Thinking Matters

Whole School Metacognition

BEYOND ROSENSHINE

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Introduction

Over the last decade, as schools have sought to support their students' learning with evidence informed approaches, Rosenshine's Principles of Instruction have become an increasingly popular focus of school CPD. But for many educators, remote learning has highlighted the requirement for something more than 'instructional' pedagogy as they look to develop independent learners, capable of navigating both exams and thriving in the 21st Century.

This article seeks to inform MAT and individual school leaders how they might build on Rosenshine's principles and add 'meta' strings to their teaching staff's pedagogical bow.
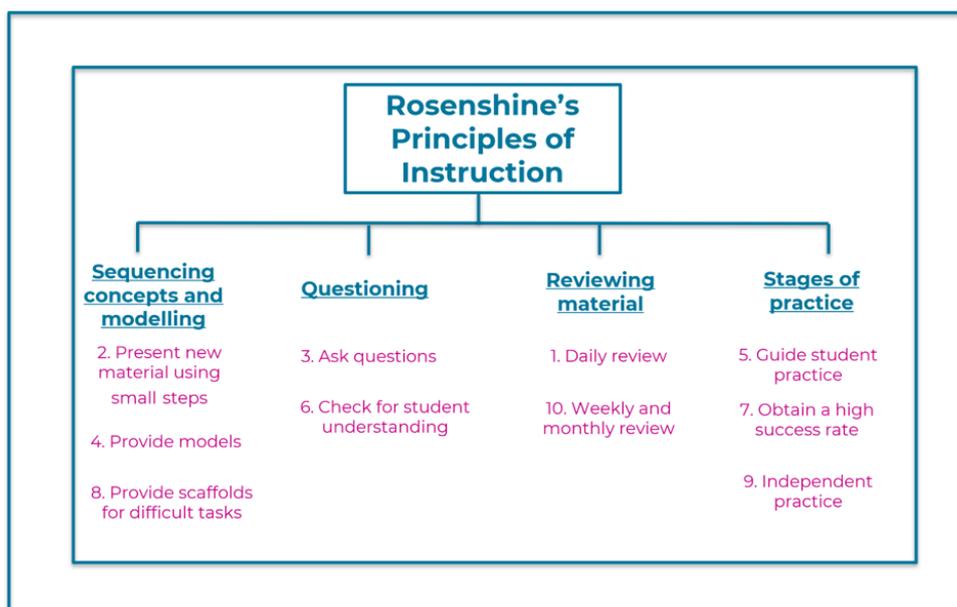
What are Rosenshine's Principles of Instruction?

Barak Rosenshine's 'Principles of Instruction' - first became popular in 2010 following their publication in the International Academy of Education and were profiled further in the *American Educator* magazine in 2012. In this short paper, Rosenshine outlined the research basis for each principle and then provided examples of classroom practice from the most effective teachers with guidance for classroom application.
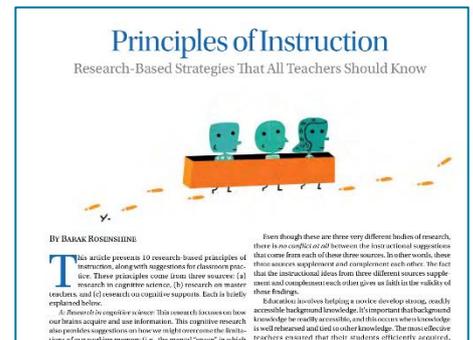
The principles gathered further traction following their popularistation by edu-author Tom Sherrington in his 2018 'Teacherhead' blog, *Exploring Barak Rosenshine's seminal Principles of Instruction: Why it is THE must-read for all teachers*.

In 2019 Sherrington's *'Rosenshine's Principles in Action'* helpfully categorised the principles into four 'strands' as summarised below:

Today, most schools, particularly secondaries, are familiar with Rosenshine's principles and many have done some form of CPD in them.

The principles provide a hugely valuable framework for the process of instruction. However, despite their obvious benefits, schools who have adopted them do voice some concerns. These fall into two main areas:

1) That whilst the principles are an effective tool in improving knowledge transfer, teachers can fall into a trap of using them as a formulaic prescription. Often they are followed as a type of checklist, rather than in the spirit in which they were developed - to be used to inform reflective practice and school improvement.

2) That they can be seen by teachers as the 'be all and end all' of good teaching - but as Sherrington himself stated in his 17th January 2021 blog: *"Rosenshine's principles are not – and were never intended to be – a universal description of all aspects of teaching; they apply to those parts of teaching where teachers are leading the learning, in an instructional mode."*

So how do schools build on Rosenshine's principles to provide their teachers with professional development across a more comprehensive spectrum of practice that moves beyond simply instruction and enables them to support students in becoming truly independent learners?

Progress and the Meta-Learner

Covid-enforced remote schooling highlighted to many educators that their learners were over reliant on teacher input. It also provided many with time to consider what type of learners they were shaping. That has caused a number in the profession to explore how to develop their pupils' metacognition and to support them in becoming self regulating 'meta' learners.

This interest has undoubtedly been fuelled by the publication of the Education Endowment Foundation's (EEF, 2018) *'Teaching and Learning Toolkit'*. Its findings recognised the potential for metacognition and self-regulatory strategies and showed the scope for incredibly high levels of impact on student progress (an additional seven months beyond expectations) for low cost.

The EEF (2018) published a helpful Guidance Report on the subject which includes seven recommendations for implementation - one of which encourages schools to ensure that "*Teachers should acquire the professional understanding and skills to develop their pupils' metacognitive knowledge*" and another that suggests, "*Schools should support teachers to develop knowledge of these [metacognitive] approaches and expect them to be applied appropriately*" (EEF, 2018).
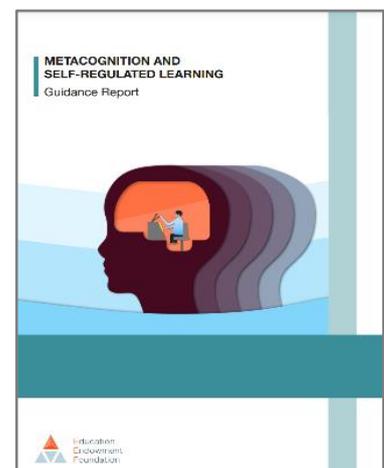
It is a document that has been hugely useful in assisting schools to identify *what* possible actions to take forward. However, many remain uncertain about *how* to implement these approaches in practice.

How?

As the 'Bananarama Principle' ('*It ain't what you do, it's the way that you do it - that's what get's results'*) originally coined by EEF Toolkit Founder Professor Steve Higgins would suggest - there's a big difference between 'doing metacognition' and doing it well. So what are the approaches that work? Research from Exeter University on accredited 'Thinking Schools' would suggest that a whole school approach to developing meta learners is a route to follow. Over simplistically, Thinking Schools take a Collective Teacher Efficacy approach - putting the development of their students as 'meta learners' at the centre of their community's focus.

The 'Thinking School' model can be summarised in the Thinking Matters 'Big Picture' where the image of the airport control tower is used to represent the student or '**meta-learner**'.
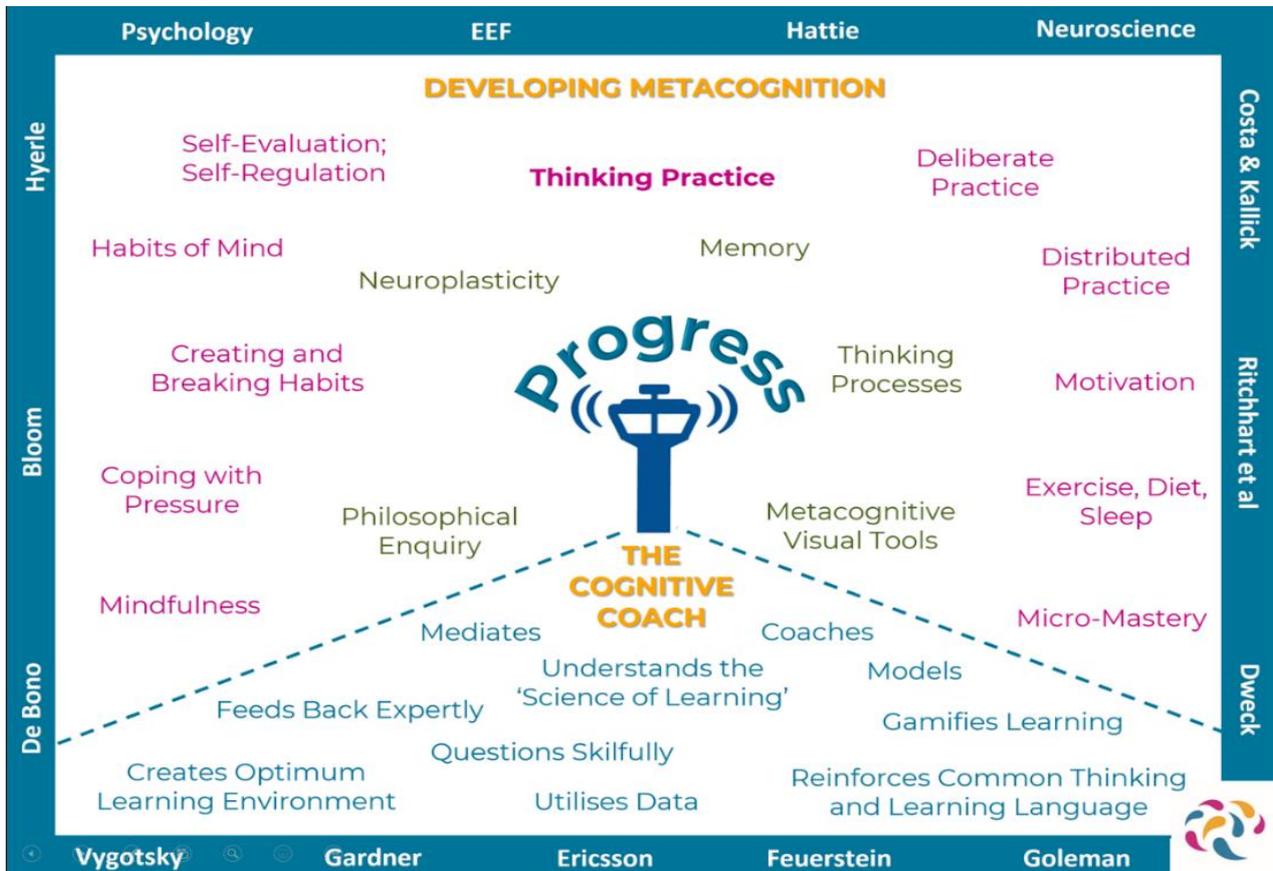
An airport control tower (or those who work within it) has a high degree of alertness to what is going on around it, with information taken in, processed and, as a result, appropriate and effective resulting action is taken. This is a powerful metaphor for the metacognitive student who likewise is aware of what is going on within their learning environment, how they are taking in and processing information, how they are making decisions and organising their learning and who then expertly select and utilise tools and approaches from their metacognitive toolkit. As a result, they can process information effectively, make informed judgements and react appropriately. They have control and mastery as agents of their own learning - ideal qualities for problem solving whether those be exam or real life problems.

The Teacher as Cognitive Coach

At the heart of developing a meta-learner within a Thinking School is the teacher acting in a role of 'cognitive coach'. The full extent of the cognitive coach's role is the topic for a future article but their focus is to develop independent learners using a pedagogical tool kit based on the 'Science of Learning'. Given that objective there is clearly an emphasis on student-led learning but the robust evidence on the positive impact of direct instruction, means that drawing on elements of Rosenshine's principles, is a regular feature of the cognitive coach's practice.

To Instruction… and beyond

So how does the Thinking School approach marry with Rosenshine's principles? We can explore the overlaps by re-visiting the Thinking Matters Big Picture and identifying where the principles fit in. Whilst doing so we can start to look at where the Thinking School's approach goes beyond instruction in an explicit desire to improve the development of the learners own learning skills:

- ### Sequencing concepts; modelling; scaffolding

Rosenshine builds on our growing knowledge of the limitations of working memory to recommend that learning should be broken down into small steps. Students are then supported to practise each step by the teacher modelling, scaffolding and providing structured support. Within the TM 'Science of Learning' module, a helpful synopsis of cognitive science research in areas such as **neuroplasticity**, **memory**, **cognitive load**

and **deliberate practice** is provided, and schools are encouraged to engage with this information and to consider implications for their practice.

Within the TM Big Picture, 'Micromastery' is specifically identified as an important strategy for developing student metacognition. This involves the teacher in 'expert' role carefully observing and assessing each student's current level of knowledge/skill and breaking the content or procedure down appropriately into small steps, then scaffolding, supporting and guiding them to make progress in their learning. This reflects Lev Vygostsky's theory of the 'zone of proximal development' and the importance for teacher and student to understand the need to work within the 'learning zone' in making progress. Micromastery is also an element within 'Deliberate Practice' as defined by Anders Ericsson, which is also specified as a discrete strategy to help develop metacognition in the TM Big Picture.
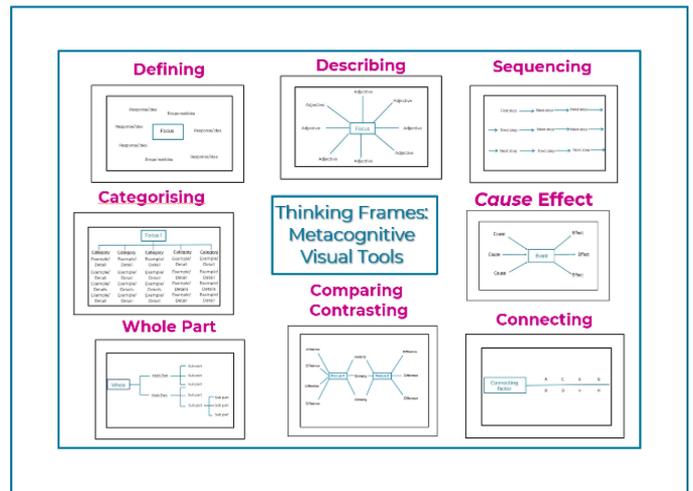
The pedagogical strategies of **modelling** and **mediating** are also identified within the TM Big Picture in which the role of the teacher, as previously mentioned, is reframed as a **cognitive coach**. The EEF's recommendations similarly highlight the importance of teacher modelling as a "*cornerstone of effective teaching*" and of the teacher providing *scaffolded support* and opportunities for *guided practice*. As with Rosenshine's principles, the skilled cognitive coach will model by providing physical representations of completed tasks (or worked examples), conceptual models and also model the explicit narration of their thought processes when problem-solving or creating.

In the Thinking School approach **Metacognitive Visual Tools** such as Thinking Frames are used by teachers and students to organise and display their thinking, and Visible Thinking Routines are used to scaffold and support student thinking. These tools are generally introduced explicitly in accordance with recommendation 2 and the process (see image) recommended within the EEF's Guidance Report (2018). This series of steps for introducing such metacognitive tools begins with the activation of prior knowledge, followed by explicit strategy instruction, modelling and prompts for memorisation of the strategy, after which the teacher guides the student towards independent practice and facilitates structured reflection. This procedure for introducing metacognitive tools and strategies has obvious synergy with Rosenshine's principles.

Activating prior knowledge

Explicit strategy instruction

Modelling of learned strategy

Memorisation of learned strategy

Guided practice

Independent practice

Structured reflection

Thinking Frames, based on [dual coding theory](), also enable students to combine the visual and linguistic modes of learning, attending to both speech and visual representation simultaneously which effectively doubles the amount of information which can be processed and reduces load on working memory.
They therefore provide useful scaffolds to support students as they plan, monitor and evaluate their independent work.

Thinking Frames: Metacognitive Visual Tools — Defining, Describing, Sequencing, Categorising, Cause Effect, Whole Part, Comparing Contrasting, Connecting

- ## Questioning and checking for understanding

Rosenshine's third principle profiles the importance of 'asking questions' and his sixth, of 'checking for student understanding'. Sherrington (2019) states that "*One of the strongest implications from Rosenshine's 'Principles of Instruction' is that effective questioning lies at the heart of great instructional teaching*". This is entirely consistent with the TM approach, in which '**skilful questioning**' is considered a fundamental metacognitive strategy for the cognitive coach.

Rosenshine believes that effective teachers will ask a greater quantity of questions, thus involving more students and providing opportunity to check for or monitor understanding, to provide challenge and to probe for deeper thinking. This reflects the questioning skill of the cognitive coach in a Thinking Classroom, where there will be evidence of a careful and considered focus on the quality of questions being used and also on the balance between teacher and student-initiated questions.

It's worth noting however that Rosenshine's focus on questioning is solely on teacher questioning, whereas in a Thinking School the focus is on seeking to develop the thinking capacities of students. There are clear expectations that the student as meta-learner will also ask skilful questions so, in addition to modelling, the cognitive coach will also introduce a number of meta-tools and thinking routines which students can use to generate probing and challenging questions. The meta-learner will be curious about their world, inquisitive to know more and to delve deeper into concepts, and critical in their responses to others. The self-regulating student will also be self-questioning as they seek to plan, reflect, direct, monitor and evaluate their progress.

- ## Reviewing material

Rosenshine's first principle identifies the importance of daily review and, his final principle, the importance of weekly and monthly review. This is founded on a recognition of the need to develop neural networks through regular retrieval practice to build our long-term memory. Daily review seeks to build fluency and reduce [cognitive load,]() ensuring that recent learning can be more easily recalled. Weekly and monthly reviews further embed learned material in long-term memory, enabling students to establish solid neural connections or schemas which aids recall and frees up space in short-term memory. Review is centrally about supporting students to

activate their prior knowledge to connect new learning, thus helping them to remember what they've been taught over a period of time.

The TM 'Science of Learning' content provides a very similar theoretical explanation to that cited by Rosenshine on the importance of regular review, particularly within the modules on neuroplasticity and memory. This information highlights the importance of making connections in supporting learning and development, both in helping students develop understanding and in supporting their capacities for knowledge recall/information retrieval. TM thus recommends that a key role of the cognitive coach as they plan learning opportunities is to build in regular opportunities for review, such as at the start and end of lessons, and at the beginning and conclusion of a topic or enquiry. Furthermore, TM highlights the use of **distributed** or **spaced practice** as a useful strategy.

Cognitive coaches will utilise Thinking Frames and many of the Visible Thinking Routines to review material in a way that connects thinking processes and helps consolidate knowledge. For example the routine 'Claim-Support-Question', which seeks to help students make connections between prior knowledge and new ideas, and 'Connect-Extend-Challenge', which is particularly useful when introducing a new topic, concept, or theme as it helps students take stock of what they already know and then pushes them to be curious or generate new ideas to explore. Continuing with the exploration theme, Thinking Matters also offers schools the opportunity for their KS2/3 students to engage with how they learn with the use of a game-based app, Adventures in Metacognition, in which they meet engaging characters that introduce them to how they learn and reflect on their learning as they find their way across a desert island.

- ### Stages of practice

This strand in Sherrington's summary includes Rosenshine's principles of guiding student practice, securing a high success rate and supporting students to practise independently. Rosenshine himself emphasises the distinction between guided practice and independent practice. His recognition of the importance of practice emanates from his analysis of research findings in the area of information-processing and long-term memory. He notes that during guided practice the teacher will spend more time explaining, modelling and providing worked examples, asking more questions to check for student understanding and providing formative feedback, thus supporting the student to establish a firm schema. The guidance provided should be gradually reduced as the student makes progress and demonstrates gains in their levels of knowledge.

Sherrington (2019) acknowledges that in order to make an effective transition from guided practice to independent practice, the most successful teacher must know their content and how to break it down into micromastery steps, as well as knowing their students well. He describes this as a '*subtle skill*'. Having had sufficient experience of guided practice, the student will have high levels of success in independent practice as they set their own goals or targets, utilise strategies confidently to complete tasks, recall knowledge learned, build fluency and generate their own feedback.

Rosenshine also recommends that questions and tasks should be set which explicitly seek to enable the students to achieve a high level of success – optimally 80%. This principle is based on studies that show practising in this supportive context is likely to result in improving student outcomes and fluency by reinforcing 'error-free, secure learning'. However, it is also recognised that, in order to make progress, the student needs to be appropriately challenged, to take risks in their learning and to recognise errors as opportunities for learning.

Guided and independent practice and awareness of the need for challenge are similarly highlighted in the recommendations in the EEF's report (2018) - "*Carefully designed guided practice, with support gradually withdrawn as the pupil becomes proficient, can allow pupils to develop skills and strategies before applying them in independent practice,*" and "*Challenge is crucial to allow pupils to develop and progress their knowledge of tasks, strategies, and of themselves as learners*". The need for challenge to be at an appropriate level and for students to have the motivation to accept the challenge are also noted.

As mentioned previously, the concept of [deliberate practice](#) (Ericsson, 2017) is also discretely identified in the TM Big Picture as an important strategy for developing student metacognition. The key elements of deliberate practice include the need for the student to:
- have a clear goal/purpose,
- engage in focused micromastery,
- have expert input and feedback which provides both support and appropriate levels of challenge or 'stretch', and
- use visualisation/mental representation to support their progress.

The Thinking School approach also recognises the importance for students to understand that intrinsic motivation is necessary to sustain engagement in the right type of practice. To do something practical about that, Thinking School students are encouraged to explore what it is that motivates them through the use of [Motivational Maps](#). These provide learners (and their teachers) with a framework for how to shape learning opportunities and activities in a way that connects with what it is that meets their true needs, aspirations and interests.

Conclusion

Rosenshine's Principles are an excellent framework for teachers to utilise when considering the instructional element of their craft. For MAT, school leaders or individual teachers looking to gain the documented benefits of developing independent 'meta' learners we hope that this article provides an overview of how they can build on Rosenshine based instructional approaches to achieve that aim.

In settings such as accredited Thinking Schools the teachers are using pedagogy based on the similar 'science of learning' upon which Rosenshine's work is based but are explicitly looking to go beyond instruction and to arm their students with the knowledge, tools and strategies to become self-sufficient learners. Their whole school approach to developing meta learners is concerned, not only with lesson structure and

teacher instruction, but is centrally about establishing a culture of making thinking or metacognition visible.

The results of this approach are powerful, not only in the narrow confines of increased pupil progress as measured by exam grade improvements but in developing the skills and attributes required to progress, whatever challenge is put in front of their learners.

"*To Infinity and Beyond!*", Buzz Lightyear's famous catchphrase in the popular Toy Story films captures the positive mindset, drive and enthusiasm of this lovable character who aims high and who believes in limitless possibilities. To some extent, perhaps the concept of 'whole school metacognition' reflects a philosophy of education, a conceptual understanding of thinking and learning and a vision for future-proofing our learners which is similarly ambitious.

The concept of the cognitive coach, who has acquired a robust level of understanding of the Science of Learning, has a deep appreciation of interventions that develop the thinking capacities and learning behaviours of their students and who is able to pay highly attuned attention to the factors that make a difference to learning, certainly seems to challenge the perception of the teacher far beyond that of one who provides instruction.

To find out more about taking your school beyond Rosenshine ...

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