

Evaluating curriculum impact: using powerful disciplinary knowledge as ‘waypoints’

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This article is an example of how subject leaders can practically evaluate the impact of their curriculum without heavy reliance on internal and external examination data. Rather, the focus here is using the concept of powerful disciplinary knowledge (PDK) to establish how students are thinking geographically. It is based on the framework in *Planning your coherent 11–16 geography curriculum: a design toolkit* (Gardner, 2021, p. 146), where I provided a case study of the action plan, from my school in South Lincolnshire, for evaluating the impact on our curriculum after significant changes were made in 2020. The action plan, which is structured around curriculum design, teaching, and outcomes, is intended to be undertaken over several years, and features several different methods of collecting evidence. Now, several years into the action plan, this article focuses on two of the key questions posed (Figure 1) and reports the outcomes of lesson observations and focus groups with GCSE geography students. First, I outline how our department understands the concept of PDK, the role of PDK as curriculum ‘waypoints’, and how these can be used as identification tools in the evaluation process. Second, I illustrate from the findings what seems to be working well in our department, then highlight how the enquiry has revealed areas for development, before raising further questions in the conclusion.

As a departmental activity, the evidence was collected during two GCSE lessons in year 11, taught by two different teachers, and a focus group lunch with twelve of the students from the two lessons. As well as the two teachers observing each other’s lessons, I also observed both lessons with my line manager from the school’s senior leadership team. This gave all observers (three in each lesson) the chance to focus on specific students (based on lower, middle, and higher GCSE target grades) and triangulate the evidence

collected. We used a common recording sheet for the observations and the questions for the focus group were planned beforehand (see online extras).

Using PDK as ‘waypoints’ for evaluation

Geography is a statutory requirement for key stage 3 students (the geography National Curriculum *must* be taught in local authority or maintained schools), which means that a key stage 3 geography curriculum does not just prepare them for GCSE geography. Some students won’t choose geography yet have an *educational right* to know about the world and how it is changing (www.geocapabilities.org). In recognising this, our curriculum is designed around the PDK that enables students to understand geographical change, but it also allows several different facets of curriculum making to become more ‘visible’: the sequencing of concepts, the use of case studies, and a *focus on the knowledge that we want students to embed in their long-term memories*. This also allows us to identify key ideas for assessment. Maude (2016) draws out five types of PDK, and these have influenced how we think about knowledge and geographical thinking in our curriculum (see Figure 2). For further conceptual snapshots of geographical knowledge more generally, see Lambert (2017); and for an analysis of progression through key stages, see Rawling (2016).

We have found identifying PDK to be incredibly useful in exemplifying knowledge-building and knowledge-retrieving, particularly in a subject as holistic as geography, where the interconnectedness of the world is a key idea in itself. Throughout curriculum plans, we have highlighted examples of PDK that serve as ‘waypoints’ of this knowledge-building and

Aidan describes what his department did to evaluate the impact on their curriculum of PDK.



Accompanying
online materials

Key question	Method	Evidence sought
To what extent does the key stage 3 curriculum prepare students for GCSE geography?	<ul style="list-style-type: none"> Evident in lesson observation(s); prompted or not by the teacher Follow-up focus group discussions 	<ul style="list-style-type: none"> GCSE students can recall and use PDK from key stage 3 that grounds GCSE study, i.e. identification of ‘waypoints’
To what extent do students know more over time, and can they remember more of it?	<ul style="list-style-type: none"> Teaching/learning/assessment during lesson Observer questioning students at appropriate times during the lesson Follow-up focus group discussions 	<ul style="list-style-type: none"> Students understand PDK and can use it fluently Students are observed to build on their previous PDK in lessons Student work shows that previously-learnt PDK is used to contextualise new knowledge Students exemplify that they know more over time and can remember it

Figure 1: The two impact questions investigated; adapted and developed from Gardner.

Figure 2: Types of PDK, adapted from Maude (2016, pp. 72–5).

- Type 1:** knowledge that provides students with ‘new ways of thinking about the world’, e.g. ‘place’ as a set of meanings rather than just a physical location
- Type 2:** knowledge that provides students with powerful ways to analyse, explain and understand the world, including analytical and explanatory concepts, and generalisations
- Type 3:** knowledge that gives students some power over their own knowledge, e.g. thinking critically about data that produces knowledge
- Type 4:** knowledge that enables young people to follow and participate in debates on significant local, national, and global issues, e.g. decision-making, rationalising and ethical issues
- Type 5:** knowledge of the world, including specific knowledge of people, places, environments, etc.

Figure 3: Examples of PDK ‘waypoints’ in the curriculum.

When?	Key question	PDK
Year 7	How are we connected to the rest of the world?	Globalisation/interdependence
Year 7	Why do people move to cities?	Push/pull factors
Year 7	Why is water so important to Earth?	Water cycle
Year 8	What is development?	Development and colonialism
Year 8	How does plastic affect ocean ecosystems?	Ecosystems
Year 8	What is Earth’s climate like?	Biomes
Year 9	What impacts does technology have on the Democratic Republic of Congo (DRC)?	Globalisation/interdependence/colonialism
Year 9	What causes severe weather?	Global circulation system/atmospheric pressure
Year 9	Why are glacial regions so cold?	Global circulation system/atmospheric pressure/altitude

knowledge-retrieving (think of ‘pushpins’ in a map that help to signpost a journey – see Figure 3), which can help provide something a little more tangible to look for when evaluating and questioning the impact of the curriculum, and answering the question, *to what extent are students thinking geographically?*

We have found some types of PDK (e.g. Type 2) reasonably straightforward to identify on our curriculum plans (the global circulation system, for instance) as an ‘explanatory concept’ (Maude, 2016). This not only helps students understand the distribution of atmospheric pressure, but also the location of extreme weather events, and even the gyres that circulate ocean plastic. It also helps to contextualise what is learnt at GCSE, such as biomes and climate change. However, other types are more difficult to identify. Type 3, for example, requires students to think critically about knowledge. There are several instances where we do this, e.g. when examining carbon emissions as part of climate change in year 8. Here, students are encouraged to reflect on which countries are most responsible for climate change, yet each data resource (emissions per capita, net emissions, and cumulative emissions) paints a different picture, and requires students to critically discuss how different conclusions can be reached depending on the data used as evidence. And Type 4 requires that students have the capacity to select knowledge when participating in debates about issues, which is entirely the point of our Anthropocene unit at the end of year 8; we hope that our students have the knowledge required to make informed arguments about whether the latest epoch should be classified

as the Anthropocene. In short, we have found identifying PDK within the curriculum tricky, but the endeavour helped us to reflect critically on the extent to which we prepare students for the next stages of their education, and the extent to which they are thinking geographically.

Another of the key purposes of identifying PDK in our curriculum is that teachers draw out the links between them – or connect the PDK ‘waypoints’ – requiring students to retrieve key geographical ideas when learning new ones. For example, when teaching about the impacts of technology on the Democratic Republic of Congo in year 9, we require students to retrieve their knowledge of development and colonialism in year 8 (and even globalisation in year 7) to contextualise what they are learning. Ultimately, what we really want to see is that the PDK taught and learnt at key stage 3 acts as a springboard for further understanding at GCSE, and these vignettes help reveal knowledge-building and knowledge-retrieving at longer timescales. This impact study focussed on ‘development’ as an ‘analytical concept’ (Maude, 2016), where year 11 students, having studied this at key stage 3, examined the link between the demographic transition model and development (found in the AQA GCSE Geography specification) in the lessons we observed. The focus group enabled us to follow up any observations made during the lessons, but also to enquire into the students’ memories of and thoughts on the key stage 3 curriculum more widely. In short, it was an exercise in tracing the lineage of what students had learnt and remembered in geography lessons over five years.

What is working well?

After two years of disruption from COVID-19 I wasn't that hopeful that the key stage 3 curriculum had had much impact. However, I was pleasantly surprised to see quite the opposite, and across the two lessons made numerous promising observations. Most students used key terminology with confidence. Students could define and explain Gross National Income (GNI) per capita, Low Income Countries (LICs)/High Income Countries (HICs) etc., and 'development' as comprising aspects of health, wealth, and education. They also used key events and other PDK (perhaps seemingly unrelated), where, for example, students drew on their knowledge of colonialism and conflict over minerals in the DRC to contextualise the link between conflict and development, and used their knowledge of natural hazards to explain why some countries remained in poverty following earthquakes. Students also used other contextualising knowledge, such as locational knowledge, adeptly to explain what was actually happening in the world, despite being asked quite abstract questions about the factors that affect 'rates of development'. This illustrated how students were retrieving knowledge from key stage 3 to make sense of new stimuli and to respond to new comprehension tasks. It also showed how students are increasingly capable of making synoptic links between different units, both from key stage 3 and GCSE. Students were able to retrieve and apply this PDK to help explain differences in shapes of population pyramids, using healthcare, conflict, the infant mortality rate, life expectancy, and the idea that conflict may involve more males – all learnt at key stage 3 – to explain variations in shape. These observations suggest a fluency or 'automaticity' of using PDK to analyse new geographical information: this is how we understand students to be *thinking geographically*.

In the focus group, several students made it quite clear that the year 9 unit on climate and extreme weather was fundamental in helping them understand GCSE content. Perhaps some of this was repeated content (for example the global circulation system), but it helped them connect to other PDK waypoints like climate, biomes, glaciers (another year 9 unit) and climate change. Indeed, this interconnectedness was picked up by one student, who summarised rather neatly the holistic ideas that tie geographical knowledge together: 'we learnt how the small things affect the big things' (we took this to mean that human-physical interactions are multi-scalar). Other students were also quite forthcoming in articulating supporting aspects of the key stage 3 curriculum, particularly fieldwork and geographical skills. This is a year group that has had much less fieldwork experience due to COVID-19 but the one key stage 3 fieldwork enquiry students did undertake clearly had an impact: 'trends, data, and graphs' were emphasised. Students asserted their confidence in being able to deal with data, either in its raw form or when presented graphically, and this permeates their classwork as well as their GCSE fieldwork.

Our next steps

However, there are things we need to work on; for example, some students lacked a secure understanding of specific terminology. It was widely known that GNI is a measure of wealth, but precise knowledge of what it measures – the economic output of a country – was scarce (some suggested it was how much money the country had; some thought it wages, etc.). Some students also seemed to have 'fuzzier' memories than others, which raises the question, what can we do to help provide more clarity or more scaffolding for remembering? Our school is currently focussing on retrieval practice as a whole-school improvement idea, and this departmental activity helped us to make sense of how we can begin to improve the retention and retrieval of knowledge in geography, and what is absolutely necessary to support those who choose geography at GCSE.

Students also raised the subject of extended writing at key stage 3, and while at the time they really disliked being taught how to write at length – it was invariably described as 'boring' – they understood how it was vitally important in accessing higher marks in examination situations (which will no doubt contribute to improved outcomes at A level as well). We identified quite early on that significant improvements were needed at key stage 3, but the question for us now is, how do we make writing-based activities more engaging, and how do we raise the profile of writing as a worthwhile skill at an all-boys school?

Students also suggested that their map skills were not strong enough and that key stage 3 should have prepared them better, and more attention should be given to the factual recall of places, events, dates and statistics – what is often called 'specific evidence' or 'place-specific detail'. While we have amended the curriculum already, this feedback requires us to critically reflect, again, on how we teach map skills at key stage 3, and how we can encourage students to remember more factual, place-based knowledge. There are other questions that require further thinking too. To what extent can we draw links with other key stage 3 subjects for greater contextual understanding: for example, history and colonialism, or biology and ecosystems? Ultimately, as teachers and curriculum makers, how can we do more to tether new knowledge to existing PDK 'waypoints'?

Conclusion: evaluating impact

This article is a reflection on a departmental activity that sought to evaluate the impact of the key stage 3 curriculum, and I hope it helps other departments to devise similar ways to assess impact without a heavy reliance on examination-based data. By conceptualising PDK as constituting particular 'waypoints' in the curriculum, it offers something more tangible and visible when examining impact, helping to shine a brighter light on longer-term knowledge construction and knowledge retrieval. I hope this article also helps practising teachers engage more with the concept of PDK, beyond the theoretical debates within curriculum studies (see Muller, 2022).

Figure 4: Indicators of the impact of a curriculum on students.

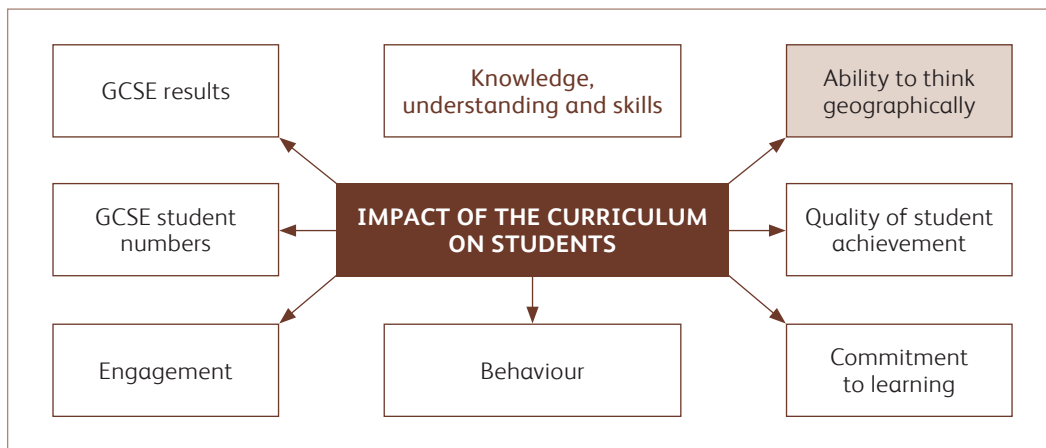


Figure 5: Focus questions to help evaluate the impact of your curriculum (adapted from Gardner, p. 135).

<p>Curriculum impact</p> <p>How are you evaluating your curriculum?</p> <p>How far have your students progressed towards the vision for your curriculum?</p> <p>What impact has your curriculum had on student learning?</p> <p>How are your students different now from the starting point you initially identified?</p> <p>How has your new geography curriculum prepared your students for the next stage of education?</p>	<p>What challenges have you experienced in changing your curriculum?</p> <p>How have you overcome them?</p> <p>What key things have you learnt as a result of your curriculum development work?</p> <p>Next steps</p> <p>What would you do differently next time?</p> <p>How can you further improve/develop your curriculum?</p> <p>What do you need to do next?</p>
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Overall, the process required significant human resources – four members of staff and 12 students – and it entailed considerable planning. Yet the outcomes were invaluable, and I would recommend the process for several reasons. First, departments can work together when both making the curriculum and examining its impact, and therefore the focus is primarily on the curriculum’s content and structure. This somewhat removes the pressure on individual teachers, and therefore, second, the process isn’t done *to* members of a department, but conducted *by them*. Third, this means that all members of the department have ownership of, and a stake in, the process. And fourth, this raises the value of the outcomes that emerge from it. Involving senior leadership gives them a greater insight into what is happening in individual departments too. The overarching aim, though, is the identification of potential gaps in the curriculum, and insights into how to improve the outcomes for geography students. One of the key questions asked of middle leaders is ‘how do

you know’? Exercises like this provide evidence and a line of reasoning as to how a department is performing and developing (Figures 4 and 5).

It has also prompted us to think of other areas we could enquire into, such as how knowledge of *development* grounds new understandings of environmental slow violence when studying climate change at A level. And it has reminded us of some of the fundamental questions of curriculum making, such as:

- *What do students need to know at key stage 3 to expedite understanding at GCSE?*
- *How can we design teaching and learning so that PDK is committed to long-term memory?*
- *How can we encourage strong retrieval of this knowledge so that its use becomes ‘automatic’ and fluent?*

It’s not just about how well we are teaching geography, but how well we are helping students to think geographically. | **TG**

Online extras

The downloads that accompany this article can be accessed at <https://portal.geography.org.uk/journal/index/tg>. Select Autumn 2023.

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