



South East Cornwall Multi Academy
Regional Trust



SMART Learning Model Version 18

***SMART LEARNERS
SMART LEADERS
SMART COMMUNITIES***

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Introduction

Since 2019 we have seen an enormous amount of interest and research focussed on the topic of curriculum in schools. OFSTED has been part of the fuel for this debate and has stated that all schools will regularly review their curriculum as it is at the heart of what schools do. In brief:

Our curriculum describes the total of all learning experiences we plan for children to benefit from whilst in our care. It covers all of the timetabled lessons but also the personal development, attitude and sense of community we are committed for children to learn.

All Headteachers, Senior leadership teams, CEO and Chair of the Trust Board of SMART have taken part in a series of debates and discussions. In these we have agreed how we want to refocus our curricula around developing learning. We have gone into great detail to read widely and challenge available research to arrive at a joint view of how we collectively believe we can best serve the current and future learning of children and adults. There is a great deal of excitement around these ideas, and senior leaders have enjoyed going back to thinking about our core purpose and looking afresh at what we teach, how we teach and most importantly, why we teach our curriculum.

There are three stages of curriculum which we have considered:

Curriculum Intent (Planned): This is what we plan to be in the curriculum and why we believe it to be important.

- Senior leaders decide the time allocation for subject employing a clear and shared rationale.
- Middle leaders structuring their subject so children's understanding develops over time.
- Teachers planning activities and approaches based on how they know children learn.

Curriculum implementation (Taught): This is how we deliver on our curriculum intent.

- Senior leaders ensuring the timetable happens without disruption, with the right ethos.
- Middle leaders knowing teaching maintains a high standard and using best practice.
- Teachers delivering the lessons that they planned to at the pace they need to.

Curriculum impact (Learned): This is knowing how well we are doing and adjusting accordingly.

- Senior leaders ensuring we continuously improve; evaluations are skilled and transparent.
- Middle leaders having enough evidence to steer teachers towards best practice.
- Teachers questioning deeply enough to know real learning is taking place.

Our Shared Vision

All schools in the Trust have a strong alignment with our shared vision as described publicly on our website <http://www.smart-trust.net/vision-principles/>

Translating our shared vision into a curriculum

Our curriculum will focus on the **E**xpectation that all children will develop conceptual understanding of the world around them through engagement with a progressive and sequentially logical curriculum that systematically builds these concepts and the essential skills required to apply them. They can expect to be challenged by all staff to link concepts between subjects in ever more complex schemas. Teachers skilled at **Q**uestioning deeply will verify that the knowledge they teach from a broad and balanced selection of disciplines, is able to be applied correctly and hence be learned and **U**nderstood. Essential skills and attitudes developed in the classroom complement the wider extracurricular and social learning enabling a positive school ethos in which **I**nspired curiosity is **P**raised by staff and peers alike.

Every Teacher and TA is a Specialist in Pedagogy, Informed by Research.

All teachers and TAs will be able to recognise when real learning has occurred by checking for understanding and what actions they should take where misconceptions still remain. They will have a wide range of pedagogies ‘in their back pocket’ and the professional autonomy to select from these when adapting their teaching to the needs of their learners. They will model lifelong learning, remaining professionally curious, questioning, challenging and evaluating new research and new ideas to continuously improve their own practice and impact.

Every Middle Leader or Subject Lead will see their main role as coaching others in Pedagogy.

Middle leaders will ensure that the curriculum they are responsible for will be progressive, ambitious, and sequential. Their main responsibility is to ensure all pupils understanding and skills progress rapidly. They must ensure challenging learning experiences for all members of their team regularly, so expertise in pedagogy grows. They will collaborate within and outside of their school for the benefit of children.

Senior Leaders establish high expectations of excellence for learners and staff.

Senior leaders have excellent professional knowledge of pedagogical approaches maintained through reading and strategic discussion. All staff are actively and intentionally provided with opportunities to continuously improve their professional practice through excellent line management, appraisal and mentoring. Low expectations are always challenged.

A brief history of our development of the model

In March 2019 after a year of debate and professional reading, we agreed as a leadership team of three primary Heads and three secondary Heads to adopt the spiral curriculum model of J. Bruner built around central core concepts and the mastery model of deeper learning that had been mostly applied to Maths teaching nationally at that stage. We agreed on adopting the SECRET skills framework and a timescale for our work on pedagogy of five years leading to every teacher being a pedagogy specialist by 2025.

In April we conducted an intensive testing of the model over five days with the Maths teams from all six schools. This work involved a full review of all current research literature in Maths and more generally. From this work we were able to formulate our working model.

In May 2019 we met with all subject leads from our 3 primary and 3 secondary schools to debate the application of the model to all subject areas and determine if there were any changes to terminology and approach we needed to take account of. This led to draft 3 of the model and a timescale for middle leaders to propose their core concepts by November.

In November 2019 a joint Trust training day was given over to arriving at core concepts in each subject area. We discovered that the process of arriving at a concrete and agreed set of concepts was exceptionally difficult. Feedback from the event was overwhelmingly positive about the opportunity to speak at such depth in each subject and the need for further discussion around pedagogy was clearly needed and requested. Many leaders felt passionately about particular approaches whilst others had previously blended spiralled their curriculum around skills or content and needed to reformulate.

In April 2020 despite Covid-19 lockdown 1, we had formulated a proposal for a set of primary concepts in the foundation subjects and a model of tracking which began being trialled in Dobwalls Primary School. The impact this was beginning to have on curriculum design and teacher intent was encouraging enough for us to plan the use of the primary model with all year 7 in all three Secondary schools from September 2021.

In November 2020 despite a further lockdown which had prevented full trialling, our second Trust Pedagogy training day conducted virtually was extremely impressive. The depth of pedagogical thinking had taken a very significant step forward and although final agreement on Secondary level core concepts eluded many of the subject areas, the primary model was critically evaluated and improved through this process arriving at a firm and applicable draft 4 of the model which all Primary schools were able to commit to implementation.

Executive summary of the SMART learning model in three pages

Our SMART Model of Learning

Real Learning: Concepts, Knowledge, Schemas and Understanding

- The aim of the curriculum is to help children build a 'Schema' of **Concepts** that structure their understanding in the same way as the branches and trunk provide the structure for a tree. **Learning is defined as any permanent change to this schema.**
- Knowledge** is attached to the schema like leaves attached to the tree. They feed and nourish the schema allowing it to expand in new directions. Even if the knowledge is then forgotten, the schema has been formed so it is much easier to learn it again.



- You can't grow branches before the trunk, the learning of concepts must be carefully sequenced with increasing complexity so the schema builds correctly by returning to the same concept on numerous occasions in different contexts as a **spiral curriculum**.
- Each context needs the relevant knowledge to support it (around 80% memorised and usable).
- This is why our model for real learning asks the teacher to sequence knowledge and understanding through a carefully crafted set of lessons we call a **learning episode**.
- How the teacher structures the learning towards a given concept must be their own design, using their pedagogical skills. One possible model for a learning episode is shown here.
- All lessons should have conceptual understanding as the final goal.

Reasoning – Ask deep 'why questions' throughout to challenge understanding.

Learning Hook – inspire links and build curiosity.

Direct Instruction – perhaps with worked examples

Low Stakes Questions– Check direct instruction was learned (80% of the knowledge on the organiser)

Fluency Practice – Repeating examples with increasing speed until recall is second nature

Variation – Question deeply to apply the knowledge in different ways and different settings.

A Space –(2wks?) so mimicking can be forgotten

Reasoning for Problem Solving – Applying the concept hidden with other ones to solve problems

Skills – essential tools that are learned through practice

- Skills underpin ALL learning. It is impossible to have any lesson or any learning taking place that does not involve both **skills and knowledge working together**.
- Some skills such as the ability to read, write, count and communicate are seen as core and are set as the priority for primary and secondary schools through English and Maths.
- Some skills are specific to one field of learning such as map reading skills, volleyball etc.
- The remaining skills are useful across numerous fields of learning. The SECRET skills model is the most comprehensive description of these and appears in summary below. A full progression ladder for each of these skills [appears on our website](#).

SECRET Skill	Cognitive	Strategic	Emotional	Social
Self-Management	Manage Risk	Be Organised	Go for it, Finish it! (Resilience)	Manage Emotions
Effective Participation	Persuade Others	Find Solutions	Identify Issues	Get Involved
Creative Thinking	Imagine	Make Links	Take Creative Risks	Question Assumptions
Reflective Learning	Set Yourself Challenges	Plan-Do-Review	Invite Feedback	Share Learning
Enquiry	Explore a Question	Evaluate Evidence	Stay Objective	Reach Conclusions
Team Working	Take Responsibility	Manage the team	Build team strengths	Evaluate the team

- SECRET skills are integrated into lessons when teachers intentionally require them in their choice of learning activity. For example, a teacher may intentionally use a group activity as a way of addressing a skills gap for pupils who find it difficult to work collaboratively.
- The balance of skills, knowledge and concepts varies from subject to subject.
- In the Early Years classroom the skills are formally teacher assessed and reported on nationally. These skills are called the Characteristics of Effective Learning (COEL).
- Coaching regularly is often seen as the most effective teaching method for developing and maintaining skills.
- Knowing how to approach the application of skills in each subject is called '**Disciplinary Knowledge**'. Subjects should adapt the SECRET skills statements to how a Scientist (for example) evaluates evidence, finds solutions etc. and then formally build this disciplinary knowledge and regular practice into the curriculum.



Assessment of learning and for learning

Formative Assessment is needed to help learners reflect on the progress they are making and help teachers modify and adapt lessons to the needs of their pupils for greatest impact.

Assessment of Concepts – Teachers and TAs will check for understanding of concepts numerous times in EVERY lesson. They know that without accurately knowing a pupil's current understanding they can't get the balance of challenge and support just right so that true learning can take place. To help teachers achieve this, our model asks subject leaders to describe the stages a pupil will go through as their understanding of the most important concepts becomes greater. This 'ladder' model allows teachers to ask questions so they can work out the current 'level' so they can move them to the next. Sometimes it will be useful for teachers to record these assessments although checking for understanding happens so often most cannot be recorded in this way. An example of how a teacher may record this for their class appears here.

Objective:	Pupils
RE1 - Shared symbols and rituals – The concept: Communities are strengthened by shared rituals, actions, 'sacred' symbols and objects.	
Shared Symbols & Rituals Y1 Understand people with the same religion or belief share the same symbols and rituals.	John, Ewan, Grace
Shared Symbols & Rituals Y2 Understand the meaning behind some symbols and rituals. Can give examples from religions and non-religions.	Sally, James, Peter
Shared Symbols & Rituals Y3 Understand symbols and rituals can be 'SACRED' and why damaging them or changing them can be offensive to a group.	Peter, Sue?
Shared Symbols & Rituals Y4 Pupils show they understand the meaning of 'Religious Expression' and can describe how some people express this through symbols, clothing and rituals.	Sam, Jane, Sarah
Shared Symbols & Rituals Y5 Pupils understand how symbols and rituals are used in religious practices such as weddings. They can suggest ideas why the symbols and rituals are used in this way.	Toby
Shared Symbols & Rituals Y6 Pupils understand ways people in groups feel closer when they have shared symbols and rituals. Can compare how different religions and non-religions achieve this.	Toby, Katie, Emma, Andrew F

Assessment of Content – To understand and apply concepts effectively learners needs to recall at least 80% of the core factual content with fluency. A **knowledge organiser** for each topic shows just this core factual 'enabling' content. Teachers use low stakes tests to discover when 80% of this has been memorised so they can progress further. Hinterland knowledge isn't normally tested but is drawn upon by pupils increasingly as they show their understanding of concepts or 'read around' the topic.

Assessment of Disciplinary Knowledge and skills – Most commonly assessed through practice activities specifically designed to test the skill. E.g. bench test in PE or orienteering for map skills. Skills are always best assessed by teaching the child the framework and coaching them in self and peer assessment rather than labelling them with a score. Subjects choose how they record progress such as using grids like the one below.

Geography Skills – Field work and How to Represent Space	Date	Needs Practice	Mastery
Map Skills Y1 (Requiring the concept of representing 3D 'Space' in 2D) Use maps of the classroom/school to find objects. Can find roads etc on aerial photos. Ability to collect information for a map from a field trip near the school site.			

Summative Assessment– Exams are still the most common form of summative (end of course) assessment. OFSTED and EEF warn that schools must be wary of over-reliance on such assessments due to their high stakes status. Whilst some teaching in how to answer tests should be done to give pupils better exam outcomes and life chances, varied forms of assessment for the purpose of learning should always remain the central focus.

Expanding on Our Shared Vision and Professional Intent: Expectations and Skills

Summary of this section

This section uses EQUIP to set out our professional expectations for all those who work with pupils and the how the skills we are aiming to teach, fit into this model. The sections of EQUIP are as follows:

- Expecting the very best of all pupils
- Questioning deeply
- Understanding our goals
- Inspiring lifelong learning
- Praising the positive

Professional Expectations and Skills

We aim to set out broad principles within which staff have the professional freedom to explore variation and develop solutions most suited to their local communities and students. For us to be more than the sum of our parts, this distribution of professional ownership to the classroom must be accompanied by honest and open collaboration so we are able to all learn from each other's research, mistakes and creativity. Such collaboration requires us to use common systems where we agree that doing so removes barriers to in depth discussion and sharing. Our learning model is our attempt at providing a common language and the minimum set of common processes and principles around which to base this, such as a common set of core concepts and a common underpinning skills framework.

Expecting the Very Best

Research curated by the EEF (Education Endowment Foundation) has suggested that a teacher believing in the child and hence having high expectations of them, correlates most strongly with their future success and self-belief. Conversely, teacher labelling in which a teacher makes assumptions about the limits of a child's abilities has been shown to be the single factor most likely to provide a barrier to the child's progress.

Occasionally, teachers will use 'scaffolding' techniques. These are when they break a problem down into smaller easier steps to enable a child to progress. High expectations mean that, like all scaffolding, the main aim is to remove it as soon as possible when it has served its purpose and the progress has been 'built'.

Professionally - Teaching requires a firm belief that every individual can achieve anything given the right conditions, opportunities, experiences and time. Such high expectations are set out as strand 1 in the National Teacher Standards. (Teacher Standards 1) but also reflected in the requirement to promote good progression for all students (Teacher Standards 2).

From the skills perspective we enable learners to develop resilience, self-efficacy and high levels of self-expectation and self-management.

Questioning Deeply

Establishing **conceptual learning as the core of our spiral curriculum** as proposed through J Bruner's work, requires skilled teachers who are able to adapt their teaching to formulate intelligent questions that discover misconceptions and then assist the learner to break and reform their schema. These skills require higher order thinking, creativity and daily problem

solving expressed through strategic questioning. Some staff have already begun experimenting with debating key questions around each common misconception.

Professionally this requires risk taking, trying new ideas, exploring new approaches, adaptability (Teacher Standard 5) and excellent understanding of subject content (Teacher Standard 3). Our core concept trackers are designed to highlight key foci for questioning. Leaders should question their own assumptions and find solutions based on evidence.

From a skills perspective we enable learners to question their assumptions, make links, take risks in their learning, engage their imagination and apply these skills to the wider community in which they live, learning to critically question and engage in local and global issues. Our teaching must aim to help formulate such applications of children's schemas.

Understanding our Goals

Before OFSTED made '**Teacher intent**' core to their new strategy we had already begun to explore the reasons why teachers selected particular approaches and particular pedagogies in the classroom. Our central goal is now to ensure that all teachers and TAs are pedagogy specialists who not only think deeply about their planned choice of approach but also continually reflect on these choices to develop deeper understanding over time as well as continually adding to the pedagogies 'in their back pocket' that they can call on as and when needed. This is expressed mainly through their detailed planning (Teacher Standard 4) but also through their analysis of and reflection on the outcomes (Teacher Standard 6).

Professionally this requires staff to invite and welcome feedback and in so doing, recognise the value of their work, sharing their learning with their colleagues. This requires leaders to adopt a transparency and professional integrity within their coaching and an openness to offering feedback and facilitating sharing.

From a skills perspective we enable learners to self and peer assess against skills frameworks so they can reflect on their own abilities with understanding. Like the teachers they are enabled to safely invite and receive feedback free of labelling.

Inspiring Lifelong Learning

Children should enjoy learning and revel in their curiosity. In developing rich schemas, forming links and removing the barrier provided by misconception, we are providing children with a greater capacity for further learning. By teaching them to think deeply, explore a topic and reach their own informed conclusions we are also protecting them from future manipulation. This forms part of teacher's wider responsibility towards the life chances of their students (Teacher Standard 8).

Professionally this requires teachers to engage in critical professional reading, to model lifelong curiosity and passion for learning. Our STAR projects are principally designed to provide a space for such professional curiosity and are often focussed on testing out and evaluation new research findings in education.

From a skills perspective we enable learners to enjoy exploring new ideas, considering different perspectives, evaluating evidence and having the space and respect to allow them to draw their own informed conclusions. The recent OFSTED subject review for RE sets out some of the reasons such skills are so essential for live in a modern pluralist society.

Praising the Positive

Not only is praise the fuel of learning, but praise also plays a pivotal role in the formation and development of effective teams and communities. Teams share values and an ethos which is exemplified by excellent practice that is publically praised and recognised. Hence our model has praise running through it and equally requires us to illustrate what we mean by success and excellence. The creation of a safe and positive classroom (Teacher Standard 7) and a wider school safe and supporting learning environment for staff (Teacher Standard 8 and Part 2) are core teacher requirements.

Professionally this requires staff to at all times adopt a professional approach to praise, recognising that whilst they should passionately and critically question all aspects of school policy and practice within their professional line management meetings, their professional duty is to actively support and praise what the community has agreed as effective practice. Leaders have a responsibility to actively recognise and praise achievement as well as actively and meaningfully collaborating in any aspect of school life that staff may be required to take ownership of and support. Anything in fact, that impacts their working practice or their view of role and purpose in school. As a Trust we use 'Hart's ladders' as a way of formally planning for all stakeholder's voices to be heard and we actively train students in representative student leadership so that their voices can be more regularly taken into account within the decision making process.

From a skills perspective we enable learners to understand their role in teams, their class and their local community by actively teaching a curriculum for developing behaviour. This curriculum requires them to take responsibility for their role in the team, praise others where this is earned and evaluate constructively where it isn't. For staff and students alike, continuous peer coaching and peer mentoring are critical components of building teams.

How we Build Our Curriculum Part 1: Shared, Clear Intent

Summary of This Section

Subject leaders must be clear and unambiguous about what they intend to achieve through their curriculum. Examples and reasons are presented.

The majority of the key terms used in our model are explained such as schema, fluency and variation.

We also set out the questions that a teacher in a well structure and well led department should be confident to answer regarding each of their lessons.

Subject Leader's Curriculum Intent

Subject teams should begin with a clear statement and agreement about what they hope to achieve through their curriculum. The OFSTED subject review for RE (May 2021) suggested that no work on curriculum design could be effective without clear guiding principles.

For example, in the case of RE such a statement may read: *All pupils will understand their own world view as part of a complex and diverse set of global religious and non-religious traditions. They will explore these as a structured journey through current academic understanding and lived experiences.*

This intent statement should be clear enough for teachers to be able to challenge the final curriculum and ensure that the core goals were not lost in the process of writing. Examinations and the practicality of schools can cause us to lose sight of the main aim of the curriculum and our ambitious goals for children around which teachers can advocate.

Setting Ambitious Learning Goals for All Pupils – Learning for Understanding

Surface learning is easy to achieve, easy to prove and easy to forget. In primary school I remember learning all the states in the USA. I proved I had learned them in a test and received a badge to show it. I can still remember some of their names today but I'm embarrassed to admit that it wasn't until a chance conversation in a snack bar at University that I realised what these states were and that this is what United States actually referred to. Fortunately this conceptual gap turned out not to be critical for my progress but our ambition must be to focus the learning time we have, on deeper, meaningful learning that leads to a change in understanding or reinforcement of patterns.

We define learning as any permanent change to the learner's schema.

Hence, all learning experiences should be building towards this goal.

Achieving this requires considerable pedagogical skills and experience and in order for a subject lead to enable teachers to achieve this, there should be clear systems of support so that they are not continually having to plan from scratch.

In this section, we define our terms more clearly so that subject leads can discuss these ideas with confidence as they coach their teams in their understanding.

Following the explanation of key ideas we have provided a list that details all of the questions a teacher could be legitimately asked of their lesson. It is helpful for subject leaders and curriculum designers to ensure answers to these questions are built in.

All of the sections in the remainder of the document seek to explain how curriculum designers and curriculum leaders can provide a supportive framework around the teacher to enable them to answer the questions listed in this section, with confidence and passion.

Schemas

When skilled teachers consider, for example how cars are built, they could ask the children to 'Think like a designer' and consider ease and comfort of use, or think like an artist and be governed by aesthetics or 'think like a scientist' and think of fuel consumption etc. Such questions help children focus more deeply on key concepts that link things together rather than on collections of facts in each subject. [See Psychology explanation of schemas.](#)

How children arrange these concepts is known as their schema. We understand a schema to be something we can hang knowledge on: an organising structure to build things around. A schema is sometimes described as being what is left when you have forgotten all the facts. Schemas make it easier to re-learn the facts because the schema has already been built to accommodate them. When we probe with deep questions we are really checking that the knowledge we have just taught has been organised in the right place in the child's schema. [See CBBC article on pre-school schemas.](#)

Children often develop completely different schemas for every subject we teach them and if we ask them to use these in different subjects it helps them link them and understand more deeply. "As a Scientist, how would you look at this problem' alerts the child to pull up their 'Think like a Scientist Schema' in their head. In most lessons, teachers help children improve the schema for their subject area. In the longer term we would like them to refer to others too. Examples include 'Thinking like a Scientist'; 'Thinking like an Artist'; for English Language we use 'Thinking like a communicator' and for English Literature 'Thinking like a critic'.

What does it mean to think like a scientist, or an artist or a historian? What we mean is that we are helping them arrange their knowledge and understanding in a way a scientist might. How we organise knowledge and answer a question from that perspective then ask them to 'Think like a... There is no real difference between how the person is making sense of maths in a primary school or in a research laboratory – both are being mathematicians just at different stages. Both are using a maths schema in different stages of development. Knowledge taught without the schema in place will be seen as a set of unconnected facts and will slip away over time.

The analogy of the 'Top Drawer'

Lots of people have a 'top drawer' or somewhere they put random things they haven't got a place for. The drawer gets full and you either need to expand to another drawer, sort it out or throw away the contents and start again. Sorting it out is hard work and requires you to think really hard about each item and where it fits in the house. Really tough items might require you to reorganise drawers or cupboards to accommodate them. In this analogy the items are knowledge and the drawers and rooms in the house are the schema. It is the role of the teacher to challenge the schema and make sure pupils do the hard work of creating a space for the knowledge. Without this, the knowledge will end up gathering in the top drawer from where the pupil will struggle to retrieve it or create links to it. Higher order questioning and requiring application of new knowledge could be thought of as ways of

helping pupils with the hard work of reorganising their existing schema to create space to fit the new knowledge into it. The underpinning skills are what they use to enable them to do this.

Taking the analogy further, different people arrange items in their house in different ways. You need to get inside the head of the owner of the home and think like them if you are to work out where they might choose to store things. Thinking like a scientist for example. Core concepts in this analogy would be the rooms.

Fluency

This is when you practise something so much it requires very little effort to retrieve it. Memorising your times tables until you are fluent in them is an example. Fluency is just memorising and so is not learning but it can help you to be more able to learn things which require fluency. The cognitivist scientists would argue that if you are fluent then you no longer need to use your short term memory and so this is freed up for more deeper thought.

Variation

This is when learning first can happen. You take the concept that has just been learned and which you may be fluent in and you apply it to a wide variety of contexts or vary the way the questions about it are answered. The variation stage requires the learner to think in depth at the new situations. The best examples of variation cause 'cognitive conflict' which forces the learner to alter their schema to accommodate a new way of looking at the same problem.

Here is an article giving more examples of how to use variation to change 'Episodic' learning (each piece of learning is remembered separately) into 'Semantic' learning (pieces of learning can be linked to each other without having to remember exactly how you learned each piece). <https://improvingteaching.co.uk/2019/10/20/deep-learning-planning-for-knowledge-transfer-responsive-teaching-update/>

Cognitive Conflict

Cognitive Conflict is the term used to describe the moment when a new piece of knowledge just doesn't fit your current schema and you have to break off a bit and start again or add a new concept as a branch to the tree. Some schools call re-learning 'the pit of doom' because it feels uncomfortable for a while until you repair it stronger. IOE demonstrated through extensive research that putting a learner in cognitive conflict and helping them get out again had the biggest impact on their future examination success in that area. Mastery learning is also based on this model.

Interleaving

Interleaving was originally designed as a way of building concepts as described above. As you reached a relevant part of your subject you might weave in part of a different topic which you had covered before but in some way links to this concept. The purpose of this is so that children can strengthen a schema built on concepts that are common to both topics and make useful links to hold their overall schema together more strongly. If it is used in this way there is some evidence ([Hausman & Kornell](#)) this builds stronger schemata and so helps children deal with more complex problems. If the material is not related through the same concepts the evidence in the same report is that it does not enhance learning and can actually worsen the situation.

Highlight opportunities for interleaving in the curriculum but be explicit about the connections and relevance to revisiting them at that point. As children's schemata become more complex they may be able to add this revisited material into the new slot that was not there before.

Application of knowledge - Reasoning

The only way to test the construction of the Schema is to see how it deals with new situations that require thought. This is sometimes called the Mastery approach. If the teacher asks a question to test understanding, and that question could be answered just with factual knowledge then they have not tested the schema. Higher order questioning is one way around this. The teacher asks 'why' following an answer. This could be answered using a memorised answer which still does not test the schema so a second why may aim to go deeper again. Dual Coding can be used to get the child to translate the work into a different form or may be used by the teacher to represent the concept in different ways—this can test the schema because it should be able to adapt.

The ultimate test for checking that knowledge is being assimilated is to require application of the knowledge into a novel context.

Ensure that teacher questioning tests the schema and not just the knowledge, by using higher order and not closed questions or by any other method, requiring the learner to show general understanding that they can adapt to new situations.

Teachers Intent, in a well structured curriculum with ongoing coaching

All teachers are subject to the National Teacher Standards which are generic descriptors of excellence in teaching. In the planning stage for a lesson, the teacher takes these skills and applies them to the specific goal of the lesson in hand. If the curriculum is well resourced and well-structured it is possible for the teacher to create more holistic planning. If their coaching is ongoing then they can develop more in-depth understanding of pedagogy.

Hence an outstanding teacher, delivering a well-resourced curriculum in a supportive coaching environment when asked about their intent will be expected to have thought through and pre-empted the following questions:

1. Why is it important for pupils to be studying this subject?

To answer this question the teacher must have been involved in regular discussions with their subject leader and should understand the curriculum intent statement and 'why' they are passionate about this subject's inclusion in the pupil's education. They should also be looking for links and always mindful that they are building a subject schema of which this lesson is just a part.

2. What is the substantive knowledge you are hoping will be learned?

Substantive knowledge comprises, the concept which is the main focus for the learning and the factual knowledge that is needed to support it. The term 'knowledge' has been confused by varied usage in recent years and particularly by an active train of thought calling itself 'knowledge rich' which really meant 'factual content rich'. Hence we need to define it clearly here so that staff can recognise these differences. By Knowledge we refer to both factual content and the concepts that hold this content together.

When teaching substantive knowledge, the teacher has to have a clear sense of the section of the schema they are hoping to help strengthen. They need to understand the misconceptions, the key words, the key ideas and how this section of the schema links to other areas of learning and other parts of their subject. Hence, appropriate questions that could be asked of the teacher include:

- a. How many lessons have you devoted to this particular learning episode and which one of the series is this one?
- b. What is the core concept this whole learning episode is building towards?
- c. What is the minimum core factual content that will be needed and how have you ensured the pupils are fluent in at least 70% of these terms?
- d. Do the pupils have access to this minimum core factual content perhaps in the form of a knowledge organiser?
- e. What are the most common misconceptions associated with this concept?
- f. What other smaller concepts are embedded in this knowledge that you are aware of and could any misconceptions impact on understanding?
- g. What questions might you use to uncover mimicry and tell if pupils genuinely understand or are pretending to?

- h. If you plan to use scaffolding, how and when will you remove it so all learners have access to progress in this core concept?
- i. What hinterland knowledge do you feel might help?
- j. What links to other subject areas could you use and what parts of the curriculum in this subject could you link with where appropriate?
- k. What approach and which pedagogies have you chosen for this lesson and why?
- l. When was the last time these pupils encountered this core concept and how do you plan linking back to this learning?
- m. Which pupils do you believe currently have misconceptions in the core concept and how deep are their gaps? What strategies do you have to ensure they make progress on this occasion?

3. What Disciplinary Knowledge and skills training are you interweaving into your lesson?

The simplest definition of Disciplinary Knowledge is probably 'Ways of knowing'. It is a set of skills that enable the learner to not be a passive recipient but rather an intelligent, critical and engaged inquisitor. The SECRET skills framework provides a description of the 24 generic areas of skill and these should be tailored to the specific ways in which they operate in a particular subject. For example, if you consider 'Evaluate Evidence' then knowing how to do this 'As a Scientist' may be different to 'As a Philosopher' or 'As a Journalist'. Appropriate questions for the teacher could include:

- a. Which skill or skills are you integrating into this lesson?
- b. How has your choice of pedagogy or approach been guided by your wish to improve the disciplinary knowledge?
- c. What factual content and words do they need to be fluent in to apply the skills you want them to 'as a historian (for example)' in this context?
- d. What will you consider success in the use of these skills? Do you have points of progression in mind?
- e. Which pupils do you know to have difficulties with the skills you aim to be employing and how are you aiming to ensure their progress in skill development?
- f. What opportunities are there for peer and self-assessment of these skills?

4. How will you assess the impact of your work and reflect on your approach?

Numerous techniques for formative ongoing assessment should be in place for the teacher to use.

- Pupils' use of hinterland knowledge should be praised as evidence of wider reading and wider application and understanding of concepts, but assessments should not be dependent on any specific item of hinterland knowledge.
- Substantive factual content from knowledge organisers can be tested through a range of low stakes tests and quizzes. Marks in these don't tend to be labelling as for most pupils' success is through a mixture of memory techniques and effort.

- Conceptual understanding is usually assessed by interrogative questioning by the teacher but some methods such as multiple choice questions that contain options that draw on the most common misconceptions, and longer writing tasks conducted under test conditions can draw out some of the most common misconceptions.
- Readiness for examination. Ensuring that pupils can answer examination questions effectively is part of our responsibility as educators, knowing the enormous impact on future prospects such exams can have. Examination questions can also sometimes be used for diagnostic formative assessment, particularly if you feel that you need to test for a threshold before going on.
- Disciplinary knowledge and skills. These require regular practice and assessments can go up and down depending on the application and the practice. It can be enormously counter-productive therefore, for a teacher to share such assessments with pupils. In almost every case, such assessments are better conducted by teaching the pupil to apply a rubric to their work or to their peers. The evidence of their work and their application of the rubric can then be questioned rather than directly questioning their abilities.

Hence the kinds of questions that may be asked of teachers include:

- a. What forms of assessment are you planning to use and why?
- b. What data and assessment did you use when planning your lesson?
- c. In what ways have you changed your approach as a result of your assessments?
- d. Which pupils surprised you this lesson?
- e. What have you put in place to support pupils with SEND? Are they working?
- f. Where are the greatest misconceptions and gaps in the learning and how are you intervening to address these?

5. What steps have you taken to create a productive and positive classroom ethos?

In order for the teacher and pupils to have the mental space and concentration to delve into educational pedagogy they will have needed to establish a strong set of habits and classroom procedures as well as a classroom ethos that supports high aspiration and a safe environment in which to ask questions and fail. Skilled teachers may integrate much of the learning around this into their disciplinary knowledge section, creating a notion of what it means to be a 'Geographer' etc. Hence there is overlap with that section but questions may include:

- a. How do you ensure pupils feel safe enough to offer suggestions?
- b. How do you use praise constructively and strategically in your classroom?
- c. Who in the school do you use to support you when cases are more challenging?
- d. How do you act when you have concerns over safeguarding?
- e. Which systems do you use which are consistent in every classroom in the school and which ones would pupils experience differently here? What is your thinking behind these differences?

How we Build Our Curriculum Part 2: Substantive Knowledge: Concepts

Content and Concepts

Knowing that teachers require clearly defined core concepts around which to build their learning, a key responsibility of the subject lead is to define these concepts and the content that supports them.

What is a Core Concept?

A concept is an abstract idea (Oxford Dictionary), meaning an idea abstracted or separated from its context. An idea that can be applied to lots of different situations and contexts.

An example may be the concept of 'Design'. To design well requires understanding of ideas of being fit for purpose, materials science, empathy, aesthetics, cost, etc. Children revisit this concept many times, building up the complexity of their understanding.



A key test for understanding of a concept is, giving an example of what it is NOT and WHY.

Every misconception and poorly understood concept holds a child back and sets up a 'gap' in their learning which they struggle to close later. Such gaps may partly explain why an average disadvantaged child makes two years less progress than their peers by Year 11 even if the period of hardship or trauma (when the gaps first opened up) was many years earlier.

Our ambition for this phase of our model is to identify between 3 and 5 concepts per subject that have greatest impact and name these our Core Concepts. We then will build our curriculum around these, checking regularly for good development without misconceptions.

The method suggested in the Science and RE OFSTED reviews (May 2021), which both heavily endorsed the central role of concepts within curriculum design, was to work from the academic study of these subjects then track these back to the earliest possible age.

Both reviews then recommended spiralling the curriculum to ensure that these core concepts were revisited regularly.

In our work with subject leaders in the Trust we have often found a desire to keep concepts and skills intertwined. Whilst we entirely support the complete integration of content, concepts and skills in teaching and planning, the assessment methods are very different for these three pillars of the curriculum and hence we need to be explicit about what the core

concepts are, separately from the skills. The following table is designed to help make this distinction by providing clear rules.

It is impossible to conceive of a lesson that didn't involve both knowledge and skills intertwined but it is worth making a distinction between the differences.

What is a Concept	What is a Skill
An idea you learn in one topic and then apply in a different topic in an abstract way. You would need to explain the link you made to those who don't yet understand. E.g. energy change in leaves and in cars	Generic skills, like concepts can be learned in one area and applied to another but you tend to be able to apply it in the same way. E.g. writing, evaluating, catching, concentrating.
Something you can almost feel clicking into place when you learn it – like an 'aha moment'. It changes how you think about ideas. You may feel the need to revisit ideas you had before and re-order them. You rarely go backwards from this point back to your previous understanding.	- Something that improves the more you practise but you also often get worse at it if you don't practise for a long time. - It can be practised in a way that doesn't directly link to the all the other skills you have.
- A barrier that holds you back from progressing because you 'don't get it'. - If you get to a stage you can't understand, your progress stops until you pass this threshold. This can make future learning much harder and cause gaps to widen.	Something someone can show you how to do, you copy them. With their help you become aware of how to do it better (consciously incompetent) then you become able to practise and self-improve (consciously competent).
Concepts are developmental. You need to keep revisiting them to build up your understanding over time. Like the trunk of a tree getting wider and fuller as it grows.	Skills can be practised until your body assimilates them into a permanent change. The ability to ride a bike could be argued, requires a permanent change to your schema. Some also draw comparison to concepts as 'brain muscles' like 'muscle memory'. Beckham's conceptual understanding of aerodynamics was present even if he wasn't aware of it!

How to Describe our Spiral Curriculum?

The next step, having identified the core concepts is to sequence the curriculum such that they are revisited regularly.

Departments and subject leads have used one of the following four ways to plan out this spiral.

Method 1 – Colour coding

Each core concept is allocated a different colour and this allows the frequency of revisiting them to be easily seen. The following example is a November 2020 draft of the Secondary Geography at KS3. When teachers are planning their work they can instantly see the core concept that their topic is focussed on and working towards.

KS 3 Assessment and Concept Tracker 2020/2021

Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
7 topic	Introduction - What is Geography? - Physical and Human - Atlases, globes and maps	Mapping/Mapskills - Direction - Distance/scale - Grid Ref - Symbols - Relief	UK - Cities/counties - UK weather - Transport - Tourism - Development - Economy	Flooding - UK Flooding - Causes/effects - Boscastle - Bangladesh comparison	China - China or Not? - Hum/Phys - Made in China - Urban - Rural - Compare	Settlement - FIELDWORK - Site Factors - Hierarchy - Function - Assessment
7 Assessment	Baseline	Mapskills test	UK Economy	Boscastle	Comparison UK	Looe
Key Concepts	Place, Scale	Place, Scale	Place Cultural Physical Processes	Physical Processes Env. Int	Interdependence Cultural Place	Human Processes Place
8 topic	Coasts - Waves - Processes - Landforms - Defence	Rivers - Water cycle - Drainage basin - River Changes - River features - Human uses	Tectonics - Structure - Tectonic theory - Boundaries - Earthquakes - PPP - Haiti/Japan	Tectonics - Volcanoes - Mt St Helens	Crime - Classify - Prioritise - Mapping - GIS - Planning out Crime	
8 Assessment	Knowledge Test Coastal Features	Knowledge Test	EQ PPP assessment	Mt St Helens	GIS Police.UK	
Key Concepts	Phys. Process Env. Int	Phys. Process Env. Int	Phys. Process	Phys. Process	Hum. Process Culture	
9 topic	Weather Hazards - Weather - Tornado - Hurricane - Drought	Climate and climate change Antarctica - UK Climate - Greenhouse Effect - Global Warming	Ecosystems/TRF - Trophic Levels - Biomes - TRF	Development/LIC - Indicators - Patterns - Ghana	Development/LIC - Ghana - Fair Trade - Gap	Urban Life Globalisation NEW UNIT
9 Assessment	Hurricane Katrina	Letter to Trump	D2A			
Key Concepts	Phys. Process Env. Int	Sus. Dev	Sus. Dev Env. Int Scale	Culture Place	Hum. Process Interdependence	Interdependence Place

Place; Scale; Interdependence; Physical and human processes; Environmental interaction and sustainable development
Cultural understanding and diversity

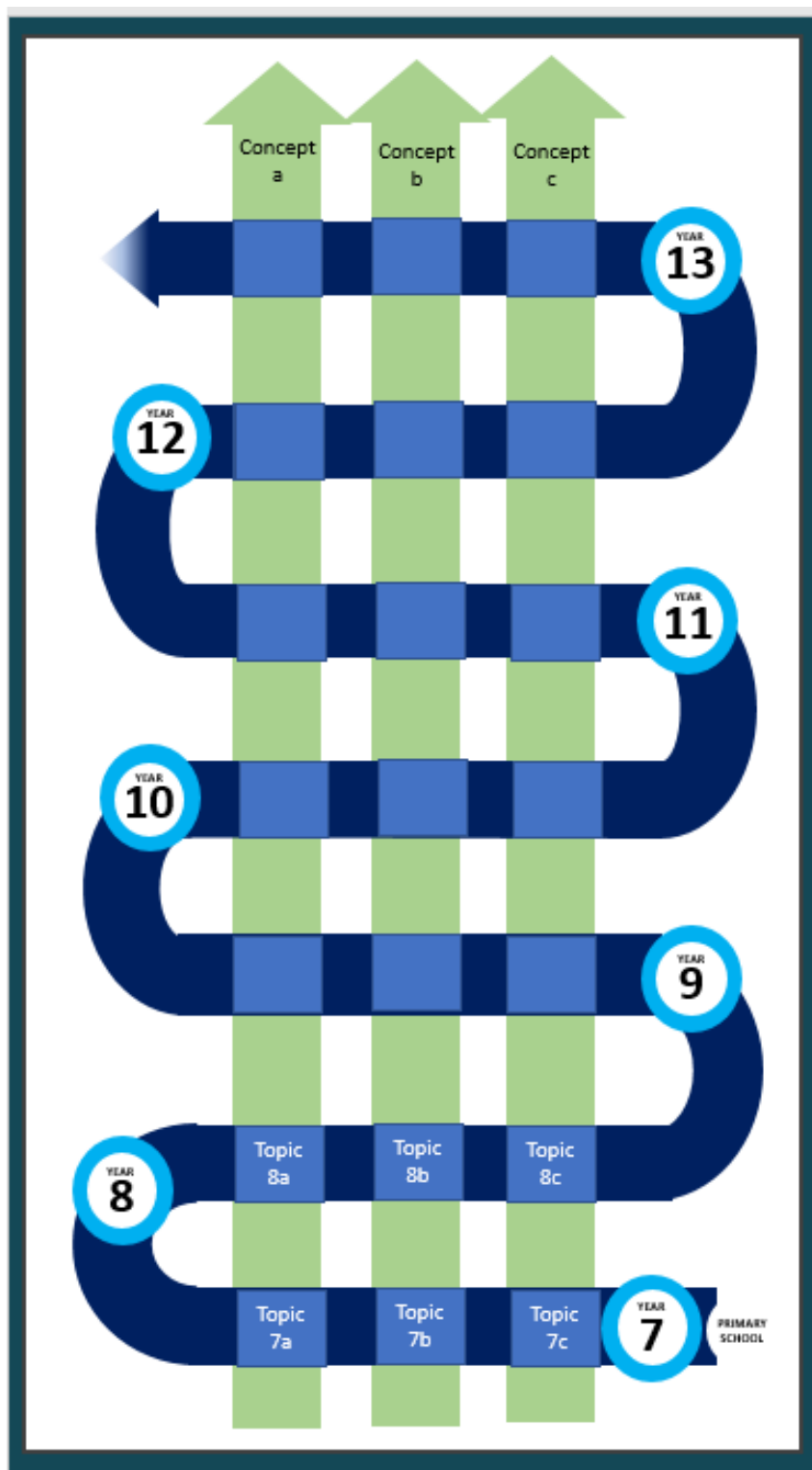
Method 2 – Snakes

The regularity of the curriculum model in some subjects means that only one core concept can be focussed on at a time and these can be placed almost exactly a year apart in the planning. Such a neat curriculum model lends itself to a much simpler graphic as shown below.

The diagram illustrates a curriculum model where concepts are introduced sequentially over time. It features a horizontal timeline with a circular marker indicating 'YEAR 13'. Above the timeline, three green arrows point upwards, labeled 'Concept a', 'Concept b', and 'Concept c' respectively, representing the focus of the curriculum at different points in time.

The three concepts (Concept a, b and c) are further reinforced by naming the topics that focus on them 7a, 7b and 7c.

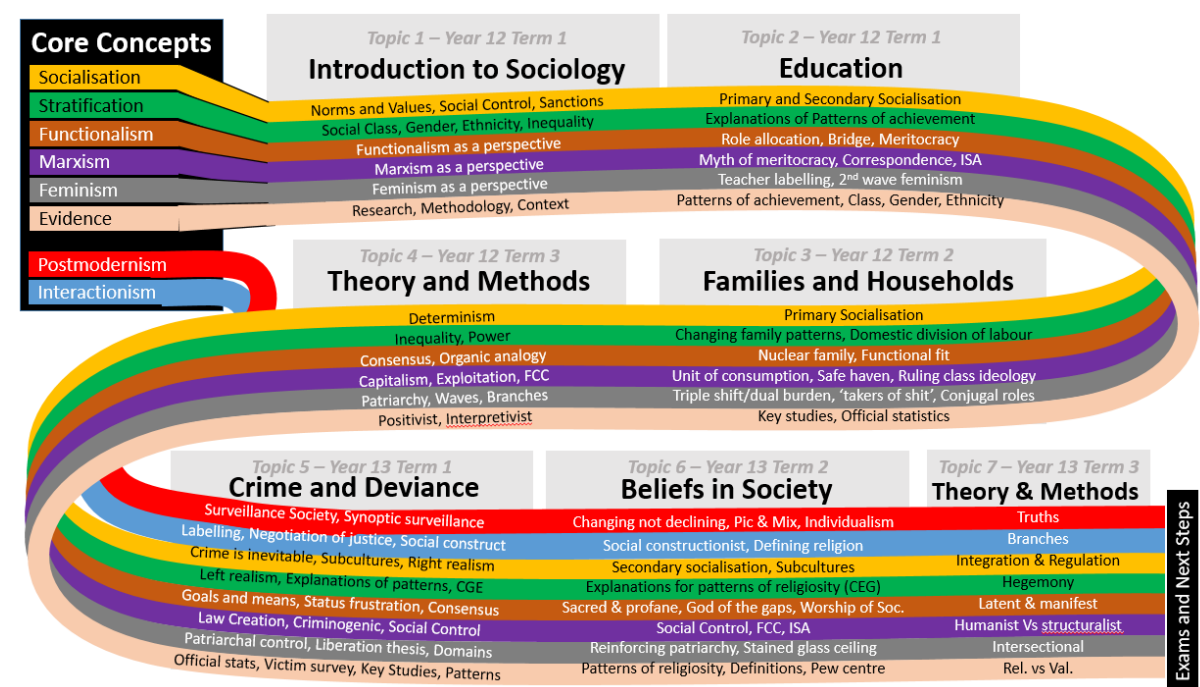
Some subjects have used diagrams like this one even if the topics do not appear every year or do not occur at the same times each year but simply to illustrate the way in which the concepts and the content overlap.



Model 3 – Ribbons

This is particularly suited to those subjects in which the core concepts must be revisited more regularly throughout the course, particularly in A level courses when the pace of delivery of new content is higher as is the number of hours a week of work. This model also allows for new concepts to be introduced at a later stage in the study.

The example below relates to A level Sociology. Each concept is denoted by a different colour ribbon. The learning episodes in each topic are then written on the ribbon.



How we Build Our Curriculum Part 3: Substantive Knowledge: Content

How to Make the Core Content Accessible?

Once the core concepts are decided and sequenced, the next task is to ensure that no pupil is prevented from the opportunity to engage with these as a result of a lack of core content knowledge.

In 2019 the OECD found that 17% of 15 year olds in the UK were unable to identify the main idea in a text of moderate length or find information based on explicit, though sometimes complex criteria. https://www.oecd.org/pisa/publications/PISA2018_CN_GBR.pdf

Six research articles in recognised journals from [2010](#) to [2016](#), have demonstrated that fluency in key vocabulary is the best predictor of later comprehension and understanding in pupils. By Secondary age the ability of the pupils to construct sentences with these terms and understand them in conversation begins to take over as the more important indicator, but for all year groups it is critical that we make explicit the key terms we are using and develop oracy in the classroom insisting that these key terms are correctly used when pupils are in discussion about the topic.

In [May 2021](#) OFSTED reiterated the additional benefits to pupils with SEND of having these key terms identified and used in this way.

Knowledge Organisers – Making Critical Knowledge More Accessible

The most common solution used by departments and subject leads across the Trust is to identify this core content is the use of knowledge organisers.

These have now in many case been shared online with parents and were found to be an extremely useful tool by parents aiming to support their child during the pandemic.

As well as being posted online, some subjects have experimented with laminated ‘mats’ that the pupil does their work on so they can reference the core content. Others have used booklets at home and at school.

Common elements include:

- A vocabulary list in a table with the word and meaning side by side. Parents have found these particularly useful as they have been able to ask their children to provide them with definitions for terms or read the definition and ask the child to say the word.
- Key diagrams that summarise key points and are likely to be remembered more easily.
- Clickable links on the electronic version to find out more or to hear the word spoken.
- Use of dual coding to make some of the content more accessible.
- Making organisers very specific to particular topics so each one can contain less.

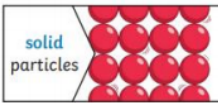
It is important not to crowd the organiser with information and to focus just on the information that will help the pupil to develop their understanding and achieve mastery of the core concepts that the topic is focussed on.

The following example has been taken from the website of Dobwalls Primary.

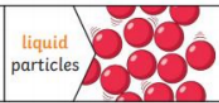
Knowledge Organiser Year 5 Science: Properties and changes of materials

Key Vocabulary	
solid	One of the three states of matter. Solid particles are very close together, meaning solids, such as wood or glass hold their shape.
liquid	Particles are more loosely packed than solids and can move around each other. This state of matter can flow and take the shape of their container e.g. milk is a liquid.
gas	Gas particles are further apart than solid or liquids and they are free to move around. Oxygen is a gas.
transparent	A material which lets light through e.g. glass
translucent	A material which allows some light through
opaque	A material which does not let light through
flexible	How a material bends, stretches
conductor	Electricity can easily travel through
insulator	Does not allow heat or electricity to travel through

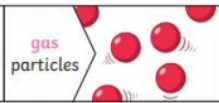
Changes of state: Materials can change into solids, liquids and gases when heated or cooled.



solid particles



liquid particles



gas particles

Concept: Chemistry

Key knowledge: materials are the substance that something is made out of. Different materials are used for particular jobs based on their properties: electrical conductivity, flexibility, hardness, insulators, magnetism, solubility, transparency

Dissolving
A solution is made when **solid** particles are mixed with **liquid** particles. **Materials** that will dissolve are known as soluble. **Materials** that won't dissolve are known as insoluble. A suspension is when the particles don't dissolve.



Sugar is a soluble **material**.



Sand is an insoluble **material**.

Irreversible changes results in a new product being made e.g. burning wood, mixing vinegar and milk.

Reversible changes (such as mixing and dissolving liquids and solids together) can be reversed by **separating** materials using these methods ...

sieve



filter



evaporate



Low Stakes Tests, 'Do it Now' and Retrieval Practices

Research in language reading suggests that you need to know between 95% and 93% of the words you are reading if you are to understand the text, but most of these studies are for those developing a second language. When we assume the pupil is fluent in the language studies suggest they need to know 65%-70% to achieve a pass mark in examinations. Laufer (1989).

We have therefore arrived at 80% as our minimum expectation for the core content and we are suggesting that teachers conduct low stakes quizzes and tests to reassure themselves that at least 80% of the key terms are fluently known before progressing. Those who achieve less than 80% are at risk of failing to understand the tasks, lessons and discussions and so will find it much harder to achieve understanding of the core concept.

The key terms the teacher is planning to use can be placed in a 'Do it now' activity at the start of the lesson to help pupils recall / retrieve the information they need for the task to come. These tasks can also alert the pupil about possible links to earlier learning that is related to the topic in the lesson.

How we Build Our Curriculum Part 4: Disciplinary Knowledge: Ways of Knowing and Skills

Skills and Disciplinary Knowledge

It is impossible to think of an effective lesson that does not contain both Skills and Knowledge working together.

There is an array of skills a learner needs to use to learn effectively. For example, a child with limited resilience is unlikely to stick with learning long enough to challenge their own schema if knowledge doesn't fit. Essential skills work best when they are practised often enough to become habits.

The OECD has pointed out the UK over recent years has downgraded the importance of skills more than most countries and highlights this as a critical trend that needs reversing. In order to do this coherently a school needs to define what it means by the skills and how they can be built continuously from classroom to classroom. As a Trust we have recently gone further than this by all agreeing to all use the same skills framework so that exemplary work can be shared between sites.

Literacy Skills

The skills of, Reading, Writing, Speaking and Listening provide the greatest barrier to progress in learning if they are not regularly practiced. All of our schools prioritise regular practice in these skills. ICT literacy is sometimes included in this set particularly where the basic use of a computer is expected regularly for access to the curriculum.

Underpinning Skills (SECRET Skills)

This is the set of skills which underpin all learning. They are referred to by a confusing array of names but all essentially mean the same thing. You will see then referred to as:

- Metacognitive skills
- Soft skills
- Essential skills
- Learning to learn skills
- PLTS (Personal Learning and Thinking Skills)
- Competencies / Core competencies
- Capabilities / Core capabilities
- Essential Learnings
- COEL (Characteristics of Effective Learning)
- SEAL (Social Emotional Aspects of Learning)
- Learning Powers
- The 3 (5, 7) Cs

In the early years (EYFS) these skills are set out through the national curriculum so are common to our schools already. In KS2-5 we will adopt the SECRET skills framework and in KS1 we will assist children in their transition to it.

The SECRET skills framework was arrived at originally through work funded by the UK government's QCA (Qualifications and Curriculum Authority). At the time it was recognised that although the essential skills are the same in all countries, the names given to them are different, causing confusion and lack of progress. For the SECRET skills the 54 most commonly used skills frameworks internationally were amalgamated to form a universal set which has since been adopted by schools in a number of countries. It is the set that was used to form EQUIP which is used as the vision of the Trust.

The 6 skill areas each have a Social (share it), Emotional (feel it), Cognitive (think) and Strategic (work it out) skill associated with them making 24 in total.

Skill Area	Specific skills			
	Think	Work it out	Feel it	Share it
Self Managers	Manage Risk	Be Organised	Go for it, finish it!	Manage Emotions
Effective Participators	Persuade Others	Find Solutions	Identify Issues	Get Involved
Creative Thinkers	Imagine	Make Links	Take Creative Risks	Question Assumptions
Reflective Learners	Set Yourself Challenges	Plan-Do-Review	Invite Feedback	Share Learning
Enquirers	Explore a Question	Evaluate Evidence	Stay Objective	Reach Conclusions
Team Workers	Take Responsibility	Manage the team	Build team strengths	Evaluate the team

Each of the 24 skills has descriptors from KS2 to adult so next steps are understood by all learners. A copy of these can be found on the [SMART Trust website](#).

Disciplinary Knowledge

The way in which the SECRET skills are applied can vary from subject to subject. For example, take the skill of 'Evaluate Evidence'. Even though the underpinning skill is essentially the same, how you do this in Science is different from how you do it in History or English.

We call knowing how to apply a skill, 'disciplinary knowledge'. The Scientific Method for investigation is an example of disciplinary knowledge that is needed if you are able to practice the four SECRET skills of 'explore a question', 'evaluate evidence', 'stay objective' and 'reach conclusions', in a Science context.

Subject leaders are able to take the framework of the SECRET skills and build them into their teaching of disciplinary knowledge in their subject.

Subject Specific Skills

Some skills are unique to a particular subject area. Examples could include map reading, kicking an effective corner kick, accurate use of a measuring cylinder, etc. These are skills that the subject leader must find ways to integrate into their curriculum regularly enough for practice to be maintained and find ways to assess and help pupils improve.

Integrating Skills into the Curriculum

Skills require regular practice and so are usually overlaid on top of a curriculum once it has been completed. This can be done formally by putting in assessment points or it can be done less formally by asking the teacher to integrate opportunities where they are most appropriate. For example, improving team working can be done where the teacher feels the lesson content would fit well, whereas the skills of enquiry may need to be done through an in depth investigation module built into the curriculum.

Some skills training requires the use of equipment or school facilities and so the management of the curriculum may need to take into account rotas to share access to this resource.

Skills mapping should be done to ensure that coverage of the desired skills happen regularly enough to make them meaningful and to ensure that over a five year period the range of skills taught is comprehensive.

Teaching Skills through Coaching

Subject leaders should recognise that the teaching or coaching progress in skills requires different approaches and pedagogies and ensure these are included in how they develop their staff team.

- Skills training is most effective when the learner has a good understanding of their next step and is able to practise independently. This is usually achieved by providing a rubric which is written in accessible language. Rubrics for all of the SECRET skills are provided on the [SMART Trust website](#). Rubrics for literacy skills and writing frames are used by some schools.
- Skills training is most effective when it is evidence based. This is achieved most effectively by the teacher asking the pupil to assess their own work or a peer's work

against a rubric and then by asking questions to draw out evidence. This empowers the learner in the long run to assess more accurately.

- Skills training is most effective when the feedback can be acted on directly. This is normally achieved through a coaching conversation in which the learner is inspired with a new idea of motivated to try again following advice and encouragement.
- Skills training is best suited to coaching approaches in which the trainer attempts to avoid giving direct instructions but instead uses coaching conversations to encourage the pupil to reflect more deeply and come up with credible coached ideas.

Assessment

Methods agreed at Subject and School level

Formative Assessment

Teachers should select a range of assessment methods that inform them of their own impact and help them to adapt their teaching to meet the needs of the class.

Formative assessment should not be high stakes or used for accountability purposes as it is a diagnostic tool that is designed to uncover concerns for the teacher's own benefit.

Schools should focus on the question of how the teacher is adapting their work and how well it meets the need. There should be as wide a scope as possible for teachers to experiment and probe as they need to.

	Knowledge (Content)	Application (Context)	Understanding (Concept)	Skills and aptitudes
What low stakes tests are used for formative assessment by the teacher and not for accountability?	Knowledge checks Fact checks Quizzes	Practice exam questions Self-mark papers	Teacher questioning for understanding Misconception multi-choice	Teacher observation Peer and self-assessment from a rubric
What assessments are passed on to the next teacher at the end of a year for information	The typical percentage the child achieves in knowledge checks?	Exam scores and test scores?	Concept tracker	Effort grades Coursework grades Skills rubrics
What is the main purpose of assessment?	To inform the teacher if the child's retrieval practices need work	To inform people how well the child does in exams	To inform the teacher if the child has any barriers to their understanding	To help the teacher choose appropriate coaching strategies
Evidence for QA and Accountability	Hard to use knowledge checks as they are 'low stakes'	Exam performance (the easy one!)	Triangulate the concept tracker with questioning children	Are there skills assessments in use?

The role of the subject leader in formative assessment

Making accurate assessments of pupils as they are learning and then using these assessments to adapt your approach is incredibly skilled work. Such professional skills is only achieved by Teachers and TAs after numerous years of experience and coaching.

It is the role of the subject leader to help each teacher and TA in their team continuously improve in these skills. There are a number of ways in which they can approach this but the most widely used in the Trust is that of triangulation.

To triangulate formative assessments the line manager or pedagogy specialist takes information from three sources to combine it.

1. **Observation** - They will observe the member of staff teaching and particularly the questioning of pupils and the adaptive measures they take in response to answers.
2. **Talking to pupils** - They will look at the work the pupils are doing, what they have completed previously and talk to them about their work.
3. **Talking to staff** – They will listen to the teacher’s assessments of the pupils and understand their intent for the lesson compared to the direction it went in.

The questions the observer asks will depend upon which type of formative assessment they are commenting on.

When observing the teacher’s use of formative assessment when teaching skills, the observer may be interested in the following areas in order to advise the teacher:

1. Observing how the teacher watches the pupil practising the skill or analyses the outcomes and how well the teacher diagnoses which advice would help to coach the pupil to improved performance. Are they tactful in their balance between nurture and challenge such that the pupil is motivated to continue and keen to immediately try out the suggestions. Did they refer the pupil to a rubric of any kind or involve peers to ensure that the pupil is able to use other sources for advice and coaching.
2. Talking to pupils they may be keen to see if they access a rubric or can independently know what their next steps are. They may ask the pupil to recall their previous level of skill and compare it to their current one to see if they appreciated the steps they have taken and how coaching helped them.
3. In their discussion regarding intent, the observer may ask about all of the pupils and where they are in terms of development of the skill in question. They may ask how the teacher remembers this and what notes they keep to remind them. They may ask when the teacher plans to practise this skill again and if the lesson made them feel this should be sooner or later than planned. They may ask if any pupil made particular progress and caused them to increase or decrease the level of challenge they had planned for them.

When observing the teacher's use of formative assessment when teaching concepts, the observer may be interested in the following areas in order to advise the teacher:

1. Observing how the teacher questions the pupil and which pupils they decide to focus this questioning on. How the teacher uses a range of contexts with some pupils. How open ended and complex the questioning is.
2. Talking to pupils they may use similar expert questioning to the teacher so they may come to their own conclusions about which pupils are on the 'gap list' for the concept and which have understood. They will look for signs of mimicking and if there are ways that pupils could avoid thinking deeply.
3. In their discussion regarding intent, the observer would be keen to know the journey the teacher has taken the class on. What knowledge had they ensured the class were fluent in? What concept were they intending to develop? How did they know which pupils had yet to understand the concept BEFORE the lesson? Which pupils do they feel progressed in their understanding and how did they find out? Which pupils did they suspect of mimicking?

When observing the teacher's use of formative assessment when teaching content and application of content, the observer may be interested in the following areas in order to advise the teacher:

1. Observing how the teacher insists on the correct language and provides opportunities for the pupils to hear, use, write and read the key language as well as interpret sentences and questions that contain the language. They may observe how the teacher makes use of knowledge organisers and wall displays to introduce independent sources for the pupil. For some pupils they may be increasing the pace to test their fluency. They may observe what 'do it now' activity or preparation the pupils were given to remind them of linked terms.
2. Talking to pupils they may test them on the meaning of words and how they would use them. They may see how the pupils automatically use the correct terms without being prompted to do so. They may question the pupil on their wider reading or to see if they have made the link between where these words may have appeared before. They may test comprehension and how well the correct terminology can be explored by the pupil.
3. In their discussion regarding intent, the observer would be keen to know how the core content had been decided. They may ask how secure the teacher is that the class are fluent in enough of the content knowledge to progress. They may ask about specific pupils who appear to be ahead or behind.

Summative Assessment

Summative assessments is when we attempt to sum up all of the educational gains and progress made by a child normally over the period of a year or a term.

Summative assessments play a number of roles including.

1. At a personal level, these assessments recognise the achievements of the pupil.
2. At a teacher level, these assessments give the teacher useful feedback on the impact of their work and useful information about classes they are about to start working with.
3. At a departmental or subject leader level they give useful feedback on how effective their support of individual teachers has been, how effective their policies have been and what impact their leadership is having.
4. At the whole school level it provides impact measures that can be used to focus support and training as well as to evaluate whole school measures with particular groups and developments that may be needed in the future.
5. At the governmental level they can be used as an indicator of how successful the school is being.
6. For parents it can give them reassurance if the progress is in line with expectations and support if it isn't.
7. For governors and Trustees it focusses their future scrutiny and accountability.

Some of the most successful education systems in the world separate out these roles so they don't get confused. Separate assessments are used for accountability compared to those that give information to the individual. The UK currently subjects its pupils to more examinations than any other developed country and uses these for both accountability and personal qualifications making them amongst the highest status assessments anywhere in the world.

The UK also focusses its assessment more narrowly just on knowledge and application tests at the expense of assessing skills and understanding. The OECD in 2018 warned that these policies were damaging to the education system and individuals in it. They were giving evidence to the education committee who agreed with them. OFSTED reviewed its practices and have attempted to shift the balance back onto summative assessment that is focussed on recognising progress in the full range of learning outcomes and is focussed on the pupil rather than the system.

Our learning model must strike the balance between continuing to prepare our pupils for written exams that continue to play a very large part in their future, and focussing more on developing deeper learning, understanding and personal skills and competencies that will make them more successful in life and more likely to engage in lifelong learning.

It is our aim to use summative assessment to provide us with lines of enquiry that will help us continually improve our effectiveness and impact for all pupils.

Summative assessment of content and application

We recognise the continued importance of written examinations and aim to provide pupils with regular access to examinations so that we can continue to guide them towards successful outcomes.

We recognise that exams which have been taken by over 10,000 individuals provide our pupils with the best objective guidance as to their likely performance in norm referenced national exams which are currently still the main form of national assessment. Hence where possible we will include exams that are used by numerous schools nationally as a way of verifying our standards of examination preparation are in line with the national average.

We aim to regain the balance of assessments and so will reduce the status of content and application tests in non-examination year groups.

Where exams are taken we are committed to question level analysis so that we can learn as much as possible about the impact of our work with different groups and in different types of question

We will engage in training of our middle leaders so that they fully understand the limitations of examinations and don't re-establish the same focus on them as prior to the OFSTED review. See appendix 2 for explanations of key terms.

The main focus for success in exams will be the delivery of high quality teaching and learning to all pupils in all year groups.

In order to convert an internal examination to one in which we can measure progress we must either a) use an examination that has been taken by more than 10,000 pupils and so grade boundaries are reliable or b) norm reference our own results by ranking all of the pupils and then awarding the same percentage of each grade that we normally achieve, or c) arranging to take the same examination in two or more of the schools in the Trust or in the locality so that each has a clear and independent reference point.

Summative assessment of concepts and understanding

Until there is a national framework of concepts for the UK our summative data will be limited to the 3000 pupils in the Trust and hence any conclusions we draw will only be statistically significant if we conduct the same studies for more than three years across all schools. We may decide therefore to restrict the assessment of concepts to purely formative assessment or we may develop the use of the concept trackers so that we can investigate questions such as.

- 1) Data from the previous teacher that allows you to focus immediately on the understanding and misconceptions of pupils who you start working with in September
- 2) Evaluations of what proportion of pupils achieve understanding each year so that we are able to evaluate the effectiveness and impact of our curriculum

- 3) Correlations between those pupils who achieved understanding and those who achieved high progress scores in examinations
- 4) Correlations between those pupils who report that they are likely to continue learning the subject after they leave school and their understanding
- 5) The impact on closing the disadvantage gap
- 6) Research into the proportion of SEND and disadvantaged pupils have greater conceptual gaps in their understanding and the focussing of interventions to address these.

For all of these purposes, our current model of concept trackers would provide the required data with minimal investment of additional teacher time.

Teachers record which pupils have mastered each concept in an ongoing single sheet that can be collected in at the end of the year and entered as data for analysis.

Summative assessment of skills and disciplinary knowledge

If pupils maintain self and peer assessed rubrics for skills that are identified by subject leads as being crucial to their curriculum, these rubrics can be converted to data at the end of any year through the teacher either verifying them at this stage or through a process all year of teachers agreeing to self and peer assessments when they are convinced by the evidence that pupils and peers have presented.

One example of such assessment is in the 'High Tech High' schools in numerous states in the US. In these schools, pupils present an end of year project to an audience including their parents and the audience grade their performance against a rubric they have been provided with. This method relies on peer and self-assessment all year for formative reasons that help the learner without any recording of this data. The only data recorded is the final summative assessment of the audience.

A number of PE departments use their sports day as the exemplification of work throughout the year by a pupil improving their personal best in a particular skill.

Explanations of Related Ideas

The 'Golden Thread' of teacher development

The journey from novice to pedagogy specialist has recently been termed the 'Golden Thread' of teacher development. It begins with ITE (Initial Teacher Education) which leads to QTS (Qualified Teacher Status) then a two year programme called the Early Career Framework or ECF. Beyond the ECF there will be regular Continuous Professional Development (CPD) every year towards excellence in pedagogy and practice.

Some teachers may choose to develop further and take on the leadership of a subject area within a school perhaps taking the NPQLT (National Professional Qualification in Leading Teaching) and becoming a Head of Department, Leader of Learning or Primary Subject Lead.

Some teachers may choose to develop their pedagogy in training others and take the NPQLTD (National Professional Qualification in Leading Teacher Development).

Some specialise in their pastoral role becoming a pedagogy specialist in the teaching of behaviours and school culture taking an NPQLBC (Leading Behaviour and Culture).

The National Teacher Standards

The question of what makes an outstanding teacher is described in the National Teacher Standards. A summary of these is provided here -

[Teachers' standards: overview \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/672212/teachers-standards-overview.pdf)

These form the current UK assessment framework for all teachers. It is only through showing minimum competency in these that QTS is achieved and then only by showing progression in these each year as an ECT that further qualification is conferred.

The same criteria are used after numerous years of teaching as part of the assessment for the NPQ courses and if a teacher chooses to apply for the Upper Pay Scale (UPS) which they can do when they provide lessons of reliably high quality and regularly have impact beyond their own classroom by sharing this expertise across the school.

Being a national set of standards, they must be generic enough to apply to numerous contexts. It is for the school to continuously review the evidence for excellence in teaching in each subject and each age group and provide a school or Trust based model that aligns to their policies and practices as well as using common language so that training can be done together and discussions about pedagogy can be supported. This document is our model.

Teacher Planning Checklist

- Always plan multiple lessons in a sequence and not singular ones.
- Start with why – why are you teaching this group of lessons?
 - What **concept and understanding** are you building?

- Identify the concept on the 'concept tracker'.
- Which children will you be aiming to move off the 'gap list'?
- This concept is the basis of your whole learning episode so try to keep it to one or two as a maximum to keep it manageable.
- What **enabling knowledge** is needed for learners to access this understanding?
 - Can you summarise it in a glossary or a knowledge organiser?
 - How will you ensure they memorise this knowledge (at least 80%)?
- Which **hinterland knowledge** links this content to the learner's life?
 - What contexts can you use?
 - Which current news items are aligned to this content and can more current content knowledge and links be made?
 - What links with workplace awareness can be built into examples so that links can be made to careers as well as local companies as examples?
 - Is there a context or question you can use to hook learner interest at the start?
- Which learners require coaching or practice in **essential skills**?
 - The skills, practice and coaching needed by your class helps you decide which types of activity you may choose and how long you will spend on each one.
 - If, for example, you have five learners who don't respond well to feedback you may build in opportunities that need peer feedback.

Some Common Pedagogical Approaches

Knowledge (Content)	Application (Context)	Understanding (Concept)	Skills and aptitudes
- Spaced learning - Retrieval practice - Knowledge organisers - Low stakes tests / Quiz - Separation of Enabling and Hinterland - Expectation of 100% scores - Look/cover/write/check - Ambush by parents (Giving QA sheets for parents to use)	- Practice exam questions - Marking and feedback - DIRT - Peer Marking - Key exam terms - Walking, Talking Mocks - Common pattern in past paper questions - Examiners reports	- Skilled higher order questioning - Sequenced curriculum, - Peer discussion - Three whys - Variation - Reasoning in your 'Own Words' - Making links + analogy - ZPD – Zone of proximal development - What it's not (Alice)	- Repeated and regular practice - Personalised chosen challenges, - Personal bests - Coaching - Self- assessment - Goal setting - Rubrics written in accessible non age related language

The Role of the Teacher and TA

Every Teacher and TA is a Specialist in Pedagogy, Informed by Research.

The vision for all schools in SMART is for all teachers and leaders to have a deep understanding of pedagogy and have the professional autonomy to make informed choices about how to have the greatest impact on learning for all the children they teach.

- All Teachers and TAs will **continuously learn and improve their practice** throughout their career.
- Every Teacher and TA can expect their line manager and appraiser to actively support and coach them in becoming an increasingly skilled **Specialist in Pedagogy**.
- There are no 'right' and 'wrong' methods for teaching or 'magic bullets'. Good teaching is the result of a specialist in pedagogy evaluating how well the children in front of them are learning and **having the freedom and 'toolkit' to adapt** and meet their needs.
- Deep learning happens over time so professional teachers and TAs make agreements for how to work collectively over time to help learners sequence this learning. These are the only boundaries to the autonomy of a teacher and do involve **some common practices being adopted for the sake of coherence** for the children. For example, how terms and practices are named.

The Role of the Middle Leader and Subject Lead

Every Middle Leader or Subject Lead will see their main role as coaching others.

Middle leaders will ensure that the curriculum they are responsible for will be progressive and sequential, building understanding and skills over time for all learners and delivered to a consistent standard through actively training, coaching and monitoring the members of their team. They will collaborate within and outside of their school for the benefit of children.

- All middle leaders will be **strong positive advocates** for their subject and learning in general.
- All will actively coach and mentor any teacher or TA delivering their subject to ensure they have the time for professional dialogue, increase their subject knowledge and improve their practice.
- All will focus on what concepts are needed in their subject for deeper learning to take place over time and will sequence the development of these concepts over time through careful design of their curriculum bearing in mind it is part of a 13 year development of understanding.
- All will use the fact that every learning episode requires skills and knowledge and so will integrate these so they are never seen as separate and keep in step to support the child.
- To actively promote and integrate with the ethos and vision of the school and the wider MAT.
- Maintain their own level of professional knowledge and pedagogical understanding so they are able to make informed decisions and gain the confidence of SLT to enable more and more autonomy over policy at a local level.

Cognitive load theory

Some of this theory describes the brain like a kind of computer and argues that if the working memory is full the whole thing slows down (close some apps that are running in order to free up space). A whole load of experiments have been done distracting people while they solve problems to show they do slow down. Another use of this term is used in habit forming. The idea is that if something is repeated so often it becomes a habit and you no longer need to devote working memory to it. For example, it was hard trying to read road signs when I first learned to drive as I had to put so much thought into gear changes, steering etc. Now that these are all habitual I have free space to think.

The use of the theory that ties both of these together is most helpful to our model. If knowledge and skills are in a schema the theory goes that the brain uses much less power to process them. In the classroom, if a child has not yet got the concept of numbers representing quantities then they will have to work harder to deal with learning addition. This does not mean you follow Piaget's teaching and restrict harder content from learners it also doesn't mean you differentiate work to predict what children will cope with. What it does mean is that it is good to be aware of how much cognitive load there is likely to be in a lesson and take steps to manage it. Three new concepts in one lesson for example is likely to prevent learning in all but the most resilient learners. A less able child in one area could have an excellent schema in another but may need freedom to select in the lesson to let the teacher see this.

Actions: Creating classroom habits and sticking to them is good for freeing up thinking time and transition time in classrooms allowing more time for deeper thinking.

Full engagement is needed for deeper learning – some find this hard work and physically exhausting so manage the number of concepts being dealt with at any one time to make it manageable. Good curriculum planning can highlight when this may happen.

If a child has learned just the knowledge and not understood how it fits in then when they come to draw on this later it will add to the overall load. A mastery approach to making sure concepts are revisited is critical to creating strong foundations for future learning.

Use forms of differentiation that don't restrict one group within the class but have enough flexibility to allow the teacher to adapt the content when focus on rebuilding a schema is happening.

Spaced learning / Spiral Curriculum

When planning the curriculum over a number of years, the amount of time between learning a concept then revisiting it in different contexts then revisiting again is important. There are no hard and fast rules but some research suggests you need a gap of at least 4 hours between a fluency session and a variation of reasoning lesson to ensure learning is happening and not just remembering. Some say two years are needed others say four years.

Some argue that similar topics should be separated in time so they are not confused. E.g. Mathematicians typically teach different types of average together (Mode, Median, Mean etc.) but some research shows this adds to confusion and pupils choosing the wrong method because they get mixed up which is which. Spaced learning approach may be to do the mean, get fluent in this, see variation in this and apply it in novel situations so it is learned and not just memorised. Then do

some other topics, then do the Mode, get fluent in this, see variation then apply this in novel situations, then a gap before doing Median etc. Perhaps a few months later you bring all three together to make the links they are all averages. This is an example of how curriculum planning requires really detailed thought by the whole team.

Closing the disadvantage gap

Children who fail to 'learn' so don't alter their schema as a result of this learning episode are much less likely to ever achieve this learning because next time they meet it they will know they were unsuccessful before. A gap has effectively been opened up.

One way of countering this is the mastery approach. In this approach, you keep a list of all children and as you convince yourself they have learned the concept you strike them off the list and give them more challenging tasks that use the concept linked with others or in higher order uses. You then focus on those remaining on the list to make this list as small as possible before the learning episode ends. One of the challenges you could set those that have achieved it, is to teach someone on the gap list. This gap list should not be a formal assessment system because there will be lots of ways a trained teacher can gauge understanding and some of them would be hard to evidence to others. If you restrict teachers to having to prove it, fewer children would be helped.

It is for the teacher as the specialist in pedagogy to decide how best to achieve the learning of these concepts and which particular set of techniques to use but current research suggests that Mastery Learning is one system that can be an effective starting point. The example below is of a maths learning episode but most of the terms are generalised below.

Mastery learning as a suggested starting point for a learning episode

Mastery learning is an approach that focusses on the key importance of conceptual learning in the classroom and provides techniques designed to maximise the deeper learning that takes place.

Sometimes, mastery learning is wrongly characterised by stating that the whole class does not move on until every child has mastered the concept in question. This is a considerable oversimplification of the approach which does start from the expectation that 100% of children will reach mastery but it does this though enriching the more able and recording which have not reached mastery so that they can be returned to when the concept is encountered next.

The most significant technique used is maintaining multiple strands of work within the same classroom including:

- Pupils who have mastered the concept in question being given a greater number of different contexts to apply this to that are not just repetition but actually challenges them to make new links.
- Pupils who have mastered the concept being given greater peer responsibility in explaining it to others.
- Pupils who are in the process of mastering the concept being asked to provide reasoning and be transparent about their thinking so that any misconceptions can be examined.

- Pupils developing understanding to have the benefit of expert diagnostic questioning from the teacher to find the limits of their understanding and extend it.
- Pupils being given the chance to become fluent in key knowledge and techniques so that these do not provide barriers to future mastery.
- Clearly defined core knowledge that is expected to be learned to a high degree of fluency.
- Recording or tracking of those who have not mastered the concept so that they can be returned to when the concept is next visited.

In mixed prior attainment classes, while those who struggle are learning the concept there is no end of challenging problems that get you thinking and help achieve mastery.

The following learning sequence for conceptual understanding was agreed by Maths leaders across SMART in their curriculum intent intensive discussion. They are calling this their 'Stages of Learning'

Manipulatives – Using manipulatives to describe and solve problems are used to support learners	Reasoning – Asking why – must be continuous	A learning hook – to give an overview, inspire thinking, build curiosity.
		Direct Instruction – Teaching exactly how to do something perhaps with a worked example:
		Checking Questions – Short sets of questions tightly linked to what has just been taught to check if communicated OK
		Fluency Practice – Repeating examples with increasing speed until second nature
		Variation – Trying lots of varied questions – each requires thinking in a different way from the last
		A Space – Leaving a sizeable (2 week?) gap when another topic is taught so mimicking can be forgotten
		Reasoning for Problem Solving – Using the skills to help solve a problem together with other skills

Learning Hooks

Help children bring their prior learning to this question, engenders some inspiration and curiosity and sets the context for where the learning might fit into a schema.

Direct instruction

This generally does not expect understanding. It is a way of making sure that the basic knowledge and skills are in place to support the learning. This normally involves the delivery of Key knowledge, terms and words that will be introduced – factual knowledge. This is good practice for developing literacy and also rigour in requiring children to use the correct terminology and language when they answer questions and discuss the topic. These objectives start with “Know that...”

Checking questions

These verify that direct instruction has worked. No understanding is expected but learning by memory or 'rote' learning is common at this stage to make sure key terms are in place on which to build the understanding. It is unusual for there to be more than one or two checking questions together.

Fluency practice

Responding at speed but still with limited understanding. Pupils at this stage could probably score well by memorising and mimicking.

Variation

Conceptual learning begins here. The learner is asked to apply the knowledge learned to a range of different contexts, using different methods and perhaps in different voices. Anything that begins to test the wider concept rather than repeating learned techniques.

The teacher needs to have pre-thought out questions and challenges beforehand that they can use to keep learning happening even with children who progress much more rapidly. The teacher should be able to have strategies for children who are at every different level in their class and may need to elect lead learners to help them on occasions. They should have the ability to drop the level of challenge or raise it when needed. Some prefer to consider the concept at different levels of proficiency and understanding so how to drop or raise challenge has been thought of beforehand.

A space

Generally, children are able to learn mimicking techniques which mean it is hard to see if real learning has taken place. Over time the memorised work and mimicking techniques drop off quite quickly and become confused whereas true understanding is linked to a schema so is retained. Leaving a space to allow for forgetting is one of the clearest ways to separate real learning from mimicking.

Problem solving

Use of the concept in a range of contexts. Questions that can only be answered if the knowledge is understood well enough to be applied. To check it is a concept you should be able to think up tests for understanding and describe how someone could misunderstand it. These objectives start with “Understand how or understand why” etc. Freya diagrams are a tool often used to help children summarise a concept.

Name: Colleen Date: _____

Fun with Math Vocabulary!



What does it mean? <u>Area is the</u> <u>measure of the</u> <u>inside of a shape.</u> <u>It is the surface</u> <u>of a closed shape</u>	Facts/Characteristics: <u>- measured in</u> <u>square units.</u> <u>- Use the formula</u> <u>Area = length x</u> <u>width</u>								
WORD: <u>area</u>									
Examples: <table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td></tr></table> <u>Area = length x width</u> <u>Area = 4 x 2</u> <u>Area = 8 square units</u>	1	2	3	4	5	6	7	8	Non-Examples:  <u>The perimeter</u> <u>measures the outside.</u>
1	2	3	4						
5	6	7	8						

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Reasoning

At every opportunity, the skills of reasoning should be tested and practised. This can be as simple as asking why. Questioning techniques are a key part of a teacher's toolkit and is one of the main skill areas that require coaching and professional dialogue.

Questioning Pupils to Assess Understanding

Have you ever thought, “how have they got to this stage in their schooling and they still don't know X?” Or “They have learned X, every year for the last three years, how can they still not know it?”

If you define real learning as a change to someone's schema (or in biological terms, a change in how they have structured these ideas in their permanent long term memory) then it is almost certainly the case that they have never actually really learned X. They have worked out how to fake learning X and managed to convince, often numerous teachers. They are not consciously and maliciously doing this – in fact, they are probably more frustrated than you are about still not knowing X. They are probably using a mixture of rules, memory and guess work to hide misunderstanding.

The CASE (Science) and CAME (Maths) projects were an attempt by the Institute of Education to find some of these problems and their work is worth a read. Here is an example they found.

They tested 13 year olds on questions about a 'fair test' in Science and around 75% of the classes could answer the exam questions correctly. They then set them a task outside of their science lesson in which they had to make an organ from different length pipes. They carefully gave a wide choice of sample materials of different thickness, length and material. None of the children tested actually thought to do a fair test. None of them compared materials of equal thickness or length. None had understood the concept of a fair test because without guidance and in a different context they didn't apply it. This experiment was new to them so they couldn't 'remember' what to do.

Think of a novel way of testing if children have genuinely understood a concept in your lesson. Here are some ideas for how to do this:

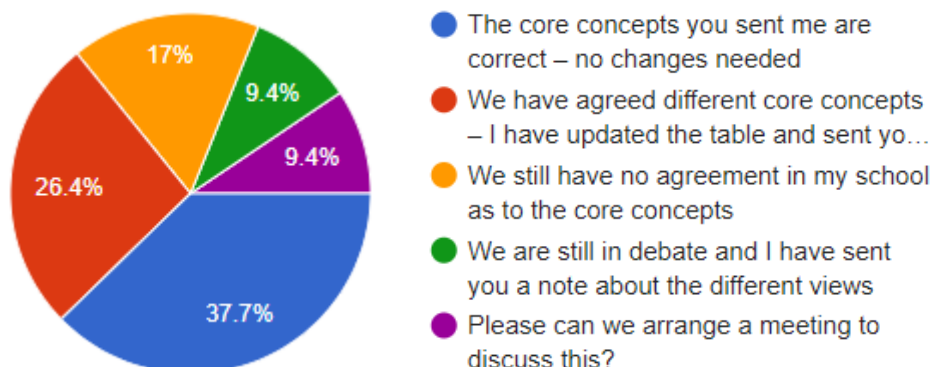
1. Ask them to represent the idea in a different medium (dual coding).
2. Ask them to make up an analogy to explain the concept.
3. Ask them the three 'whys' – explain it then explain why they think that and so on.
4. Throw the idea into a completely different context and hear their ideas.
5. Get them to teach it to someone you know doesn't understand it or explain it to you faking you don't understand it.
6. Any of the above but carried out a few days or a week later without warning which concept or lesson you are referring to.
7. Give them a question with a crucial piece of information missing.

Another example from CASE. Teachers were frustrated that children were saying salt 'disappeared' when it was put in water rather than it 'dissolving'. They wondered if it may be more than an incorrect word use so thought up a way of testing it. They set them the challenge of a large prize for the person who could get two beakers of water exactly the same weight. They added that one of them had to be salt water and no access to the weighing scales beforehand just accurate ways of measuring the volume. None of the children allowed for the weight of the salt in the water, they were genuinely totally confused as to why the same volume of salty water weighed more. They really did think the salt was disappearing.

Appendix 1 - (June 2021) Our Survey of Secondary Subject Leaders

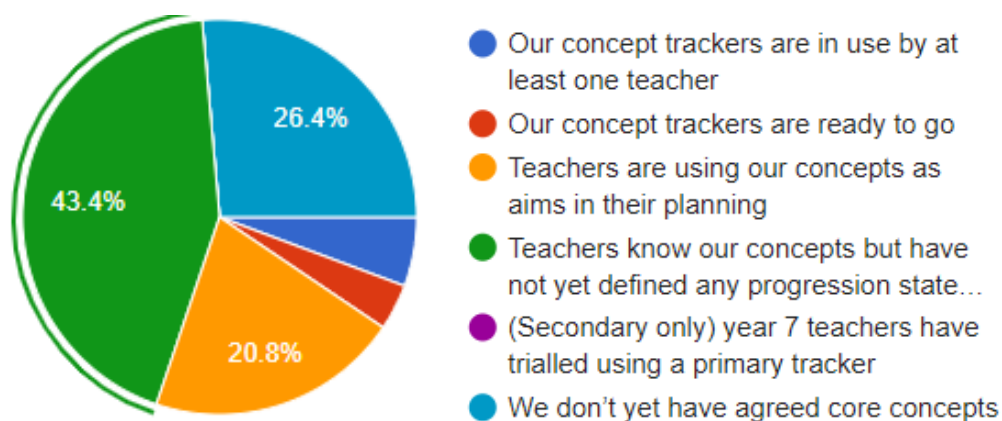
Having now had a return from every subject area in at least one of the three Secondary schools here is the summary report.

Question 1 –



Notes – If you have requested a meeting Rachel will be sending out suggested dates and times after Friday. I will assume that if colleagues from more than one school request a meeting in the same subject area that it would be OK to bring us all together to meet at the same time. Let me know if not.

Question 2 -

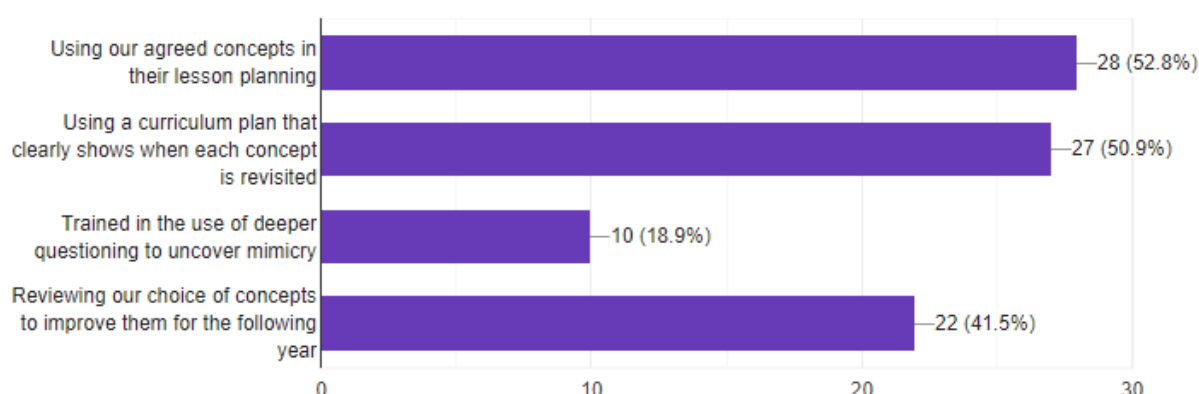


Commentary – 31% of subjects having the concepts in use for planning is a considerable step forward from November especially considering the added burden of Covid restrictions

Only one quarter without agreed core concepts is also a considerable step forward from November and suggests that all concepts being agreed by the end of next year is a very realistic prospect.

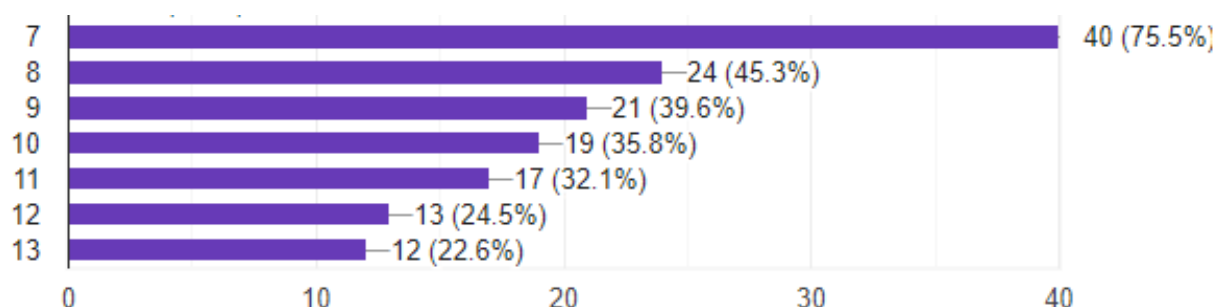
Question 3-

By this time next year we aim for our whole team to be (please tick all that apply)



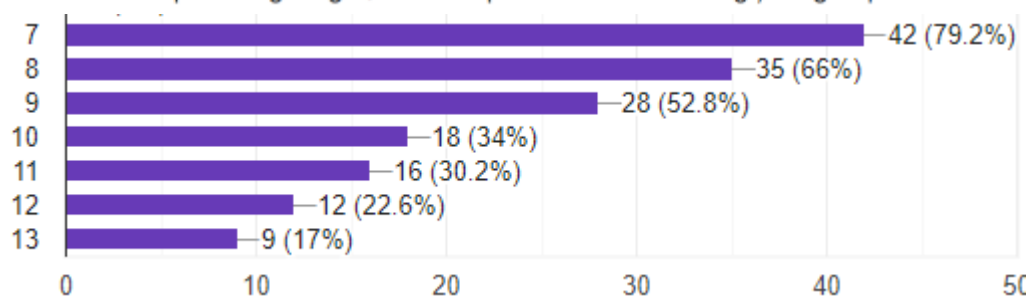
Question 4 -

By this time next year we aim to have concept trackers in use with the following year groups



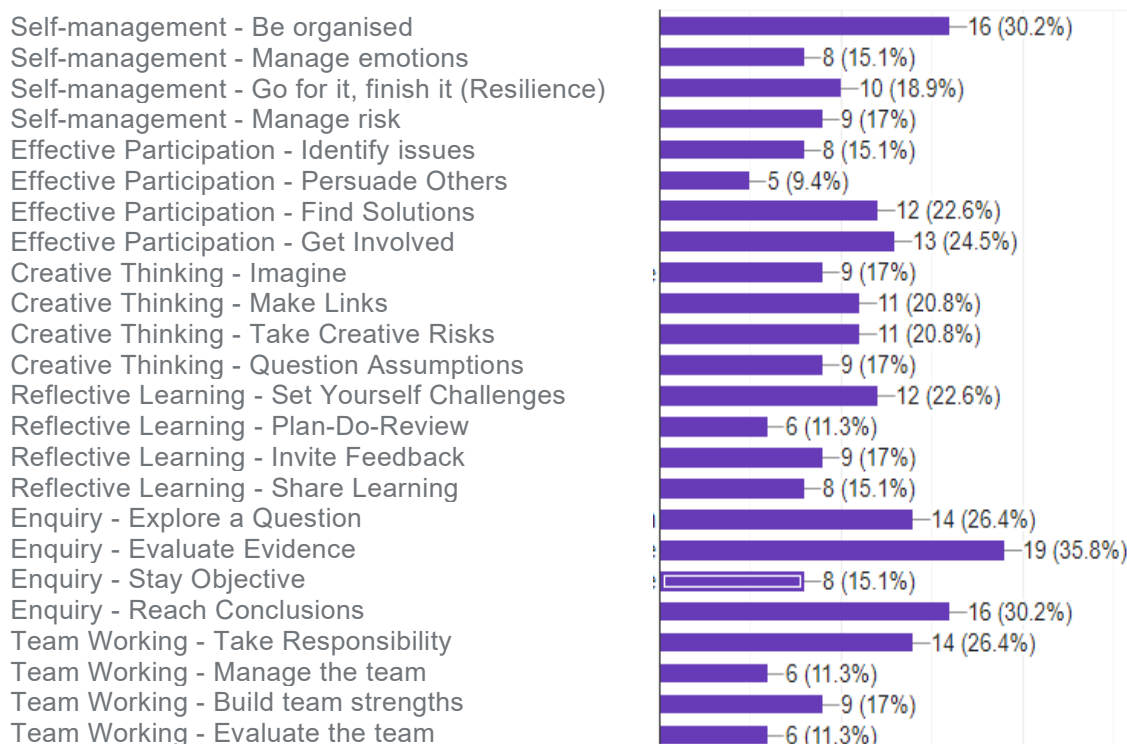
Question 5 -

By this time next year, knowledge organisers that only contain the core knowledge needed for the concepts being taught, will be in place for the following year groups



Question 6 -

By this time next year which SECRET skill will have been shared with pupils regularly enough for them to be able to self and peer assess – If more than one please tick all that apply



Subject specific skills and... 31 (58.5%)

Commentary – All skills will be covered in at least one subject. This dividing up of the skills was unplanned and yet has led to complete Secondary coverage overall being developed next year.

Question 7 -

By this time next year it is our aim to train teachers so that they can effectively and meaningfully use the information from concept tracking, low stakes tests from knowledge organisers, application tests and the outcomes from SECRET skills to adapt their planning to the needs of their class. When we ask teachers for their intent this time next year, how many do you feel will be able to adapt their teaching in this way?



Appendix 2 – Understanding the validity of summative assessment

Summative data is typically collected in by subject leaders and senior leaders and used as evidence of progress over time.

Analysis of summative data is an incredibly complex area of study and how it can be used is typically poorly understood by teachers and leaders who are not trained in statistical analysis. The famous quote by the then education secretary Michael Gove when questioned by the education committee stating that for a school to be ‘Good’, the pupils should exceed the national average for attainment. He then went on to say he wanted all schools to be ‘Good’ and couldn’t see why this would be impossible.

<https://publications.parliament.uk/pa/cm201012/cmselect/cmeduc/uc1786-i/uc178601.htm>

In 2018 OFSTED reported that the over use of summative data by schools and their own inspectorate had decreased the effectiveness of the education system by focussing teachers too heavily on how to improve summative assessment grades rather than focussing on improving all forms of pupil learning.

Having stated the concerns it is also important to state that, when used correctly, summative assessment is an incredibly powerful tool that can focus resources and expertise in the right places to increase pupil’s life chances in positive ways.

The following notes explain some of the key questions regarding summative data and our effective use of it.

The difference between an individual and a trend

If I throw a dice six million times I have an incredibly high chance that about a million of these will land on a six. In fact I can be almost certain of this statistically.

If I throw the dice five times without success, on the next throw am I more likely to get a six? What about if I threw the dice a thousand times without success, am I more likely to get a six on the next throw? How about a million times? The answer is still no. I have a one in six chance of getting a six regardless of how many times I threw it beforehand.

You can’t use statistical averages to predict an individual result.

If every child you have ever taught who joined the school with a scaled score of 100 in maths went on to get a grade 5 it in no way means that the next one will. It just tells you that if they don’t get a grade 5 there may be a reason you need to investigate. Hence data gives you **lines of enquiry** to follow. If there were reasons they didn’t get a grade 5 these may be completely valid.

If a sample size is 10,000 or more then you can be almost certain that a trend in the data is telling you something valuable. It is likely that your line of enquiry will lead to you learning

about something you could improve. The smaller the sample size is, the less confident you can be in the evidence. If you read about educational research conducted on less than 10,000 pupils then their conclusions are very open to random chance. The EEF has been re-examining research data to highlight those pieces that are not really statistically sound so that schools don't base their development on a result which was spurious.

If you enrol your pupils in a test which is taken by over 10,000 pupils nationally under the same conditions then you can find lines of enquiry about your school which are much more likely to be accurate but they still can't give you accurate conclusions about an individual pupil. This has led to the government and schools placing so much importance on the outcomes of national tests as a way of gauging the effectiveness of a school. Each result in a national test is effectively a piece of research you can use in your school to consider lines of enquiry.

Criterion referencing and norm referencing

If a teacher is marking against a set of criteria then teacher assessment is shown to be an accurate method and teachers can use moderation to become more and more accurate at agreeing a mark or a grade. They can also learn the criteria and guide pupils into answers that make it more likely they can award the grade. In this way, highly organised schools with excellent CPD provide results for coursework that enormously advantage their pupils over schools with less skilled staff. If the exam board publish a set of criteria and a pupil meets all of these then they must award them the grade. This leads to more and more pupils being awarded higher grades over time as the teachers become more skilled at coaching pupils in the criteria.

The alternative to criterion referenced marking is norm referencing. In this case the exam board is given an allocation so can, for example, award 50% of pupils with a pass. They then take the best 50% and award the grade to them. Teacher assessment in this scenario is much less accurate because the teacher can't know how the whole of the UK is likely to perform and so can't award a grade with as much certainty. The UK largely uses this method for its national examinations coupled with a few criterion referenced questions in each exam so they can spot improvements over time.

Exam results in the UK always depend on your pupils' performance relative to the national average that year.

Progress verses Attainment

Attainment is the raw grade awarded to a pupil following an assessment.

Progress is a measurement of how well the pupil did compared to other pupils of a similar ability to them nationally. A progress score of zero means that you progressed exactly as

much as you would have done had you been an entirely average pupil attending an entirely average school.

Progress scores are much more valuable than attainment scores in terms of lines of enquiry. They pose much clearer questions but, as mentioned earlier, they don't give you definite answers – just better lines of enquiry for you to investigate.

An average secondary school has around 1000 pupils who each sit around 10 examination subjects at GCSE and so the exams season generates a sample size of 10,000 results. So a progress measure that combines all these results compared to all schools nationally provides a result with a very high degree of confidence.

Hence the progress 8 score used in secondary schools is probably the most accurate measure we have available to us regarding the performance of pupils but just of their performance in written summative examinations.

The DfE and OFSTED had been using this indicator to assume that any school with a high score in the area of written examinations must equally be good at other areas of learning and so they used these measures as a proxy for how good the school was in general. The OFSTED reforms in 2018 changed this focus because an increasing number of schools that were not serving the wider learning needs of their pupils were achieving high progress scores.

They claim that now the progress scores for primary and secondary provide just another line of enquiry and they remain open to the possibility of a school being good at developing other areas of learning even if their progress score is relatively low.

Appendix 3 – The first time we collated Threshold Concepts in use in subjects

In June 2021 we asked for a return from every subject and every school in the Trust. We have since moved on considerably but this historic summary still provides a useful example of the overview. Please contact subject leads for a more up to date picture.

Key to the following table

Not taught	In draft or development	Concepts agreed (most)	Statements agreed (some)	In use in a class	In use in all classes
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Subject	Core/Threshold Concepts	KS1	KS2	KS3	KS4	KS5	Notes
Science (Primary Saltash & Liskeard)	Particles /Materials						Looe are trying a model with 10 core concepts and placing curriculum content in trackers.
	Evolution/ Independence						
	Cells (Ecosystems KS1)						
	Energy Travelling						
	Forces						
Geography	Human Processes						Agreed for all 6 schools in Nov 2020, with some title variations in Saltash.
	Physical Processes						
	Place, Scale and Space						
	Interdependence						
	Cultural understanding						
	Environmental sustainability						
History	Perspectives						Endorsed by all schools in June 2021
	Continuity and Change						
	Cause and Effect						
	Significance						
RE	Identity and Community						OFSTED review aligns and agreement reached in June 21
	Living a Good Life						
	Ultimate Questions						
Music	Rhythm & Metre (Genres?)						Stefan co-ordinated rewriting/extending to GCSE. Now aim to explain complexity for non-specialists.
	Harmony & Tonality						
	Texture & Melody (Expression?)						
	Timbre & Dynamics						
	Structure & Form (Notation?)						
DT	Design						Looe & Saltash identified a need to split into disciplines.
	Evaluation						
	Nutrition						
Computing	Programming						Secondary leaders due to meet to further clarify these concepts.
	Data and CS Maths						
	Internet / Computer Systems						
	Computational Thinking						
	Impacts						

PE	Fit for life (<i>Participation</i>)							Confirmed at Saltash and not yet confirmed at the other schools
	Outwitting Opponents							
	Game Sense (<i>Communication</i>)							
	My Personal Best (<i>Performance</i>)							
	Sense of Community							
Dance	Recently included – so concepts about to be discussed by subject leads							
Art	Drawing and Representing							Liskeard and Primaries have confirmed these, Sa and Lo still in debate.
	3D Form and Perspective							
	Colour							
	Narrative							
MFL (Liskeard & Saltash)	Oracy and Grammar							Debbie co-ordinated design of the primary tracker. Secondary under development.
	Knowledge of Language							
	Literacy and Grammar							
	Intercultural Understanding							
MFL (Looe)	Phonics							Emma has used similar concepts and developed statements for KS3/4
	Vocabulary							
	Grammar							
	Intercultural Understanding							
English (Liskeard)	Contexts							Ceri proposed a set running from primary to degree level
	Rhetoric							
	Structure							
English (Saltash)	Communication							Tom proposed a set that defines a detailed curriculum map from Y7 to KS5
	Culture							
	Identity							
	Perspective							
	Creativity							
Maths	Maths working collectively on the ‘White Rose’ scheme which has its own method for mastery. An alignment exercise between SMART and White Rose is planned.							
Drama (Proposed)	A set was proposed in November which started a debate			Making				Liskeard have agreed these concepts
				Performing				
				Responding				
Drama (Looe)	Planning							
	Creating							
	Demonstrating							
Drama (Saltash)	Communication							Emily has developed the ideas into statements
	Perspective							
	Culture and Identity							
Sociology	Socialisation							Sociology is studied at KS5 only. Most of the six topic areas over the two years involve revisiting all 8 core concepts within different contexts.
	Stratification							
	Functionalism							
	Marxism							
	Feminism							
	Evidence							
	Postmodernism							

	Interactionism								
Psychology	Behaviour	Liskeard Concepts (not in same order) Outline, Paradigms, Evaluation, Research methods, Application and Science						KS5 taught at Saltash and Liskeard using the same concepts but Liskeard using an 'OPERAS' mnemonic	
	Cognition								
	Evolution								
	Biopsychology								
	Evidence								
	Determinism								
PHSE	Health and Wellbeing (Sa, Lo, Li)							I have taken Liskeard's Healthy, Balanced Lifestyle to be analogous to Health and Wellbeing. 5 are used by Liskeard only and one is Sa and Lo.	
	Relationships (Sa, Lo, Li)								
	Living in the Wider World (Sa, Lo)								
	<i>Identity (Li)</i>								
	<i>Diversity and Equality (Li)</i>								
	<i>Power (Li)</i>								
	<i>Career (Li)</i>								
	<i>Risk (Li)</i>								
Business	Recently included and so concepts not yet debated by subject leads								
HSC	Relationships & communication							Health and Social Care is currently studied at KS4 and KS5 in Saltash and Liskeard	
	Equality, diversity & rights								
	Health, safety & security								
	Anatomy & physiology								
	Public Health								
	Sexual health, reproduction & early development stages								
Media Studies (Saltash)	Media Language								
	Representation								
	Audiences								
	Industries								
Media Studies (Liskeard)	Media Language							New Film Studies SOW has been introduced in Year 8.	
	Representation								
	Media Audiences								
	Media Industries								
	Contexts								
Politics	Recently included and so concepts not yet debated by subject leads								
Philosophy	Recently included and so concepts not yet debated by subject leads. Meeting scheduled this term.								