Knowledge Terminology

Term	Meaning in brief	Additional notes	Implications for curriculum
Core and hinterland	Key ideas and enriching context	Two useful terms from Christine Counsell (2018). *Core knowledge* is the key facts; *hinterland* is the enriching, meaningful context. In her analogy, reading a revision guide based on a novel would give core knowledge (characters, plot, themes, structure) and reading the entire novel would provide the hinterland. She argues both are essential. Core knowledge encompasses declarative and substantial, procedural and disciplinary knowledge	Does the curriculum express the big questions and fundamental concepts that underpin them? Does the curriculum address the most challenging ideas? 'Eliminate mediocrity - e.g. low-level tasks' (Sherrington & Caviglioli 2020) The importance of hinterland knowledge varies significantly by subject (eg.maths vs. geography). For subjects where hinterland is essential, how it is defined in the curriculum to ensure that all students receive the same quality of education is key
Key Concepts	The 'big ideas' Sometimes called 'Threshold Concepts'	key ideas in a discipline that act as a portal to new ways of thinking and understanding. They may either open up new insights or be usefully troublesome barriers (Meyer & Land, 2005) - *usefully* because they impose a difficulty which enhances long-term retention.	
Declarative knowledge	Know that	**Declarative knowledge** is our awareness and understanding of factual information about the world. Examples of declarative knowledge might include: that Princess Diana died in 1997; that Goethe was 83 when he finished writing Faust; that there is a village in Hertfordshire, England, called Ugley.	Is declarative and substantive knowledge carefully sequenced to support schema building? Is it taught to be remembered?
Substantive knowledge	Know that	If we are talking about the accepted body of declarative knowledge *in a particular discipline* (the kind of knowledge that is often made explicit in textbooks or knowledge organisers), then we call it **substantive knowledge.**	
Procedural knowledge	Know how	Knowing how to do something and how to do it skilfully. This knowledge is often implicit and more difficult to verbalise. For example, many people have the procedural knowledge that enables them to ride a bike, but would struggle to verbalise it ('physicists, on the other hand, know that the rule for riding a bicycle is to turn the handlebars so the curvature of the bike's trajectory is proportional to the angle of its imbalance divided by the square of its speed (Polanyi, 1964)).' Some distinguish between superficial procedural knowledge (I can follow an inefficient step-by-step process to achieve success) and deep	Do teachers use metacognitive talk to make these implicit procedures explicit? See the EEF's Metacognition guidance report for a useful modelling framework.

		procedural knowledge (I can select the best strategy and solve novel problems).	
Disciplinary knowledge	Know how the subject works	The way a particular field generates and verifies knowledge. This is knowledge of how a particular discipline works: the ways it accumulates knowledge (for example, empirical experimentation, source analysis, conjecture and proof) as well as how subject experts work.	Disciplinary knowledge requires explicit literacy as well as metacognitive support. Does the curriculum explicitly address these demands?

Pedagogical principles that help to ensure students know more and remember more.

Principles	Active ingredients	Description	Research	Area	Agreed terminology	Notes
Increase helpful challenge	Cognitive challenge is embedded in the curriculum and lessons	Willingham's definition 'Memory is the residue of thought' means we remember what we think about. Curriculum choices and tasks should challenge students to think hard about the things we want them to remember. In other words, it should aim to impose *germane cognitive load:* thinking devoted to the processing, construction and automation of schemas. Lessons that do not impose genuine challenge are less likely to help students retain information.	Willingham (2009) *Why Don't Students Like School* Sweller (1988) *Cognitive load during problem solving: Effects on learning*	Lesson/ curriculum design	• Learning outcome • Progression steps • 'Do it Now' abbreviated to DIN + icon • Key concepts	• Lesson materials will clearly display the learning outcome of the lesson. This will be linked to the national curriculum/subject specification where appropriate. (used instead of learning objective) • Progression steps are the small steps that a student must achieve in order to achieve the learning outcome for a lesson. The learning outcome from one lesson may form a progression step in a subsequent lesson. • DIN activities contain planned strategic retrieval practice that focuses on the core substantive and procedural knowledge for the subject. They should be used at the start of lessons and should take approx. 5 minutes with no lengthy teacher follow up (unless planned in advance). used instead of silent starter/starter) • Use of key concepts
Reduce unhelpful challenge	Teachers aim to identify and reduce unhelpful challenge	Building on the point about challenge above, it is possible to create an unhelpful level of challenge: challenge that actually impedes learning. Poorly designed instructional materials – materials that are confusing, distracting or irrelevant – impose this kind of unhelpful challenge (called		Lesson/ curriculum design	• Learning outcome • Progression steps	• Lesson materials will clearly display the learning outcome of the lesson. This will be linked to the national curriculum/subject specification where appropriate. (used instead of learning objective) • Progression steps are the small steps that a student must achieve in order to achieve the learning outcome for a lesson. The learning

		'extraneous cognitive load'). The curriculum can help to reduce extraneous cognitive load by clarifying key concepts.			• 'Do it Now' abbreviated to DIN + icon • Key concepts	outcome from one lesson may form a progression step in a subsequent lesson. • DIN activities contain planned strategic retrieval practice that focuses on the core substantive and procedural knowledge for the subject. They should be used at the start of lessons and should take approx. 5 minutes with no lengthy teacher follow up (unless planned in advance). used instead of silent starter/starter) • Use of key concepts
Explicit instruction	Teacher explanations are purposeful, clear and unambiguous	Explicit instruction is not 'lecturing' or' excessive teacher talk'. It involves planned teacher explanations, extensive practice, and independent work. Commonly explicit instruction includes: • teaching skills and concepts in small steps; • using examples and non-examples; • using clear and unambiguous language; • anticipating and planning for common misconceptions; and • highlighting essential content and removing distracting information. Rosenshine's Principles of Instruction is a popular approach.	Rosenshine (2012) *Ten Principles of Instruction* EEF SEN in Mainstream Schools guidance report (2021) Allison and Tharby (2015) *Making Every Lesson Count* Kirschner et al. (2006) *Why Minimal Guidance During Instruction Does Not Work*			
Scaffolding, worked examples and concrete examples		A **worked** example is a step-by-step demonstration of how to perform a task or solve a problem. This guidance — or **scaffolding** — can be gradually removed in subsequent problems so that students are required to complete more problem steps independently. Teachers can alternate **concrete** examples (e.g., word problems)	Deans for Impact (2015) *The Science of Learning* Rosenshine (2012) *Ten Principles of Instruction*			

		and abstract representations (e.g., mathematical formulas) to help students recognise the underlying structure of problems.	The EEF Guide to Supporting School Planning: a Tiered Approach (2021)			
Modelling	Students are explicitly taught *how* to learn.	Modelling should be used to make implicit, expert thinking explicit. EEF Metacognition guidance report: *'Teachers should verbalise their metacognitive thinking ('What do I know about problems like this? What ways of solving them have I used before?') as they approach and work through a task.'*	EEF Metacognition and Self-Regulated Learning guidance report (2018) – *see Recommendation 3 for a modelling framework*	Modelling and instructional strategies	• My turn/our turn/your turn • Key vocabulary • Work the clock	• Used to describe the stages that can be used when modelling a process (used instead of I do, we do, you do). • Language required to access the curriculum. Frayer models used where appropriate to teach this. (Used instead of golden words etc..) • Teach like a champion (TLAC) terminology for use of timings for tasks to maintain pace.
Deliberate practice	Purposeful practice Note: Though it shows promise (and has been used and studied in, for example, healthcare) deliberate practice is less strongly supported by the evidence base than the other principles listed. It has been studied most often in the domains of music, sports and chess.	It is recommended that deliberate practice includes: • highly structured activities explicitly directed at improvement of performance in a particular domain • working at the edge of competency • specific informative feedback • rigorous skills assessment • Building comfort level and confidence levels in students • Spacing practice over time	Didau and Rose (2016) *What every teacher needs to know about … psychology.* Ericsson (2008) *Deliberate practice and acquisition of expert performance: a general overview* Lemov et al. (2012) *Practice Perfect*	Deliberate practice		• Lesson materials would say 'silent deliberate practice' with an icon for silence.
Questioning	Teachers and students ask questions at lower cognitive levels (recall questions) and	Ask a large number of questions and check the responses of all students Ask questions which focus on the salient elements in the lesson;	Rosenshine (2012) *Ten Principles of Instruction*	Questioning	• Cold call • No opt out	• The teacher strategically chooses which student answers questions rather than taking hands up. (TLAC terminology, also known as no hands up)

	higher cognitive levels (questions that require students to manipulate previously learnt material) to embed knowledge, develop understanding, practice retrieval and promote metacognitive thinking.	avoid questioning students about extraneous matters. Ask 'why' and 'how' questions so that students elaborate on existing knowledge For a more comprehensive list of recommendations, see this article from the Research School Network.	Cotton (1988) *Classroom Questioning* https://researchschool.org.uk/durrington/news/what-does-the-evidence-say-about-questioning		• Hinge questions • Right is right • Rounding up	• Students always have to answer a question (although sometimes this will be after they have heard a model answer from the teacher or another student). (TLAC terminology) • https://www.futurelearn.com/info/courses/introducing-assessment-for-learning/0/steps/52664 a hinge is a point in a lesson when you need to check if students are ready to move on, and if yes, in which direction; a hinge-point question is a diagnostic question that you ask your students when you reach the hinge, responses to which give you evidence about what you and your students need to do next. • The teacher only accepts complete correct answers. They don't give approval/praise for only part of an answer. (TLAC terminology) • Rounding up is when a teacher adds detail to a student's answer. It is something to avoid – they should use right is right and if the student can't answer provide a model answer and use no opt out. (TLAC terminology)
Feedback	Feedback should aim towards (and be capable of producing) improvement in students' learning	*(From the EEF'S Teaching and Learning Toolkit):* Effective feedback tends to: • be specific, accurate and clear (e.g. "It was good because you…" rather than just "correct"); • compare what a learner is doing right now with what they have done wrong before (e.g. "I can see you were focused on improving X as it is much better than last time's Y…"); • encourage and support further effort;	EEF Teaching and Learning Toolkit Hattie and Timperley (2007) *The Power of Feedback*	Feedback	• Responsive feedback (with a purple pen icon) • Live marking	• To be used instead of DIRT or Purple pen time. • This is done through effective circulation of the class. Aim to give individual feedback to a smaller number of students each lesson and be prepared to stop the class to feedback and address any common misconceptions.

		• be given sparingly so that it is meaningful; • provide specific guidance on how to improve and not just tell students when they are wrong; • be supported with effective professional development for teachers.				
Self-testing and Retrieval practice	Lessons provide opportunities for recalling information Note: the terms are often used synonymously, though *retrieval practice* is perhaps the better term since it more accurately describes the process.	For ideas about ways to implement retrieval practice, see [this article](#) by Tom Sherrington.	Roediger and Karpicke (2003) *Test-Enhanced Learning* Weinstein et al. (2019) *Understanding How We Learn* Dunlosky et al. (2013) *Improving Students' Learning with Effective Learning Techniques* https://teacherhead.com/2019/03/03/10-techniques-for-retrieval-practice	Assessment	• Low stakes quiz	• The term for any short assessment/test outside of cycle assessments.
Spaced practice	Teachers implement a schedule of practice that spreads out study activities over time.	Students often "mass" their study—in other words, they cram. But distributing learning over time is much more effective. Longer intervals are generally more effective: 'Long delays between study periods are ideal to retain fundamental concepts that form the basis for advanced knowledge.' (Dunlosky et al 2013)	Dunlosky et al. (2013) *What Works, What Doesn't* Weinstein et al. (2019) *Understanding How We Learn* Cepeda et al. (2008) *Spacing*			• The idea that practising a particular skill or retrieving particular information is more effective when spread over time, rather than repeated sequentially over a short time period

			Effects in Learning			
Dual-coding	Combine words with visuals. (Firstly, we remember pictures better than words. Secondly, we process verbal and visual information through separate channels - hence it is 'dual coded'. Providing information in two formats increases the chance of recall.)	Dual coding is especially helpful for novice learners. Dual coding can help to make schema explicit - and show where new information belongs in an existing schema. Dual coding is **not** visuals for the sake of visuals. Poorly chosen or unnecessary visuals (or words) will increase extraneous cognitive load, impeding learning. Timelines, graphic organisers, diagrams, cartoon strips and infographics are commonly used examples of dual coding.	Weinstein et al. (2019) *Understanding How We Learn* *Clark and Paivio (1991) Dual Coding Theory and Education* *Caviglioli (2019) Dual Coding with Teachers*			
Vocabulary acquisition	Provide targeted vocabulary instruction	Teachers should prioritise teaching Tier 2 and 3 vocabulary, which students are unlikely to encounter in everyday speech The Freyer Model is a helpful way to structure teaching in definitions, characteristics, examples and non-examples. For phase-specific guidance, see the relevant EEF literacy guidance report.	EEF Literacy guidance reports Quigley (2018): *Closing the Vocabulary Gap*			