquiry

Expectations by age 7	by age 9	by age 11	by age 14	by age 16
Be able to investigate places and environments by asking and answering questions, making observations and using sources such as simple maps, globes, images and aerial photos	Be able to investigate places and environments by asking and responding to geographical questions, making observations and using sources such as maps, atlases, globes, images and aerial photos. They can express their opinions and recognise that others may think differently	Be able to carry out investigations using a range of geographical questions, skills and sources of information including a variety of maps, graphs and images. They can express and explain their opinions, and recognise why others may have different points of view	Be able, with increasing independence, to choose and use a wide range of data to help investigate, interpret, make judgements and draw conclusions about geographical questions, issues and problems, and express and engage with different points of view about these	Be able to plan and undertake independent enquiry in which skills, knowledge and understanding are applied to investigate geographical questions, and show competence in a range of intellectual and communication skills, including the formulation of arguments, that include elements of synthesis and evaluation of material

Fig 6 Benchmark statements for geography skills and enquiry GA (2023)

Designing a curriculum using progression strands and benchmark statements

It is possible to use the progression strands and benchmark statements to create a coherent key stage 3 geography curriculum. As a starting point, at KS3, compare the benchmark statements for each aspect of achievement/progression strand for an 11 to 14 year old. This will help you to consider the nature of progression you will be planning for. You can use them to plan a curriculum journey to take your pupils from the benchmark statement for an 11 year old to those of a 14 year old, following a journey along the GAs dimensions of progression.

To plan a curriculum that is "coherently planned and sequenced towards cumulatively sufficient knowledge and skills for future learning and employment" you could use these progression strands to determine an approach to sequencing in order to better support pupil progress, for example, how a geographical concept or skill can be introduced or progressed across topics, or how they build and progress KS2 geography.

Fig 7 shows how the topics that make up a KS3 curriculum can be interconnected in a coherent way by the three progression strands. This represents an approach to the curriculum design process that puts progression at the very heart. Once initiated, this approach makes the need for sequencing units (topic 1-6) in each year group shown in Fig 7, transparent, to create logical stepping stones in teaching and learning. Each unit can be assigned 'responsibilities' to introduce or progress an aspect of achievement to work towards the long-term vision of the key stage course. Planning in this way, has the potential to naturally align geographical concepts, core knowledge and skills.

How do you plan for progression?

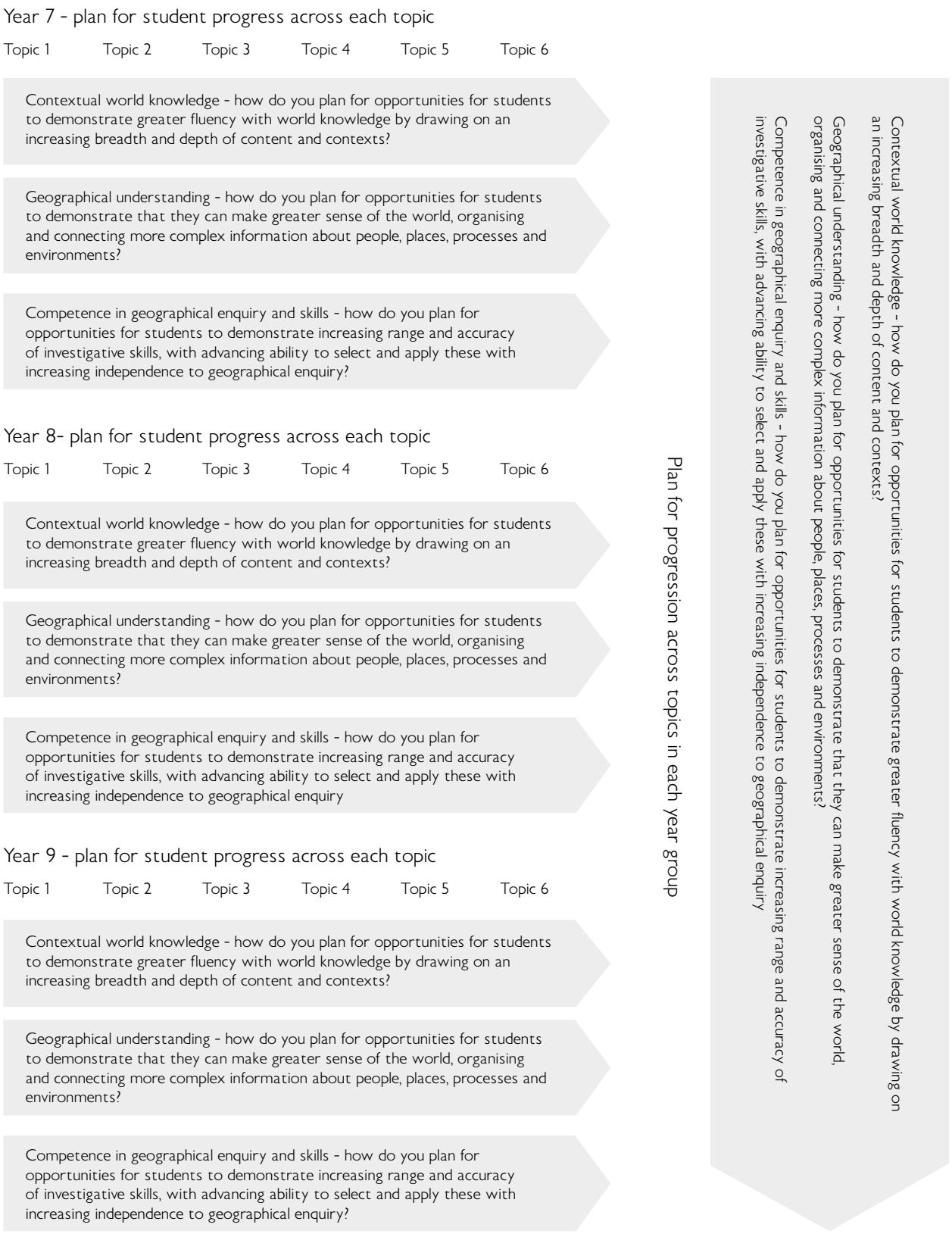


Fig 7 Interconnecting unit topics with progression strands at KS3 Source : Gardner, D (2021) Planning your coherent 11-16 geography curriculum: a design toolkit, GA, p46

Recording your starting point

If your primary feeder schools have developed map skills as part of Key Stages 1 and 2 your new Year 7 students should already be able to do the basics, but you will need to find out. This is why many secondary schools have a skills unit of work at the beginning of year 7. Paula Owens has produced a progression framework for map skills for primary schools, in 'Teaching map skills to inspire a sense of place and adventure - planning for progress from 5-11 years', published by the Ordnance Survey. It will be useful to look at this and ensure early in year 7 your pupils have a good grasp of the skills outlined here.

https://digimapforschools.edina.ac.uk/files/resource-hub/downloads/pupils%20planning%20document-low%20ink%20version_2.pdf

Using the progression strands to create your curriculum plan

The Key Stage 3 progression framework grid outlined below is a useful device to support your curriculum-making process. It can be used by a geography department to consider how to plan for pupil progress. It can be used as a starting point before evolving schemes of work to develop students that can think geographically and work independently. The age-related expectations for an 11-year-old from the GA's progression framework, are provided for each progression strand or aspect of achievement at the bottom of the grid. The benchmark statements for a 14-year-old are placed at the top of the grid. You can adapt these statements to embed your vision of where your students should be in their learning at the end of key stage 3. Year 7 units begin at the bottom of the grid, and work upwards, planning progress towards the 14-year-old statements at the top. The left-hand column is provided for you write in the sequence of units you devised in the previous activity. For each unit you can begin to map out the contextual knowledge, understanding, and skills you plan to develop. As you do this, you will begin to build a progression map of your curriculum. Recording planning in this detail on one grid will allow you to see issues you perhaps had not considered in your initial planning.

	The three aspects of pupil achievement in the National Curriculum	**Contextual world knowledge** of locations, places and geographical features	**Understanding** conditions, processes and interactions that explain geographical features, distribution patterns, and changes over time and space			Competence in **geographical enquiry**, and the application of skills in observing, collecting, analysing, evaluating and communicating geographical information		Judgements could be expressed and recorded as, 'working towards' 'meeting' and 'exceeding' the expectations for their age or whatever system is in place in your school.
	By the age of **14** pupils should :	Have extensive knowledge relating to a wide range of places, environments and features at a variety of appropriate spatial scales, extending from local to global.	Understand the physical and human conditions and processes which lead to the development of, and change in a variety of geographical features, systems and places. They can explain various ways in which places are linked and the impact such links have on people and environments. They can make connections between different geographical phenomena they have studied.			Be able with increasing independence to choose and use a wide range of data, to help investigate, interpret, make judgements and decisions to draw conclusions about geographical questions, issues and problems, and express and engage with different points of view about these.		
			Physical geography process-landform	**Human geography process**	**Physical human interaction**	**Geographical skills**	**Fieldwork**	**Key assessment opportunity**
15								
14								
13								
12								
11								
10								
9								
8								
7								
6								
5								
4								
3								
2								
1								
	By the age of **11** pupils should :	Have a more detailed and extensive framework of knowledge of the world, including globally significant physical and human features and places in the news.	Understand in some detail what a number of places are like, how and why they are similar and different, and how and why they are changing. They know about some spatial patterns in physical and human geography, the conditions which influence those patterns, and the processes which lead to change. They show some understanding of the links between places, people, and environments.			Be able to carry out investigations using a range of geographical questions, skills and sources of information including a variety of maps, graphs and images. They can express and explain their opinions, and recognise why others may have a different point of view.		

Fig 8 Curriculum planning grid to create key stage 3 long-term plan with progression in mind

Fig 9 provides a similar planning grid for GCSE. The aims for GCSE (see fig 3) match the progression strands and aims for the National Curriculum geography, they also align with the GCSE Assessment Objectives. These form the progression strands for planning a GCSE curriculum. The age-related benchmark expectations for a 14 year-old are now at the base of the grid; the expectations for a 16 year-old at the top.

Initially you will use the curriculum grids to create your key stage 3 and/or key stage 4 curriculum, with statements or lists of content, concepts and skills for each unit, to think through and evolve the coherence and sequencing. As this becomes established, you can begin to replace the lists with key performance indicators (KPIs). In effect, these lists identify the key elements of world contextual knowledge, understanding and skills for each sequenced unit of work that, if mastered, demonstrate students' grasp of that facet of your emerging curriculum.

Key Stage 4 Plan			**The 3 aspects of pupil achievement in the National Curriculum**	**Contextual world knowledge of locations, places and geographical features**	**Understanding of the conditions, processes and interactions that explain geographical features, distribution patterns, and changes over time and space**			**Competence in geographical enquiry, and the application of skills in observing,collecting, analyzing,evaluating and communicating geographical information**		
			GA age related expectations By the age of **16** pupils should :	Have a broader and deeper understanding of locational contexts, including greater awareness of the importance of scale and the concept of global	Gain a deeper understanding of the processes that lead to geographical changes and the multivariate nature of human-physical relationships and interactions, with a stronger focus on forming valid generalisations and abstractions, together with a growing awareness of the importance of theoretical perspectives and conceptual frameworks in geography.			Be able to plan and undertake independent enquiry in which skills, knowledge and understanding are applied to investigate geographical questions, and show competence in a range of intellectual and communication skills, including the formulation of arguments, that include elements of synthesis and evaluation of material.		
GCSE AOs				**AO1 know geographical material** Demonstrate knowledge of locations, places, processes, environments and different scales. **15%**	**AO2 think like a geographer** Demonstrate geographical understanding of concepts and how they are used in relation to places, environments and processes, and the inter-relationships between places, environments and processes. **25%**			**AO3 applying geography** Apply knowledge and understanding to interpret, analyse and evaluate geographical information and issues **25%** **AO4 study like a geographer** Select, adapt and use a variety of skills and techniques to investigate questions and issues and communicate findings. and to make judgements. **35%**		
Year	Term	Time	Theme/enquiry question	Locational contexts	Physical geography process-landform	Human geography process	Physical human interaction	Interpret,analyse evaluate	Geographical skills	Fieldwork
11										
10										
			GA age related expectations By the age of **14** pupils should :	Have extensive knowledge relating to a wide range of places, environments and features at a variety of scales, extending from local to global	Understand the physical and human conditions and processes which lead to the development of, and change in, a variety of geographical features, systems and places. They can explain various ways in which places are linked and the impact such links have on people and environments. They can make connections between different geographical phenomena they have studied			Be able with increasing independence to choose and use a wide range of data to help investigate, interpret, make judgements and draw conclusions about geographical questions, issues and problems, and express and engage with different points of view about these.		

Fig 9 Curriculum planning grid to create a key stage 4 long-term plan with progression in mind

The Ofsted subject report (2023) makes this clear the importance of planning a curriculum in this way.

"Sequencing geographical content is complex. When considering the curriculum as the progression model, leaders need to identify precisely what pupils need to know and to sequence it clearly. There needs to be a clear progression 'map' for each subject."

The diagram below, relates to the two key steps in creating your curriculum intent. It shows how the progression framework grid allows you to connect the different elements curriculum design in a geography curriculum –; substantive knowledge, disciplinary knowledge, procedural knowledge; dimensions of progression, progression strands, benchmark statements to create a sequenced and coherent curriculum, designed to support students to know, think, work and apply like a geographer.

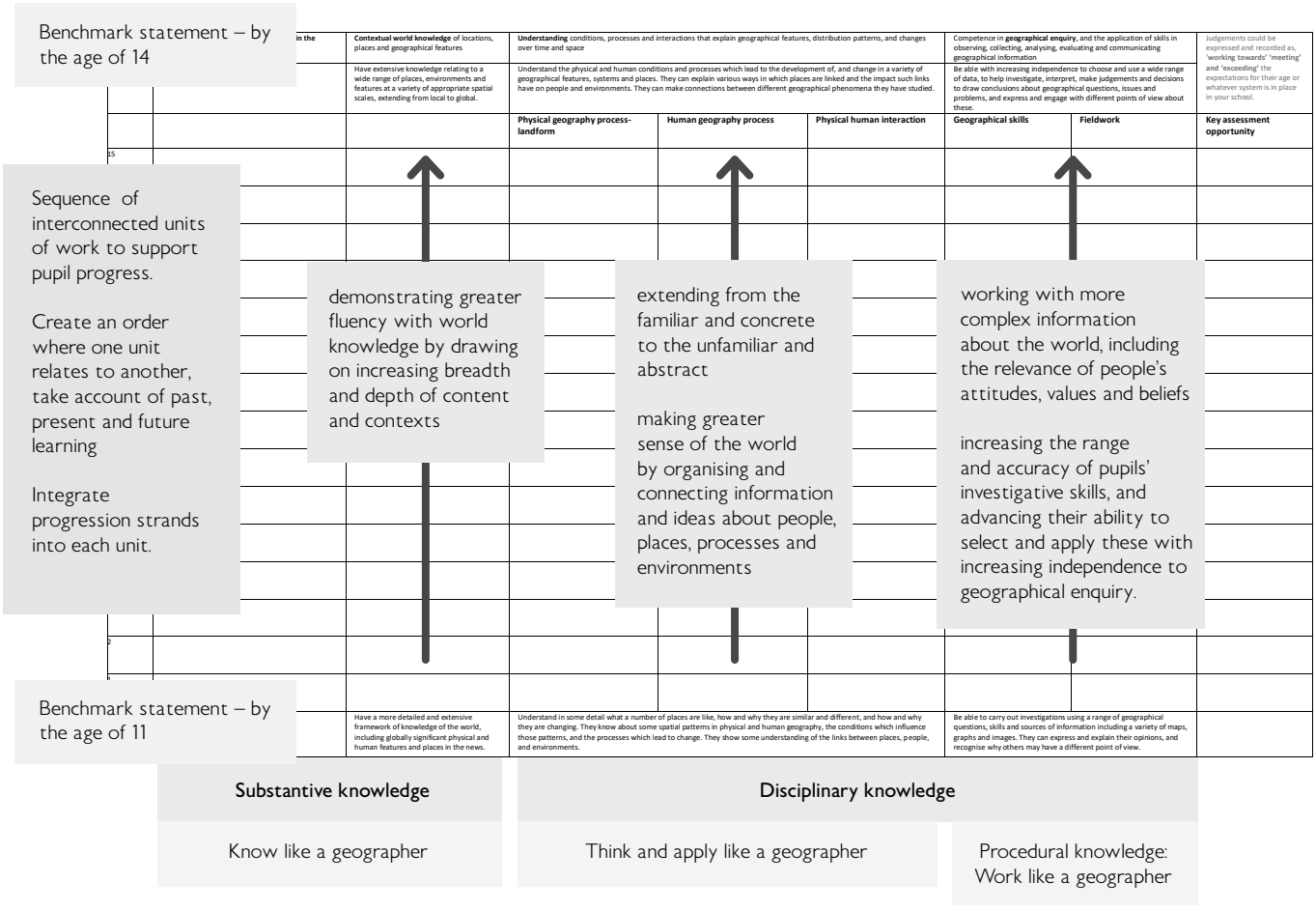


Fig 10 Planning a coherent geography curriculum, as a progression model

Guidance and ideas about designing a coherent geography curriculum using all three progression strands, as shown on the planning grids Fig 12 and 13 is provided in Gardner, D (2021) 'Planning your coherent 11-16 geography curriculum : a design toolkit'.

The guidance in the rest of this booklet focusses on the enquiry and skills progression strand to provide support in planning for progress in procedural knowledge 11-16.

What is procedural knowledge?

A key reason for publishing a new edition of this guidance was identified, (see page 1) as the Ofsted (2023) finding regarding the lack of planning of procedural knowledge in the geography curriculum in most schools. It is important, therefore, to clarify what procedural knowledge is, how it connects to the ideas of progression, other types of knowledge, and ideas about designing a coherent curriculum with pupil progress in mind, as explained in the earlier sections of this guidance.

The GA's ITE guidance for geography provides a useful definition of procedural knowledge, and its significance to learning to become a geographer.

> "The procedural knowledge and skills used in learning geography are about doing, finding out, making, thinking, analysing and applying. The term geographical practice is used to cover all of the skills, competencies, methods and ways of thinking that are integral to the study of geography as a discipline. Geographical practice is working 'like a geographer'. It is how geographers find out and make sense of the world."

Making sense of the world requires pupils to be able to visualise and analyse spatial relationships between places considering aspects as location, distance, direction, shape and pattern. This is at the heart of geographical practice, and procedural knowledge. It involves the use of maps and other geographic representations, including globes; diagrams; ground, aerial and satellite images; digital data, and GIS; to develop geographical understanding and the capability to communicate spatial information. The GA curriculum framework identifies geographical practice as a feature of disciplinary knowledge.

The ability to understand and present information as graphic images is also known as graphicacy. This includes the ability to decode and interpret maps. As long ago as 1965, W.G.V Balchin and Alice Coleman wrote in the Times Educational Supplement, that 'graphicacy should be the fourth ace in the pack', along with oracy, literacy and numeracy. They explained their belief that using maps and diagrams at a range of scales from local to global develops an appreciation of spatial relationships at different scales, which provides a framework of knowledge into which students can classify new information and knowledge logically. Unfortunately, graphicacy is rarely taught explicitly (unlike literacy) except in geography classrooms. Despite this a level of graphicacy is assumed of adults, as demonstrated by the widespread use of maps and graphics in the media.

In 1989 the GA published a report by its working group to inform the debate about the first national curriculum, 'Geography in the National Curriculum', edited Richard Daugherty. This report made very clear statements about the significance of graphicacy and in particular maps to a geography education. The report highlighted that the study of places 'cannot be conveyed in words and figures alone.' It explained that pictorial representation of the real world is indispensable to geography, stating 'Above all, the central questions of location, networks, boundaries, distributions can only be addressed via the subject's major mode of communication – the map in all its forms.' P29

The report went on to explain that ' the school curriculum needs to equip young people to cope with the vast and confusing information inflows (much in graphical form) which are characteristic of the late 20th century society (even more prevalent today – see government comment below) The report also highlighted the very important critical thinking skills that also need to developed in the curriculum to consider provenance of data when detecting bias. 'It is becoming increasingly important that people can not only understand what is being conveyed but are aware of how graphical modes (for example) world map projections or tourist trade presentations can be manipulated to transmit unspoken messages' p30

Margaret Roberts in her book 'Geography through Enquiry' 2nd edition also encourages this capability to question the reliability of data, particularly with the increase in online, misinformation, disinformation and fake news. She identifies important critical questions for students to consider of sources:

- Who produced the resource?
- When was it produced?
- Is it still up-to-date?
- For what purpose was the source produced?
- How likely is the source to be reliable?
- In what ways might the resource be biased?
- What assumptions does the resource make about how the world works, e.g. related to market forces, the role of government, the role of local communities?

(P56)

The Ofsted research review (2021) reinforces the importance of procedural knowledge and the need to design a curriculum that interconnects this knowledge with world contextual knowledge and understanding.

> "...pupils learn to interpret spatial representations, particularly maps, globes and atlases, and construct their own plans and maps. Pupils also draw on these skills to support their knowledge of environmental, physical and human systems and also to gain a sense of place..... As well as thinking about the technical, or procedural, knowledge that pupils need, teachers and leaders also need to ensure that pupils can apply that knowledge. Consequently, the integration of this aspect with other aspects of geography is important."

The research review also highlights the importance of spatial thinking

"Geographers visualise and analyse spatial relationships between objects. For example, through the use of maps, pupils are presented with a spatially referenced framework and visual cues. Through such visualisation, pupils draw on concepts they have already learned, such as location, distance, direction, shape and pattern. Taught well, spatial thinking develops a meaningful sense of place and appreciation of the interconnectedness of the subject."

The review explains that procedural knowledge is becoming more important in everyday life, as governments and commerce recognise its value as spatial data technology advances. The research review provides a link to the UK Government Geospatial Commission's policy paper (2020) 'Unlocking the power of location : The UK's geospatial strategy 2020 to 2025.

The Commission's more recent paper UK Geospatial Strategy 2030 (2023), includes a Ministerial Forward by Viscount Camrose, former Minister for AI and Intellectual Property, where he states:

> "We depend on a sense of place to understand the world - what is happening around us and in distant places. Location services are a crucial part of our everyday life. Live location data allows us to plan a car journey or track a bus, find a local restaurant or share our location with friends. Businesses use location data to be more efficient and provide new and better services and it enables emergency services to reach an incident quickly. This technology has become so ubiquitous, we all expect to access our location wherever we are, whenever we need it."

https://www.gov.uk/government/publications/uk-geospatial-strategy-2030/uk-geospatial-strategy-2030

The Geographical Association (2024) promotes the importance of maps in 'Geography for all our futures' illustrating some of the opportunities and challenges for the subject, as part of developing the GA's 2025-2030 strategy. This overview also identifies the significance of geospatial data, referencing the government view, that geospatial data is vital to the UK's society, economy, and environment and the growing need for geospatial skills in the workforce.

https://geography.org.uk/geography-for-all-our-futures/

All these statements clearly illustrate the significance of locational data, enhancing the notion of being a geographer in modern life. Geospatial technologies including global positioning systems (GPS), remote sensing (RS) and geographical information systems (GIS), are all utilised in the everyday life, businesses and government. The UK government has created a Geospatial Commission and strategy recognising the role of GIS and other geospatial technologies as part of the 'fourth industrial revolution' that is changing the way people work, communicate and socialise. Schools also need to recognise the role they have to play in creating a high-quality geography curriculum, which embeds and progresses student's knowledge and use of these technologies, to prepare them for their future.

An OS promotional video demonstrates the organisation's pivotal role in this revolution. We are the Ordnance Survey – a further promotional video explains the role of the organisation in a modern world.

https://www.youtube.com/watch?v=uEVTWIyrFv0

https://www.youtube.com/watch?v=8oxyB6Dp2Ik

Procedural knowledge, therefore, has a pivotal role in learning to become a geographer. As well as providing important skills for living and working in our modern world, it can support pupils in making progress towards knowing, thinking and working like a geographer. When designing a curriculum, schools need to think carefully about how to sequence, and integrate stepping stones of progress in procedural knowledge, across each unit of work in any coherent long-term curriculum plan.

OS mapskills in the DfE Geography National Curriculum (GNC) and GCSE subject content

The GNC and GCSE geography both identify the importance of procedural knowledge clearly identified in the aims, programme of study and subject content.

Aims of the National Curriculum Geography Programme of Study (England)

The national curriculum for geography aims to ensure that all pupils:

- Develop an understanding of social and physical characteristics and processes within the context of significant areas of the world.
- Understand the processes behind key physical and human geographical features, how these are interdependent and how – and why – things differ from place to place on the surface of the earth.
- Are competent in the geographical skills needed to:
    - collect, analyse and communicate information gathered through fieldwork
    - interpret the likes of maps, diagrams, globes, aerial photographs and Geographical Information Systems (GIS)
    - communicate geographical information in a variety of ways, including through maps, numerical and quantitative skills and writing at length

Fig 11 Aims of Geography National Curriculum DfE

Key Stage 3 geography programme of study includes the following reference to maps:

Geographical skills and fieldwork

- build on their knowledge of globes, maps and atlases, and use this knowledge routinely in the classroom and in the field
- interpret OS maps, including using grid references and scale, topographical and other thematic mapping, and aerial and satellite photographs
- use Geographical Information Systems (GIS) to view, analyse and interpret places and data
- use fieldwork in contrasting locations to collect, analyse and draw conclusions from geographical data

https://www.gov.uk/government/publications/national-curriculum-in-england-geography-programmes-of-study/national-curriculum-in-england-geography-programmes-of-study

At GCSE the DfE geography subject content provides the prescribed content from which awarding bodies developed their specification.

Aims for GCSE geography

GCSE specifications in geography should enable students to build on their key stage 3 knowledge and skills to:

Aim	Aspect of learning	Assessment objective
Develop and extend their knowledge of places, locations, environments and processes, and of different scales including local and global, as well as social, political and cultural contexts.	Know geographical material	AO1: Demonstrate knowledge of places, locations, processes, environments and different scales (15%).
Gain understanding of the interactions between people and environments, change in places and processes over space and time, and the interrelationship between geographical phenomena at different scales and in different contexts.	Think like a geographer	AO2: Demonstrate geographical understanding of concepts and how they're used in relation to places, environments and processes; the interrelationships between places, environments and processes (25%).
Develop and extend their competence in a range of skills including those used in fieldwork, maps and Geographical Information Systems (GIS), and in researching secondary evidence including digital sources, as well as develop their competence in applying sound enquiry and investigative approaches to questions and hypotheses.	Study like a geographer	AO4: Select, adapt and use a variety of skills and techniques to investigate questions and issues and communicate findings (25%, including 5% used to respond to fieldwork data and context(s)).
Apply geographical knowledge, understanding, skills and approaches appropriately and creatively to real world contexts, including fieldwork, and to contemporary situations and issues; and develop well-evidenced arguments drawing on their geographical knowledge and understanding.	Applying geography	AO3: Apply knowledge and understanding to interpret, analyse and evaluate geographical information and issues to make judgements (35%, including 10% applied to fieldwork context(s)).

Fig 12 Aims of GCSE Geography and Assessment Objectives, DfE

The scope of study in the GCSE subject content specifies that GCSE specifications in geography should require students to extend their Locational Knowledge (1) and to develop competence in Maps, Fieldwork and Geographical Skills (2) as they study the content of the following four areas of geography: Place: processes and relationships (3); Physical geography: processes and change (4); People and environment: processes and interactions (5); Human geography: processes and change (6).

In terms of map skills, it states that GCSE specifications should require students to develop and demonstrate the following skills throughout their study of the specification as a whole:

The use of a range of maps, atlases, OS maps, satellite imagery and other graphic and digital material, including the use of Geographical Information Systems (GIS), to obtain, illustrate, analyse and evaluate geographical information. To include making maps and sketches to present and interpret geographical information.

Further prescribed content regarding using maps is provided in Appendix : Use of Mathematics and statistics in geography.

Cartographic skills

- use and understand gradient, contour and height on OS and other isoline maps (e.g. weather charts, ocean bathymetric charts)
- interpret cross sections and transects
- use and understand coordinates, scale and distance
- describe and interpret geo-spatial data presented in a GIS framework (e.g. analysis of flood hazard using the interactive maps on the Environment Agency website).

DfE (2014) GCSE Geography subject content

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/301253/GCSE_geography.pdf

The GCSE subject content emphasises the need for progression from KS3, not duplication.

Aims and Assessment Objectives are carefully aligned as shown in the table. At KS3 the emphasis regarding OS maps is on interpretation, but at the same time, ensuring basic skills such as locating using grid references and scale are in place. Subject content at GCSE is more focused on embedded use of maps as data across the specification, as a matter of routine, analysing and evaluating the evidence shown in maps.

Why schools do not always plan for progress in procedural knowledge and maps skills?

As stated in the introduction to this guidance (page 1), the Ofsted report 'Getting our bearings' (2023) commented that planning for pupil progress in procedural knowledge was rarely evident in schools.
"92. At all key stages, leaders struggled to sequence geographical procedural knowledge in the curriculum and rarely did it well. Although many schools have moved away from this approach, some began key stage 3 with a topic on 'geographical skills'. One problem with this was that pupils were taught a wide range of different geographical procedural knowledge in their first term, but they did not then have the opportunity to practise using it to develop fluency in it as a skill. They struggled to carry out the procedures in the future."

This has been a recurring theme in most Ofsted geography subject reports over the years.

The 2008 Ofsted geography report 'Changing practice' identified
"Limitations to the quality of teaching include:
- insufficient development of geographical skills
- insufficient use of maps and fieldwork to progressively build up pupils' skills in data gathering, analysis and interpretation."

The 2011 Ofsted geography report 'Learning to make a world of difference'

"37 Most of the students had poorly developed mapwork skills. Predominantly, this was because using maps was often limited to specific examination requirements or to a unit on geographical skills, usually early in Key Stage 3. The students said that they rarely had the opportunity to use maps in many of their lessons. Frequently, teachers gave students insufficient opportunities to develop real competence in map skills." (P22)

In 2013, Leszek Iwaskow, the then HMI and National Advisor for geography, in a Teaching Geography article 'Geography: a fragile environment?, reiterated this problem.

"Mapwork skills continue to be poorly developed. It is not uncommon for students to be unfamiliar with Ordnance Survey maps. Maps are a basic tool of geography but few students admit to being comfortable reading or using maps. Students often inform inspectors that they rarely have the opportunity to use maps in lessons. They are expected to develop an understanding of places and issues without being clear about where these places are, or knowing about the unique characteristics of their landscape. In far too many schools, map use is limited to specific examination requirements, rather than the progressive development of these specific geographical skills. " (p53-54)

Margaret Roberts in her book 'Geography through Enquiry 2nd edition (2023) also identifies and comments on this failure to embed use of maps through KS3 and GCSE curriculum.

"For most themes and places investigated in geography, maps of various kinds can be used as a source of data: topographical maps at various scales; atlas maps; weather maps and maps found in brochures. Many geography courses devote a lot of time when students start secondary school teaching the map skills required to use OS maps. What I find astonishing is that they emphasise the importance of these skills but then fail to make much use of them when investigating themes and places. In my experience as external examiner for PGCE courses, I have only rarely seen information on maps used as evidence, in spite of their relevance to what was being studied and in spite of wall maps, globes and atlases being readily available for use. If the skills are not used for several years, e.g. using six-figure grid references, then students will forget how to use them. If skills are not applied in meaningful contexts students are less likely to perceive their value. " (p55)

This evidence seems to suggest that many schools misunderstand why it is necessary to develop geographical skills / procedural knowledge in the geography curriculum. The big picture of the significance of procedural knowledge in designing a coherent and sequenced geography curriculum has somehow got lost. The GNC and GCSE specifications present skills as a long list, this can be misinterpreted as content to be covered. GCSE textbooks, for example, present skills as a separate chapter often at the end of the book.

This is a consequence of what Ofsted (2023) refer to as 'the exam specification has become the de facto curriculum.'

83. A second limiting factor to the scope and ambition of the geography curriculum was the way that schools approached exam specifications, particularly in key stage 4. In many schools, the exam specification had become the de facto curriculum. In the weakest examples, the school's curriculum involved little more than working through the textbook a few pages at a time until all the content specified for the exam had been covered. This approach ignored the synoptic nature of the subject and lacked ambition in terms of developing pupils' knowledge of the discipline of geography. Leaders and teachers often said that time constraints and the amount of content to be covered led to this approach. However, in other schools, careful planning of the curriculum enabled teachers to take a more effective approach to teaching the discipline of geography. In these cases, textbooks were still often used but in a way that allowed pupils to make links between different aspects of the subject.

In many schools, pupils are introduced to OS maps in an initial unit of work in Key Stage 3 geography lessons, in part ,to consolidate skills that hopefully have already been developed, as part of geography in key stages 1 and 2. The basic skills of direction, compass points, scale, measuring distance, map symbols, four and six figure grid references, representation of height on maps – spot heights, contours, describing routes are introduced and tested. It is not helpful if next time students use an OS map is as part of their GCSE course! At GCSE students are often, again taught a skills unit, designed to refresh these map skills. Unfortunately, opportunities to develop these skills are often not embedded in the GCSE curriculum. In the run-up to the exam, year 11 students will undertake further revision of these map skills. Once established, pupils need frequent opportunities to use and progress these aspects of map use in future units of work in both the KS3 and GCSE curriculum. Frequent practice and reacquaintance with these skills will help consolidate pupil map skill capabilities.

More importantly frequently planned use of maps for pupils, can provide opportunities to progress skills from use to interpretation of a range of places using maps as evidence allowing pupils to progress their understanding of the concept of Place, as well as, their ability to apply their knowledge and understanding can be developed studying different places and topics.

This lack of coherence can at times be inadvertently encouraged by Awarding Bodies, as identified by Rynne, Hinchliffe, Hopkin, Gardner, Pilkinton, members of the GA's Assessment and Examinations Special Interest Group (2020) in an analysis of the Awarding Bodies Examiners Reports from GCSE 2019. At times these reports offer pointers on how to plan and teach the curriculum comments, for example,

'Rehearsing how to respond to statistical data, different types of graph and a range of maps at different scales is important prior to taking the exam (AQA, 2018, repeated in 2019);

'Teachers should practise using a variety of different graphs with candidates throughout the geography course' (Edexcel B, 2019).

Such comments can be unhelpful, and actually encouraging a silo approach to skills in GCSE teaching, to be 'rehearsed' and 'practised' for the exam. Rynne et al., make it clear that enquiry and making sense of geographical data, such as maps, is a key element of curriculum design, linked to the aims of GCSE as the vision for the intent of a GCSE curriculum:

"However, practising for the exam should not take the place of designing a coherent GCSE geography curriculum. The curriculum should be planned at a strategic level to enable students to know geographical material, think like a geographer, study like a geographer and apply what they have learnt. In this curriculum experience, using geographical data is embedded and progressed in each unit of work, rather than rehearsed for the exam. " (p24)

Ofsted (2023) recommended that schools "Plan procedural knowledge into their curriculum in the same way as they do substantive knowledge, so that pupils make progress in their ability to use different geographical skills. In secondary schools, this should include the use of GIS."

The next section of this guidance explores why planning for progression in procedural knowledge is important, considering the important role procedural knowledge has when designing a coherent curriculum with pupil progress at its heart. The guidance will then consider what progression in an aspect of procedural knowledge - using maps in the geography, might look like.

Why is it important to plan for progress in procedural knowledge in designing a coherent curriculum?

The GNC KS3 statement makes clear the central role geographical skills have in becoming a geographer, interconnecting contextual knowledge, understanding and skills.

"They [pupils] should develop greater competence in using geographical knowledge, approaches and concepts [such as models and theories] and geographical skills in analysing and interpreting different data sources. In this way pupils will continue to enrich their locational knowledge and spatial and environmental understanding."

The Ofsted subject report (2023) explains that:

94. In schools where procedural knowledge was selected more carefully, it was treated in a similar way to substantive knowledge in the curriculum. Leaders had considered what pupils needed to know, when best to teach it and when to return to it. They also considered when pupils would have the opportunity to practise, to become more skilled in using it.

Leszek Iwaskow (2013) in his Teaching Geography article provides a useful overview of Ofsted's view of what effective secondary geography teaching looks like :
"Inspection evidence shows that the most effective geography teaching develops breadth and depth in students' knowledge and understanding of key geographical concepts of place, space, scale, diversity, interdependence and sustainability. Frequent opportunities are provided for pupils to develop and consolidate key geographical skills of enquiry, graphicacy and geographical communication. Regular fieldwork – in a variety of locations – is integrated with classroom teaching. Good use is made of the outside environment and fieldwork to support learning with a range of multimedia resources used appropriately. Effective teaching makes frequent use of maps at a variety of scales. Good use is made of ICT and GIS to promote learning, enabling students to use data and information sources to search and investigate, select, organise, refine and present information well." (P54)

These two Ofsted, explanations of good practice, points to the frequency of opportunities in using maps with pupils, and the need to practice map skills, without explaining why this is important to developing a coherent curriculum.

Trevor Bennetts (1995) in a Teaching Geography article 'Continuity and progression' defined both of these aspects of the curriculum design process. He makes clear the significance of continuity stating that 'the idea of continuity suggests the persistence of significant features of geographical education as pupils move through the school system...With strong continuity, it is possible to design courses which enable pupils to build upon their previous experience and learning; and, thereby, help them to acquire knowledge and develop their understanding, skills and competencies in a structured way.' (p75)

These features of continuity could include aspects of content, or concepts such Place, Space, Earth Systems, and particular types of learning activities such as enquiry, which includes geographical skills such as use of Ordnance Survey maps, and GIS.

As explained, in an earlier section of this guidance, Bennetts defined the idea of progression, as focussing on how pupils' learning advances. A curriculum needs to be designed in a way which supports this progression, structuring the content and sequence of learning activities in ways that provide planned opportunities for pupils to progress.

With regard to skills Bennetts identified three types of learning in the 1995 GNC, which have also tended to be included in further iterations of the GNC since then:

- Specific techniques, for example, those associated with fieldwork, the use of maps and diagrams and lately GIS.
- Categories of cognitive activity such as describing, interpreting, analysing, explaining and communicating
- Strategies of geographical enquiry – the ways of structuring and carrying out enquiries to reach conclusions rooted in the evidence, which can be substantiated.

Bennetts pointed out that 'Although different these three types of skills, in practice, it is often necessary to use them in conjunction' p78. Bennetts believed that skills should be developed systematically over the key stage, rather than be taught in a single unit in year 7 and then largely ignored. He, explained that these types of skills have to be applied in contexts related to substantive knowledge.

Bennetts believed that these skills are actually competencies, which depend on the disciplinary knowledge of the pupils. This points to the reason why planning for progress in procedural knowledge is such an important aspect of designing a coherent curriculum. He provided an example of this interrelationship between knowledge, understanding and skills :

> "To interpret the coastal relief depicted on a 1:50 000 Ordnance Survey map it may be necessary to know something about coastal processes and coastal landforms as a well as about map convections" (p78)

In his article 'Learning of skills articulated in the curriculum', Phil Wood (2013) neatly captures the issue of the lack of planning for progress in procedural knowledge outlined in the last section, when he highlights the important role progression in skills or procedural knowledge has in designing a coherent geography curriculum

> "If we only want students to know and understand some geographical content, then skills are not central to their development, but if the main intention is to aid students in beginning to act as geographers…. then skills are an inherent element in learning the 'language' of geography. (P178)

Wood (2013) also makes the point that 'in developing the curriculum, careful thought needs to be given to the emphasis, role and relationships skills have with other elements of students' learning." P173

This point is also emphasised in the Ofsted subject review (2021). The review refers to the holistic nature of the subject, and the key role that using maps have in developing your pupils to think geographically.
"The more proficient a pupil is in using maps, the stronger their ability to relate to geographical concepts. For example, pupils are better able to interpret the spatial information and identify increasingly complex patterns, such as land use."

> "Within geographical skills, pupils learn to interpret spatial representations, particularly maps, globes and atlases, and construct their own plans and maps. Pupils also draw on these skills to support their knowledge of environmental, physical and human systems and also to gain a sense of place….Pupils need to learn how to interpret resources such as aerial photography, satellite imagery and digital mapping. As well as thinking about the technical, or procedural, knowledge that pupils need, teachers and leaders also need to ensure that pupils can apply that knowledge."

The review even went as far as suggesting that:

"Maps are, to a certain extent, the language of geography."

The review also highlights the significance of integrating the use of aerial and satellite imagery into your curriculum, maintaining that " If used effectively, it helps pupils to visualise the physical or human phenomena that is present."

It concluded that:

"A high-quality geography curriculum also includes sufficient opportunity for pupils to practise:

- decoding information from maps
- constructing (or encoding) maps
- analysing distributions and relationships
- route-finding
- interpreting the information to draw conclusions"

Ofsted (2014) 'Geography survey visits: Supplementary subject-specific guidance for inspectors on making judgements during visits to schools', provides invaluable support in thinking about what makes an ambitious curriculum. This document also provides clarity of purpose for the use of maps.

As part of the outstanding description for quality of teaching OFSTED state the following:

> "Maps, at a variety of scales, are used frequently as a matter of routine and are an intrinsic part of learning in geography. This ensures that pupils have good spatial awareness and are very secure in their ability to locate the places they are studying."

Gardner (2021) provides an example of planning for progression in using OS maps on pages 87 to 89 in Planning your coherent 11-16 geography curriculum: a design toolkit, as well as, in his Teaching Geography article, 'Maps as a matter of routine, (2015). These ideas have been further developed in this OS guidance booklet. The Ofsted outstanding statement, related to teaching, 'Maps as a matter of routine,' formed a starting point for planning for progress in map skills, in the Hachette Learning KS3 geography course, also written by David Gardner - 'Progress in Geography'. The Ofsted statement was integrated into the strategic vision flap for Progress in Geography for both the 1st and 2nd editions, as part of a curriculum intent vision statement. (see page 59)

An if/then strategic curriculum thinking activity, highlighted in Gardner (2021) p88, was used to help think through the implications of this statement for planning for progress in mapskills in Progress in Geography.

> **If...** we want students who can use maps, at a variety of scales, as a matter of routine to develop good spatial awareness and become secure in their ability to locate the places they are studying.
>
> **Then...** we need to design a curriculum that introduces a range of map skills: a curriculum that provides opportunities for applying these skills in meaningful contexts, when investigating different themes and places across the units of work that make up our long-term plan. In this way students will come to see the value of these skills in helping them understand their world.

The interpretation of maps, therefore, provides a crucial way for pupils to apply their knowledge and understanding to describe and explain different places shown on maps to demonstrate their capabilities to know, think, work and apply like a geographer.

Bennetts (1995) points out that 'A curriculum should be designed to give pupils opportunities to improve the quality of their descriptions and explanations, and to apply their understanding in increasingly sophisticated ways. Their explanations can reveal their understanding and both will reflect their knowledge and their styles of reasoning" (p78)

This, therefore, is why maps should be used as a matter of routine it goes way beyond practicing the skills. Interpreting OS maps provide opportunities to think like a geographer, where pupils can marshal and apply their knowledge and understanding of the big ideas of the subject to interpret particular physical and human landscapes shown on a map OS, to also see the inbetween spaces of interconnection.

The evidence outlined earlier, particularly the findings of the Ofsted report of 2023 regarding schools not planning for progression in procedural knowledge and map skills, seem to suggest that schools, particularly at GCSE level are intent on students knowing and understanding content. The irony is that the aims and Assessment Objectives for GCSE, shown in the table on page 34, make it clear that knowing, thinking, studying and applying like a geographer are the outcomes used to assess students in the final examinations. The use of resources such as OS maps are central to providing opportunities for students to progress their ability to interpret maps to think, and apply their knowledge and understanding of the concepts of geography, to a particular locality shown on the OS map. Teaching pupils how to read and interpret different types of OS maps is a fundamental aspect of geography teaching. Ofsted explain that skills need to be used frequently, but not only as Ofsted and Awarding bodies suggest, as practice so pupils don't forget how to do them.

Skills need to be embedded and planned for in the curriculum with a bigger purpose in mind. When skills are taught in an integrated manner, within a coherent and sequenced curriculum, it is easier to provide opportunities for repetitive practice and application of the skill in different contexts. It is vital, however, that time and opportunities are provided initially for pupils to learn the skills in the first instance. Curriculum plans should clearly indicate where the initial teaching of a specific geographical skill occurs. Further opportunities for applying and using these skills should be planned for, so pupils can not only practise these skills to achieve fluency, but also describe and explain geographical patterns, considering and applying the big ideas of the subject. Such an ongoing approach affords opportunities for pupils to hone their geographical thinking and understanding, as part of progressing their disciplinary knowledge, en-route to becoming a geographer.

This approach to planning requires consideration for each unit of work for how world contextual knowledge, and disciplinary knowledge – understanding and geographical practice/ procedural knowledge, will be introduced, progressed and interconnected, as part of a coherent and sequenced curriculum. If skills are introduced and progressed, it will ensure that students use a well-developed range of geographical skills, as a matter of routine.

Rather than viewed a list of skills to be covered teachers need a change of mindset, and think about how to develop pupil's geographical practice to work like a geographer. Careful consideration of the significance of procedural knowledge to your curriculum intent, identifying what you are trying to achieve, requires a clear understanding of the purpose of developing skills, such as the use of OS maps. Wood asks an important question

'If skills are embedded with content and concepts to aid geographical thinking, in what order should they be developed?" (p175).

The answer to this important question requires an understanding of what progression in this geographical practice looks like. This is explored in the next section of this guidance, followed by examples of how schools are planning for progress in procedural knowledge.

Fred Martin's Teaching Geography article 'From the archive : The moving landscapes of maps' (2016) reached a conclusion which highlighted the significance of maps to designing and implementing a geography curriculum.

'Perhaps the best place to end is with the article by David Gardner (2015) in which he noted the importance that Ofsted inspectors attached to using maps. The key to the article lies in its title: 'Maps as a matter of routine'. No matter what style of map, or the technology by which it is produced, it is their constant and embedded use that is essential in a geographical education.'

This conclusion is also a fitting conclusion to this section of guidance, confirming the importance of the progression of procedural knowledge as part of your curriculum intent, to create a coherent learning journey for pupils. To do this successfully it is important to have a clear idea of what progress in procedural knowledge, exemplified by OS maps, looks like.

What does progression in procedural knowledge, using maps, look like?

Wiegand (2006) explains that 'research evidence in relation to young people's thinking with maps is stronger for preschool and primary aged children than it is for secondary school students." P2 Unfortunately, little has been published for the secondary phase of education about the role of map skills in creating a coherent and sequenced curriculum with pupil progress in mind. The main focus has tended to be on the enquiry process as a whole, particularly within the GA's curriculum framework. Margaret Roberts in her book 'Geography through Enquiry' 2nd edition, includes Chapter 6 Using geographical resources: an evidence-based approach. This begins by listing the wide range of resources that can be used as part of geographical enquiry, rather than how to plan for progressing procedural knowledge. She does comment how fortunate geography teachers are in being able to utilize such a wide variety of forms, summarised in a list. This provides a useful starting point to consider the extent of resources that can be utilised in developing procedural knowledge. This guidance, however, will focus mainly on the use of maps.

Images
- Photographs
- Paintings, drawings
- Film, video clips
- Diagrams
- Cartoons
- Advertisements
- Graffiti
- Satellite images
- Google Street View

Text
- Textbook accounts
- Newspaper and magazine articles, brochures and advertisements
- Journal articles
- Fiction and non-fiction, poetry, lyrics of songs
- Social media sites

Sound
- Commentaries on film
- Music
- Natural sounds, e.g. sounds of tropical rainforests
- Voice, recorded interviews, podcasts

Numerical data
- Statistical data
- Graphs (bar, pie, line, flood hydrographs, population pyramids, climate)
- Choropleth, flow line and isoline maps

Maps
- Street maps, Google maps
- Topographical maps, e.g. OS maps
- Atlas maps (political, physical, thematic)
- Worldmapper
- Weather maps
- Maps and plans in brochures, newspapers, football programmes etc.
- GIS maps

Personal knowledge
- Memories of place
- Mental maps
- Affective maps

Objects
- Rocks
- Vegetation
- Food, everyday objects

People
- Invited into the classroom with particular expertise
- Presenting and/or being interviewed virtually

Multimedia
- Incorporating several forms of representation, e.g. text, still images, animation, film, audio

Figure 6.1: List of range of resources used in geography.

Fig 13 List of range of resources using in geography Source Roberts, M (2023) Geography through Enquiry 2nd edition Fig 6.1 p50

Maps as a communication system

Maps are a form of communication. The model of the map as a communication system, shown in Fig. 14, characterises mapping as a process of transmitting geographic information via the map from the cartographer, who encodes the information, to the end user who decodes this data. This communication is largely visual and relies on various, but precise, application of rules and guidelines. Unlike language, maps and cartography involve complex decisions about what to include on the map and how it should be included. The cartographer uses a variety of tools, such as colour, shape, symbols, lines, abbreviations and pattern, in combination with the unalterable spatial relationships of the geography being mapped. The success of this communication requires a common understanding of map language, otherwise there will be confusion and misunderstanding. As with any language the common conventions have to be learnt if the message is to make any sense. This is neatly summed up by Wiegand (2006) 'In order not to be misled by maps, learners have to understand the rules cartographers use to create them" (p21)

Decoding maps involves learning how to read a map. Gerber (1992) explained the complexity of a map as a graphic representation,

"Maps are a presentational form of communication in that they are simply a set of encoded signs made on a plane surface. The signs and the concepts that they encode, unlike spoken or written language, are displayed all at once and in no particular sequence." (P195)

Skilled map-readers may, therefore use strategies such as initial random scanning to identify features or familiar names and then focus on their area of interest or they may look for larger recognizable patterns. Beginner map-users need clear guidance on where and how to start reading the map. Students will do this best through a structured programme involving practice.

GA working group report for the first national curriculum (1989) was very clear on the significance of planning for progression for map skills.

'Maps are sophisticated and abstract documents. The child's understanding of how they work and what they convey does not emerge spontaneously but requires a carefully planned sequence of learning experiences' (p29)

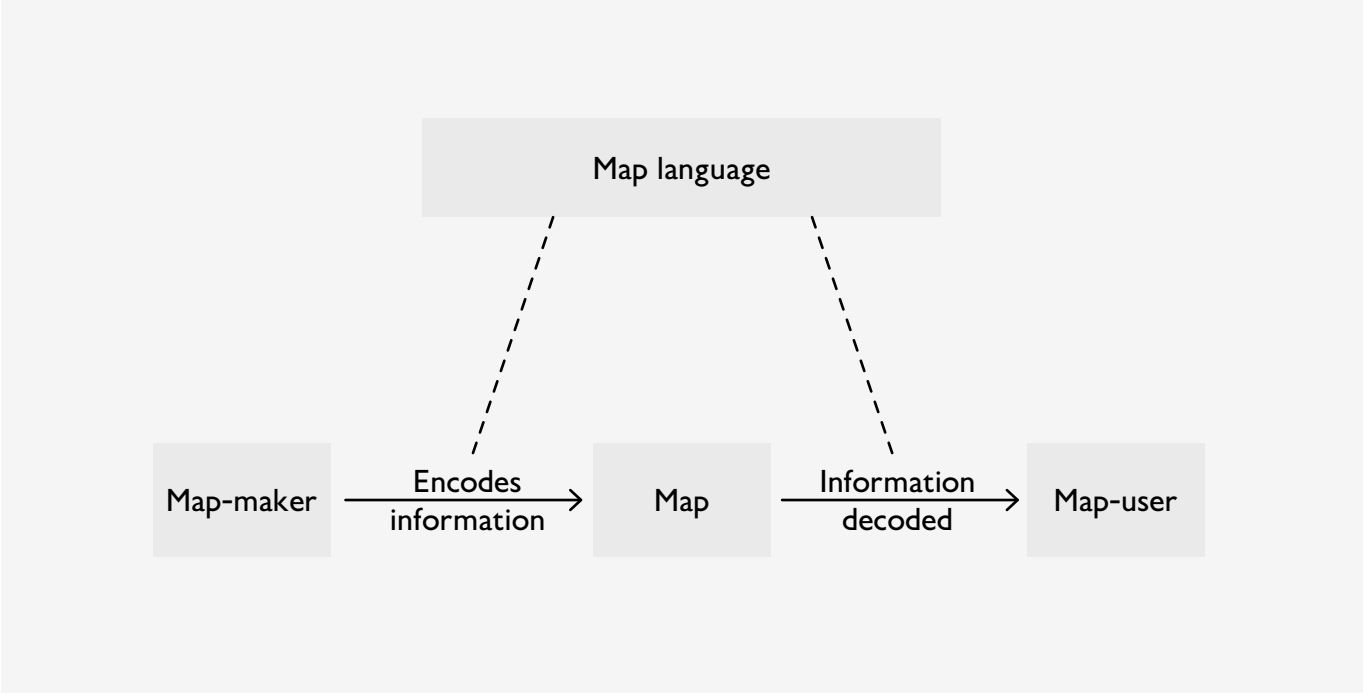
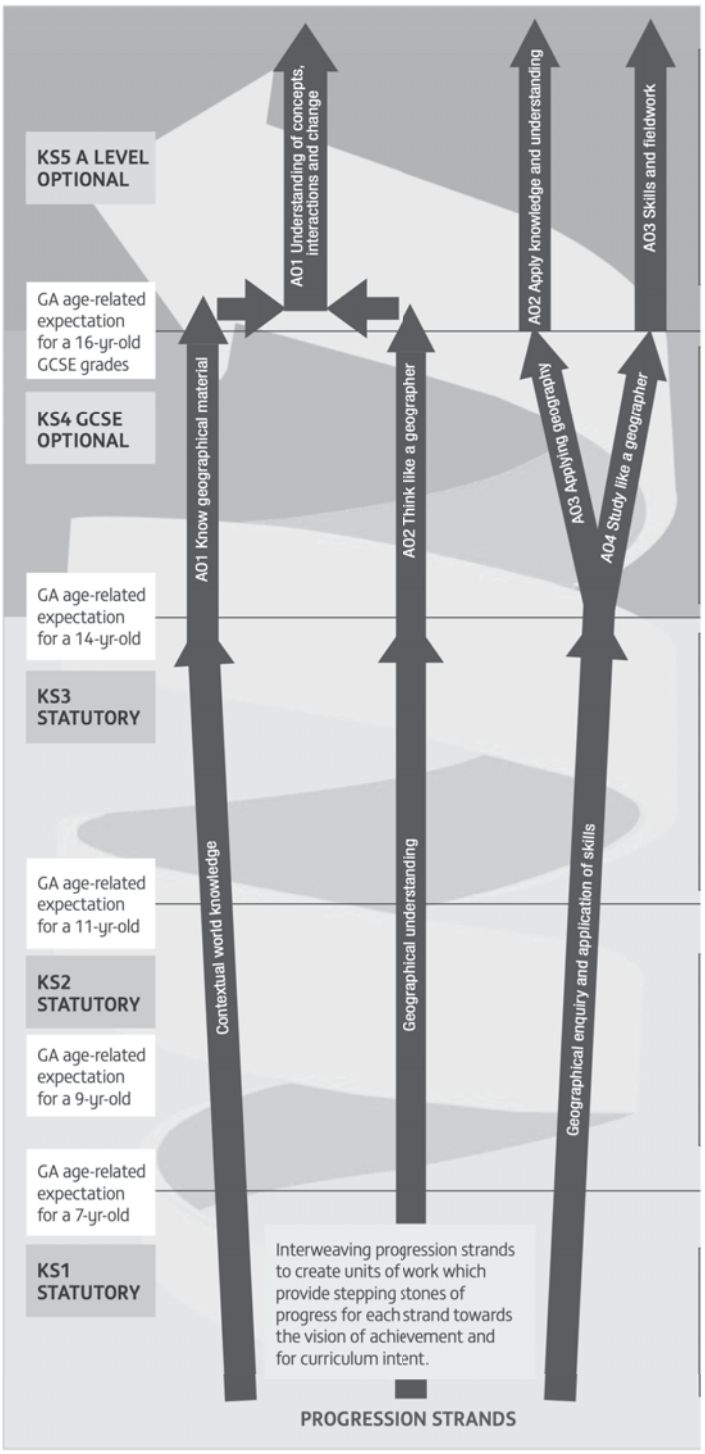


Fig 14 A simplified map communication system source Gerber and Wilson

DfE Progression in procedural knowledge/geographical skills

Progression in geographical skills is built into the Department for Education documents, for students aged 5-19. They provide an important starting point for planning for progression. This progression is shown in Fig 15



KS5 – Students should become confident and competent in selecting, using and evaluating a range of quantitative and qualitative skills and approaches, (including observing, collecting and analysing geo-located data), and applying them as an integral part of their studies.

KS4 – Students should build on their KS3 skills to develop and extend their competence in a range of skills in using maps, GIS and in researching secondary evidence, including digital sources; and develop their competence in applying sound enquiry and investigative approaches to questions and hypotheses.

KS3 – Pupils should develop greater competence in using geographical knowledge, approaches and concepts and geographical skills in analysing and interpreting different data sources. In this way pupils will continue to enrich their locational knowledge, and spatial and environmental understanding.

KS2 – Pupils should develop their use of geographical knowledge, understanding and skills to enhance their locational and place knowledge.

KS1 – Pupils should begin to use geographical skills, including first hand observation, to enhance their locational awareness.

The diagram shows the broad view of curriculum progression in geography, including statements from the various documents that demonstrate progression in geographical skills at each key stage.

KS1

KS1 even at this initial stage the GNC suggests a purpose for the development of geographical skills, the key stage statement –

"They [pupils] should understand basic subject-specific vocabulary relating to human and physical geography and begin to use geographical skills, including first-hand observation, to enhance their locational awareness."

The programme of study provides a list of opportunities to be provided by school to achieve this statement of intent. This includes an introduction to atlas maps and globes, aerial photographs, and the skill of direction, and the beginnings of locating features and places on a map.

- use world maps, atlases and globes to identify the United Kingdom and its countries, as well as the countries, continents and oceans studied at this key stage
- use simple compass directions (North, South, East and West) and locational and directional language [for example, near and far; left and right], to describe the location of features and routes on a map
- use aerial photographs and plan perspectives to recognise landmarks and basic human and physical features; devise a simple map; and use and construct basic symbols in a key
- use simple fieldwork and observational skills to study the geography of their school and its grounds and the key human and physical features of its surrounding environment

KS2

At KS2 the purpose for developing skills reiterated and strengthened in the KS2 statement

"They [pupils} should develop their use of geographical knowledge, understanding and skills to enhance their locational and place knowledge."

The programme of study progresses the opportunities for skills, use of digital maps and OS maps are introduced, with advances in using maps to locate places using 8 points of a compass, as well as 4 and 6 figure grid references. Procedural knowledge is also progressed in terms of fieldwork, where use of a range of skills are introduced including drawing sketch maps, and using plans and graphs, as well as digital resources.

- use maps, atlases, globes and digital/computer mapping to locate countries and describe features studied
- use the eight points of a compass, four and six-figure grid references, symbols and key (including the use of Ordnance Survey maps) to build their knowledge of the United Kingdom and the wider world
- use fieldwork to observe, measure, record and present the human and physical features in the local area using a range of methods, including sketch maps, plans and graphs, and digital technologies.

KS3

At KS3 the GNC progresses the idea of coherence in the curriculum and how knowledge, understanding and skills should work together, to enhance geographical understanding. Clear intention is provided for the map skills developed in the primary phase, to be practiced and progressed in KS3. This progression is evident in terms of a requirement to use maps and other forms of data introduced in KS1 and 2 , including GIS to interpret places and locations.
They should develop greater competence in using geographical knowledge, approaches and concepts [such as models and theories] and geographical skills in analysing and interpreting different data sources. In this way pupils will continue to enrich their locational knowledge and spatial and environmental understanding.

The list of opportunities in the programme of study for KS3 confirm this, progression.

- build on their knowledge of globes, maps and atlases and apply and develop this knowledge routinely in the classroom and in the field
- interpret Ordnance Survey maps in the classroom and the field, including using grid references and scale, topographical and other thematic mapping, and aerial and satellite photographs
- use Geographical Information Systems (GIS) to view, analyse and interpret places and data
- use fieldwork in contrasting locations to collect, analyse and draw conclusions from geographical data, using multiple sources of increasingly complex information.

GCSE

The GCSE subject content Identifies areas for progression from ks3 including

- an increased involvement of students in planning and undertaking independent enquiry in which skills and knowledge are applied to investigate geographical questions
- enhancing competence in a range of intellectual and communication skills, including the formulation of arguments, that include elements of synthesis and evaluation of material
- A wide range of skills should be used throughout their study of the specifications as a whole, including:

Maps
10. The use of a range of maps, atlases, Ordnance Survey maps, satellite imagery and other graphic and digital material, including the use of Geographical Information Systems (GIS), to obtain, illustrate, analyse and evaluate geographical information. To include making maps and sketches to present and interpret geographical information.

Use of data
12. 'Data' should include both qualitative and quantitative data and data from both primary and secondary sources: fieldwork data; GIS material; written and digital sources; visual and graphical sources; and numerical and statistical information. Using data should include its collection, interpretation and analysis, including the application of appropriate quantitative and statistical techniques (a list of required skills and techniques is given in the Appendix); it also includes the effective presentation, communication and evaluation of material.

Formulating enquiry and argument
13. The ability to identify questions and sequences of enquiry to write descriptively, analytically and critically, to communicate their ideas effectively, to develop an extended written argument, and to draw well-evidenced and informed conclusions about geographical questions and issues.

A Level

The A Level subject content makes clear how students should progress their procedural knowledge or geographical practice at this level:

- become confident and competent in selecting, using and evaluating a range of quantitative and qualitative skills and approaches, (including observing, collecting and analysing geo-located data) and applying them as an integral part of their studies
- understand the fundamental role of fieldwork as a tool to understand and generate new knowledge about the real world, and become skilled at planning, undertaking and evaluating fieldwork in appropriate situations
- apply geographical knowledge, understanding, skills and approaches in a rigorous way to a range of geographical questions and issues, including those identified in fieldwork, recognising both the contributions and limitations of geography
- develop as critical and reflective learners, able to articulate opinions, suggest relevant new ideas and provide evidenced argument in a range of situations

Interestingly the subject content makes clear that geographical skills should be integrated across the A level curriculum rather than presented to students as a separate theme of content.

"Competence in using geographical skills should be developed during study of core content and non-core content, not as a separate theme or topic." (P12)

These DfE documents from KS1 to KS5 identify the purpose of introducing and progressing pupil competence in geographical skills. This is not just about the skill itself, but more about how pupils use the skills to apply geographical knowledge and understanding. The pupil's disciplinary knowledge can be progressed using maps to interconnect these key progression strands in ever more complex and sophisticated ways. This is at the core of designing a coherent and sequenced curriculum to support pupils on their journey to becoming a geographer. The GCSE specification provides a detailed list of content and skills, if this is used as a curriculum by schools, as suggested by Ofsted, teachers miss the opportunity for them and their pupils to realise the true purpose of introducing geographical skills.

Wiegand (2006) identifies two key aspects of progression in relation to maps, increasing the complexity of the map as a resource, and the mapping task. In terms of the map, he refers to a general consensus that large scale maps should be used by pupils before small scale ones.

He explains that large scale maps are more concrete with less need of generalisations in the form of symbols than small scale maps. Maps become more demanding to make sense of when the pupils are required to bring additional information and understanding to the map, for example, comparing an OS map with an aerial photo, or a world population density map with a world physical map, or describing and explaining geographical distribution patterns, requiring pupils to apply their geographical knowledge and understanding.

Wiegand (2006) p91 distinguishes between map reading, map analysis and map interpretation.

Map reading he believes is characterised as decoding and extracting information from the map, identifying and locating features on maps.

Map analysis involves processing the information in order, for example, to describe patterns and relationships or to measure distances between places.

Map interpretation goes beyond what is shown on the map and involves the application of previously acquired information in order to solve problems or make decisions

Boardman (1986) when explaining progression in map skills made the point that "Map skills develop continuously with constant practice. It should not be assumed that once a map skill has been learnt it will automatically be retained"

He also made the very significant statement that:

> 'Mapwork should not be treated in isolation from other aspects of geography. Clearly the skills will need to be taught separately, but as soon as the pupils have acquired them, they should be encouraged to apply them to the study of maps of landscapes' (p134-135)

Boardman went on to discuss the types of questions using OS maps that appeared in the public examinations of the time, identifying three broad categories, similar to Wiegand : Map reading, map transformation and map interpretation. These categories demonstrate key aspects of progression in using maps:

Map Reading involves Identifying and naming features shown by symbols, specified at grid references, stating the direction from one place to another, measuring the distance between two places and estimating the height of the land at a particular point. These are the early stages of a map skills progression framework for pupils. P135

Transformation involves transferring information from a map into another form, such as a cross-section or a sketch map of part of an OS map at the same or different scale. Transformation can also include using an OS map, with other sources of data including ground and aerial photographs, satellite images, historical maps of the same area. Pupils can be required to identify selected features on the OS map with the other data source, considering location and orientation, as well as identifying change, and evaluating the strength and weaknesses of each source when conducting an enquiry of a place or feature.

Map interpretation progresses pupil's capability to use OS maps to describe geographical patterns and identify landforms, and as part of the progression in map skills explain these patterns using the OS map with additional data sources. This requires an ability to apply understanding of the relationship and interconnections between human and physical geography, and the big ideas of the subject.

Weedon (1997) suggests four strands of learning through maps:

- using maps—relating features on a map directly to features in the landscape;
- making maps—encoding information in map form;
- reading maps—decoding successfully the elements of map language;
- interpreting maps—being able to relate prior geographical knowledge to the features and patterns observed on the map.

(p171)

A coherent and sequenced geography curriculum needs to be designed in a way that integrates this idea of map progression across various units of work, with maps used in lessons as a matter of routine. Progression in map skills, as mentioned earlier, requires frequent practice to ensure pupils maintain and progress their map capabilities. At the same time the curriculum needs to consider progression in world contextual knowledge and geographical understanding. Using maps as part of geographical enquiry provides a way to make interconnections between these progression strands. The curriculum plan needs to include opportunities for pupils to learn how to use and interpret different types of mapping, including OS maps, atlases and thematic mapping. This should include digital mapping and Geographical Information Systems (GIS) as these geospatial technologies are so vital to the 21st century way of life, as well as the way maps are produced and used in our modern world.

The Ofsted Research Review (2021) reinforces the significance of frequent use of maps across the curriculum.

"Integrating opportunities to develop these skills throughout the curriculum supports pupils' development of fluency and automaticity. For example, once they become familiar with the symbols used on an Ordnance Survey 1:50,000 scale map, pupils no longer need to routinely reference the key. This both speeds up their map reading and frees up working-memory space to process the information more efficiently. Of course, much mapping is now available digitally and the same principles apply. The more proficient a pupil is in using maps, the stronger their ability to relate to geographical concepts. For example, pupils are better able to interpret the spatial information and identify increasingly complex patterns, such as land use."

Pupils in primary schools may or may not have mastered the map reading skills explained in the GNC, (also see OS publication Owens, P Teaching Map Skills to inspire a sense of place and adventure Planning for pupil progress from 5-11 years).

As part of a transition phase for any new Y7 pupils in secondary school, it is important to discover the map reading capability of the new cohort. As you discovered earlier in this guidance this is not just to ensure pupils can read maps and move on, but to begin to progress these skills into a competence in map interpretation where pupils can describe and explain geographical patterns shown on maps applying their geographical understanding to think like a geographer.

Progression in using maps can be seen, therefore, in both these ideas and the DfE documents to be a transition from pupils reading maps to using maps, and associated resources, to interpret spatial patterns and apply their knowledge and understanding to explain distribution patterns. It is important to consider what progression looks like for each stage in this transition.

Map reading

Weedon (1997) identifies four essential properties of maps that students need to understand to be able to read maps:

- Plan view
- Arrangement
- Proportion
- Map language

(p170)

Plan view (perspective and relief)

The GA working group report (1989) explains that children progress from pictorial map making to gradually appreciating the limitations of a picture and the important qualities of a map.

Margaret Mackintosh in a Primary Geographer article 'The Process of Progress', (2008) illustrates a key aspect of this transition in understanding from pictorial view to the vertical view of a map.

She points out that 'Going from a pupil's familiar view of the world, the horizontal, to the perspective of most maps, the vertical, is a huge conceptual leap; too big for most young pupils to readily understand. They need to be helped to make the journey in small steps.'

The article illustrates these small support steps in understanding with Figure 16 identifying the different perspectives and resource experiences that can be provided to support pupils to read, interpret and understand on a journey to appreciating the benefits of maps. She states that 'providing graphicacy experiences using all perspectives, in a planned way, helps pupils' eventual understanding of conventionalised OS maps preventing them from saying, when they are older, 'I can't do maps'.' (P5)

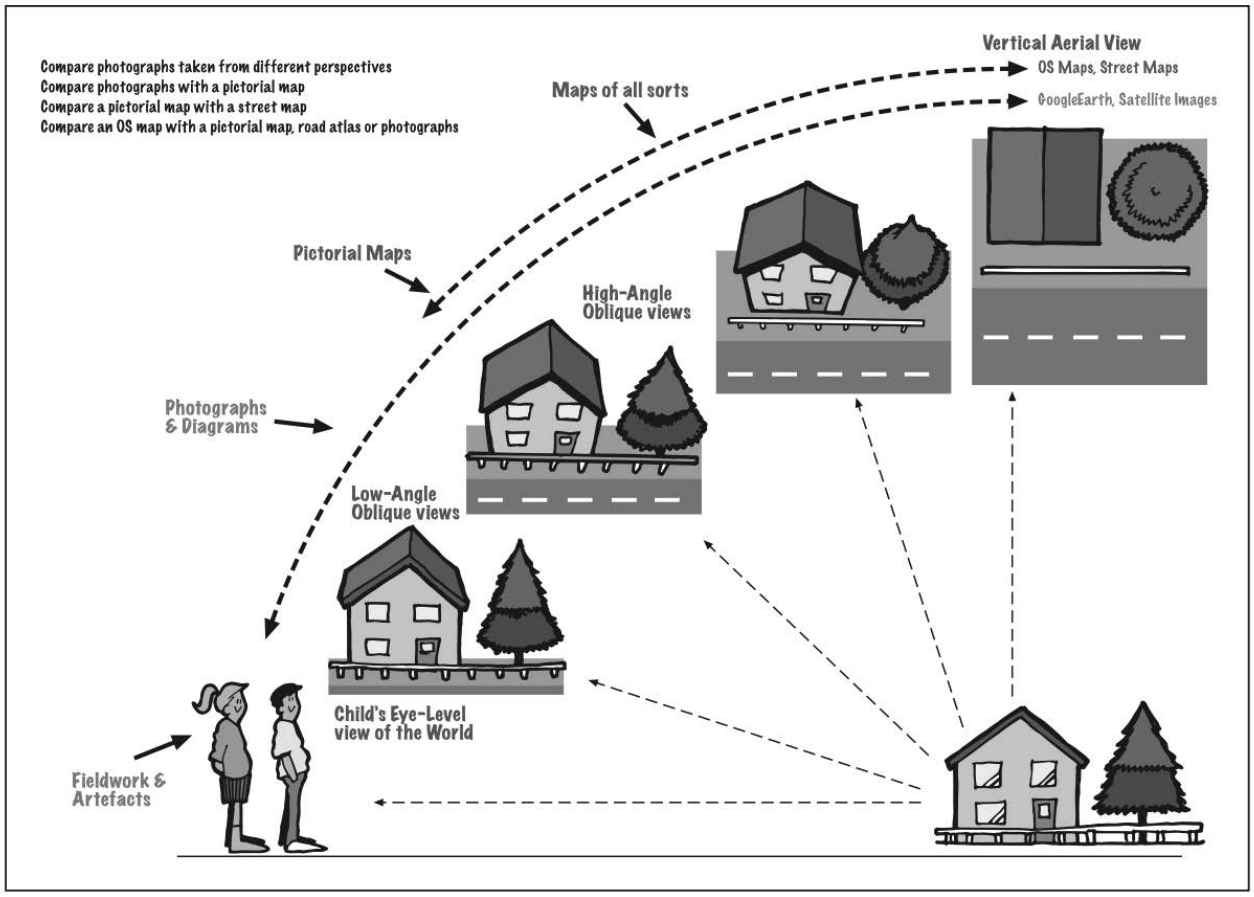


Fig 16 The range of graphicacy resources that pupils should experience provides a form of progression source Mackintosh, M (2008) The Process of Progress, Primary Geographer, p5

The representation of relief 3D on a 2D map is also an important, but difficult idea, for students to understand. The commonest form of relief representation are contours, imaginary lines connecting points of the same elevation on the surface of the land above or below a reference point, which is usually mean sea level. Maps that use contours to show height and the shape of landscapes, such as OS maps are called topographic maps. Interpreting contours and how they show landscape shapes is a common cause of confusion for students as landscapes and therefore contours often form complex patterns. Students have difficulty visualising slopes, the 2D map view, in 3D.

ESRI have developed an excellent story map that supports pupils to understand and visualise 2D contours representing a 3D landscape.
https://esriukeducation.maps.arcgis.com/apps/MapSeries/index.html?appid=81acb6053269432bbab23a130cf3c844

It shows contours in 2D transformed to 3D, as well as providing a cross-section drawing tool, and a video clip from the OS explaining contour lines.

Arrangement (location, direction and orientation)

Grid references provide a system, which allows the user to locate features and places or features on maps, as well as describe in relation to other places, using compass directions. An important map skill is orientating the map to match the location and direction of view of the map user, either whilst conducting fieldwork, or using a map in conjunction with a ground or aerial photograph. It is important to emphasis to students that the direction from one place to another is always the direction from which they are standing, or where the photograph was taken, towards where they or the photo are looking.

Proportion (scale, distance and selection)

Maps are drawn to scale, reducing the size of objects on the ground so that the object can be represented on a small piece of paper. It is usually important that relative size is maintained, but in some cases important features are drawn larger than their true scale, for example, roads on Ordnance Survey maps. Distance can be measured on the map using a linear scale, but involves numerical manipulation and often requires a series of difficult procedures. The reduction in size means some detail will be lost, involving the map-maker in selection of items to be included. Thus, while aerial photographs record everything seen at a particular time, maps are generalizations which, in improving clarity, can result in bias and omission. Scale is therefore another area of difficulty for many map-readers. It is important that pupils are provided with opportunities to use OS maps at different scales from 1:2500 to 1:250 000, to see how the data provided on the map changes, and how the smaller scale maps become more generalised, with the need for increasing generalisations and use of symbols. This is very easy to do with a GiS, such as the OS Digimap for Schools, where pupils can easily zoom through the scales for a particular area.

Map language (signs, symbols, words and numbers)

Maps show information by the use of signs and symbols, and extra information is available through the use of words, letters and numbers which help decoding and interpretation. Skilled map-users learn not just to read the symbols but also to interpret the spatial patterns by drawing on their geographical knowledge.

When learning map language, it is helpful to recognize that map symbols and information can be classified into three types—points, lines or areas. The symbols used can be classified on a continuum from pictorial to abstract with the more abstract symbols generally being more liable to misinterpretation. Boardman (1986) makes a significant point that "It is important to recognise that, when pupils are examining symbols, they are performing two distinct tasks. Firstly, they have to perceive the symbol on the map, and secondly they have to understand the concept for which it stands." P127 It is useful to share photos of what particular symbols look like on the ground to help with this, for example, photos of railway or road cuttings and embankments to compare with the symbols.

The OS map legend can be downloaded from the Ordnance Survey website, and printed for use by pupils. https://www.ordnancesurvey.co.uk/documents/product-support/support/50k-raster-legend.pdf

The OS provide an excellent online resource, OS symbol flashcards. https://www.ordnancesurvey.co.uk/documents/resources/25k-map-symbol-flashcards.pdf

These can be downloaded and printed for use in the classroom, to compare with photos of what symbols look like on the ground or for sorting into the different categories of symbols, lines, colours etc. They could also be grouped into physical and human geography features. Pupils could also discuss how the need for providing some symbols could change in the future, for example 1: 25 000 and 1:50 000 locate on maps public phone boxes, but how useful is this in the age of the mobile phone? Might the OS ultimately stop showing this symbol, particularly as the use of phone boxes has changed in some places to a village book exchange or defibrillator.

The Ordnance Survey website includes an education section which provides a range of useful resources to support the progress of pupil's map reading skills: https://www.ordnancesurvey.co.uk/education

Secondary school teaching resources section https://www.ordnancesurvey.co.uk/education/teacher-resources/secondary

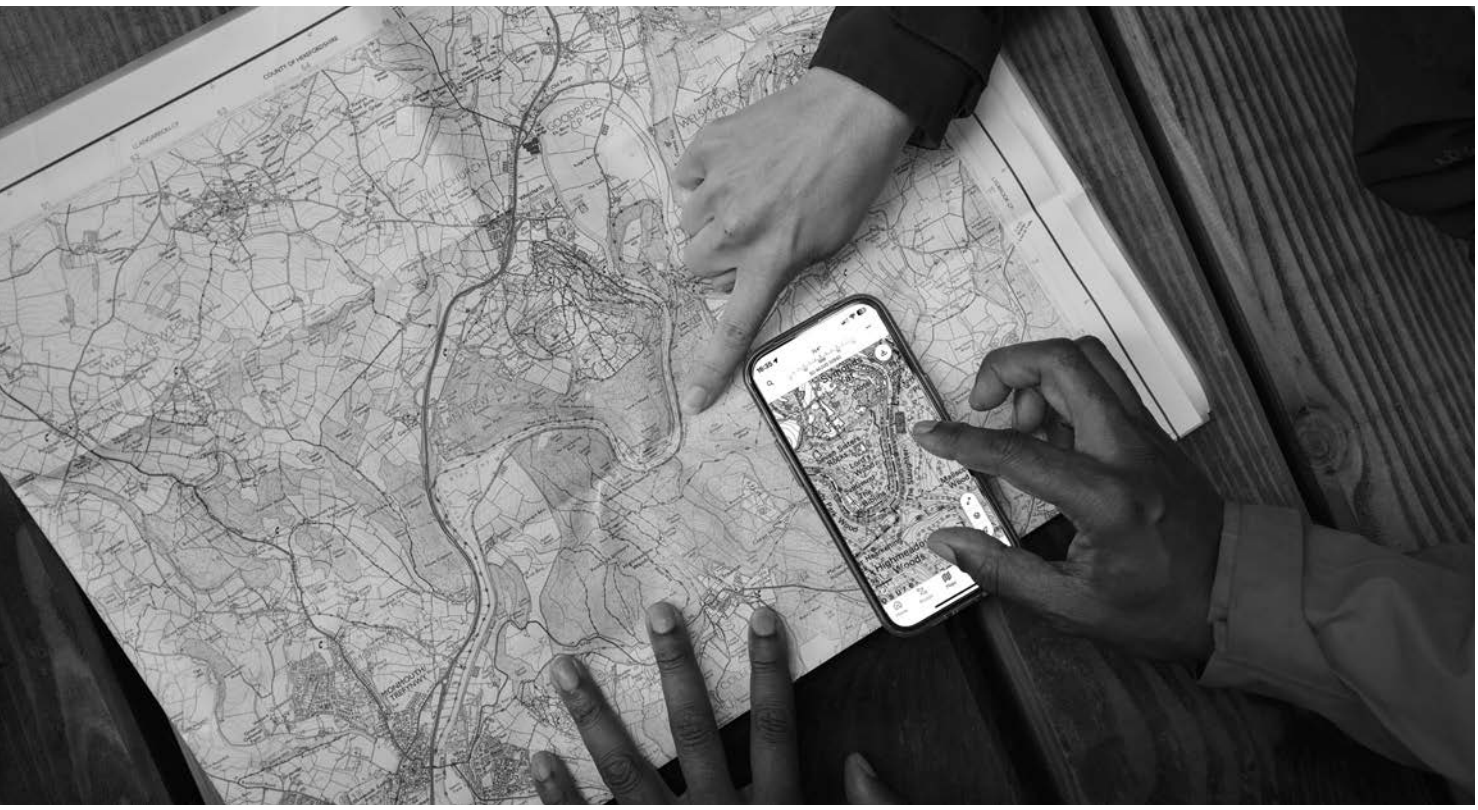
Mapzone https://www.ordnancesurvey.co.uk/mapzone/

GIS zone https://www.ordnancesurvey.co.uk/mapzone/gis-zone

A role for fieldwork

The most effective way of supporting pupils to understand these essential properties of maps, in order to read maps is through fieldwork. Pupils will best appreciate all these properties by standing on the ground shown on the map, at the same time developing a clear sense of place and space from the interaction of these two perspectives. Progressing pupil's capability to see the map from the ground through fieldwork is an important stepping stone to support pupils to apply this capability to unfamiliar localities.

Medley & Snead (2004) list foundation skills students need in order to be confident in using OS maps. They explain that "without these, students may find it difficult to grasp the higher skills needed to fully appreciate maps....when your students, understand and can use [these foundation skills] they can move onto map interpretation and problem solving exercises, and to do this they will need to have developed other geographical knowledge."



Range of resources and transformation

Using different types of maps

Wiegand (2006) believes that students should be introduced to a wider range of types of map at KS3.p119. Many of these types of maps can be introduced aligned with appropriate topics within the sequenced curriculum plan for progression. Different types of maps are associated with different topics or substantive knowledge, for example, weather charts and climate maps. The table below lists these different maps, that can progress map skills at the same time as knowledge and understanding in units of work for topics such as weather and climate, population, development. Place based units of work can begin with atlas maps of the country, region or continent to be investigated demonstrating to pupils the importance of maps when investigating places.

Fig 17 Types of maps

OS maps at different scales	Topographical maps for different countries	Atlas maps – world and regional political, physical, biomes	Historical maps
Weather charts, using the synoptic code	Climate maps	Maps using different projections	Population density maps
Route maps	Choropleth maps	Tourist maps	Road maps
Geology maps	Cartograms, topologically transformed maps	Flowline maps	Newspaper maps
Sketch maps	Proportional circle maps	GIS	GPS, google maps

A significant aspect of progressing pupil's capability beyond map reading is using other resources in association with an OS map. By comparing an OS map with other resources of the same area, pupil's ability to analyse the map, identify and understand geographical patterns can be enhanced. Fig. 17 lists examples of the types of resources that can be used in conjunction with an OS map.

Fig 18 Examples of resources that can be used with an OS map

Compare OS maps of different scales	Historical maps	Geology map	Statistical maps	Vertical aerial photos
Ground level photos	Satellite images	Cross-sections	A real place investigated through fieldwork	fieldsketch
	Sketch maps	Theoretical models	Views of different people about an area	

Another key aspect of progressing map reading is transferring information from a map into another form, such as a cross-section or a sketch map of part of an OS map at the same or different scale. Drawing a cross-section involves transferring contour data from an OS map. A cross-section is simply a graph which uses the contour lines as data to give a different representation of height, showing slopes. This helps students with a difficult in visualising slopes, the 2D map view, in 3D.

Map Interpretation

An important outcome of a coherent and sequenced geography curriculum 11-16, that has planned for progress in procedural knowledge is that students benefit from frequent opportunities to interpret a wide range of maps, including GIS. As a result, they are able, as a matter of routine to describe and explain human and physical features of a location, as well as reach conclusions, make decisions and problem solve.

Medley & Snead (2004) explain

"If your students are to gain the maximum benefit from their geographical education, you need to teach mapping skills at the start of year 7 and constantly reinforce them through to the end of year 11. OS and other maps should be used to illustrate case studies and can demonstrate to students how maps can aid their understanding of the environment, the local area, the region, and so on." P124

To successfully design a curriculum that considers progress in procedural knowledge in using maps, it is necessary to visualise what capabilities students will have developed.

These include:

- make connections between map evidence of physical and human geography
- compare and contrast mapping data
- identify and locate geographical features using grid references
- apply prior knowledge and understanding related to geographical concepts to achieve this
- describe and explain increasingly complex distribution patterns on the map, locating evidence on the map using grid references and give reasons for their findings
- use map evidence and applied knowledge and understanding to conclude how landscapes on maps are formed
- use map evidence to make decisions, and problem solve
- visualise an area from the mapped information, skilled map-users have learnt to 'see' the landscape from the information on the map.
- build up a sense of a place from the map.

Weedon (1997) provided three case studies to illustrate the thinking strategies children use while working with maps. An interpreting patterns case study demonstrate the abilities listed above.

> "David (year 11, age 16), when asked to describe and explain the patterns on a map as part of a GCSE examination question, starts by analysing the question. He decides the key word is redevelopment area, finds the symbol for this in the key, and locates the areas correctly on the map. He describes their arrangement (in a tight ring around the city centre) and draws on his knowledge of urban 'models' to recall the main features of this area. He also applies this knowledge by picturing a redevelopment area in his home town and remembers that the older buildings have been knocked down and rebuilt. He does not immediately use the scale to help him work out how far from the city centre the areas are; rather, he senses their proximity and only later confirms it. He recognizes the line around the city as a boundary of some sort and uses the key to identify it as the city boundary.
>
> David's thinking involved a complex interaction of knowledge recall and synthesizing information from the map. His familiarity with maps enabled him to recognize the pattern of the redevelopment areas and to put them into a meaningful context. He moved quickly from description into the processing of his stored geographical knowledge and was able to read and interpret the information on the map in a sophisticated manner.'

Paul Weedon summed up this case study by explaining how David's case study illustrates the difference between map reading and map interpretation.

"The symbols on the map can be read like the words in a book, but they have little meaning unless they can be combined to make 'sentences'. If the map-users have other geographical knowledge they can draw inferences and make interpretations—more akin to 'reading between the lines' in a written passage."
P174-175

Geographical Information Systems (GIS)

The earlier section of this guidance – What is procedural knowledge? (p32) highlighted the importance of ensuring GIS is integrated across the curriculum, as a significant aspect of map progression. All the DfE curriculum documents, highlighted at the beginning of this section include mention of GIS.

Healy and Walshe (2019) make a strong case for GIS "The place and value of GIS in geography education is fully acknowledged with a growing consensus that it can be successfully used in 'promoting spatial literacy; supplementing fieldwork and in enhancing pupils' visualisations of geographical phenomena in increasingly interactive digital environments often through geographical enquiry" p52.

GIS is also highlighted in the GA's Curriculum Framework.

Danny Dorling (2012) in a Teaching Geography article 'Mapping change and changing mapping' concluded "On our screens, on our phones, in our textbooks and magazines, our images of the world are changing faster than the world is itself. This is because we are rapidly evolving to think, collectively, differently, to visualize better, and to accept conformity less meekly."

However, the Ofsted geography subject report Getting your bearings (2023) highlighted general weaknesses in secondary schools in using GIS

"95. GIS continued to be an area of the national curriculum that was rarely being taught in schools. When asked why GIS was not being used more widely, leaders tended to point to time constraints, a lack of access to computers and/or a lack of training. Another reason was the perceived complexity of GIS software. Where GIS software was used well, leaders focused on simple methods for pupils to plot data on a map and use different layers of data to reach conclusions about the spatial distribution of different phenomena."

The report recommended that secondary schools should include the use of GIS.

The GA ICT Special Interest Group, responded to this report in a GA blog (2024) 'How mapping and the use of GIS enrich thought and action' https://ga-blog.org/2024/01/24/how-mapping-and-the-use-of-gis-enrich-geographical-thought-and-action/

The group believe that initial development in the use of GIS in schools focussed too much on procedural aspects, with insufficient consideration of a holistic pedagogy. GIS seems to be developed in a detached manner, approach by schools as content to be covered. The group welcome increased calls from classroom teachers to 'find ways to make GIS part of the furniture' https://geography.org.uk/ICT-Special-Interest-Group

This is a point made by Harry West (2021) in his Teaching Geography article 'Taking the first steps towards bringing GIS into the classroom' One of the very important points he makes is "the answer to the question as to how to 'teach GIS' as well as subject content is simply – don't. You do not need to 'teach GIS' as it is not, at school level, a topic in its own right (unlike in geography undergraduate study)." P14

He believes teachers are better integrating GIS into the curriculum, using it to introduce or reinforce content; for example, using ArcGIS Online to visualise spatial features and processes as part teaching different units of work. The interactive nature of GIS and the ability to visualise spatial data is not only more engaging, for students, but also aids progress and geographical understanding. Even establishing the use of GoogleEarth 'as a matter of routine' to locate different case studies, by zooming out of a satellite view of the school, on the interactive whiteboard to the location of the lesson's case study for example Mount Etna in Sicily, is a simple way of supporting students to progress the world contextual knowledge progression strand.

It is, however, similar to using OS maps, to consider the contribution GIS makes to your curriculum intent before planning how to integrated it's use. A point clearly made by Walshe (2018) "Rather than viewing GIS as a skill to be ticked-off, we should see it as a means to develop a greater capacity for geographical thinking in students…..with this comes a responsibility to ensure that GIS earns its place within the classroom for geographical learning rather than for its own sake." P48

In a Raising Issue article in Teaching Geography Alan Parkinson (2021), evaluated traditional map skills in a digital age. A question worth asking, he states, is **why**, as GPS and GIS exist, do teachers feel that students need to learn skills such as four and six figure grid references? In the end if becomes clear that Parkinson is not suggesting that we should no longer teach students how to use an OS map, he gives good justifications for doing so.

It is not an, either or part of the progression in developing map skills. Both paper maps and geo-technologies have strengths and weaknesses. GIS allows the user to view layers of data which can be turned on and off or bleed into each other. Historical maps or satellite images can be draped over present day maps to aid interpretation of geographical patterns or change in a locality. It is possible to zoom through the scales to investigate a locality using GIS this supports pupils in understanding the concept of scale. It is easier to select, view and interpret a wide range of data layers overlaid spatially using GIS, as a means to better understand our world, by analysing spatial relationships between datasets. GoogleEarth globe interface allows the user to zoom in from a global view to a locality. It even allows the user to jump to Google Streetview. A paper OS map, on the other hand, obviously does not need a computer to use it, therefore, avoiding the issues of computer access in the geography classroom. It affords close scrutiny, and allows detailed scanning and reading rather than the less clear image on the computer screen. Topographical maps, such as, Ordnance Survey maps have the potential to allow the user to see themselves in their surroundings, to better understand the context of space they are in.

An excellent Guardian news article, ' The end of the road for the Ordnance Survey ? published 19th April, 2014, analysed the pros and cons of digital v paper maps, from the perspective of Rachel Hewitt, author of a biography of the Ordnance Survey, 'Map of a Nation' Rachel concludes the article with the following thoughts:

"These two very different forms inspire similarly different methods of engagement from their users. But both types of maps have their place, of course..... I'm grateful for these gadgets [satnavs..] when I'm driving, or running purely for speed. But they encourage passivity. They keep us in ignorance of a world beyond the immediate vicinity. They suppress diversions from the fastest route. They quash active attempts to immerse ourselves, knee-deep in the bogs and fescue grass of the British countryside."

This article could be a useful resource to consider the pros and cons of digital v paper-based maps with students.

https://www.theguardian.com/books/2014/apr/19/end-of-the-road-ordnance-survey-rachel-hewitt

When you do use geospatial technologies, it is important to build on and progress the skills that students have developed with paper maps. Alan Parkinson's article (2021) quoted the view of Bethan Davis, lecturer in geography at Royal Holloway, University of London. She feels that "students can arrive at university struggling with basic map-reading skills, including the interpretation of contours, visualising topography, and constructing cross-sections. She thinks that these have to be in place before GIS skills can be built in." p9

The skills developed using geo-technologies are an extension or progression of those developed using paper maps

Step 4 of the curriculum design process - Designing your curriculum

Examples of planning for progression in using maps

Progress in Geography KS 2nd Edition, (2024) Hachette Learning
https://www.hachettelearning.com/geography/progress-in-geography

As lead author of this series of the Hachette Learning Progress in Geography KS3 series, I have put into practice the principles of curriculum design outlined in this guidance. A curriculum intent vision flap is included with the student book, (see next page). It is provided as a flap to the book, so that it can easily be shared with pupils, in different lessons in the course, to reinforce what they are trying to achieve, on their curriculum journey to becoming a geographer. The Progress in Geography KS3 curriculum was designed using a progression framework approach to strategic planning.

I have also written a curriculum handbook for Progress in Geography, which explains the curriculum intent and implementation of the course, as well as this progression framework approach. Two free online webinars are also available on the course website, where I explain the design and structure of the course, and how it relates to the geographical thinking of the subject community and Ofsted.

Progress in Geography was originally designed in 2017. This second edition, was published in 2024. This new edition more clearly outlines the vision for progress, signposting the disciplinary elements of the course, notably the concepts and enquiry.

As the title of the course suggests, progression is at the heart of the course. The intent vision flap identifies key opportunities provided by Progress in Geography across the three progression strands for the course:

- world knowledge of locations, places and geographical features
- geographical understanding
- application of geographical skills and enquiry.

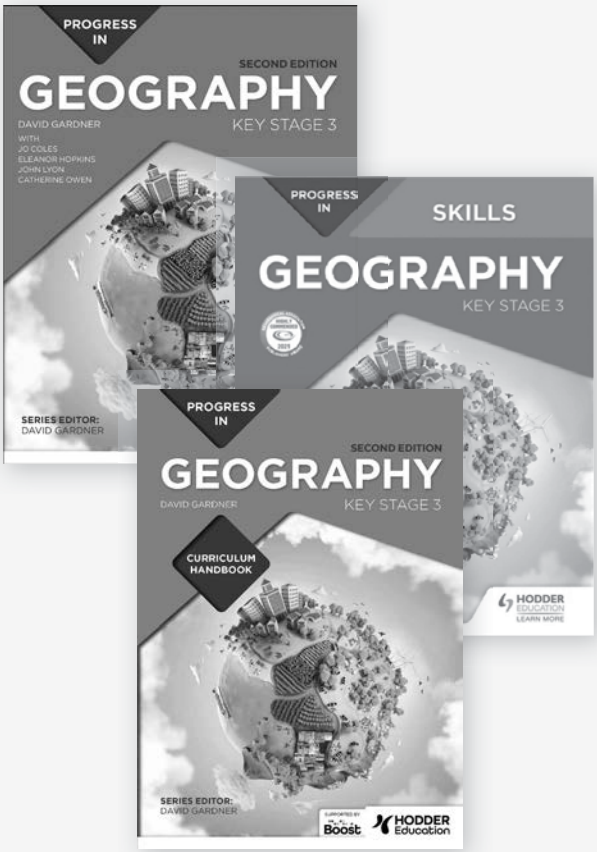


Fig 19: Progress in Geography 2nd edition, Progress in Geography skills, Progress in Geography curriculum handbook

Vision for Progress in Geography

Progress in Geography has been designed to promote curiosity about, and passion for, the world. It has been planned to support you on a learning journey to help you understand the world in the past, present and future.

Through the three interconnected areas shown on this diagram, **Progress in Geography** will enable you to successfully know, think, and work like a geographer.

Progress in Geography will give you the opportunity to:

Fig 20 Intent vision flap from Progress in Geography KS3 2nd edition

Progressing pupil's capabilities to use maps is a key element of the course. As you can see from the vision intent Fig 20, the Ofsted outstanding teacher descriptor for using maps, is incorporated into this vision. If this is the intent, then the use of maps needs to be embedded and progressed throughout Progress in Geography, for a variety of places, and at different scales. Use of a wide variety of maps is progressed from map reading to map interpretation. The course provides a wide range of opportunities through each unit for pupils to use and interpret an ever-widening range and complexity of geographical data, including OS maps, and geographical enquiry. 'Progress in Geography' has been designed to support pupils in the use of maps, to interconnect the three progression strands of this coherent and sequenced curriculum.

The Progress in Geography 2nd edition student book includes 24 Ordnance Survey maps at a variety of scales, as well as, 48 atlas maps, 15 weather charts, 3 sketch maps, and 3 GIS map, as well as a topographical map for New Zealand, 16 choropleth maps, 10 geology maps, 3 historical maps, and 6 statistical maps.

Both student books, as well as, activity sheets and student workbooks, available online in Boost, have been developed with the support of the Ordnance Survey.

Eight OS maps are provided as flaps to the book, allowing the use of larger map extracts, across different lessons. These maps are used repeatedly, and progressively through the course, for example Fig. 21 shows how the Southampton extract is used through the book.

Lesson	Use of Southampton 1:50 000 OS map
1.8 How can we use aerial photos with OS maps?	Locating places on vertical aerial photo and OS map providing grid references; draw a sketch map
1.9 How can we use a model to investigate settlement patterns ?	Identify five settlements on the map, use map evidence to provide the grid reference for each, and compare each with a settlement hierarchy model to determine the size of each settlement.
3.5 How does the UK trade with other countries?	Compare aerial photo of port of Southampton, with OS map, locate and give grid references of port features labelled on photo; determine direction of the view; use map and photo to identify advantages of Southampton as a port.
10.6 How did urbanisation change Southampton? part 1	Compare1: 50 000 OS map with 1890 OS map of Southampton to identify change.
10.9 How did urbanisation change Southampton? part 2	Compare 1 : 50 000, OS map with 1: 10 000 OS map extracts to identify land use patterns
11.1 What happens where the land meets the sea?	Compare1: 50 000 OS map with aerial photos to identify features and land uses
18.6 What are the consequences of climate change for the UK ?	Compare1: 50 000 OS map with online Environment Agency flood risk GiS map give grid references of areas at risk of flooding

Fig 21 Using the OS map flap for Southampton to progress pupils' procedural knowledge

A similar approach was taken with '**Progress in Geography Skills Key Stage 3**' Four OS maps are provide as flaps, to be used across different lessons:

1: 25 000 Nant Ffrancon; 1: 50 000 Liverpool; 1: 50 000 Isle of Purbeck focussed around Swanage; 1: 50 000 Cockermouth, 11 other OS maps are also provided for pupils to make sense of, and interpret in the book, as well as 11 atlas maps, 4 weather charts, 4 GIS maps, 2 tourist maps, a port plan, 3 cartograms.

Lesson	Use of Liverpool 1:50 000 OS map
1.9 How can I use atlas maps and aerial photos with OS maps	Compare the 1:50 000 OS map with a vertical aerial photo to describe the absolute location of Liverpool and identify features on the aerial photo and map with grid references.
1.11 How can I use qualitative data to investigate what Liverpool is like ?	Compare the 1:50 000 OS map with a pictorial tourist map of Liverpool, locate places using grid references. Identify the different functions of the two maps.
3.2 How can I use geographical data to determine what the port of Liverpool is like ?	Compare the 1: 50000 OS map with the official Port of Liverpool plan to locate different port facilities.

Fig 22 The Liverpool OS map extract flap Progress in Geography Skills is used across the following lessons

Fig 23 shows an extract of the 'Progress in Geography' progression framework, that shows planning for progression in procedural knowledge, including OS maps. This table also demonstrates how this grid can be used to plan substantive and disciplinary knowledge to create a coherent and sequenced curriculum to support pupil progress towards an intent vision.

Copies of the whole progression framework, as a pdf poster and in an Excel spreadsheet can be downloaded from the Hachette Learning Progress in Geography 2nd edition KS3 website.

Competence in geographical enquiry, and the application skills in observing, collecting, analysing, evaluating and communicating geographical information. **By the end of the Progress in Geography course pupils should:** Be able, with increasing independence, to choose and use a wide range of data including OS maps at different scales, to help investigate, interpret, make judgements, and decisions, to draw conclusions about geographical questions, issues and problems, expressing and thinking critically about different points of view about these. Write at length and discuss their geographical ideas, using a wide range of geographical vocabulary.		
18	What is the future for our planet?	• Consider a range of evidence of climate change to investigate controversial issues • Consider and critically reflect on different viewpoints, detecting bias • Use a wide range of geographical data in this unit and those throughout the book marked with 'cc' symbol to identify and classify the causes and consequences of climate change • Use of GIS with OS maps to identify flood risks in the UK • Debate three options for the future • Consider future personal actions as a geographer • Use a wide range of geographical terminology, from across many of the units in the curriculum

17	Are natural disasters 'natural'?	• Analyse a wide range of geographical data • Consider ideas in the book Disasters by Choice by Ilan Kelman • Conduct a series of more complex geographical enquiries, thinking critically about a range of viewpoints, decisions and events to reach conclusions about Disasters by Choice for the Haiti earthquake 2010, Hurricane Ian 2022, impact of flooding in Pakistan in 2022, heatwave in UK 2022 and the Covid-19 pandemic
16	Why is the Middle East an important world region?	• Draw and interpret climate graphs, atlas maps and photos to investigate the Middle East • Interpret statistics, graphs, population density maps, population pyramids to investigate population change • Consider different points of view and decisions that people make to change • Describe and explain the impact of plate tectonics on the Middle East • Conduct a more complex geographical enquiry: apply prior understanding of the concepts of development, population and economy to investigate UAE and Yemen, using a variety of geographical data to reach conclusions
15	How does ice change the world ?	• Compare OS maps with aerial and ground-level photos to identify glacial landforms • Use OS maps to draw cross-sections to show glacial features • Describe and explain how people use glacial landforms, using OS map • Conduct an enquiry using geographical data from OS maps, ground and aerial photos of the Helvellyn area of the Lake District
14	What are the challenges and opportunities for countries in Africa?	• Challenge a single story view of Africa, reassessing own view at the end of the unit, as part of an overarching unit enquiry • Interpret climate maps, graphs, atlas maps, use coordinates to locate places, news articles and photos to investigate Africa • Interpret statistics, graphs, population density maps, population pyramids to investigate population change and a range of online GIS visualisers, • Gapminder and Dollar Street websites to investigate Africa • Conduct a geographical enquiry about population change in Tanzania to reach a conclusion • Apply understanding of development and Sustainable Development Goals to Africa • Use a Development Compass Rose to classify and critically think about different viewpoints
13	Will we ever know enough about earthquakes and volcanoes to live safely?	• Interpret atlas maps, online GIS, eye witness accounts, scientific evidence, public information material to investigate plate tectonics • As part of a complex geographical enquiry, describe and explain geographical distribution patterns and the theory of plate tectonics • Know and use new geographical terminology associated with plate tectonics • Create a log of volcano and earthquake events
12	Diverse and dynamic: how is Asia being transformed?	• Interpret climate maps, atlas maps, historical maps, political cartoons, photos, satellite images, economic reports and news articles, statistics, graphs, population density maps and population pyramids to investigate Asia • Use a range of online GIS visualisers to investigate Asia • As part of a geographical enquiry, consider different points of view and decisions that people make to change

11	What happens where the sea meets the land?	• Compare an OS map with aerial and ground-level photos to identify coastal landforms, and coastal management strategies • Create an annotated sketch map of the Holderness coastline to develop understanding of interconnected coastal processes and their affect on the coast and people • As part of an enquiry, consider a wide range of geographical data including news articles, interpreting a local council shoreline plan and different viewpoints to justify own decisions about coastal management
10	Why do people move and what impact does it have?	• Investigate migration analysing a wide range of data including statistics, graphs, models, GiS, people's decisions to explain patterns, using new terminology • Compare OS maps of different scales and identify change, comparing an 1890 OS map with a current OS map • Use geographical data critically to challenge stereotypical views • As part of an enquiry, consider a wide range of geographical data to make a decision about migration
9	One planet, many people: how are populations changing?	• Interpret statistics, atlas maps, graphs, models, population density maps, choropleth maps, population pyramids, news articles, to investigate population • Interpret census data and interactive online census GIS, online population counters, and interactive online population pyramids • Identify and explain the world patterns of population distribution • Conduct a more complex enquiry using a wide range of geographical data, including the consideration of conflicting viewpoints and new vocabulary to reach conclusions
8	What is development?	• Interpret statistics, Dollar Street website, WWF global footprint calculator, DCR news articles and choropleth maps to investigate patterns of development at different scales • Communicate understanding of development and use new geographical terminology
7	Why are rivers important?	• Compare an OS map with an aerial photo to identify river features and how people use rivers • Use data on OS maps and GIS to draw a cross-section and long-profile of a river valley • Conduct a river fieldwork enquiry using a model to test • Describe and explain how rivers create landforms
6	Is the geography of Russia a hinderance or a benefit?	• Interpret and draw climate graphs and maps for Russia • Use atlas maps, GIS and photos to investigate Russia • Interpret and analyse a range of geographical data including different viewpoints about an issue • Describe the physical landscape of Russia • Describe and explain the population distribution of Russia • Identify how the geography of Russia is a hinderance or a benefit
5	Why do we need to understand how the Earth works?	Use annotated diagrams to explain how the Earth works • Describe and explain geographical patterns, comparing atlas maps of biomes • Interpret a climate graph for a tropical rainforest • Conduct more complex enquiries to make a decision about the future of rainforests and plastics in oceans • Use geotechnologies and new geographical terminology • Interpret the Spilhaus ocean map projection

4	What is weather and climate?	• Use the synoptic code, weather charts and satellites to analyse weather patterns • Interpret and draw climate graphs for the UK, and the world • Describe and explain weather patterns and the climate of the UK using new geographical terminology • Conduct a fieldwork enquiry to identify patterns of weather for a locality for a week
3	What is an economy, from local to global?	• Use statistical data to draw a graph to show how the UK economy has evolved • Make a decision about locating a factory and justify choices • Compare an OS map with an aerial photo to identify location factors for a car plant and a port • Introduce and use GIS and consider how it is used in economic activities
2	How can we use our planet as a natural resource?	• Compare an OS map with ground and aerial photos to analyse the location of an oil refinery and quarry • Use advice to describe geographical patterns – develop the concept of space • Use an increasing range of geographical data as part of an enquiry to make a decision
1	What is a geographer?	• Locate and describe places using latitude and longitude and grid references • Demonstrate ability to use OS maps, symbols, scale, grid references, height, and direction, with aerial photos to identify types of geographical data, the stages of the enquiry process, using guidance to write like a geographer, how geographers use models • Conduct fieldwork
By the age of 11 pupils should: Be able to carry out investigations using a range of geographical questions, skills and sources of information, including a variety of maps, graphs and images. Pupils can express and explain their opinions and recognise why others have a different point of view.		

Fig 23 Extract of the Progress in Geography KS3 2nd edition progression framework for geographical skills

Westminster City School, London plan for progress in OS map skills

Katherine Baulcomb, Senior Lead Practitioner for Teaching and Learning, Westminster City School and member of the GA's Assessment and Examinations Special Interest Group.

Rationale for including OS maps in our curriculum intent and progression framework:

Katherine Baulcomb, a geography teacher at Westminster City School, London, has been working with the geography department team to redevelop their KS3 and KS4 curriculum to make it more coherent and sequenced to support student progress, a significant aspect of this work is to plan for progress in the use of Ordnance Survey map, as she explains:

Our Geography curriculum has been purposely designed so that maps - and OS maps more specifically – form a central pillar of our progression framework and are a core vehicle through which we aim to deliver on achieving our curriculum intent.

In our introductory unit of KS3, pupils are introduced to OS maps as one of the fundamental tools of a geographer; they learn how to use them to interpret UK landscapes, developing the basic skills needed to identify human and physical features using symbols, contour lines and grid references.

We then aim to integrate OS maps consistently and routinely throughout the rest of KS3-KS4 in order to give pupils repeated opportunities to re-visit and build on these skills in other units. For example, pupils in Year 8 infer how the characteristics of a river basin change from source to estuary using OS maps, which allows them to apply and deepen their existing understanding of OS maps in a new and unfamiliar context. (see Fig.22 p64)

In deliberately weaving OS maps throughout our curriculum with increasing levels of complexity, we therefore aim to create young geographers who can interpret spaces and places with independence to gain a deep understanding of the geographical processes that shape the world around them.

This ambition is reflected in the intent vision for geography at the school. (Fig 23)

Our vision for Geography at Westminster City School

At WCS, our intent when teaching geography is to inspire in our learners a curiosity and fascination about the world and the people within in, leading to a life-long passion for learning about the spaces and places that exist in our diverse and dynamic planet.

Through our teaching of geography, we aim to foster 'bigger' thinking about the interconnectedness of people, places and economies and seek opportunities for our learners to experience a sense of awe and wonder about the worlds' diverse environments. We also strive to develop their awareness and understanding of places beyond their own doorstep, through routinely using real-world geographical data and maps as the lens through which they are able to explore the complex nature of spaces and places and develop a deep understanding of the physical and human processes that shape them.

We seek to nurture pupils; understanding of the challenges we face when deciding how to manage our planet's precious and finite resources, aiming to inspire in our learners a sense of duty and responsibility to the environment as custodians of our planet who care about the future of the world and champion social, economic and environmental sustainability. We strive to empower our pupils to become active global citizens who understand the importance of working together to solve problems on a variety of scales - from local issues to the global - and as geographers who can communicate their ideas and opinions with clarity and confidence.

Wisdom, Integrity, Compassion, Excellence

WESTMINSTER CITY SCHOOL

How does our vision for geography link to the WCS values?

Wisdom (Knowledge and understanding of the world)	Through our teaching of geography, we aim to foster **'bigger' thinking** about the **interconnectedness of people, places and economies** and seek opportunities for learners to experience a sense of **awe and wonder** about the world **diverse environments**. We also strive to develop their **awareness and understanding of places** beyond their own doorstep through routinely using **real-world geographical data and maps** as the lens through which they are able to explore the complex nature of spaces and places and develop a deep understanding of the **physical and human processes** that shape them.
Integrity (Sustainability and social / economic / environmental responsibility)	We seek to nurture pupils' understanding of the challenges we face when deciding how to manage our planet's precious and finite resources, aiming to inspire in our learners a sense of **duty and responsibility** to the environment as **custodians of our planet** who **champion social, economic and environmental responsibility**.
Compassion (Caring about the future of the planet)	We strive to empower our pupils to become **active global citizens** who understand the importance of working together to solve problems on a variety of scales - from local issues to the global.
Excellence (Developing the knowledge and skills to become excellent geographers)	At WCS, our intent when teaching geography is to inspire in our learners a **curiosity and fascination** about the world and the people within in, leading to a **life-long passion** for learning about the **spaces and places** that exist on our **diverse and dynamic planet**. We aim to develop geographers who can **communicate** their ideas and opinions with **clarity and confidence**.

Wisdom, Integrity, Compassion, Excellence

WESTMINSTER CITY SCHOOL

Fig 24 Vision intent statement for Westminster City School geography department

By the end of Key Stage 4, pupils should be able to:

- interpret Ordnance Survey maps in the classroom and the field, including using grid references and scale, topographical and other thematic mapping, and aerial and satellite photographs
- use and interpret OS maps at a range of scales, including 1:50 000 and 1:25 000 and other maps appropriate to the topic
- use and understand coordinates - four and six-figure grid references
- use and understand scale, distance and direction - measure straight and curved line distances using a variety of scales
- use and understand gradient, contour and spot height
- identify basic landscape features and describe their characteristics from map evidence
- identify major relief features on maps and relate cross-sectional drawings to relief features
- draw inferences about the physical and human landscape by interpretation of map evidence, including patterns of relief, drainage, settlement, communication and land-use
- interpret cross sections and transects of physical and human landscapes
- describe the physical features as they are shown on large scale maps of two of the following landscapes - coastlines, fluvial and glacial landscapes
- infer human activity from map evidence, including tourism.

Key stage	Years	Unit focus	Progress in OS map skills – pupils should be able to:
Key Stage 4	Year 10/ Year 11	3.2.3 Section C: The challenge of resource management	• Use contour lines on OS maps of the UK to make links between land relief and levels of precipitation across the UK (orographic rainfall)

Key stage	Years	Unit focus	Progress in OS map skills – pupils should be able to:
Key Stage 4	Year 10/ Year 11	3.2.3 Section C: The challenge of resource management	• Use contour lines on OS maps of the UK to make links between land relief and levels of precipitation across the UK (orographic rainfall)
Key Stage 4	Year 10/ Year 11	3.2.2 Section B: The changing economic world	• Use 1:50 000 OS maps to identify the physical and human features that attract tourists to locations within the UK and to identify evidence of tourist activity • Infer evidence of economic activity in the UK over time from OS maps (e.g. quarrying) and use this to explain how the landscape contributes to different sectors of the UK's economy • Compare social and economic changes in the rural landscape in an area of population growth and an area of population decline by identifying human and physical features of both places on OS maps • Identify improvements to the UK's infrastructure (road, rail, airports) using OS maps
Key Stage 4	Year 10/ Year 11	3.2.1 Section A: Urban issues and challenges	• Evaluate the social, economic and environmental impacts of regeneration on Stratford by comparing how the human and physical features have changed over time using past and present OS maps • Identify the human features of the rural-urban fringe of London using OS maps and describe the changes that take place along a transect • Use OS maps of South London to identify evidence of sustainability in new urban residential developments (e.g. BedZED) • Identify evidence of urbanisation by comparing OS maps of London over time • Evaluate the options for urban development in the UK (brownfield/greenfield/greenbelt sites) using evidence from OS maps and aerial photographs
Key Stage 4	Year 10/ Year 11	3.1.3 Section C: Physical landscapes in the UK	• Identify the physical and human features of the river basin of the River Tees using OS maps, including using contour lines and spot heights to describe the relief and gradient and using the scale of maps confidently • Use 4-figure and 6-figure grid references to identify and locate fluvial landforms of the River Tees independently • Draw long profiles and valley cross profiles of a river using an OS map and use this to describe and explain how and why the relief of the land changes from source to estuary • Compare the characteristics of the source and estuary of rivers using OS maps and aerial photographs and explain the reasons for these differences • Identify the physical and human features of the drainage basin of the River Valency/River Jordan that contributed to the 2004 flood event in Boscastle using OS maps • Use photographs of fluvial and coastal landforms in conjunction with OS maps to identify the direction from which the photograph was taken • Identify the physical and human features of the Swanage coastline using OS maps • Use 4-figure and 6-figure grid references to identify and locate coastal landforms and features of the Swanage coastline (Dorset) independentlyUse OS maps of the coastline to identify coastal processes (e.g. longshore drift, erosion and deposition) that have shaped the coastline • Draw annotated diagrams of coastal and fluvial landforms to scale (e.g. spits, meanders) using OS maps • Compare an OS map of Lyme Regis with aerial and ground-level photos to identify coastal management strategies in place and evaluate the success of these strategies using the map and a range of other geographical data
Key Stage 4	Year 10/ Year 11	3.1.2 Section B: The living world	• N/A – global-scale and regional focus outside of the UK
Key Stage 4	Year 10/ Year 11	3.1.1 The challenge of natural hazards	• Use OS maps to evaluate the likelihood of different areas of the UK being affected by climate change (e.g. flood risk) • Identify the physical and human factors that contributed to the 2018 'Beast from the East' and 2020 'Storm Ciara' extreme weather events using OS maps of the UK

Key stage	Years	Unit focus	Progress in OS map skills – pupils should be able to:
Key stage 3	Year 9	**18. Climate change:** How and why is our climate changing and what is the future of our planet?	• Use GIS with OS maps to identify areas of flood risk in London and in the UK • Use OS maps and a range of geographical data to inform decision-making exercise about where to locate a new wind farm
Key stage 3	Year 9	**17. Antarctica:** The frozen continent?	• N/A – this unit has a regional-scale focus outside of the UK. Equivalent regional maps of this area will be used.
Key stage 3	Year 9	**16. Dynamic and diverse:** How is Asia changing?	• N/A – this unit has a regional-scale focus outside of the UK. Equivalent regional maps of this area will be used.
Key stage 3	Year 9	**15. Tectonic hazards:** How can we live safely on our violent Earth?	• N/A – this unit has a global-scale focus
Key stage 3	Year 9	**14. The Middle East:** What is its sustainable future?	• N/A – this unit has a regional-scale focus outside of the UK. Equivalent regional maps of this area will be used.
Key stage 3	Year 9	**13. Tourism:** What is the future of Jamaica's economic development?	• Use 1:50 000 OS maps to identify evidence of tourist activity in the UK – use as a starting point to link to the unit's main focus of evidence of tourism in Jamaica • N/A – this unit has a regional-scale focus outside of the UK. Equivalent regional maps of this area will be used.
Key stage 3	Year 8	**12. Africa:** Should Ethiopia build a dam on the Nile?	• N/A – this unit has a regional-scale focus outside of the UK. Equivalent regional maps of this area will be used.
Key stage 3	Year 8	**11. International development:** What is development and how developed are different countries around the world?	• N/A – global-scale and regional focus outside of the UK
Key stage 3	Year 8	**10. Globalisation:** How are the world's economies interconnected?	• Use OS maps to identify evidence that places in the UK are connected to other more distant places • Compare an OS map with an aerial photo to identify location factors for a car plant and a port
Key stage 3	Year 8	**9. Coasts:** What happens where the land meets the sea and how does this affect people and the environment?	• Use 4-figure and 6-figure grid references to identify coastal landforms and features of the UK coastline with increasing independence (peer support) • Compare an OS map with aerial and ground-level photos to identify coastal landforms, and how people try to manage the coast
Key stage 3	Year 8	**8. One planet, many people:** How are populations changing?	• Identify areas of the UK that are likely to be sparsely or densely populated using OS map symbols to identify rural and urban locations • Identify population change in the UK, comparing 1890 OS maps with a current OS maps
Key stage 3	Year 8	**7. Rivers:** Why are rivers important and how do they affect our lives?	• Compare an OS map with an aerial photo to identify river features and how people use rivers • Compare the characteristics of the source and estuary of the River Tees using OS maps and aerial photographs • Draw a long profile for the River Tees using the contour lines on an OS map and use this to describe how the relief of a river valley changes as it flows downstream • Identify the human and physical features of a river floodplain and estuary using an OS map and use this to explain the importance of these river features to people and the economy
Key stage 3	Year 7	**6. Russia:** Is the geography of Russia a gift or a curse?	• N/A – this unit has a regional-scale focus outside of the UK. Equivalent regional maps of this area will be used.

Key stage	Years	Unit focus	Progress in OS map skills – pupils should be able to:
Key stage 3	Year 7	**5. Ecosystems:** What are the world's main biomes and how do humans interact with them?	• N/A – this unit has a global-scale focus
Key stage 3	Year 7	**4. Weather and climate:** What is happening in our atmosphere?	• Use OS maps in conjunction with synoptic code to forecast the weather for different locations across the UK and explain how this might affect people living in those locations
Key stage 3	Year 7	**3. Natural resources:** Is the Earth running out?	• Compare an OS map with an aerial photo to analyse the location of an oil refinery
Key stage 3	Year 7	**2. Living in London:** What are the geographies of my local area?	• Identify the location of London's human and physical features using 4-figure and 6-figure grid references • Describe and compare the characteristics of different areas within London using OS maps to identify their main human and physical characteristics (e.g. relief) • Use OS maps on a variety of scales when conducting fieldwork in our local area to interpret the landscape
Key stage 3	Year 7	**1. Introducing Geography:** What is geography and what key skills do geographers need?	• Identify the meaning of a range of OS map symbols on maps of different scales (e.g. 1:25 000 and 1:50 000) • Use a key to identify physical and human features of different places using OS map symbols • Use 4-figure grid refences to locate features on OS maps • Use 6-figure grid references to locate features on OS maps • Use contour lines on an OS map to identify the height of the land and describe the relief • Use contour lines on an OS map to draw a cross section of the relief along a transect • Use aerial photos in conjunction with OS maps to identify and compare geographical features

By the start of Key Stage 3, pupils should be able to:

- use the eight points of a compass, four and six-figure grid references, symbols and key (including the use of Ordnance Survey maps) to build their knowledge of the United Kingdom and the wider world

Fig 25 Extract of the progression framework for geographical skills Westminster City School Geography Department

Curriculum Implementation - How will you organise the learning?

Curriculum design process - Stage 5 Aligning curriculum, pedagogy and assessment

Ofsted (2019) in the School Inspection Handbook, explains implementation as 'the way the intended curriculum is taught and assessed'. (P41)

This is given a more focussed meaning for a geography curriculum. in the Ofsted research review (2021)

> "In high-quality geography education, teachers are clear about the rationale for the teaching approaches they adopt and why they are successful. In doing so, teachers give considerable thought to how pupils learn geographical content most effectively so that they are able to reach ambitious curriculum goals."

The Ofsted EIF (2019) identifies a number of indicators inspectors can make judgements about the implementation of the curriculum including:

- teachers have good knowledge of the subject(s) and courses they teach. Leaders provide effective support for those teaching outside their main areas of expertise
- teachers present subject matter clearly, promoting appropriate discussion about the subject matter they are teaching. They check learners' understanding systematically, identify misconceptions accurately and provide clear, direct feedback. In doing so, they respond and adapt their teaching as necessary, without unnecessarily elaborate or differentiated approaches
- The resources and materials that teachers select – in a way that does not create unnecessary workload for staff – reflect the provider's ambitious intentions for the course of study and clearly support the intent of a coherently planned curriculum, sequenced towards cumulatively sufficient knowledge and skills for future learning and employment

In Inspecting the curriculum, Ofsted also states that the:

> "EIF is built around the idea of the connectedness of curriculum, teaching, assessment and standards within the 'quality of education' judgement."

Kinder and Owens (2019), point out that particular thought needs to be given to:

- How the intent for the subject helps steer the teaching and assessment
- Why specific teaching approaches have been selected, and how they are appropriate for all students
- How specialist aspects, such as the provision of fieldwork across the curriculum, help build knowledge and skills
- The subject and specialist pedagogical knowledge of those teaching geography in the school – and what is being done to support them.

The GA Manifesto A different view (2009) is very clear about the significance of geographical enquiry in the implementation of a geography curriculum:

> "The GA believes in geographical enquiry: that is, in students as active participants and investigators, not just the passive recipients of knowledge. ... Enquiry and investigation lie at the heart of geographical thinking..." p19

Margaret Roberts, in the preface to Geography through Enquiry: Approaches to teaching and learning in the secondary school (second edition, 2023), makes clear that enquiry is key to developing an important classroom culture to ensure progress in geography:

> "enquiry-based learning is not simply a succession of activities, ... It is about the classroom culture in which learning geography takes place. ... It is about a culture in which students are encouraged to be inquisitive and ask questions ...that encourages students to examine geographical evidence critically and to think and reason for themselves rather than simply remember and report the thinking and reasoning of others. It is about an interactive culture that encourages students to discuss and debate geographical ideas and viewpoints on real-world issues and to develop their own opinions. It is about a culture in which students feel free to question what and how they are taught. If geographical education is to be powerful, then it needs to have an enduring, transformative impact on students' geographical imaginations, the ways in which they see, make sense of and understand the world. I believe that learning geography through enquiry contributes to achieving that ambition." (p5)

This pedagogical approach to teaching geography is also highlighted in the Ofsted research review (2021).

"A high-quality geography education may have the following features:

- Pupils are proficient in carrying out enquiries and decision-making exercises because they are secure in the prior knowledge they need for these.
- Carefully structured tasks give pupils sufficient instruction, guidance and support.
- The enquiry approach supports the development of pupils' disciplinary knowledge. For example, it increases their capacity to recognise and ask geographical questions, and to critique sources and reflect on what they have learned, as well as the methods used."

Margaret Roberts (2003) has shown how this approach contains four central aspects including the creation of a 'need to know' through the use of an engaging stimulus. It then develops through the collection and use of data, processing and making sense of that data and finally reflecting on learning in order to apply it to future enquiries.

This process has been captured in a single diagram, shown in Fig 26

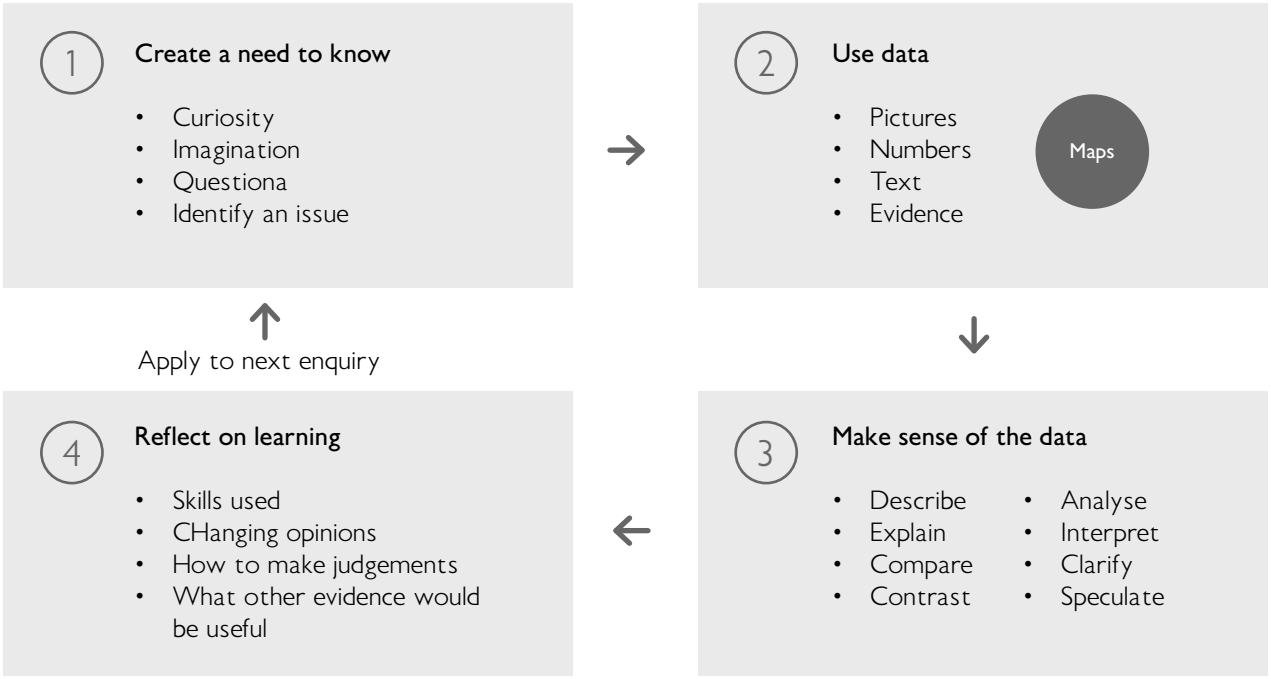


Fig 26 A framework for learning through enquiry adapted from Roberts (2003) Fig 3 p44

The GA provides online guidance about embedding geographical enquiry into your classroom https://www.geography.org.uk/Geographical-enquiry-in-the-classroom

The Ofsted geography subject report (2023) identifies good practice where geography departments have adopted enquiry as a key aspect of pedagogical approaches:

"In a minority of schools, leaders had thought carefully about how to teach geography in a distinctive way. At its best, this involved pupils being taught the processes of geographical enquiry. They were introduced to geographical questions, and presented with data (in its widest sense, including images, maps and people's testimonies as well as graphs and charts). They then used this data to reach conclusions."

The report, however, points out that some schools have misinterpreted what enquiry involves:

"... in some schools enquiry meant that pupils would find things out for themselves. This usually resulted in pupils searching on the internet for information about a place, and then copying what they had found into a table or other document. Very little was then done with what they had found, and their knowledge of geography was weaker than that of pupils in schools where a different approach was taken. ... In most schools, geographical enquiry was either ignored completely or mistaken for asking pupils to research topics themselves."

The GA's Curriculum Framework (2022) explains that the discipline of geography is shaped by its practices, encompassing working like a geographer.

Geographers find out and make sense of the world through the process of geographical enquiry. The framework explains the significance of enquiry learning "learners develop a deeper understanding of what they have found out by applying conceptual understanding, analysing context and significance, arguing a case, understanding the moral and ethical dimensions and developing their own moral values in order to make judgements" p9

Students using maps is a key component of working like a geographer. This involves students interpreting what maps show by asking questions and applying their prior knowledge and understanding of geography. Medley and Snead explain that students can use map evidence to suggest explanations for patterns of the:

- Human landscape – settlement, communications, economic activities
- Physical landscape – rivers, coasts, glaciation and the landforms they form
- Effect of human activity on the physical landscape
- Effect of the physical landscape on the human landscape

Medley and Snead (2004) provide what they call a learning skills diagram to help students question what a map shows about a landscape, place or area. This useful diagram is designed to help students use an analytical approach to interpreting OS maps to make decisions and justify them.

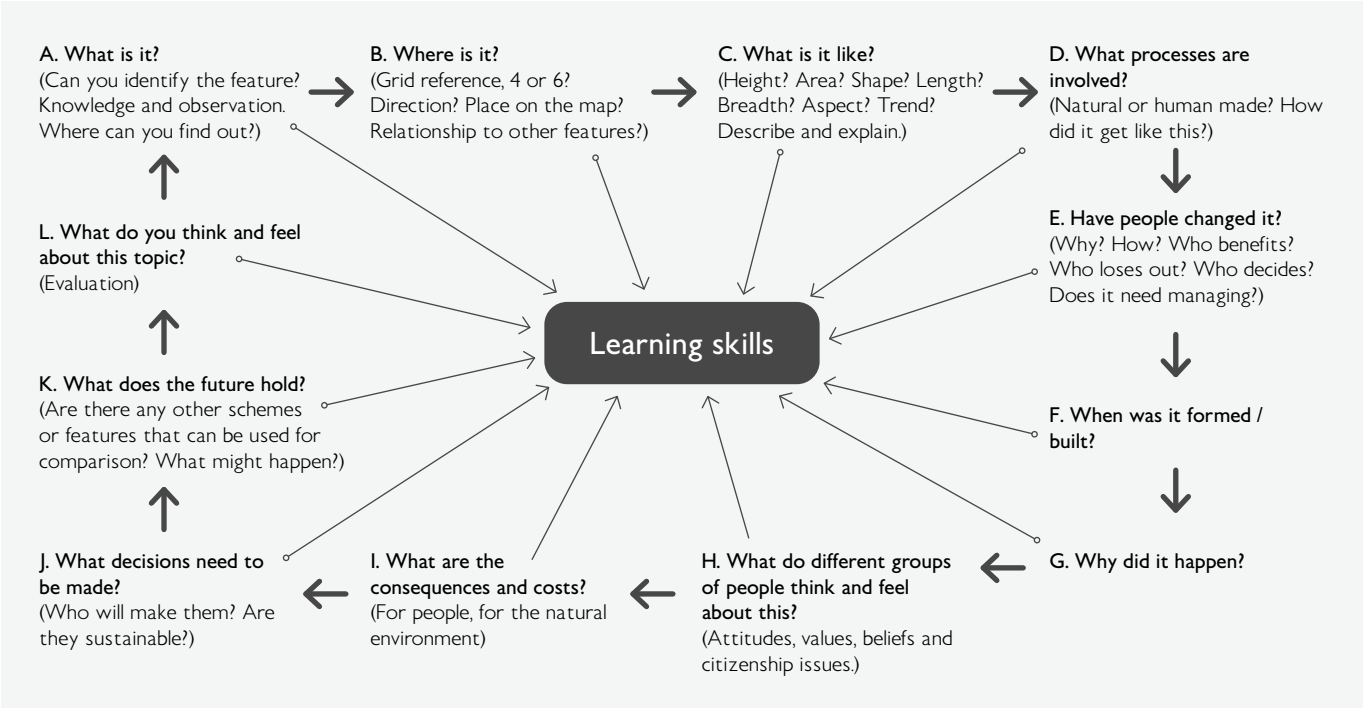


Fig 27 Medley and Snead (2004) 'Using Ordnance Survey maps' Teaching Geography p 125

Creating a need to know using OS maps

The class teacher could introduce OS maps at different scales as a 'matter of routine' to demonstrate how places are different. For example, in one lesson a mountainous area of the Lake District could be presented on the interactive whiteboard from Digimap for Schools. Pupils use the interactive whiteboard to label clues from the map about the area, for example contour lines close together showing steep slopes, roads following the valley floor etc.

At the beginning of the next lesson a flat lowland area in the Fens, for example, could be projected. This is clearly a very different landscape to be interpreted by pupils, helping them to realise how places are different and how OS maps show this.

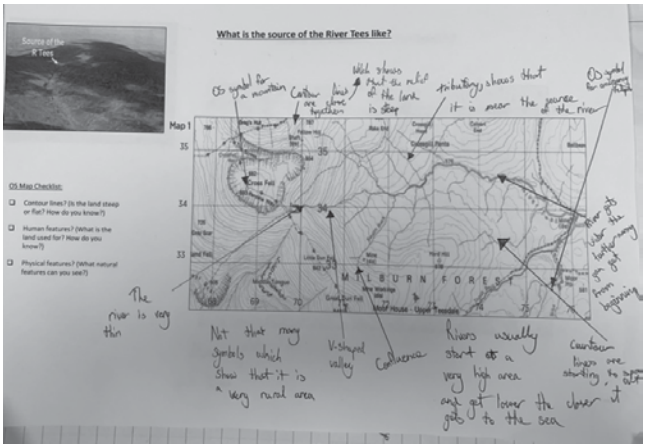
The mystery map activity, developed by Alan Parkinson, available on Digimap for Schools, could also be used as a starter for lessons. https://digimapforschools.edina.ac.uk/files/resource-hub/downloads/MysteryMaps%20.pdf

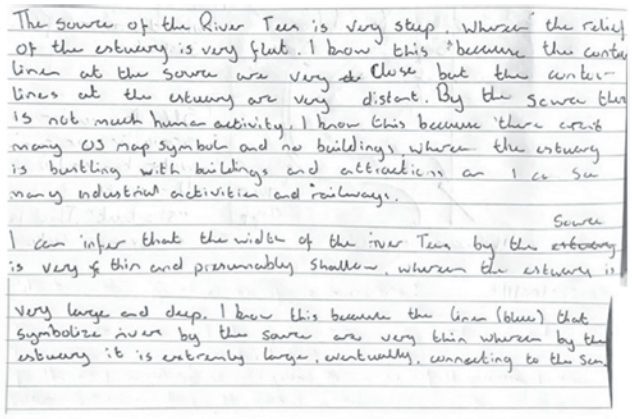
Such activities spark pupils' natural curiosity about places and maps, and if used frequently student's map interpretation skills will be progressed.

Teachers should also consider the classroom environment. Maps are a fundamental aspect of the subject, which should be highlighted, even celebrated in the geography classroom with displays of maps at a variety of scales. These maps should not take on the role of wallpaper, however, pupils should engage in activities which make them use these maps as 'a matter of routine'.

Making sense of OS maps as data

In a Y8 unit of work on rivers 'Why are rivers important and how do they affect our lives?' at Westminster City School students make sense of an OS map of the River Tees valley by annotating evidence on a copy of the map, which as Katherine Baulcomb, a geography teacher at the school explains "exploring how the characteristics of a river basin change from source to estuary using OS maps, allows students to apply and deepen their existing understanding of OS maps in a new and unfamiliar context." As Fig 23 demonstrates this is an aspect of a progression strand planned strategically by the department, to support students across a coherent 11-16 geography curriculum, to make progress towards the vision for a capability in map skills summarized at the top of the progression framework shown in fig 28.





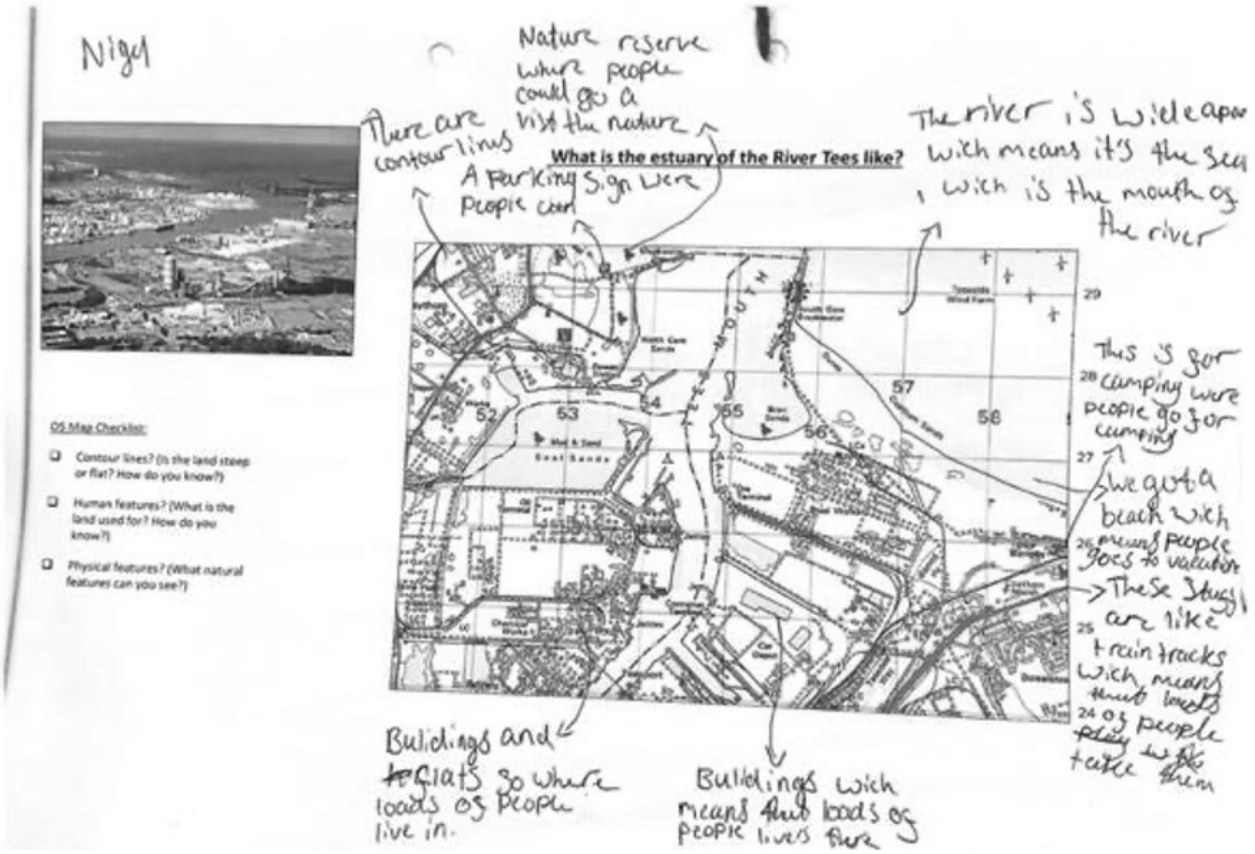


Fig 28 Y8 student map skills work, Westminster City School

Examples of implementing the curriculum using maps

Salendine Nook High School Academy

Procedural Knowledge: Rachel Kay, HoD and member of the GA's Secondary Phase Committee

Rachel wrote a very helpful article in Teaching Geography 'The deep dive geography experience : intent, implementation and impact' (2021), where she describes her department's experience of inspection under Ofsted's EIF with a focus on the quality of education.

She provides an overview of the department's vision:

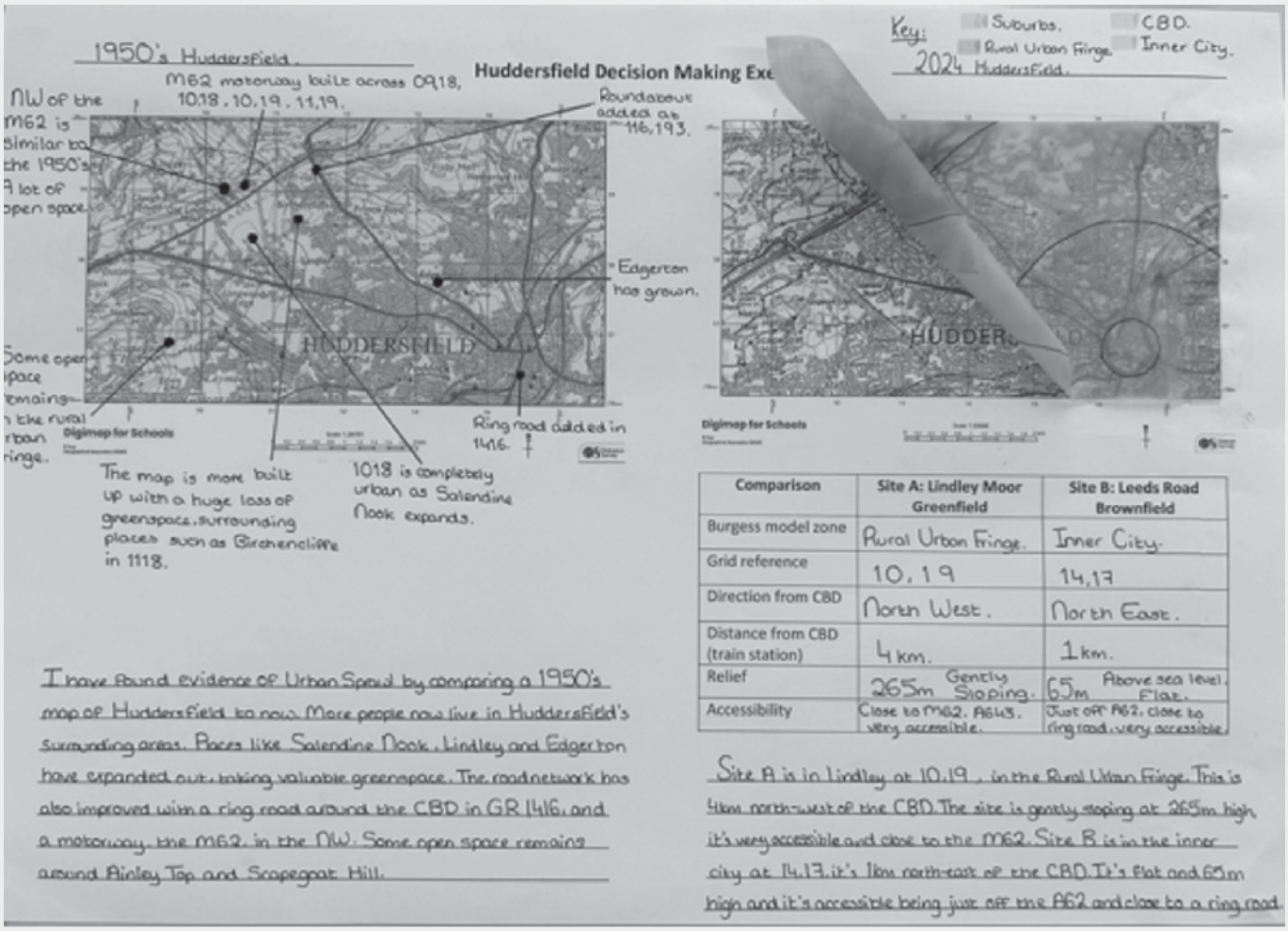
> **Our vision:** to offer an up-to-date, relevant and issues-based curriculum with sustainability at the core. The programme is designed to engender curiosity and wonder about the world; we want our students to be able to apply knowledge and conceptual understanding to new settings and through enquiry and problem-solving activities prepare for life in the 21st century. Our aim is that students think geographically about the changing world, becoming critical learners and knowledgeable, skilful and responsible citizens who care about the future of our planet.

Rachel has provided, for this guidance, the following examples of how this vision is implemented with a focus in progressing procedural knowledge in using maps.

At Salendine Nook Academy, the first unit of work investigates the local area through OS maps, aerial photographs and site plans. With several feeder primary schools, this transitional unit is fundamental in bringing our students together to develop competency of map use. From here, students practice a range of geographical skills, broadening their experiences through different topics and contexts. Careful planning has given our students opportunity for practice and repetition leading to further confidence, accuracy, and speed. The outcome is for our students to be better prepared for enquiry-based learning where skills are used more fluently to enhance geographical understanding. This approach to skill development is cumulative as students apply what they know, understand and can do to real world situations and unfamiliar contexts, thus preparing them to think on their feet and think like a geographer.

Yr 8 urban change

One example of this is illustrated through the Year 8 urban change topic, where students use OS maps of Huddersfield to investigate whether a new housing development should be built on a local greenfield or brownfield site. They create an urban land use overlay, and compare both sites for suitability, referring to location, size, relief, distance to CBD and accessibility. Through historical and current OS map comparisons, students are also able to annotate the map to show evidence of urban sprawl. They use this to make an informed judgement about potential impact on the local area. Decision making exercises have been sequenced throughout our curriculum, are varied and develop in complexity over time.



Comparison	Site A: Lindley Moor Greenfield	Site B: Leeds Road Brownfield
Burgess model zone	Rural Urban Fringe.	Inner City.
Grid reference	10, 19	14,17
Direction from CBD	North West.	North East.
Distance from CBD (train station)	4 km.	1 km.
Relief	265m Gently Sloping.	65m Above sea level. Flat.
Accessibility	Close to M62, A643, very accessible.	Just off A62, close to ring road, very accessible.

Fig 29

Is the proposed site for Hinkley Point C ideal?

Use the OS Map and aerial photographs to investigate

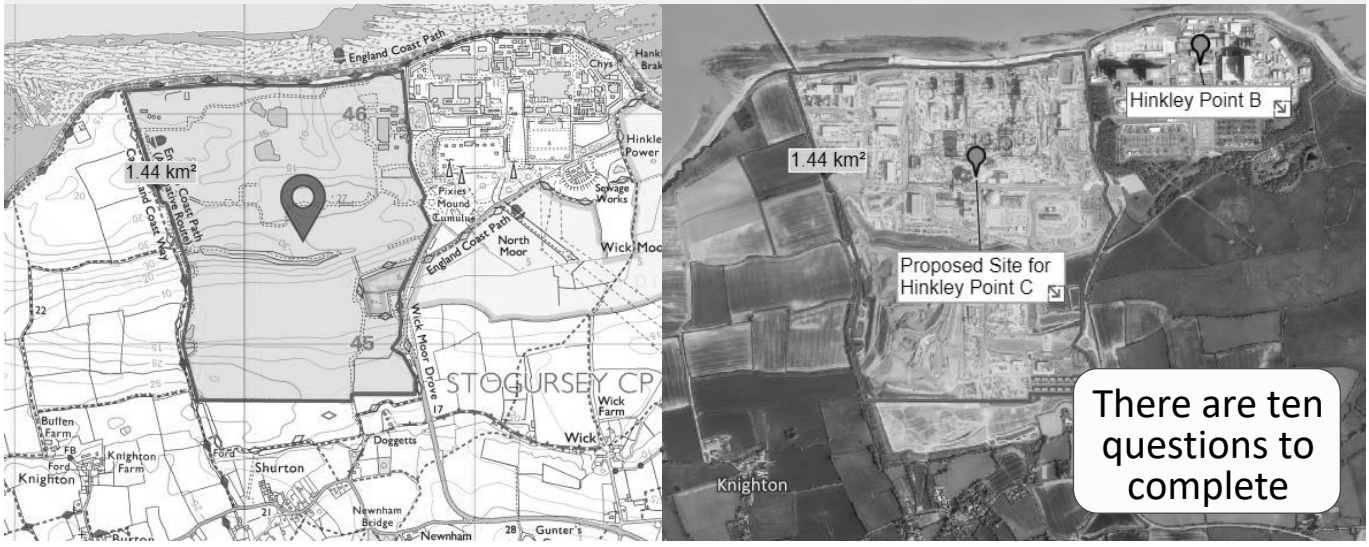


Fig 30

In Year 8 students investigate whether Hinkley Point C should be built. This larger enquiry allows students to combine a range of resources to support decision-making. Using a 1:25 000 OS map and aerial photograph, students assess the suitability of the planned site within the local area. They identify physical and human features, describe relief, and estimate the size of area, with a comparison to Hinkley Point B. From this, they are able to consider the scale of the plan, ease of construction and future expansion opportunities. Students also describe settlement and transport patterns within the area, using grid references, distance and direction to investigate proximity to local neighbourhoods. This allows judgement on ease of access for workers and suppliers, and local impacts such as noise levels and pressure on B roads. Using a 1:50 000 OS map and aerial photograph, students also investigate the site from a different scale, allowing appreciation of the size of impact within the wider area of rural Somerset.

Rachel explains the impact of progressing map skills in terms of the school's curriculum intent of thinking like a geographer:

> Using map skills and techniques gives value when applied to real and unfamiliar places, as students use their skills to think more critically and analytically; they may ask questions, make links between resources and decide on the most important evidence to support their views, thus strengthening their argument and deepening their geographical understanding.

Haberdashers' Girls School

Emma Johns is a geography teacher at Haberdashers' Girls School and also a member of the GA's Secondary Phase Committee.

Emma has provided the following overview of how her school integrates use of maps into the KS3 geography curriculum. This illustrates aspects providing opportunities to progress pupil's capabilities from map reading to interpretation.

Our Y8 students study glaciation and complete a task that asks them to annotate an OS map and satellite image to show their understanding of environments formed by glaciation. This requires recognition of contour patterns and other indicators of height (taught in Y7) as well as drainage patterns (a new skill). We combine the map with a satellite image and use ArcGIS 3D scenes to explore the relief of the landscape prior to the task.

Bullers Wood School

Rachel Giacopazzi, Head of Geography, Second in Charge of D of E. and a member of the GA's Assessment and Examinations Special Interest Group

Rachel explains the evolution of her geography department's curriculum intent vision with examples of how this has been implemented to support pupils to achieve this vision.

Our Geography curriculum is constantly evolving to meet the needs of our learners, new ideas in the geography subject community, and of course a changing world.

We constantly evaluate our curriculum, in particular to ensure our curriculum intent has a positive impact on our learners. This year we have started with a new geography team, and as a new Head of Department, it was important that I established what we were trying to achieve for our students as a foundation for working as a team.

Our intent curriculum statement for Geography at Bullers Wood is not complex but integral to our main focus:

At Bullers Wood School, we want our students to understand how the physical and human worlds work and are interconnected. We want them to be curious about our planet.

> Our students will develop the capabilities of thinking like a geographer developing understand of the big ideas of the subject and how they are connected and change. Students will investigate a wide range of diverse places. Students will also learn to work like a geographer, through an evolving process of geographical enquiry. They will progress their procedural knowledge through use of maps, Geographical Information Systems, and numeracy skills. Pupils will communicate their ideas in a variety of ways. Investigations will be progressed both inside and outside (fieldwork) of the classroom. Students will be empowered to use of their geographical skills in their future work and life.

It was important that the team understood the need to focus on teaching a balance between knowledge, understanding and skills rather than just focusing on substantive knowledge (content). It was also important to establish an understanding amongst the department team that procedural knowledge needed to be planned across units of work rather than becoming an 'added on'. This development in our curriculum is a response to the 2023 Ofsted subject reports findings about a lack of planning in schools regarding procedural knowledge.

There is a school-wide focus on hard thinking. We believe that use and interpretation of maps, can make a major contribution to developing pupil's geographical thinking. When we began to evaluate our existing KS3 curriculum, we believed, that we were already using maps, particularly OS maps well across units of work. As we dug deeper, however, we began to realise that we relied on the same lower order map skills activities. We needed to develop more challenge, more map interpretation activities that provide opportunities for pupils to apply their geographical knowledge and understanding.

With this in mind we have introduced a wider range of scales of maps, as we adapt and develop our curriculum increasing the frequency of using maps. A key approach to this is a focus on developing fieldwork throughout our KS3, in part, enabling a more accessible and purposefully use of maps.

To best facilitate the use of OS maps and GIS across our curriculum we subscribe to Digimaps for Schools. We have found this to be invaluable for both our Geography and Duke of Edinburgh Award Scheme in our school, which jointly funds the annual subscription. This online service allows us to use the latest OS maps at a variety of scales, as well as aerial photography, and historical maps. Zooming between the scales is particularly helpful for our students to grasp the idea of scale. Like many schools we have limited computer access. The single school wide access for students, however, provides them with access at home. Each year we explore how we can increase the use of Digimap, both in the classroom and at home, to develop use of maps and GIS in an increasingly more complex way from KS3 to A Level. A Level students find use of this resource very helpful for their NEA.

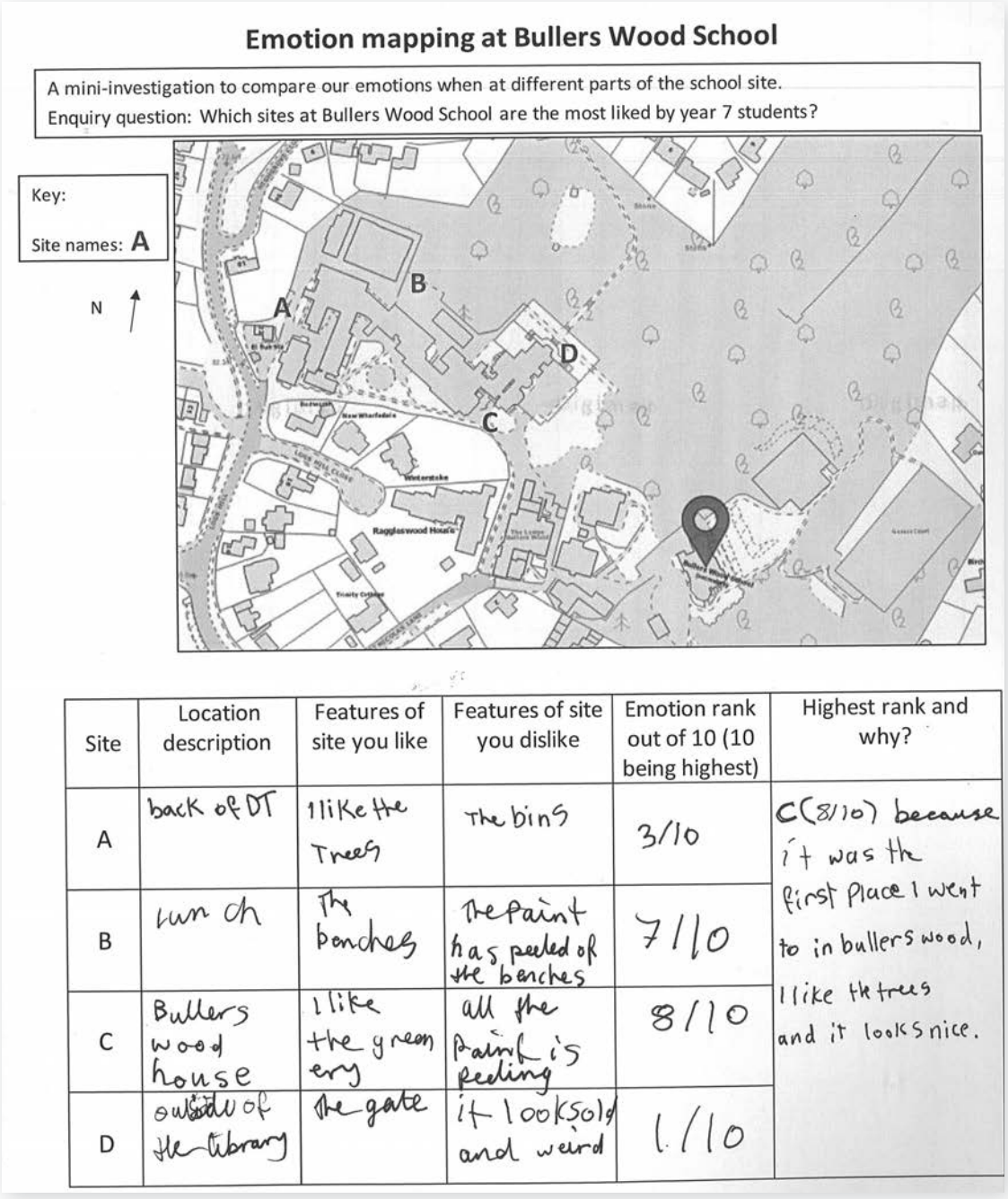
The table Fig 32 summarises a selection of OS map related classwork from our curriculum model from KS3, to illustrate how the implementation of our curriculum is designed to make our intent a reality. I have explained two of these examples, in more detail below, demonstrating our curriculum intent in action:

Yr group and unit plan	Type of map	Aim of activity
7- Geography: My passport to the World	OS map of school	Emotion mapping of school- use the map to understand locations and why space changes our emotions.
7- What shapes the UK?	OS map of local area	Our grid square- use own understanding to link to know areas on an OS maps.
7- What is weather and climate?	OS map of school- varying scales	Microclimate study- using fieldwork and maps GIS Digimaps used for data presentation
8- Why are rivers important?	OS map of two different rivers	Compare and add details to different maps from different locations.
9- What happens when sea meets land?	OS map of different coastlines	Use of coasts- what can we see
9- What happens when sea meets land?	OS map showing different management techniques	Management decision making exercise

Fig. 32 Examples of KS3 units of work where OS map skills are integrated

Year 7 Initial fieldwork activity emotion mapping of student's new secondary school, using large scale OS map.

Year 7 students at our school initially find the complicated site of the school problematic. The school has 12 main buildings, a wood, and sports facilities. The initial unit of work for Y7- My passport to the world has, in part, been developed to support these new Y7 students find their way around the school site. The school site is introduced to students, first in the classroom using Digimap through an interactive whiteboard, exploring the site using different scales of OS map zooming through the scales, and also exploring the site using aerial photos. Each class then conducts fieldwork around the site with a large-scale OS map and a grid to record their emotions at different locations shown on the map, see Fig 33. This initial activity clearly demonstrates to our new students the significance of geography as a subject in using maps to get to know a place.



Emotion mapping at Bullers Wood School

A mini-investigation to compare our emotions when at different parts of the school site.
Enquiry question: Which sites at Bullers Wood School are the most liked by year 7 students?

Key:
Site names: A

N

Site	Location description	Features of site you like	Features of site you dislike	Emotion rank out of 10 (10 being highest)	Highest rank and why?
A	back of DT	I like the Trees	The bins	3/10	C(8/10) because it was the first place I went to in bullers wood, I like the trees and it looks nice.
B	lunch	The benches	The paint has peeled of the benches	7/10	
C	Bullers wood house	I like the green ery	all the paint is peeling	8/10	
D	outside of the library	the gate	it looks old and weird	1/10	

Fig 33 Student work Yr7 emotive map fieldwork of the school grounds

Using OS maps in fieldwork: a case study

Chloë Searl, Field studies tutor, Island Geographer, and Chair of the GA's Fieldwork and Outdoor Learning Special Interest Group

Ordnance Survey maps play a key role in planning fieldwork, especially at A Level where students can use them independently to understand the wider spatial context and situation of their chosen field site. Maps are used in the classroom before heading to the field to chart the precise location of data collection points and the mechanics of the map itself can help students to establish their sampling strategies. For example, for students wishing to spatially sample in a random way, randomly generated six figure grid references can be used to place sample points on a map. Students who wish to spatially sample in a systematic way can use map features such as grid squares to ensure that each part of their field site receives even coverage in their investigation. Once in the field, students then use paper maps or the OS app on a digital device to ensure they are positioned correctly for their surveys and observations.

Students who are planning on using transects as the basis of their data collection can do so by studying the linear features already present at their field site. Students may decide to use these features, such as footpaths, as the transects themselves and follow their route, collecting data as they go. Students may use other linear features such as tree lines, field margins, overhead powerlines and waterways as way markers to ensure that their transect remains on course between two points. Planning for the use of such way markers when one is already in the field is tricky: not all features will be immediately visible to the students as they traverse certain landscapes. Using an OS map to establish these markers prior to being in the field can help students to not only navigate their chosen transects but also to associate certain transects with the geographical features around them.

In the field, OS maps can be used as part of the data collection itself. Extracts from maps can be included in questionnaires to support members of the public as they respond to students' surveys. For example, students might be looking to gather data on the perception of crime and public safety in an area. Showing members of the public a map of their current location and asking them to point to areas where they feel safe and unsafe can be an engaging activity for both students and respondents and can open up deeper discussions about the nature of particular places that have been highlighted.

Progress in Geography examples of lessons using OS maps

Figures 34 to 36 show three lessons from Progress in Geography. Each illustrate a range of OS map activities, some using a range of OS maps, GIS and photographs progressing pupils from map reading towards interpretation.

Progress in Geography Lesson 1.10

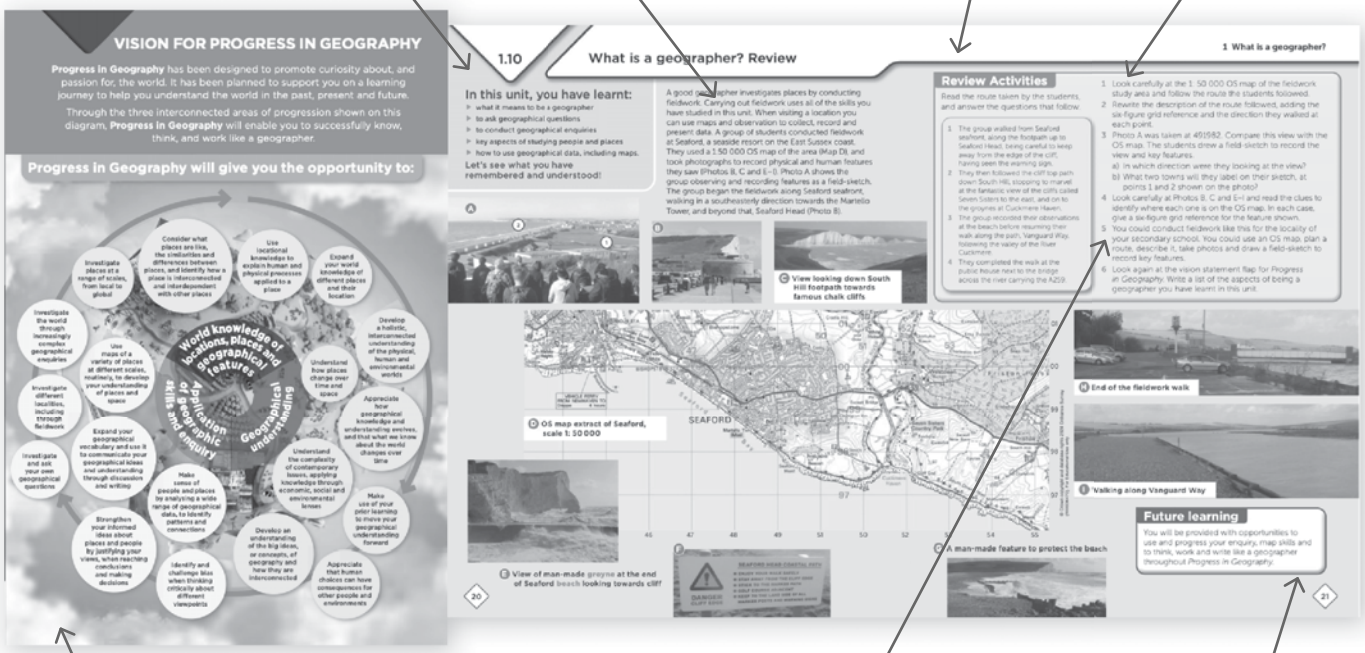
The activities for this lesson progress and consolidate the map skills introduced throughout this unit of work - symbols, grid references and direction.

This lesson provides a review of the skills progressed through this unit. The aim of this lesson is to find out what pupils have remembered and understood and can begin to apply.

This lesson introduces the idea of conducting fieldwork as part of being a geographer. Fieldwork brings together many of the skills introduced in this unit including map skills and thinking, working like and writing as a geographer.

The main focus of the lesson is the importance of using OS maps and photos to conduct fieldwork and follow a route.

Activities 1–4 could be used as an assessment to identify pupils' map skill capability



Activity 6 requires pupils reflect on learning and identify aspects of being a geographer they have learnt in this unit using the vision flap

Activity 5 introduces the idea of conducting fieldwork, following a route and drawing a field-sketch of a locality. This could be developed as an additional lesson, using Lesson 1.10 as an introduction to conducting fieldwork in the local area of the pupils' new secondary school.

The Future learning box explains how the skills introduced in this unit will be used and progressed throughout Progress In Geography

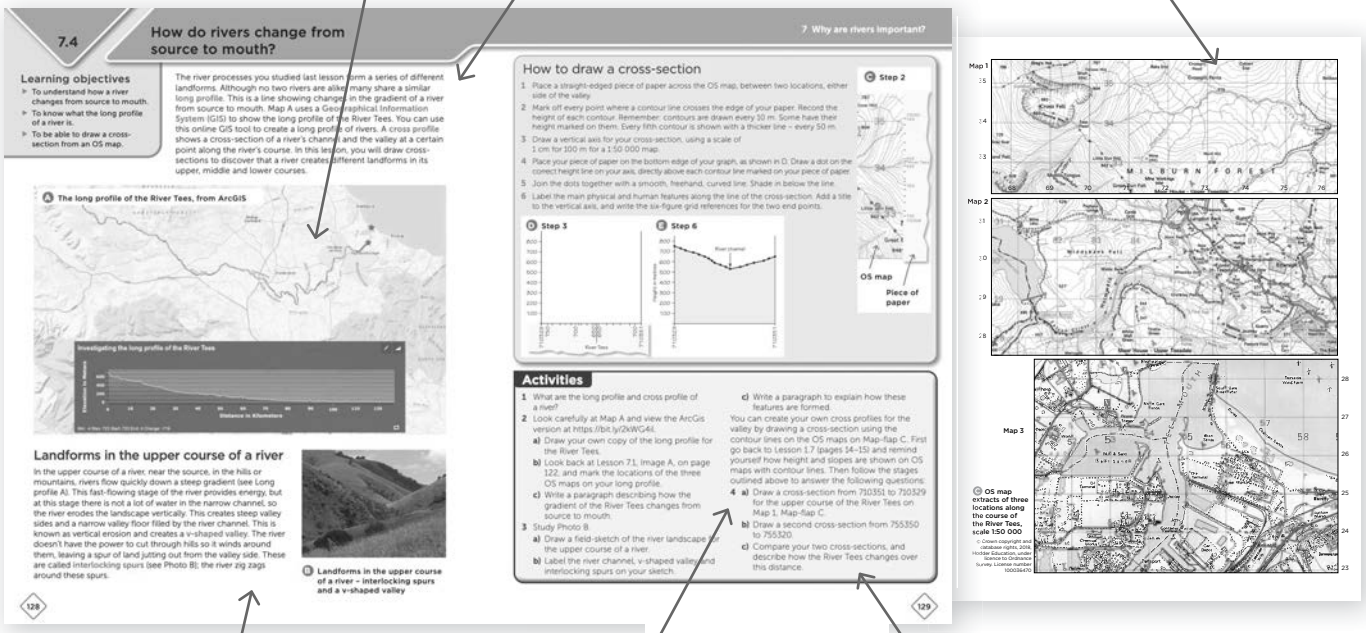
Fig 34

Progress in Geography Lesson 7.4

Further use of GIS is provided - the ArcGIS Elevation drawing tool is an easy-to-use elevation profile took to look at long profiles and coss-sections of a landscape

The lesson involves pupils in an investigation of what the river is like from source to mouth in terms of the long profile of the river, as well as landforms formed by erosion.

This lesson progresses pupils' knowledge of the River Tees, introduced in Lesson 7.1. This is part of a sequence of lessons using the River Tees and integrating the use of the OS maps on Map-flap C – Lessons 7.5 and 7.7 also focus on the River



The lesson involves pupils in an investigation of what the river is like from source to mouth in terms of the long profile of the river, as well as landforms formed by erosion.

Activity 4 requires pupils to draw cross-sections across the valley of the River Tees using OS map flap

Activities 2 and 4 require pupils to interpret how the river changes using the GIS long profile, cross-sections and OS maps

Fig 35

Progress in Geography Lesson 15.6

This lesson brings together knowledge, understanding and skills, requiring pupils to consider and apply their understanding of glaciation developed from Lessons 15.1 to 15.5, to the evidence from the OS map and aerial photos to determine how the area was glaciated.

This lesson can be used as an assessment, with pupils needing to think like a geographer, applying their understanding of glacial erosional processes to the Helvellyn area of the Lake District,

Activity 1 pupils are asked to use Google Earth to explore the glacial features of the Helvellyn area

Pupils identify and locate glacial erosional features using OS mapflap, vertical, and ground photographs in activities 2 – 5

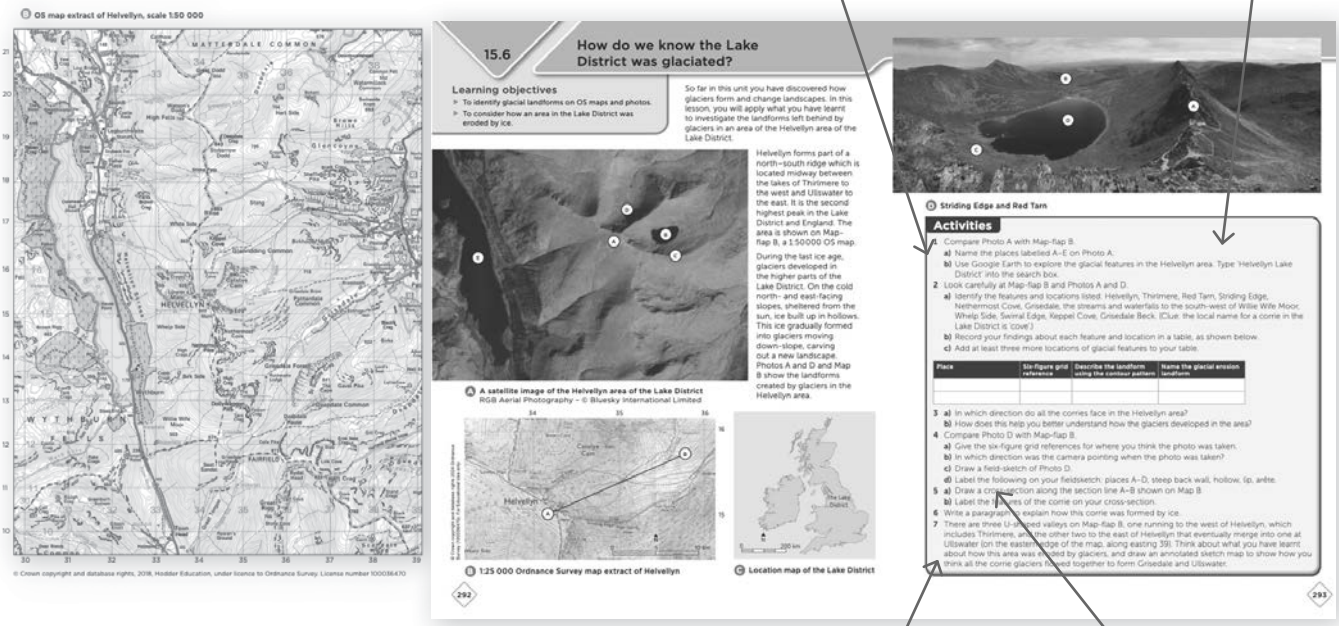


Fig 36

Activity 7 pupils interpret the OS, applying their understanding of glaciation

Activity 5 pupils draw a cross-section of a corrie, using a 1:25 000 OS map and label glacial features

Implementing use of GIS into your curriculum

Harry West (2021) concludes his Teaching Geography article 'Taking the first steps towards bringing GIS into the classroom' with the following very useful advice:

1. Start small. Explore some 'oven-ready' GIS platforms to familiarise yourself with navigating interfaces and interpreting spatial datasets.
2. Sign up to the ArcGIS Schools Programme.
3. Explore the Esri UK Learning Pathways – especially the 'Getting started with maps and data in ArcGIS Online' Learning Path.
4. Locate and map some of the datasets using your ArcGIS Online account.
5. Try out a simple mapping activity in the classroom (teaching from the front).
6. Keep practising! Gradually build up your confidence using the interface and bring some more maps and spatial datasets into your teaching.
7. Let the students have a go themselves. Set a learning task that requires them to explore a GIS interface online (either one that is freely available or one you have created yourself).

Rachel Trafford in her Teaching Geography article 'How to...integrate GIS effectively into the curriculum' (2017) also offered advice in the form of top tips:

1. GIS needs to be embedded in departmental aims and ethos.
2. Responsibility needs to be shared, not fall to one individual.
3. Keep abreast of ongoing updates and developments.
4. Be patient: a comprehensive programme takes time to develop.
5. Remember to upskill staff as well as students.
6. Be reflective and open-minded when designing – and refining – activities. They won't all work well the first time.
7. Combine larger units of work with small, quick activities.
8. Invest in younger cohorts as a priority; but don't neglect the others.
9. Don't underestimate the power of teachers' attitudes to GIS in influencing student attitudes.
10. Track your GIS programme across the curriculum, and involve students in its evaluation.

Rachel points out in her article conclusion that:

"It has taken several years to develop a GIS programme we are relatively (recognising that it will always be a work in progress) satisfied with and, on reflection, my feeling is that a steady, purposeful process guided by strategic decision-making is the key to success. It is not something that can be acquired quickly, as ongoing refinement and experimentation are critical; student and staff skills develop gradually." P107

The following case studies explain how the integration of GIS in a geography curriculum can be achieved over time.

GIS integration into the curriculum

Heidi Quenby Maplesden Noakes School Maidstone and member of the GA's ICT Special Interest Group, explains how she has integrated GIS into her geography curriculum.

GIS is built into units of work, developing in difficulty as students progress. An initial unit of understanding basic skills integrates the use of paper-based OS maps and understanding contour lines by making use of 3D scene-viewer in ArcGIS allowing students to be able to make to link between the 2D and 3D images. Units on hazards (tectonic and weather hazards) make use of ready-made layers that allow students to be able to click on events to understand specific details about them. Students make use of maps and learn basic analysis skills within GIS software.

In year 8 and 9 students are taught how to change data in maps that have already been created in GIS software, changing the data to reflect what students have collected themselves during visits, both in the local area and through a fieldtrip to London. They learn to make changes to the maps to make them easier to read and more meaningful (eg making changes to the symbol or considering the basemap used). They build on their analysis skills of year 7 to understand what the data collected is showing them.

At GCSE level, students learn to create their own maps from data collected, so start to understand the process of uploading from a spreadsheet as well as starting to make use of some of the analysis tools available in the GIS software used. This is built on further for students who progress to A Level.

Ollie Davies geography teacher, City of London School

In his Teaching Geography article 'Developing a departmental approach to GIS' (2021) describes how his department embedded GIS in their geography curriculum. Like many schools, they had to overcome difficulty accessing computer facilities, as well as staff confidence. They, however, recognised the opportunities provided by major developments of easy to use GIS platforms, such as ArcGIS, improvement in their student's computer literacy, as well as, increased support from the school's IT department, and external providers such as ESRI. The school adopted a single GIS lesson approach within a scheme of work, clearly in line with the suggestion made by Harry West. Ollie concludes that "single lesson exercises to explore geographical concepts within a sequence were popular and provided variety and elements of fun to supplement regular classroom work." (p34) The department proposed future developments in an ongoing long term plan to implement GIS in their curriculum:

- Building and maintaining staff confidence in GIS packages, sharing good practice and staying up to date with developments.
- Building strong GIS experiences into key stage 3.
- Writing more small GIS exercises, and establishing them within lessons, in all year groups.
- Reviewing fieldwork in all year groups to see how we can better implement GIS.
- Using interactive platforms such as Google Earth to supplement in-class teaching.
- Developing wider GIS applications and careers links to benefit the profile of geography. (P35)

Progress in Geography examples of integrating GIS in the KS3 curriculum

The use of GIS is embedded in many lessons and units throughout Progress in Geography. It is introduced in lesson 3.7 of the economic unit, where pupils have access to Google Earth, a GIS system. Once familiar with the tools of this software, pupils can use Google Earth as a matter of routine to explore any places studied in Progress in Geography Lesson 3.7 explains how economic activities – farming and the Port of Southampton – use GIS systems.

Further examples of GIS being used in lessons across Progress in Geography:

Lesson 5.6 How are people affecting tropical rainforests? Part 1

This lesson progresses pupils' use and understanding of geotechnologies introduced in Lesson 3.7, both in terms of analysing satellite image E, but also by considering how the Brazilian government have used remote sensing to monitor deforestation levels.

Lesson 7.4 How do rivers change from source to mouth? (see page 84 screenshot of this lesson)

Lesson 9.8 How do population structures vary within a country?

Activities 5 and 6 in this lesson show pupils how to access the ONS UK 2021 census population interactive GIS website showing population pyramids for different places in the UK: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/ukpopulationpyramidinteractive/2020-01-08

Lesson 11.7 How are people affected by the changing Holderness coast?

This lesson also provides an opportunity to progress pupils' use of OS maps. Two superimposed OS maps of Mappleton are provided; the present-day OS map, also available on Map-flap E, and a 1890s OS map, requiring pupils to compare the maps and calculate levels of cliff recession. The image is a screenshot from the excellent Digimap for Schools: https://digimapforschools.edina.ac.uk

Graeme Schofield, Geography Subject Lead at Oak National Academy, explains how they have integrated GIS into their online curriculum.

Oak National Academy, an independent arm's-length body (ALB) of the government, has partnered with the Geographical Association and Geography South West to develop a free, optional, and adaptable geography curriculum for teachers and their pupils.

Find curriculum resources at https://www.thenational.academy/

As with all curriculum planning, it was important to first identify the GIS knowledge and skills we want pupils to develop. Fundamentally, we aim for pupils to become confident in viewing, interpreting, and analysing geo-spatial data across various GIS platforms. This has been implemented through two main approaches:

Firstly, we regularly integrate GIS maps in lessons as a way of representing geospatial data. This approach means that all units at KS3 and KS4 include slides using static maps or GIFs to support pupils' understanding of geographical processes and spatial patterns. When examining spatial changes over time, we use GIFs of aerial imagery created with ESRI's Wayback app and comparisons of historical and contemporary maps using Digimap for Schools and the National Library of Scotland. These tools are especially effective in units on topics such as population, coasts, and ecosystems, where understanding spatial change over time is fundamental. We use maps from applications like ArcGIS Map Viewer, Digimap for schools and Google Earth to locate both human and natural features across settlements and landscapes. We also show how GIS is used by various organisations, such as the Environment Agency, so that pupils can apply their knowledge to analyse spatial data and make informed geographical decisions. In all these examples, we familiarise pupils with different GIS applications, emphasising that GIS is a key tool for geographical analysis of people, processes, and places, not a separate part of geographical learning.

Secondly, we design specific lessons, integrated within units, to develop pupils' procedural knowledge of using GIS while continuing to explore geographical processes and patterns. These lessons require access to desktop computers, tablets, or laptops, so pupils can gain confidence in using map layers to analyse data. In these lessons, we use a combination of static slides and video tutorials to guide pupils, step-by-step, through the procedural knowledge needed to confidently visualise, interpret, and analyse spatial data. We use a range of GIS applications, starting with the most accessible and building up to working with more complex applications so that pupils develop proficiency in using a broad range of techniques and can interpret maps based on their own data.

Through these two approaches, pupils develop procedural knowledge and build confidence in using GIS to visualise, interpret, and analyse geospatial data. Ultimately, we aim for pupils to recognise GIS as an essential tool for geo-spatial analysis, applicable across all areas of geographical study and research.

GIS resources available online

Digimap for Schools

https://digimapforschools.edina.ac.uk

This online GIS service gives all schools access to a library of OS mapping. Digimap is a subscription service, developed by the OS working with Edinburgh University (EDINA). The service is not only for OS maps but also for taking your first steps into using GIS The Ordnance Survey provides free training and support.

A single login for the whole school (no confusion over logging in with individual passwords), means every teacher and pupil in the school can use the service with just one subscription.

In terms just of the mapping available, students and teachers can access maps of the whole of Great Britain at eight different scales, from 1:25,000 and 1:50,000 right down to 1:1250. The mapping is searchable by grid reference, place name and postcode. With the 1:1250 scale data, every student in your school will be able to find their house on a map!

As well as modern mapping, Digimap includes historical layers of data for the 1890s and 1950s. Any two eras of mapping can be viewed at the same time using a slider to overlay one data set on another. With the addition of high-resolution aerial imagery, you can now view the whole country and compare it directly with current mapping.

Darren Bailey the Ordnance Survey Schools Delivery Programme Manager has written a Teaching Geography article 'Digimap for Schools What is it and what can you do with it ? (2018) where he provides example activities for using Digimap in your KS3 curriculum.

ESRI Teach with GIS

Katie Hall Strategic lead for the ESRI UK GIS for Schools Programme, highlights the issues with the integration of GIS across the geography curriculum, as well as the opportunities provided by ESRI UK GIS for Schools programme.

Access to GIS technology is one of the major hurdles for successful use across the curriculum within schools. Traditional desktop GIS applications required installation and maintenance, and access was then limited to the devices with the software installed. Professional desktop GIS software was (and is) complex – the equivalent of teaching students to drive in a Formula One car: lots of opportunities to crash out for all but the most adept of drivers!

The arrival of cloud-based GIS systems, accessible via the internet, and providing a more lightweight and intuitive user experience, offered a more realistic route for most schools to utilise GIS. It also allowed for students to continue using GIS outside of the classroom, accessing their own accounts for homework or self-study anywhere that can connect to the internet. Since 2017, Esri UK has provided free access to one such platform - ArcGIS Online - under the ArcGIS for schools programme.

While the ArcGIS for Schools programme overcomes installation, maintenance and budgetary challenges, the long shadow of previous difficult attempts to bring GIS technology into the classroom can make teachers wary of engagement. It is not enough that GIS is now straightforward and free to access. Similarly, the fact that it is mandated within the National Curriculum should not be a stick forcing teachers to begin using it. To justify use of GIS programmes, providers have a duty to demonstrate how the technology can facilitate meaningful learning across the geography curriculum, as well as, the value of GIS skills for students in terms of future learning and employment.

This is the role of Esri UK's Teach With GIS initiative, which combines online lesson materials, self-guided tutorials, and face to face CPD opportunities, to create an ecosystem of resources that make ArcGIS Online a viable classroom solution. We provide support, meeting teachers in their classroom rather than expecting them to invest a lot of time in upskilling themselves in a new technology before seeing any benefits.

https://teach-with-gis-uk-esriukeducation.hub.arcgis.com

Teach with GIS provides for schools a free, no login suite of resources that follow a carefully sequenced pathway to introduce and develop GIS skills for both students and teachers. Across different curriculum areas, users are able to visualise and explore virtual geographies and geographic data. Examples are wide-ranging, covering geology, climate, socio-demographic data and even historic OS maps.

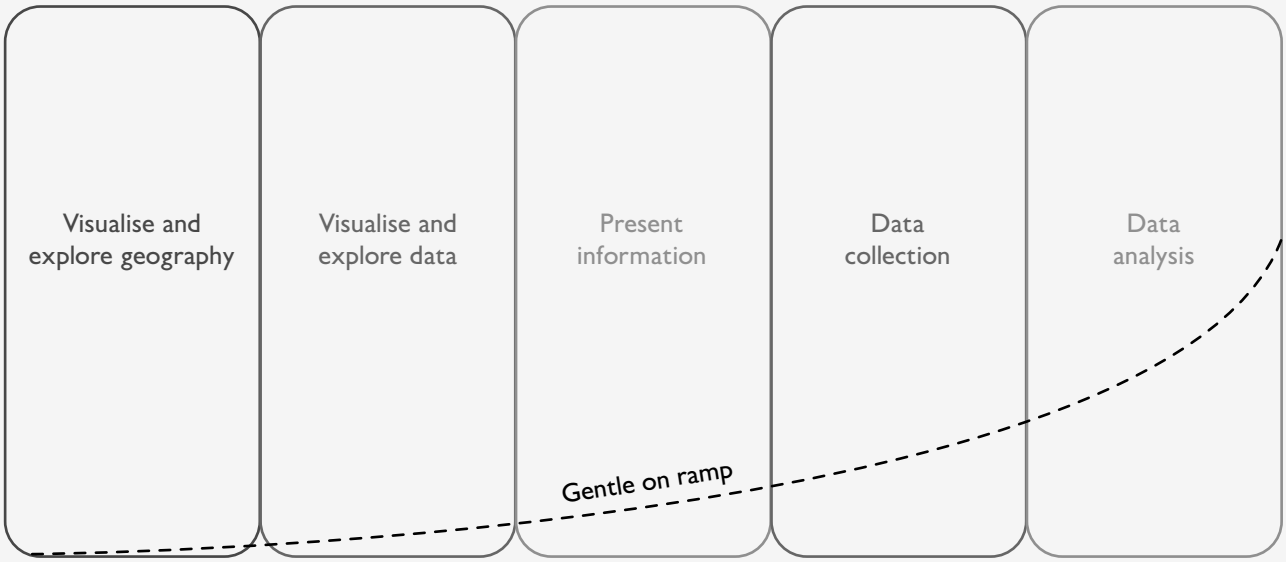
These resources introduce key GIS concepts and tools without the need for lengthy step-by-step guides in "how to drive", and they allow teachers to re-enforce and cover substantive content at the same time as building procedural knowledge.

Once these foundational concepts are secure, Teach With GIS provides video tutorials and guidance about the more complex, "traditional GIS" activities – those centred on data collection and analysis. It also connects classroom practitioners to the world of professional GIS users, featuring case studies of professionals linked to different curriculum areas that can be woven into schemes of work, and opportunities to connect with a GeoMentor for more personalised support.

Harry West and Michael Horswell, in a Teaching Geography article - GIS has changed! Exploring the potential of ArcGIS Online, explain the different ways this platform can be utilised in your geography curriculum. In the conclusion to the article they state:

"The ArcGIS Online platform has the potential to transform the teaching of GIS in UK secondary schools, providing a data-rich, interactive, and fun learning experience for students. Online GIS is moving the field into a new era, far removed from the clunky specialist software you may have experienced in your own training. There is a growing support network made up of Esri and GIS professionals, and we strongly encourage teachers and geography departments to take full advantage of this, now free, resource." (p24)

A sequenced pathway for teachers and students to follow that is guided by pedagogy



Teach with GIS ESRI ArcGIS provide for schools a free online resource.
https://teach-with-gis-uk-esriukeducation.hub.arcgis.com

Useful websites for further guidance about GIS

Geographical Association online guidance on using GIS
https://geography.org.uk/support-and-guidance-with-gis/

GA ICT working group support
https://sites.google.com/view/gaictsig/home

Members of the ICT working group work in a variety of settings, including primary and secondary schools, as well as international and teacher education. As a group, they are currently working on developing more classroom friendly resources, with our current mission being to make GIS use more accessible for all teachers, so they feel able to use it routinely in their geography lessons.

The group have developed a website to share ideas for using GIS in the classroom. This includes the ideas presented at recent GA Annual conferences and links to a wide range of online resources.

Royal Geographical Society
GIS at KS3
https://www.rgs.org/schools/resources-for-schools/gis-at-key-stage-three

Careers with GIS
https://www.rgs.org/schools/resources-for-schools/careers-with-geographical-information-systems

Using GIS
https://www.rgs.org/schools/resources-for-schools/using-gis

Examples of online geography GIS websites

GoogleEarth
https://earth.google.com/web/

Office for National Statistics census 2021
Interactive GIS maps
https://www.ons.gov.uk/census/maps/

BRITICE University of Sheffield project
https://www.sheffield.ac.uk/geography-planning/research/geography/projects/britice#aim

This excellent GIS provides a database of over 170,000 glacial landforms of the British Isles. The university project page provides links to the ArcGIS map showing the landforms, together with a range of other resources including a Teaching Geography article which provides and overview of the project and how it can be used with 11-19 year old students – Clark, C., Ely, J. and Doole, J. (2018) 'Glacial landforms: a teaching resource in maps and GIS',

USGS earthquake GIS
https://earthquake.usgs.gov/earthquakes/map/

The live site shows earthquakes that occur each day, on a zoomable map of the world, with layers that can show the world in different views, physical, political, satellite, and add population density. Each earthquake has a link to in depth reports and data about the tectonic history of the area.

Zoom Earth
https://zoom.earth/

Zoom Earth is an interactive weather map of the world. The user can explore the current weather and see forecasts for your location through interactive maps of rain, wind, temperature, pressure. It is also possible to track the development of hurricanes, monitor wildfires. The latest conditions can be viewed through satellite imagery showing weather systems updated in near real-time. The user can measure distances and area. The maps can be animated.

Curriculum Impact - How well are you achieving your aims?

Curriculum design process – Stages 6 and 7

There are two stages in this impact phase of the curriculum design process, shown in Fig 2:

6 **Evaluate and record the impact**

7 **Maintain, change or move on.**

The curriculum design process diagram, is presented as a circle, to demonstrate that the curriculum should be seen as being in a state of continuous development.

Ofsted make it clear that the end result of a good, well-taught curriculum is that students know more and are able to do more. The positive results of students' learning can then be seen in the standards they achieve. This makes work scrutiny an important part of the inspection process as it is here, in particular, that student progress will be evident.

The impact indicators in the EIF (Ofsted, 2019a) are:

- Learners develop detailed knowledge and skills across the curriculum and, as a result, achieve well. Where relevant, this is reflected in results from national tests and examinations that meet government expectations, or in the qualifications obtained
- Learners are ready for the next stage of education, employment or training. Where relevant, they gain qualifications that allow them to go on to destinations that meet their interests, aspirations and the intention of their course of study. They read widely and often, with fluency and comprehension

The self-evaluation undertaken by a geography department to determine whether these indicators are achieved is a matter of professional judgment.

Evaluating your curriculum in these two phases of the design process are explained in detail, providing design tools to support these phases in Chapter 7 of 'Planning your coherent 11-16 geography curriculum: a design toolkit'.

Katherine Baulcomb, Westminster City School originally wrote the case study explaining how the department team had integrated the use of OS maps into the 11-16 geography curriculum in 2021. (see page 65) Katherine evaluated the impact of this curriculum on learners, in 2024, illustrating stage of the curriculum design process in action.

Since embedding OS map skills more explicitly throughout our curriculum at KS3 and KS4, the positive impact on our students' confidence and attainment in this area has been both noticeable and measurable. Question level analysis of recent GCSE exam papers shows that OS map skills are now a clear area of strength for our students (having previously been an area of weakness). Their increased confidence was particularly evident last year when tackling the decision-making element of AQA's Paper 3 (Geographical Skills), which included an OS map outlining the proposed location of housing development on a greenfield site. Before students were given any contextual information about the issue being debated, they were able to make a wide range of inferences about the nature of the settlement, its humans and physical features and the likely social, economic and environmental impacts of the development simply through application of the OS map skills they had acquired over the last five years. They were able to interpret the landscape successfully with very little prompting and guidance, which is a marked difference compared to what previous cohorts would have been able to achieve unsupported in the past when presented with unfamiliar maps.

The department's evaluation of impact of embedding use of OS maps across the 11-16 curriculum has led Katherine to identify a key finding, which is in tune with the ideas about planning for progress of procedural knowledge identified and explained in this guidance. It gets to the heart of the purpose of using Ordnance Survey maps as a matter of routine. It represents a fitting conclusion to this guidance booklet.

> 'We have learned that maps are not just an add-on to lessons to tick off a skills checklist for exam readiness; they are an invaluable tool for progressing students' understanding of the core concepts of space, place, scale and change that underpin our curriculum intent throughout all key stages.'

Katherine has also considered Stage 7 of the curriculum design process, in terms of identifying next steps.

Since our initial plans were implemented, we have now turned our attention to embedding OS map skills more explicitly and consistently at Key Stage 5. OS maps are now used routinely in lessons that have a UK focus, but are also an important springboard for students to take ownership of their learning and adopt an enquiry-based approach in a range of situations, such as when exploring the locational context of a new and unfamiliar case study or when applying understanding of a geographical theory to an unfamiliar landscape. Katherine concludes that

> Overall, the time we have invested in thinking through progression of map skills strategically across all key stages has transformed the way that we teach and the way in which students learn in our classrooms on a daily basis.

One of the key indicators for inspectors judgements in terms of curriculum implementation is:

- teachers have good knowledge of the subject(s) and courses they teach. Leaders provide effective support for those teaching outside their main areas of expertise

A key question to consider when evaluating impact is:

> How do teachers ensure their subject, curriculum and pedagogical knowledge is up-to- date and influences the curriculum and its implementation towards our vision of student achievement?

Further support for developing subject knowledge in using OS maps

This curriculum guidance for planning for progress in OS map skills has been designed with this question in mind. The references provided below together with the useful links to online support and teaching and learning resources for map skills, is provided to support teachers to ensure their subject, curriculum and pedagogical knowledge is up to date.

https://www.geography.org.uk/write/MediaUploads/Teacher%20education/GA_ITE_SFT_Subject_knowledge_maps.pdf

https://www.geography.org.uk/ITE-geography-content/Why-and-how-to-teach-geography

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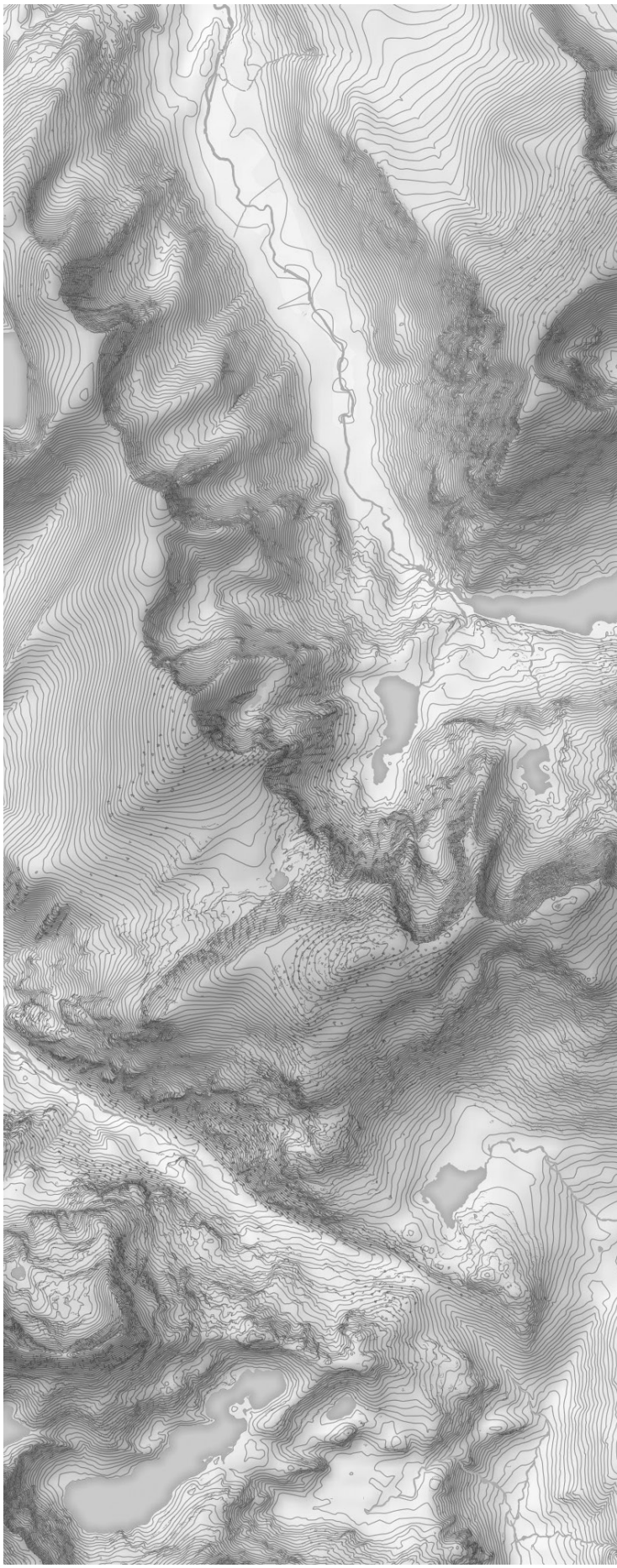

Online Resources

The Ordnance Survey website includes an education section which provides an amazing range of excellent teaching and learning resources including, video clips explaining basic map skills including grid references, contour patterns, and map symbols; guidance on using GIS in schools, downloadable pdf guides about teaching map skills, OS map symbol flashcards.
https://www.ordnancesurvey.co.uk/education

Ordnance Survey Mapzone, has been developed for homework and independent learning for students and parents to work together to develop map skills, it's a great resource to use in the classroom.
https://www.ordnancesurvey.co.uk/mapzone/

Digimap for Schools an online mapping service for schools, providing access to a full range of OS maps at a variety of scales, incorporating mapping tools, and aerial photography, as well as overlays of historical OS map.
https://digimapforschools.edina.ac.uk

ArcGIS for schools
https://schools.esriuk.com/

GoogleEarth
https://earth.google.com/web

Geographical Association guidance on developing map skills in your curriculum
https://www.geography.org.uk/Curriculum/Mapping

Geographical Association support and guidance for using GIS
https://www.geography.org.uk/Support-and-guidance-with-GIS

Geographical Association ITE support

What do trainees need to know about maps, the different types to use and maps that students create? Training for using globes and atlases and teaching map-work skills. Reviewing how well trainees use maps in their teaching and develop their students' graphicacy and spatial thinking.
https://www.geography.org.uk/ITE-geography-content/Using-resources-for-geography-teaching

As well as https://www.geography.org.uk/OS-maps

Teaching with maps https://geography.org.uk/ite/initial-teacher-education/geography-support-for-trainees-and-ects/learning-to-teach-secondary-geography/geography-subject-teaching-and-curriculum/geography-knowledge-concepts-and-skills/geographical-practice/spatial-skills-maps-and-graphicacy/teaching-with-maps/

Geographical Association

Maps and mapping
https://geography.org.uk/maps-and-mapping/

GIS
https://geography.org.uk/support-and-guidance-with-gis/

The Geographical Association

The GA website explains who the Association is and the work it does in the who are we section.

The Geographical Association's Education Group (EG) oversees the educational work of GA volunteers, covering all phases from foundation through to post-16 and Initial Teacher Training, as well as its international work and activities in areas such as Education for Sustainable Development (ESD) and Learning Outside the Classroom (LOtC).

The role of the GA's Education Group is to uphold the education policies of the GA, and support its strategic plans for high-quality geographical education. Education Group creates Communication Boards, Phase Committees, Special Interest Groups and other groupings for specific purposes.

Members of some of these different groups have provided ideas and examples of practice used in the OS guidance booklet.

Find out more about these committees and special interest groups on the GA website

https://geography.org.uk/get-connected/volunteer-groups/

As a member of the GA, you could become a volunteer member of a group.

We would like to thank all the GA volunteers who contributed to this guidance


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LOCH SPELVE