Thinking Curriculum: The One Stop Shop

This booklet is designed to help you think more deeply about your curriculum. It contains 22 key terms, definitions, examples, classroom guidance and further reading.

The terms are categorised by:

- Knowledge structures and curricular attributes
- Types of knowledge
- Characteristics of knowledge
- Curricular purposes

	Term	Definition	Example	Impact on teaching	Further thought and reading
Knowledge structures and curricular attributes	Hierarchical	When large blocks of knowledge lead to further understanding in a very sequential route.	Physics tends to be hierarchical: without understanding fundamentals of forces, you cannot understand motion.	These two factors influence your wide scale planning and how you organise your topics in the long term. In history it is worth considering "where to stop" when it comes to hierarchical knowledge. The past is a series of causes and effects, and teachers must choose a point at which to start when making a causative argument. For example, the lead up to World War I contains many events, all of which have prior causes, and decisions as to whether to start with Bismarck, or the Napoleonic wars, or the Habsburg Empire or further and further have to be carefully made.	Some subjects have live debates about what material should be included and what should not. Good examples are history and English, where periods and text choices are often hotly disputed, and often in the political arena. Subjects like maths and science tend to have less of this, as topics tend to have always been included due to their explanatory power.
	Cumulative	When large blocks of knowledge are related, but not necessarily reliant on each other for understanding.	Whilst understanding "comedy" and "tragedy" might help to understand Romeo and Juliet, understanding Romeo and Juliet doesn't necessarily help you understand The Taming of The Shrew.		
	Sequencing (macro)	The careful act of deciding which topics are taught when.	As above, hierarchical structures should follow an intuitive pattern provided enough thought has been dedicated to what explains what (see "explanatory" below). In cumulative structures, other factors must be considered.	As above	There is a strong example of sequencing in a geography curriculum here from Ben Ranson, and a science example here. Sequencing (micro) refers to how the teacher carefully explains a new topic, but this is on a much smaller scale than the wider curricular conversations.
	Spiral	A curriculum where core concepts are revisited regularly and further developed	In mathematics, in one year you might briefly cover algebra, graphing and geometry as well as three other topics, and then revisit those topics the following year and add complexity. In English, this might manifest as focussing on a genre like "war poetry" in a half term in year one and then returning to it in half term in year 2 with further poems.	In the classroom, it is vital that the links between topics are exposed. Spiralling can be used to promote long term memory techniques like retrieval practice and interleaving, but the real importance is with showing the relationships between topics.	Spiral curriculums are not to be confused with strand curriculums from Direct Instruction programmes. There is a good critical article on the difference here from the National Institute for Direct Instruction. It is also worth noting that not all subjects lend themselves to spiralling, see threads/big ideas/big questions below. For an interesting article about sequencing in designing a maths curriculum see here by Jemma Sharwood.
	Threads/Big Ideas/ Big Questions	The ideas around which a spiral curriculum would be arranged	See above	See above	You can use these overarching concepts without a spiral curriculum, but de facto if you are using them as a curricular planning tool you end up with a spiral curriculum.

					I am personally not convinced of the use of Big Ideas in science (despite their ubiquity) but Jasper Green has written a strong defence here. Claire Hill's post on threads and how an English curriculum can be woven together illustrates this nicely.
	Specificity	The extent to which the content of the curriculum are specified	The National Curriculum for biology says students should be taught about "the structural adaptations of some unicellular organisms" but it does not specify which unicellular organisms and which adaptations. This lacks specificity. A curriculum based on Core Questions would have high specificity. The National Curriculum for English has a similar lack of specificity for text choice, but high specificity for literary and linguistic terms like "cohesive device" and "fronted," for which it provides definitions and examples.	Teachers must be aware of what they are planning to teach before the lesson starts. Their resources and activities can only be determined after this central question has been answered, as different content requires different micro sequencing and instructional techniques, based on the "characteristics of knowledge" as below.	From a managerial perspective, it is important to consider how much freedom teachers are given to choose their own material. In some schools, teachers will have a lot of freedom to pick and choose. In others, things will be tighter and all teachers will be expected to teach the same material and assess centrally.
	Progression model	A progressions model is how you define "progress" as a student moves through school. Using the curriculum as a progression model means that students progress is defined as their steady movement through the curriculum and accumulation of more knowledge and skills.	Some schools will use GCSE grades as a progression model, with students coming in at year 7 at a "grade 2" and expected to improve by a grade each year until year 11. This is extremely suspect.	Your perspective of student progress has to change. Their "starting points" from KS2 to an extent become irrelevant: all that is important is how much knowledge they have acquired, independent of their "prior data" or "group membership." It also means that no limits can be placed on students: the limits of progress are the limits of all the material in any given subject.	A number of members of the history community have been thinking along these lines for some time. Michael Fordham has written on it here and described by Christine Counsell here. An outstanding outline of an art curriculum incorporating all the terminology used in this section can be found here by Sallie Stanton.
	Schema	A term from psychology used as a model of knowledge held in long term memory. The schema is how all the knowledge that someone has is arranged and interconnected in their minds.	Schema are brought to mind when you encounter new information. The better developed your schema the better able to understand new material. Students who have a well developed schema of Romantic music will be better able to understand and interpret a new piece by Mozart or Schubert.	Schema are invisible and idiosyncratic. In one chemistry student's schema, they may have conservation of mass well fleshed out in terms of mass loss and gain in reaction, but not well-related to their knowledge of balancing equations. This has important implications for new thought and processing new information.	Schema are a mainstay of cognitive and developmental psychology. An accessible introduction can be found here (Encyclopaedia Britannica) and here (psychologists Hyde and Rugg) and for how they influence thought a seminal introduction by Daniel Willingham is here
	Core/hinterland	"Core" refers to the knowledge that you expect your students to retain over the long term. Hinterland is how you couch that knowledge in the classroom.	In chemistry, the story of Fritz Haber is hinterland, knowledge of the Haber process is Core. In English, according to Counsell the entire book would be hinterland, but the particular chapter or scene of note is core.	The most obvious distinction is long term memory strategies: you do not need to do retrieval practice or spacing on material from the hinterland, but you do for the core. Instructional style may change as well, when dealing with hinterland the teacher may be more oratorial and rhetorical and employ devices more appropriate for performance than for instruction. Ben Rogers points out that it is also worth noting that there is a danger involved when using the hinterland in	Counsell is the main advocate of these terms as a curricular tool, and she describes them fully here. Bill Wilkinson has been collecting stories for use in science lessons here.

				students remembering the wrong thing. Teachers must be vigilant to this and explicit in their intentions.	
Types of knowledge	Substantive	Substantive knowledge is what is taught as established fact or content from within a particular domain	Geography: that volcanoes tend to occur at plate boundaries, the different types of plate boundary	Students learning a domain are novices, they are learning the substantive knowledge as well as the disciplinary knowledge which explains how we got to the substantive knowledge. Experts in the domain - professional scientists, studio artists, mathematicians - are in the process of using the disciplinary to add more substantive knowledge to the domain. In practice for example, professional scientists using scientific inquiry (disciplinary) to learn new things about the universe (substantive). That does not mean that novice scientists should be emulating expert scientists and learning through inquiry.	Christine Counsell elaborates extensively on the difference between these two terms here. A further and very interesting discussion of the topic by Kris Boulton can be found here, with the comments below the article being particularly illuminating.
	Disciplinary	Disciplinary knowledge represents the rules that justify what counts as established	Geography: the rules of inquiry, evidence and proof that govern whether or not Wegener's theory of continental drift is accepted.		
	Declarative	Things we know - often described as "knowing that"	Chemistry: that equations must be balanced in order to satisfy the conservation of mass History: That William the Conqueror invaded in 1066, that from the 9th to 11th centuries motte and bailey castles spread across Normandy and Britain	Declarative and procedural knowledge are generally taught quite differently, with the use of all instructional techniques being different. A worked example might be powerful for a procedure, but an annotated model answer more powerful for declarative knowledge. Ruth Walker argues that in general it can be harder to devise independent practice sequences for declarative knowledge, but there are a few techniques which are generally effective.	This is where a lot of "knowledge and skills" debates come in to play. I have deliberately not written them into this glossary as I don't think it is a particularly helpful binary. Much has been written about this, with David Didau's piece here being an excellent start. Clare Sealy's article on knowledge-rich curricula goes into much greater depth about the declarative/procedural distinction and ties it in with many other concepts as well. For more on teaching techniques and why understanding the differences is important see here
	Procedural	Procedures we know how to follow - often described as "knowing how"	Chemistry: how to balance an equation History: How to construct a historical argument about motte and bailey castles spread, incorporating evidence from a wide range of sources.		
	Disciplinary literacy	How reading and writing is governed in a particular discipline (subject)	"in Biology, a student may read an informational text about photosynthesis and assume that is it an authoritative account, suppressing thoughts about the author of the text. In contrast, in the English classroom, a student could read with an active awareness of the author and the context in which the text was authored. For maths teachers, explicitly teaching mathematical vocabulary and specific reading strategies for written problems, could support students to read like mathematicians."	It is vital for teachers to realise that literacy is not a generic skill to be shoehorned into their subject, but a vital aspect of the very fabric of their subject. Different disciplinary experts use reading and writing for fundamentally different purposes and have fundamentally different rules for governing their use. Teachers must explicitly model and teach these rules in order to allow students to fully access powerful knowledge (see below).	I took the example here from the EEF's guide on improving literacy, which is worth a read. I also recommend Pritesh's excellent "writing in science" symposium which takes a further interesting route: that writing is a tool to enhance subject based thinking (the exact opposite of how it is used in many schools).

Characteristics of knowledge	Abstract/ concrete	This axis looks at the extent to which a particular piece of knowledge is grounded in reality or existing more as an idea	See further reading for further explanation as to how to assign knowledge as abstract or concrete. In English, that Odysseus is heroic is an abstract concept. His killing of the cyclops is a concrete action. In chemistry, that the mass of an oxidation reaction increases is concrete. How a reaction reaches equilibrium is highly abstract. In mathematics, the two have a complex relationship. Generally, manipulating monetary figures is concrete, but algebra is abstract. However, these two can interact in calculations involving monetary figures and percentages.	Generally, abstract ideas are harder to understand than concrete ones, as they tend perhaps to be less relatable. When we learn things, the new information is normally integrated with pre-existing schema. Our schema can readily be brought to mind for concretes, making integration easy. But it can be harder to find something to latch onto for abstract ideas. As such, abstract ideas probably require more explicit teacher instruction in order to be fully understood. When it comes to practice, it is important for the links to be recognised between the abstract and the concrete, and interleaving practice here is probably a good idea. Often, the combination of different pieces of concrete knowledge can result in something highly abstract. Surface area is concrete, volume is concrete, but surface area to volume ratio is abstract. As a teacher, you will need to ensure that students are prepared to make the conceptual jump from one to the other through plentiful explanation and practice.	It can be difficult to assign items as abstract or concrete. I tend to think about concrete in terms of perception (i.e. we can see or hear this), action (i.e. what a person is doing) or experience (i.e. this has happened to me). Of course, some things can be concrete for some and abstract for others: a word like "poverty" may be incredibly concrete for some of our students, but highly abstract for others, the difference of course being experience. Abstract/concrete are not to be confused with universals/particulars below. You can have knowledge that is universal, but concrete (e.g. extrinsic rewards tend to decrease motivation with time). You can also have abstract ideas that are very particular (e.g. when this skydiver opens their parachute, air resistance increases)
	Universals/ particulars	A universal is a concept that can be illustrated by many different particular examples	Geography: that over time as a population increases in wealth its growth rates decrease is a universal. Demographic changes in Germany is a particular example of this. History: that dictators attempt to seize control of the media is a universal. That Turkey incarcerates vast numbers of journalists is a particular example of this principle.	Traditionally, we talk about "applying knowledge" as a holy grail of teaching. Under this model, it is the ability to perceive the universal principle that lies underneath this particular example. This is incredibly difficult to do and relies on teachers providing many different examples over time and making the jump from particular to universal to particular again completely explicit.	

	Explanatory	When a piece of knowledge must be understood before something else can be understood	Economics: details of the US auto trade must be understood before being able to get to grips with the macro-economic results of a trade tariff with Mexico. Biology: understanding surface area to volume ratio is necessary before understanding the adaptation of the root hair cell.	This is where macro and micro sequencing are important. In hierarchical sequences, the groundwork must be carefully laid and constructed to build up to the final product.	Some concepts have more explanatory power than others. Surface area to volume ratio for example is necessary for understanding root hair cells, microvilli, alveoli, animal body shape, animal foot shape, size of leaves, rates of reaction, catalyst structure, diffusion and so on and so forth.
	Catalytic knowledge	In chemistry, a catalyst makes a reaction go quicker by reducing the work required for the reaction to take place. Catalytic knowledge makes thought go quicker by reducing the work required.	Mathematics: the times tables are explanatory in that without them you can't follow complex algebra. They are also catalytic, in that the more fluent you are in them, the quicker and more efficiently you can solve algebraic problems. Physics: understanding V=IR is necessary for tackling resistance problems, but fluency in recall of the various formulae reduces the work required in interpreting and solving resistance problems (which is why students now need to know the formulae off by heart)	Understanding which knowledge is catalytic to a process you are currently teaching is vital. If students are not fluent in the catalytic knowledge, they will be slow and inefficient at solving problems and are more likely to make mistakes.	This type of knowledge probably appears most often in procedural problems like solving equations. However, knowledge of grammar and language is also catalytic in that when words flow easily and fluently it is much easier to retain a train of thought and construct an argument. If you are spending time trying to think of the right word or phrase, you are taking away from the larger problem at hand.
	Objective/ subjective	This axis denotes whether the concept is dependent on individual interpretation and experience or are independent of such.	Newton's laws are objective, whereas how a reader responds to a particular poem would be subjective.	Objective rules do not lend themselves to formats like class discussion. You cannot have a debate about Newton's laws or whether gravity exists. Even in areas which have scope to be contested (like climate change), the reason why one might contest should be based on objective fact rather than bias, inclination or emotion. Within science there is still area for debate in areas like gene editing or organ donation, but that is because a person's opinion on them is subjective.	The objective can colour the subjective experience. For example, a person with a deeper knowledge of poetic forms, structures, conventions and context (objective) might have a richer experience when reading a poem than someone without (subjective). This is why knowledge is still important in so-called creative subjects: they allow us to be more expressive and to interpret the world with more meaning and feeling.
	Ill-defined/ well-defined	An ill-defined concept is one which is open to interpretation whereas a well-defined concept is one which has strict rules governing it	In English, there may be general rules governing genres. For example, all works within a broad genre heading like "fantasy" might contain anti-realism, but within that they might also carry elements of other genres like science fiction, political allegory, dystopia or gothic. The rules governing what counts as "fantasy" and what does not are therefore expansive and fluid. Genres therefore tend to be ill-defined, with fuzziness around the edges as to what is included and what is not. Science tends to have fewer ill-defined concepts, but some items of knowledge will have multiple definitions or incomplete ones. "atom" for example has a number of different potential definitions and "molecule" is usually defined as "A collection of two or more atoms	In some subjects, you have to be fluid with your definitions. Students can find this difficult as they prefer the security of hard and fast rules to apply to unfamiliar concepts. Categorisation is a powerful conceptual tool both for schema formation and for the discipline as a whole in terms of defining its terms of reference. However, often the fuzziness is not an uncomfortable reality to have to tolerate, but the very essence of the subject, which allows for debate, creativity and subversion.	Englemann's principles of juxtaposition highlight definitional problems, and argue in favour of carefully sculpted examples by which to gather general rules to determine the boundaries of a definition. Tom Needham explains this very well here. In any discursive subject, defining terms is important. If you are dealing with ill-defined concepts debate and discussion can be very hard, as often underlying the argument is an implicit difference in how terms and concepts should be defined.

			held together by chemical bonds." However, a substance with millions of atoms is included within this definition, but no chemist would call it a molecule.		
	Context dependent/ context independent	In curricular discourse, these terms refer to how grounded the curriculum is to the students' daily lives.	Examples here could range: teaching students maths through Fortnite will qualify as context-dependent, but it uses the context aspect to teach maths. The goal would not be to teach students about Fortnite. On the other hand, teaching students about their local history, geography or culture could perhaps be construed as at the "context dependent" end of the axis, but more palatable to curriculum purists. Most school subjects contain heavy context-independent elements. It doesn't really matter where your students are from, history, literature, maths and science remain independent.	There is a live danger of using gimmicks as a tool to interest students, in that they will probably be interested in the hook and not progress to demonstrating interested in the actual content.	Michael Young is a key thinker in this area, and has argued on a number of occasions along the lines of: "It is this structuring of knowledge independently of the experience of pupils that offers the possibility for pupils to think beyond their experience and enable them, as the sociologist Basil Bernstein put it, 'to think the unthinkable and the not yet thought' (Bernstein, 2000)." See also the section on powerful knowledge below.
Curricular purposes	Utilitarian/ essentialist	Utilitarian approaches to curriculum look at how certain knowledge is useful, essentialist ones look at how the knowledge is worthy in and of itself, without regard to any particular use.	Justifying a subject like food technology as enabling students to make informed dietary choices is utilitarian. The same applies to those talking about science education as needing to fill a STEM skills gap, or geography to make informed political choices about climate change or even learning history so as not be "doomed to repeat it(s mistakes)". Essentialists argue that the purpose in studying is because the knowledge is good and worthy in and of itself: it is our students' intellectual inheritance. Studying Shakespeare might not change the choices an individual might make, but it is inherently worthy.	Motivational effects are important here. Students might become disenchanted if they have a utilitarian view of schools, and cannot see the purpose in studying maths or science or any other subject if they are "never going to use it in future." It is important that teachers emphasise the essentialist viewpoint in such cases, that it doesn't matter whether or not this knowledge will be useful, it is fundamentally worthy and important.	Michael Gove's frequent invocation of "the best of that which has been thought and said" probably lends itself to essentialism. For a take on how this applies in science, see here by Pritesh Raichura. Of course, not everyone agreed, and there is much debate around the phrase (here for example).
	Powerful knowledge	The knowledge that allows students to leave their everyday experiences and access the experiences of subject experts	Essentially any context-independent knowledge that allows students to perceive the world differently, to make predictions, explanations and to envisage alternatives. Across Young's work there are many different characteristics of powerful knowledge, beyond what can be adequately summarised here.		As discussed, Powerful Knowledge is at present not particularly well-defined, and I have struggled to summarise it here. In the words of Young and Muller "Ever since the term 'PK' entered debates in the sociology of education and curriculum studies, there has been uncertainty about what exactly it designates and implies" Interested readers can see Michael Young himself here, here or in his recent book. Christine Counsell wrote about it here, and here is a good example of principles of powerful knowledge being used to influence curriculum construction. Rebecca Foster has described well here and here how you choose texts in an English curriculum and how

					those choices are based on moving students to texts that we would not otherwise have encountered. Martin Robinson takes on contemporary tropes in assessing the relative merits of Stormzy and Mozart.
	Cultural capital	How well equipped a person is to achieve social mobility	Unfortunately, this is a fairly ill-defined concept so difficult to find examples. Ofsted define it as per the National Curriculum as “It is the essential knowledge that pupils need to be educated citizens, introducing them to the best that has been thought and said and helping to engender an appreciation of human creativity and achievement” which includes utilitarian and essentialist themes. Others, most famously ED Hirsch, include elements of having the required knowledge to be able to socially integrate with other classes.		Cultural capital is an enormous field, and I am reluctant to delve too far into it here. Interested readers are encouraged to read Willingham’s account here, Joe Kirby’s account here or ED Hirsch’s most recent book. If I am reading her correctly, Zoe Enser has written about both cultural capital and powerful knowledge as one here.