



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Yr Athrofa
Centre for Education
Addysg i Gymru | Education for Wales



Partneriaeth Dysgu Proffesiynol **Yr Athrofa**
Yr Athrofa Professional Learning Partnership

Trawsnewid Addysg Gyda'n Gilydd Transforming Teaching Together

Session 2: Pedagogical Principles



Activating prior
knowledge

ABC Brainstorm

Topic:

A:
B:
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Summary:



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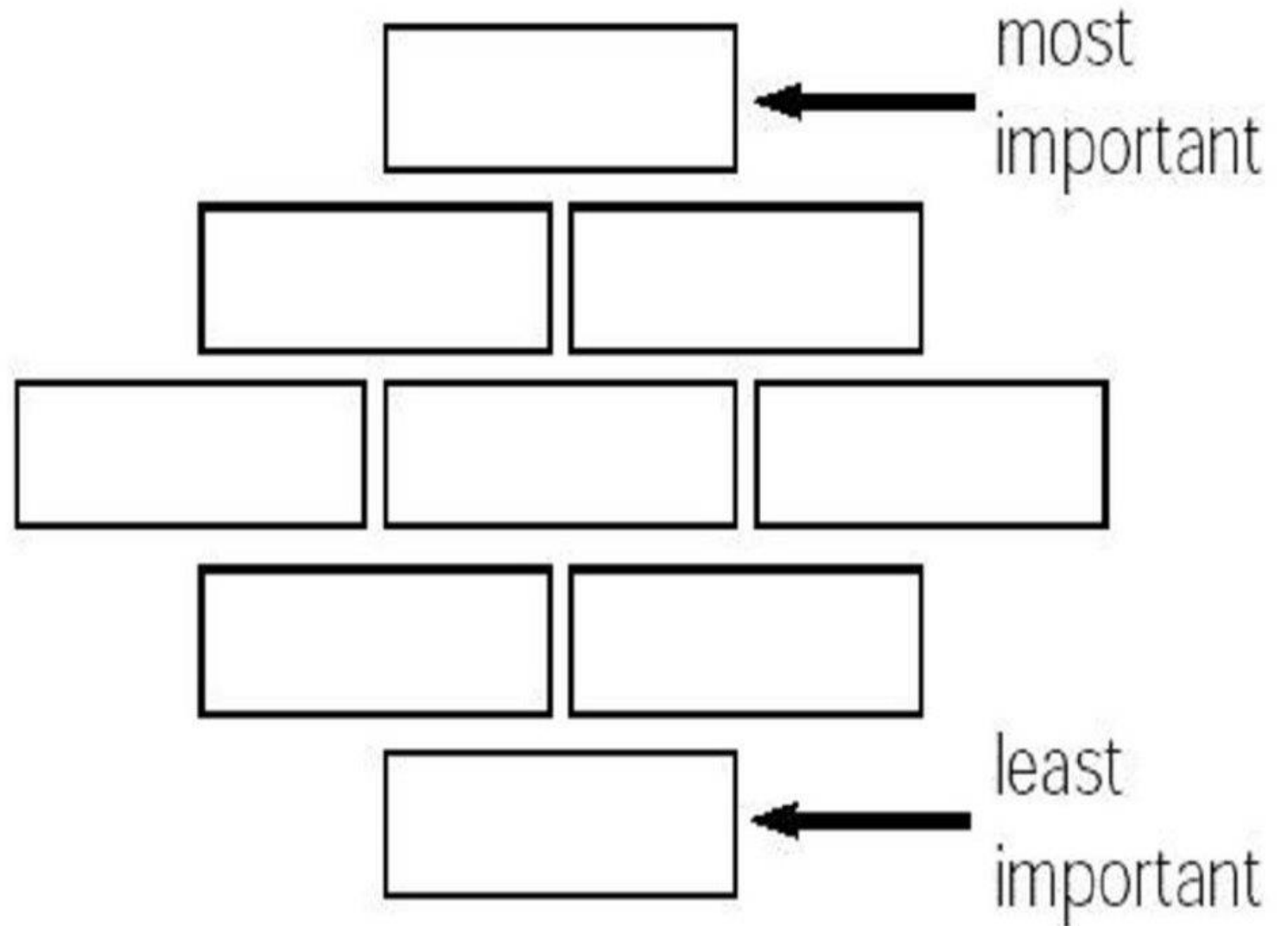
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Trwy'r Athrofa, Trawsnewid Bywydau
Transforming Education, Transforming Lives



What makes an outstanding lesson?

Diamond 9 task:





**What is
pedagogy?**

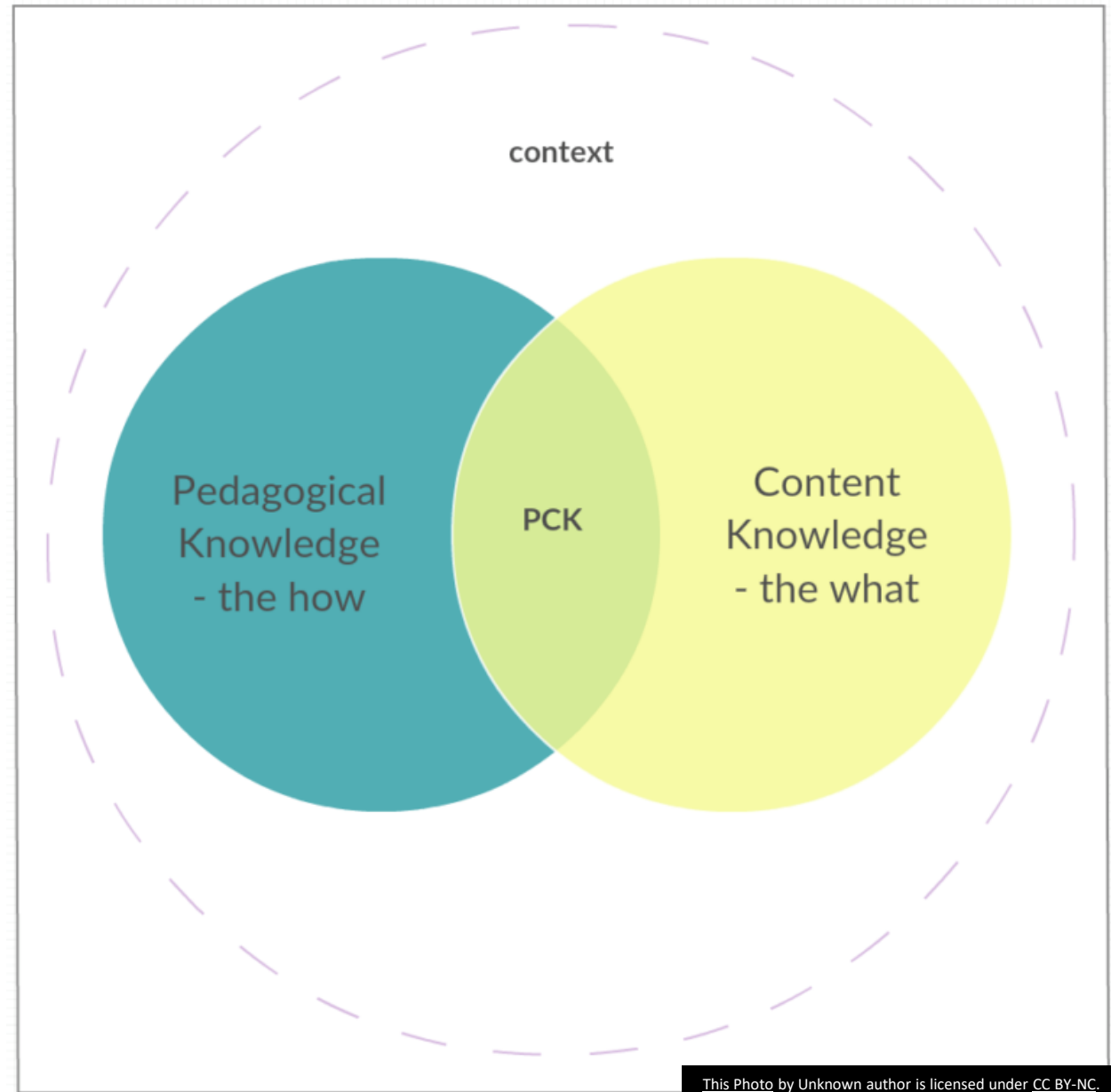
The study of teaching methods, including the aims of education and the ways in which such goals may be achieved. It relies heavily on scientific theories of learning, and to some extent on the philosophy of education, which considers the aims and value of education from a philosophical perspective.

The pedagogy adopted by teachers shapes their actions, judgments, and other teaching strategies by taking into consideration theories of learning, understandings of pupils and their needs, and the backgrounds and interests of individual students.



What makes a teacher special?

Pedagogical Content Knowledge



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“To be clear, the recommendations of this Review do not imply an emphasis on any particular teaching approaches: decisions about teaching and learning are very context and purpose specific and are best taken by the teacher themselves.”

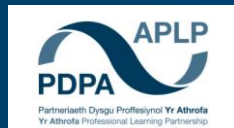
Professor Graham Donaldson

So, what does this all mean in practice? What should schools be doing with the 12 Pedagogical Principles?



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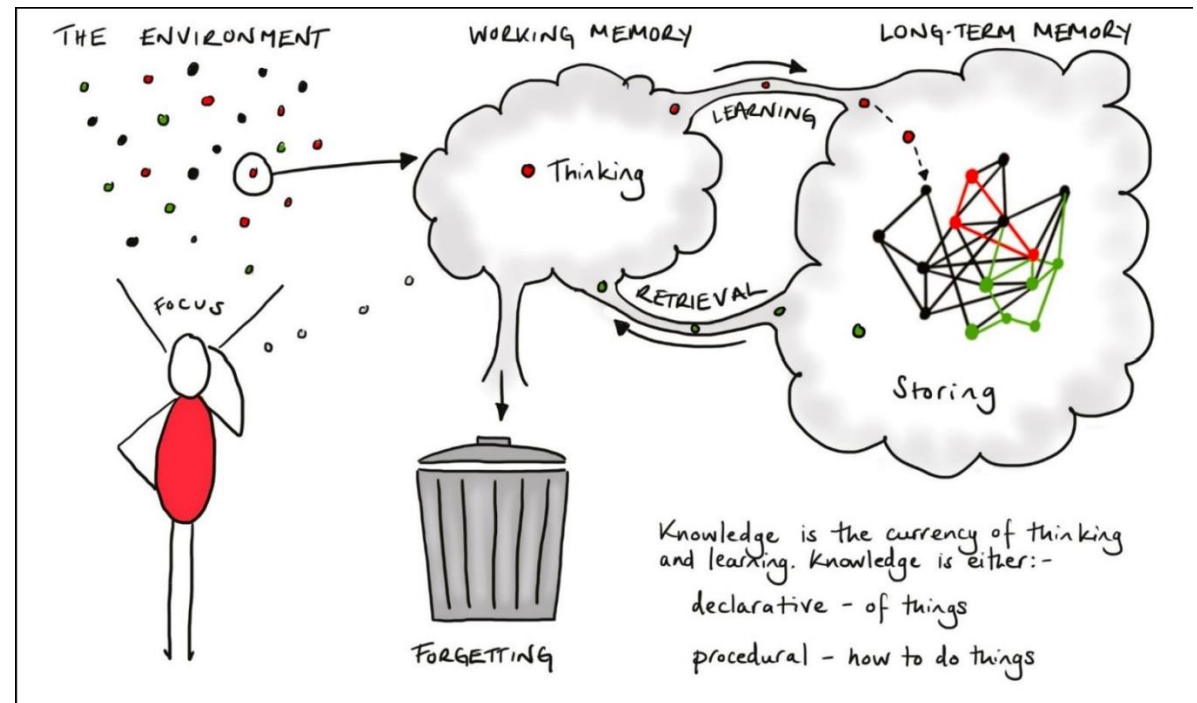
Reflective Tasks:

- 1. What do you already know about how learning happens? Write down everything you know below about what is happening inside pupils' brains as they learn something new.
- 2. How does what you know about how learning happens shape the way you teach? Describe two examples of teaching strategies you use and explain why you use them.
- 3. Which area of your own teaching do you think/anticipate will be a challenge to you and why?



Look at the illustration and answer the following questions:

1. What is the first step in the learning process? What behaviour management strategies do you use to ensure this first stage is effective?
2. What are the limits of your working memory? How many items can it retain and for how long?
3. What might you as the teacher do, to help pupils to increase their cognitive capacity and engage their long-term memory in the learning process?

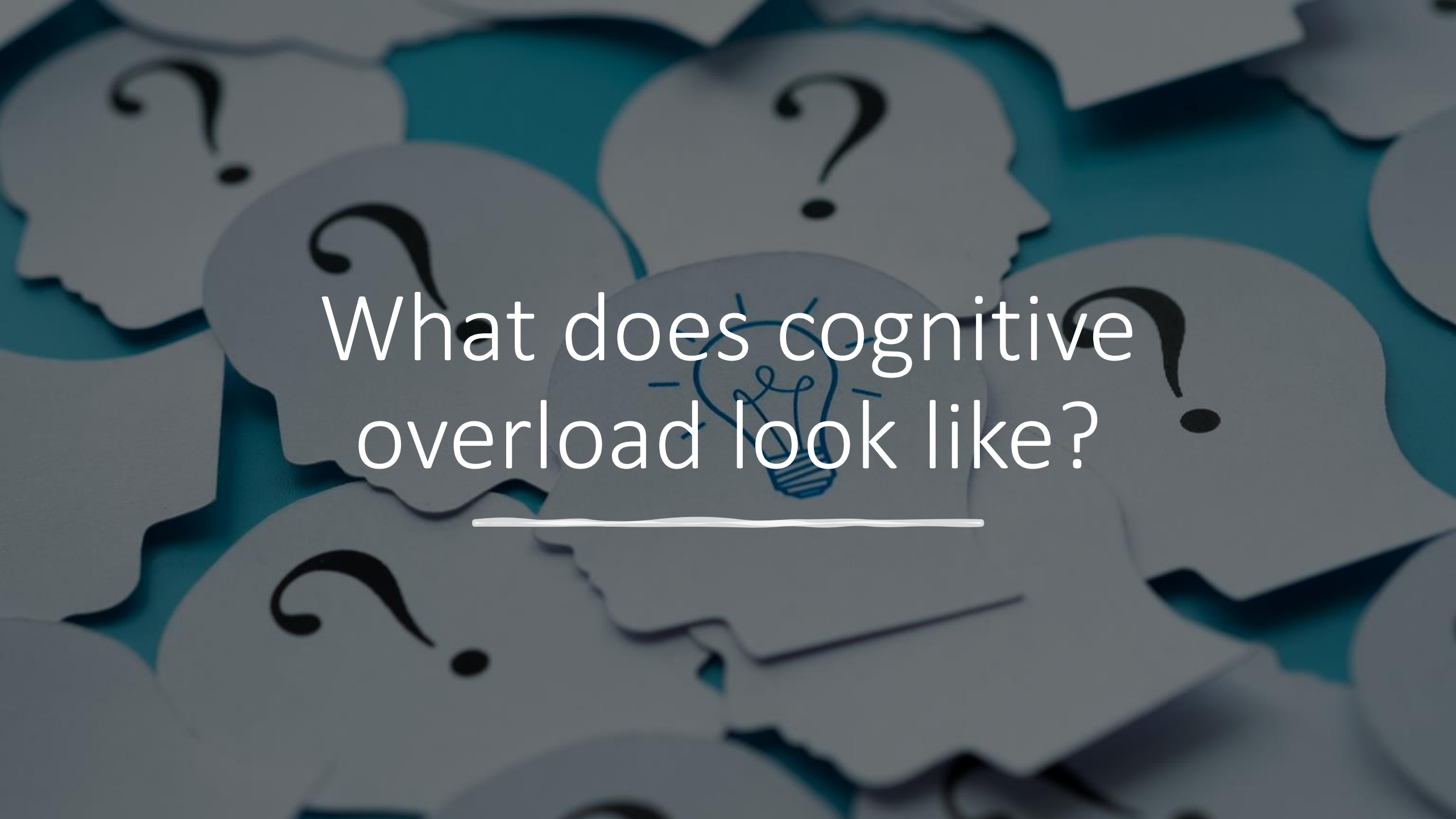


Step One - Focus

The first step in the learning process is to focus on the 'to be learnt' content. This 'to be learnt' content enters our cognitive process by means of a sensory stimulus. In other words, we attend to what the teacher is saying, or we look at a section of a diagram. Our attention can be fickle though. We are very easily distracted and attending to the intended learning, can be far harder than you may anticipate. How often have you found yourself "reading" a sentence in a text, but knowing that you haven't made sense of what you've read at all, and you need to re-read the sentence? Our environment is full of competing stimuli which we must dismiss or attend to in order to make sense of what we are experiencing. It is also very difficult to know whether outwardly attentive behaviour from pupils, is an indication of cognitive focus and attention on the right stimulus.

Step Two – processing (aka thinking)

The next step in the learning process is that the learner actively thinks about the information they are focusing on. This happens in the working memory. However, the working memory is severely limited. It can only retain 4-6 items for approximately 30 seconds. So, it doesn't take long for the working memory to become overwhelmed and shut down. This is when you will see responses like these from research by Gathercole and Alloway (2007)

The background features a collage of overlapping thought bubbles in shades of grey and teal. Several bubbles contain black question marks, and one central bubble contains a blue line drawing of a lightbulb. The text is centered over this graphic.

What does cognitive
overload look like?

Some indications of cognitive overload:

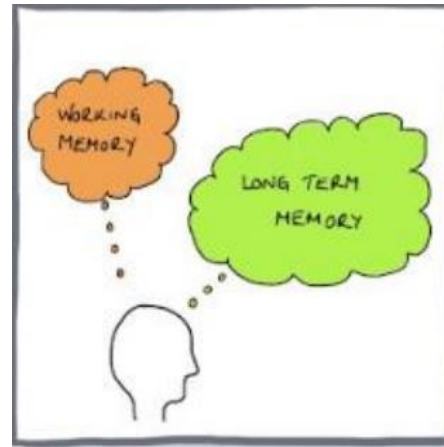
- An unwillingness to answer questions
- Failing to follow instructions
- Place keeping errors
- Task abandonment
- Incomplete recall
- Poor academic progress over time
- Low attention and therefor easily distracted

Gathercole and Alloway 2007

Step Three – increasing cognitive capacity – involving the long-term memory

The goal of learning is to embed the new information into the long-term memory, by adding to the network of connections the pupil already has. By connecting the new information with something the learner already knows. New learning does not float freely in the brain, it needs to be connected to already learnt information. New information is added to the learner's schema, or their connections of meaning. The more connections that are made, the stronger those connections and the more easily the new information can be recalled when it is needed. All prior learning is organised in networks of connections called schema (singular), or schemata (plural). These schemata are dynamic, meaning they are fluid and subject to change. A learner makes sense of the world based on the schema she or he already has. Think of the phrase a "worldview." Your schema is your "worldview" or the information you already have, with which you make judgements and make sense of any new information you encounter.

This is part
of schema
theory:

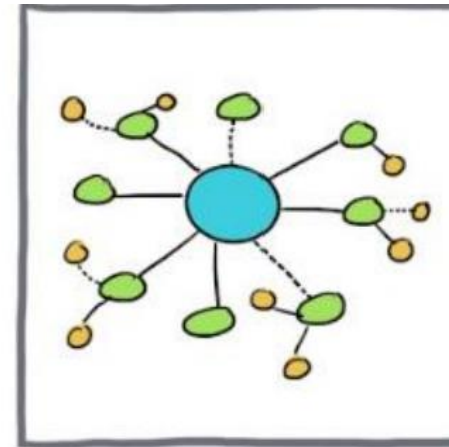


WORKING MEMORY

- 30 seconds approx
- 5-8 items
- Processing happens here

LONG TERM MEMORY

- Lasts a lifetime
- Infinite # of items
- Can free up processing



CONNECTIONS

New memories are not free floating, they are connected to things we already know.

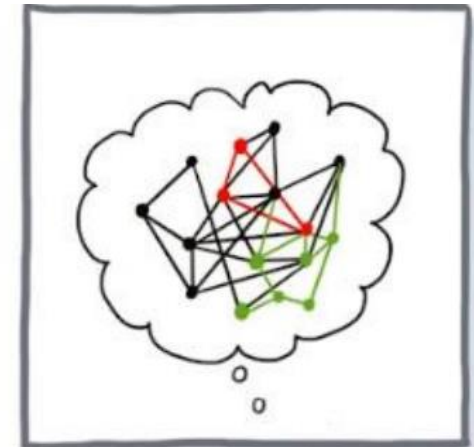
Make a connection



Revisit & strengthen connection



More deeply embedded memory



SCHEMA

The pattern of thought. The cognitive architecture.

Teaching should aim to explain & share the teacher's schema to the learner.

Learning = construction of effective schema

Reflecting on your own experiences:

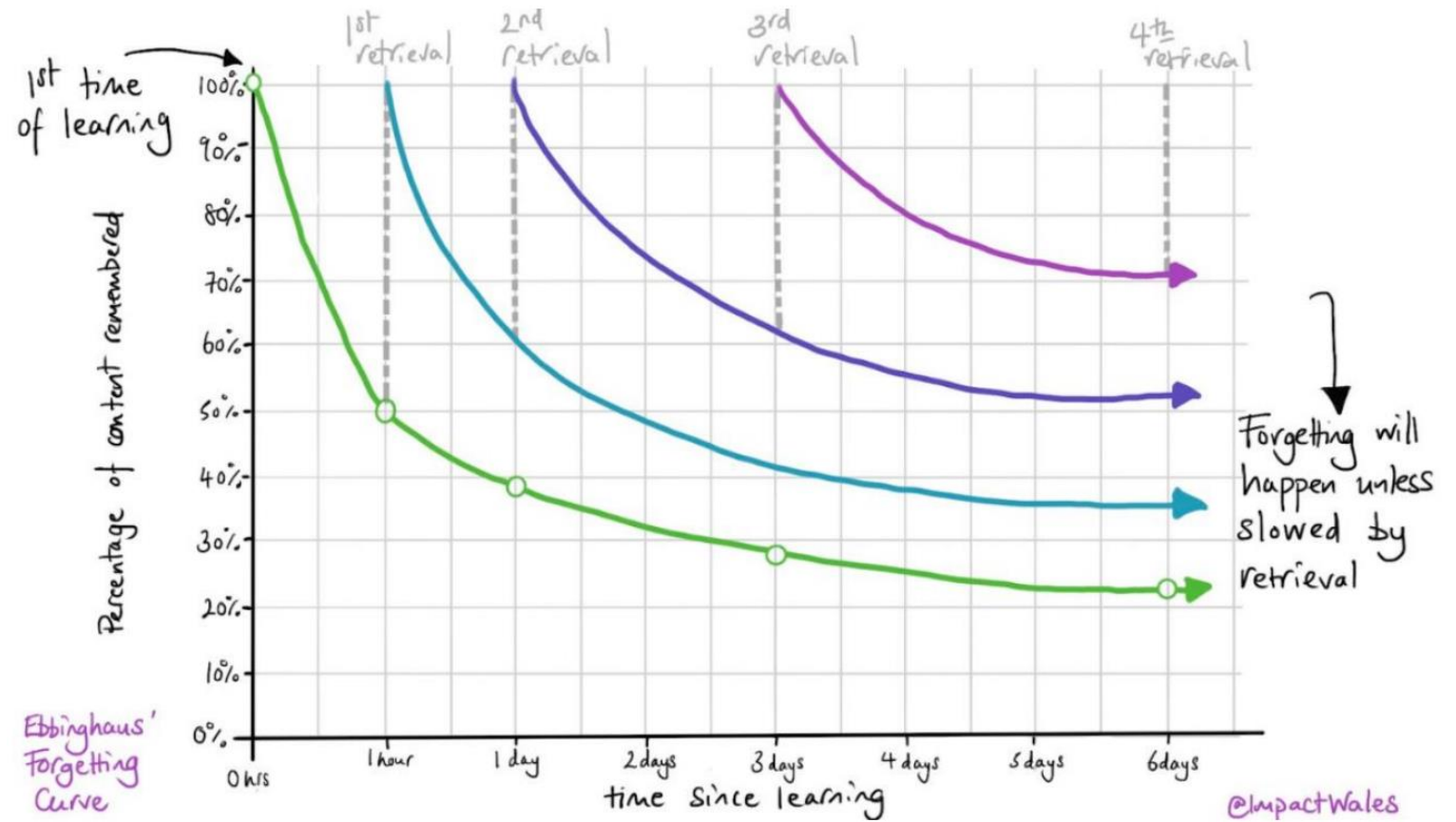


1. What do you know about forgetting? How does it happen? What is its purpose?



2. How do you ensure that important learning is deeply embedded in the long-term memory and easily accessible when required?

Ebbinghaus' forgetting curve



Reflective task:



1. How does the capacity of the working-memory impact on the way in which new information is presented to the learner?



2. How do you think you could reduce the cognitive load of pupils during the teaching of new material?



3. What might you need to consider to ensure pupils are able to utilise the unlimited capacity of their long-term memory in the learning process?

"To be clear, the recommendations of this Review do not imply an emphasis on any particular teaching approaches: decisions about teaching & learning are very context and purpose specific, and are best taken by teachers themselves." Successful Futures



Create authentic contexts for learning

Encourage learners to take responsibility for their own learning

Support social and emotional development & positive relationships

Encourage collaboration

Sustained pupil effort to reach high but achievable targets

Employing a broad repertoire of teaching approaches

Promote problem solving, creative & critical thinking

Build on previous knowledge & experience to engage interest

Focus on the 4 Purposes

Use assessment for learning to accelerate progress

Make connections within & across Areas of Learning & Experience

Reinforce Cross Curricular Responsibilities, Literacy, Numeracy, Digital Competence

For bespoke support to develop the most appropriate pedagogical and context - contact enquiries@impact.wales

approach for your pupils
www.impact.wales



Task:

Read pages 63-70 of 'Successful Futures' which focus on the '12 Pedagogical Principles'

Reflect on what the development of these principles may look like in practice. Think about what you might see in the classroom that could evidence these principles being addressed. Write your ideas in the boxes.

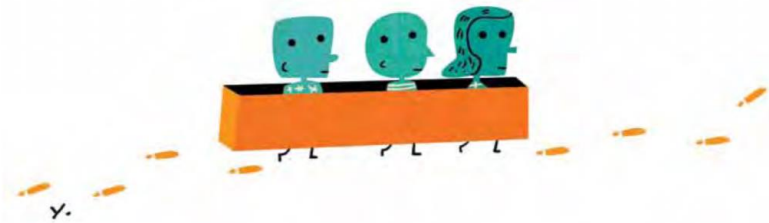
Successful Futures

Independent Review of Curriculum
and Assessment Arrangements in Wales

Professor Graham Donaldson CB
February 2015

Principles of Instruction

Research-Based Strategies That All Teachers Should Know



BY BARAK ROSENSHINE

This article presents 10 research-based principles of instruction, along with suggestions for classroom practice. These principles come from three sources: (a) research in cognitive science, (b) research on master teachers, and (c) research on cognitive supports. Each is briefly explained below.

A: Research in cognitive science: This research focuses on how our brains acquire and use information. This cognitive research also provides suggestions on how we might overcome the limitations of our working memory (i.e., the mental “space” in which

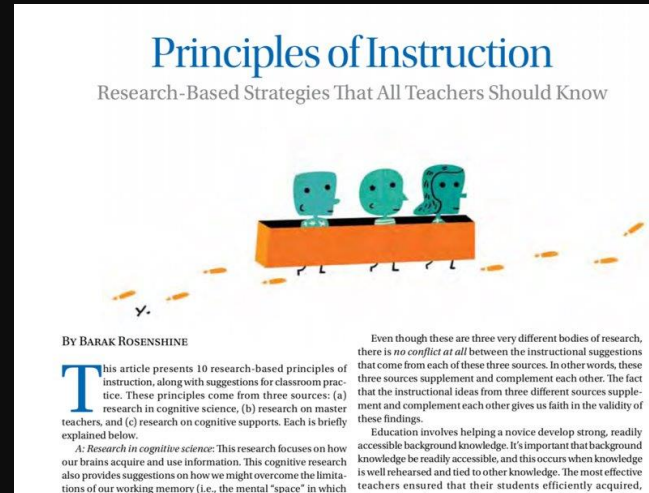
Even though these are three very different bodies of research, there is *no conflict at all* between the instructional suggestions that come from each of these three sources. In other words, these three sources supplement and complement each other. The fact that the instructional ideas from three different sources supplement and complement each other gives us faith in the validity of these findings.

Education involves helping a novice develop strong, readily accessible background knowledge. It’s important that background knowledge be readily accessible, and this occurs when knowledge is well rehearsed and tied to other knowledge. The most effective teachers ensured that their students efficiently acquired,



Consolidating our understanding of pedagogical principles.

Rosenshine's Principles of Instruction:



Principles of Instruction

The following list of 17 principles emerges from the research discussed in the main article. It overlaps with, and offers slightly more detail than, the 10 principles used to organize that article.

- Begin a lesson with a short review of previous learning.
- Present new material in small steps with student practice after each step.
- Limit the amount of material students receive at one time.
- Give clear and detailed instructions and explanations.
- Ask a large number of questions and check for understanding.
- Provide a high level of active practice for all students.
- Guide students as they begin to practice.
- Think aloud and model steps.
- Provide models of worked-out problems.
- Ask students to explain what they have learned.
- Check the responses of all students.
- Provide systematic feedback and corrections.
- Use more time to provide explanations.
- Provide many examples.
- Reteach material when necessary.
- Prepare students for independent practice.
- Monitor students when they begin independent practice.

—B.R.



Great Teaching Toolkit

Evidence Review



Evidence Based
Education

01



Great teachers understand the content they are teaching and how it is learnt

02



Great teachers create a supportive environment for learning

03



Great teachers manage the classroom to maximise opportunity to learn

04



Great teachers present content, activities and interactions that activate their students' thinking

THE GREAT TEACHING TOOLKIT

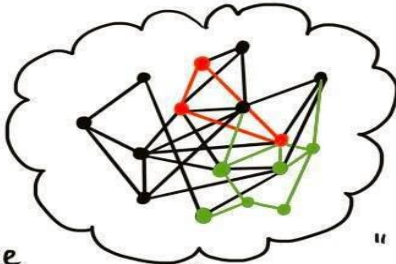
@ImpactWales

We believe in using the best evidence
to create bespoke school support
enquiries@impact.wales

1 UNDERSTAND THE CONTENT

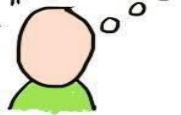
Teachers must...

"Have deep, fluent,
flexible knowledge
of learning content"



"Know what tasks
& activities will
develop learning"

"Know how to sequence
content in the curriculum"



"Know & understand
possible misconceptions"

2 CREATE A SUPPORTIVE ENVIRONMENT

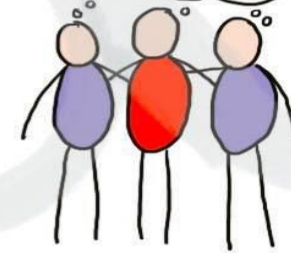
Teachers must...

"Promote relationships
of mutual respect &
care"



"Promote a positive
climate"

"Promote learner
motivation through
competence &
autonomy"



"Support high expectations,
high challenge & high
trust"

3 MAXIMISE OPPORTUNITY TO LEARN

Teachers must...

"Manage time, resources,
instructions & transitions
well."



"Ensure rules &
expectations are
clear & are followed"

"Respond to potential
disruption by
responding
appropriately"



4 ACTIVATE HARD THINKING

Teachers must...

"Question for elaboration,
thinking & to assess"

"Interact with students'
feedback & understanding"

"Explain, communicate,
exemplify & demonstrate"

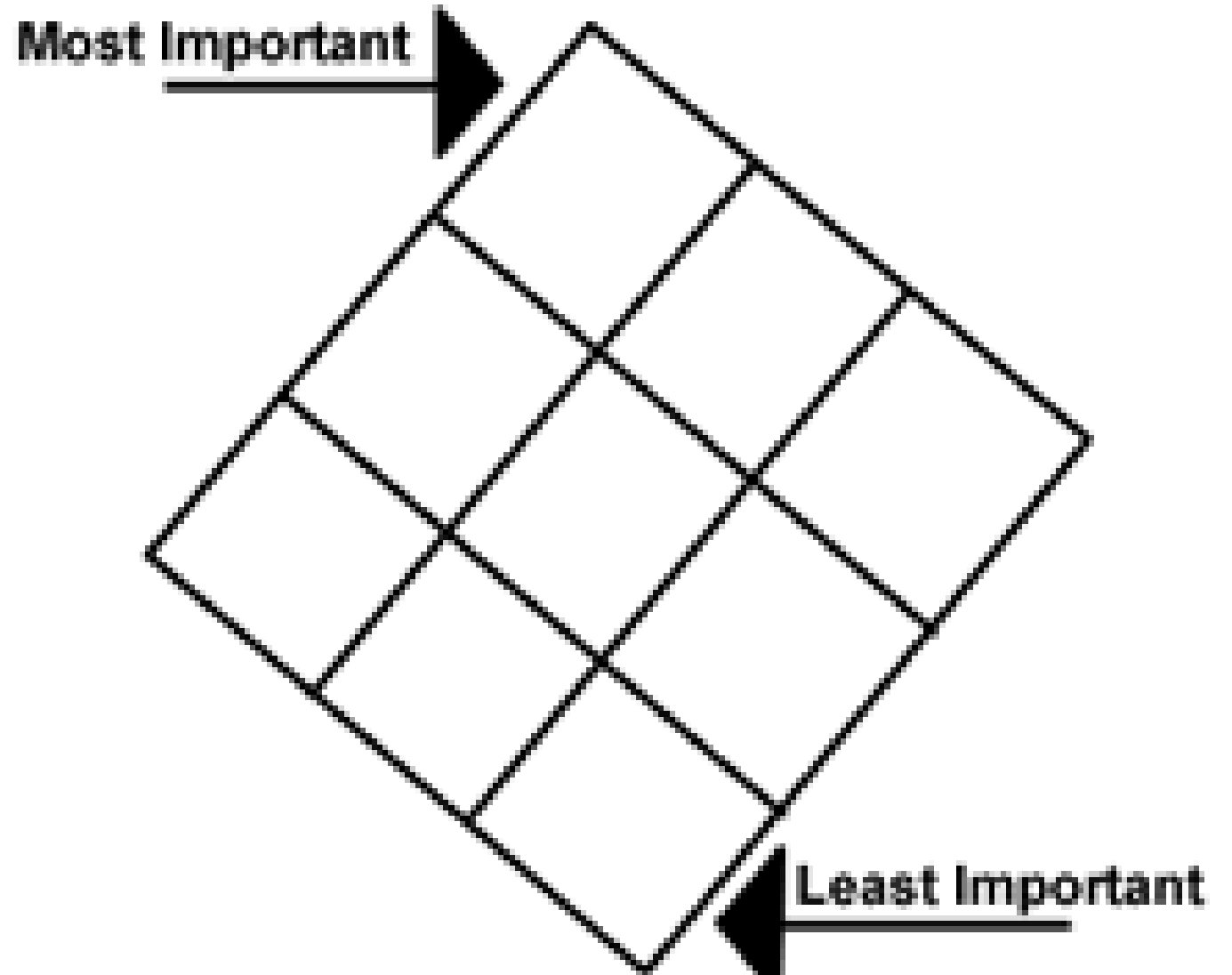


"Embed & reinforce learning
through practice."

"Structure, sequence,
scaffold & support."

"Activate students'
ability to own their
learning."

Based on
what you have
learnt today,
what makes
an
outstanding
English
lesson?



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Plenary:

List the pedagogical principles
applied in this session today



A Model for Great Teaching

1. Understanding the content

- | | | |
|---|--|---|
| 1 Having deep and fluent knowledge and flexible understanding of the content you are teaching | 2 Knowledge of the requirements of curriculum sequencing and dependencies in relation to the content and ideas you are teaching | 3 Knowledge of relevant curriculum tasks, assessments and activities, their diagnostic and didactic potential; being able to generate varied explanations and multiple representations/analogies/examples for the ideas you are teaching |
| 4 Knowledge of common student strategies, misconceptions and sticking points in relation to the content you are teaching | | |

2. Creating a supportive environment

- | | | |
|--|---|--|
| 1 Promoting interactions and relationships with all students that are based on mutual respect, care, empathy and warmth; avoiding negative emotions in interactions with students; being sensitive to the individual needs, emotions, culture and beliefs of students | 2 Promoting a positive climate of student-student relationships, characterised by respect, trust, cooperation and care | 4 Creating a climate of high expectations, with high challenge and high trust, so learners feel it is okay to have a go; encouraging learners to attribute their success or failure to things they can change |
| | 3 Promoting learner motivation through feelings of competence, autonomy and relatedness | |

3. Maximising opportunity to learn

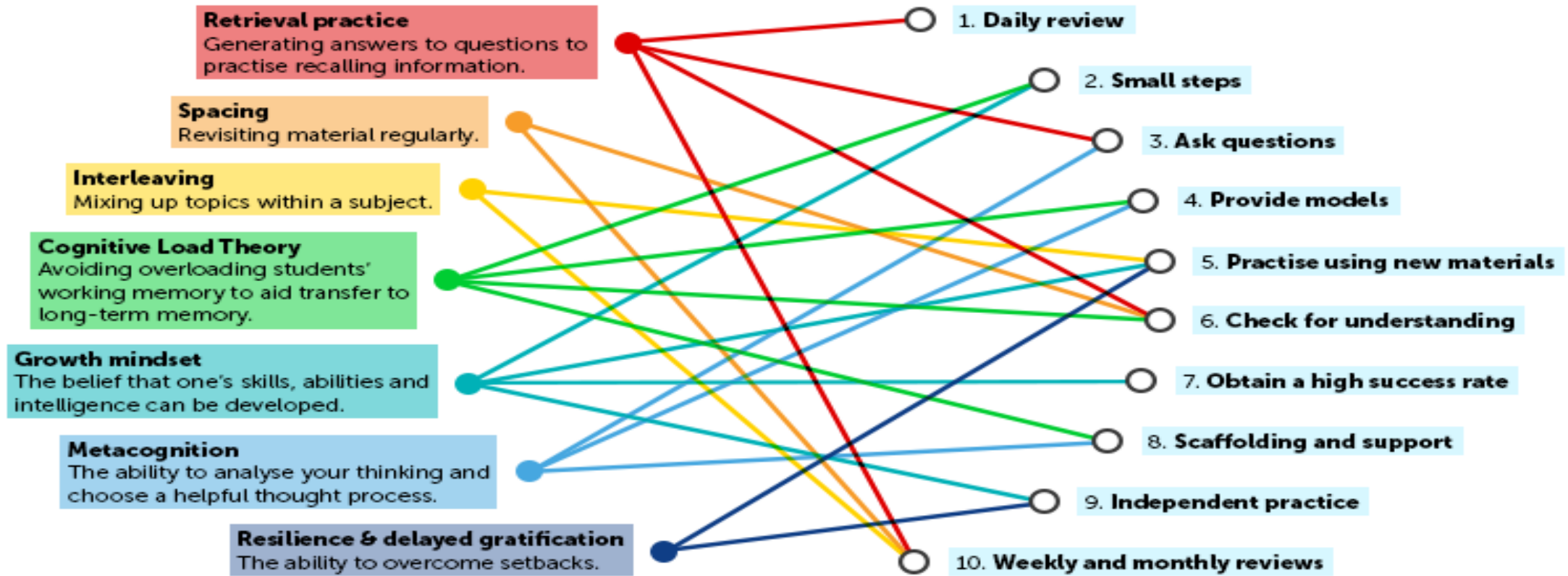
- | | | |
|--|--|--|
| 1 Managing time and resources efficiently in the classroom to maximise productivity and minimise wasted time (e.g., starts, transitions); giving clear instructions so students understand what they should be doing; using (and explicitly teaching) routines to make transitions smooth | 2 Ensuring that rules, expectations and consequences for behaviour are explicit, clear and consistently applied | 3 Preventing, anticipating & responding to potentially disruptive incidents; reinforcing positive student behaviours; signalling awareness of what is happening in the classroom and responding appropriately |
|--|--|--|

4. Activating hard thinking

- | | | |
|---|---|---|
| 1 Structuring: giving students an appropriate sequence of learning tasks; signalling learning objectives, rationale, overview, key ideas and stages of progress; matching tasks to learners' needs and readiness; scaffolding and supporting to make tasks accessible to all, but gradually removed so that all students succeed at the required level | 2 Explaining: presenting and communicating new ideas clearly, with concise, appropriate, engaging explanations; connecting new ideas to what has previously been learnt (and re-activating/checking that prior knowledge); using examples (and non-examples) appropriately to help learners understand and build connections; modelling/demonstrating new skills or procedures with appropriate scaffolding and challenge; using worked/part-worked examples | 3 Questioning: using questions and dialogue to promote elaboration and connected, flexible thinking among learners (e.g., 'Why?', 'Compare', etc.); using questions to elicit student thinking; getting responses from all students; using high-quality assessment to evidence learning; interpreting, communicating and responding to assessment evidence appropriately |
| 4 Interacting: responding appropriately to feedback from students about their thinking/knowledge/understanding; giving students actionable feedback to guide their learning | 5 Embedding: giving students tasks that embed and reinforce learning; requiring them to practise until learning is fluent and secure; ensuring that once-learned material is reviewed/revisited to prevent forgetting | 6 Activating: helping students to plan, regulate and monitor their own learning; progressing appropriately from structured to more independent learning as students develop knowledge and expertise |

The **cognitive science** behind **Rosenshine's Principles of Instruction**

by @Inner_Drive | innerdrive.co.uk



Rosenshine vs TLaC

Rosenshine's Principles are 10 research-based principles of instruction linked to the classroom. These principles come from three sources: (a) research in cognitive science, (b) research on master teachers, and (c) research on cognitive supports. Here, they have been set against a selection of techniques from Lemov's *Teach Like A Champion* which the author Doug Lemov describes as "a set of field notes from observations of the work of masters".

1

Daily review is an important component of instruction. It helps cement the connections between learned material. Automatic recall of words, concepts and procedures frees working memory for problem solving and creativity.

Daily Review

2

Our working memory is small, only handling a few bits of information at once. Avoid overload: take time to present new material in small steps and proceed only when first steps are mastered.

New material in small steps

3

The most successful teachers spend more than half the class time lecturing, demonstrating and asking questions. Questions allow the teacher to determine how well the material is learned and how then to proceed with next steps.

Ask Questions

4

Pupils need cognitive support to help them to learn how to solve problems. Modelling, worked examples and teacher thinking out loud help clarify the specific steps involved and reduce the load on working memory.

Provide models

5

Pupils need more time to rephrase, elaborate and summarise new material. Successful teachers built in time for this as it supports greater understanding as well as more successful retention in long term memory.

Guide student practice

Technique 20: Do Now

Use a short warm-up activity that students can complete without instruction or direction from you to start class every day. This lets the learning start even before you begin teaching.

Technique 46: Strong Start

Design and establish an efficient routine for students to enter the classroom and begin class. Once routine becomes habit load on working memory is reduced.

Technique 5: Show Me

Flip the classroom dynamic in which the teacher gleans data from a passive group of students. Have students actively show evidence of their understanding.

Technique 26: Exit Ticket

End each class with an explicit assessment of your objective that you can use to evaluate your (and your students') success.

Technique 21: Name the Steps

Break down complex tasks into simple steps that form a path for student mastery. Give pupils the benefit of your intuition into the material to build knowledge systematically.

Technique 16: Begin with the end

Progress from unit planning to lesson planning. Define the objective, decide how you'll assess it, and then choose appropriate lesson activities.

Technique 57: What to Do (EX)

Use specific, concrete, sequential, and observable **explanations** to tell students what to do, as opposed to what not to do. Apply these rules when scripting how to unravel ideas.

Technique 25: At Bats

Because succeeding once or twice at a skill won't bring mastery, give your students lots of practice mastering knowledge and skills.

Technique 33: Cold Call

Create a positive culture where you can call on students regardless of whether they've raised their hands and pupils are ready to offer what they know.

Technique 32: Wait Time

Allow students time to think before answering. If they aren't productive with that time, narrate them toward being more productive.

Technique 11: No Opt Out

Turn "I don't know" into a success by helping students who won't try or can't succeed practice getting it right (and being accountable for trying).

Technique 36: Pepper

Use **Pepper** as a fast-paced, vocal review to build energy and actively engage your class.

Technique 39: Show Call

Create a strong incentive to complete writing with quality and thoughtfulness by publicly showcasing and revising student writing regardless of who volunteers to share.

Technique 38: The Art of the Sentence

Ask students to synthesise a complex idea in a single, well-crafted sentence. The discipline of having to make one sentence do all the work pushes students to use new syntactical forms.

Technique 22: Board = Paper

Model and shape how students should take notes in order to capture the information you present.

Technique 15: Without Apology

Embrace – rather than apologise for – rigorous content, academic challenge, and the hard work necessary to scholarship.

Technique 37: Everybody Writes

Prepare your students to engage rigorously by giving them the chance to reflect in writing before you ask them to discuss.

Technique 43: Turn and Talk

Encourage students to better formulate their thoughts by including short, contained pair discussions but make sure to design them for maximum efficiency and accountability.

Technique 42: Habits of Discussion

Make your discussions more productive and enjoyable by normalising a set of ground rules or 'habits' that allow discussion to be more efficiently cohesive and connected.

Technique 8: Culture of Error

Create an environment where your students feel safe making and discussing mistakes, so you can spend less time hunting for errors and more time fixing them.

Rosen shine

"The best way to become an expert is through practice—1000s of hours of practice. The more practice, the better the performance."



"research works best when it is a tool not a mandate—adapted and applied by professionals to meet a specific goal."

Teach Like Champion

6

More CFU means more processing, greater long-term retention and better teacher understanding in terms of gaps. Very effective teachers avoid seeking nods from pupils and use targeted questioning to find misconceptions

Check student understanding

7

Obtaining a high success rate at each stage of delivery will build solid foundations and avoid entrenching misconceptions. Moving on too quickly will reduce effectiveness and affect those pupils reaching clarity more recently.

Obtain high success rate

8

Scaffolds are temporary supports to assist learning. They can include modelling, teacher thinking aloud, cue cards and checklists. Scaffolds are part of a "cognitive apprenticeship" leading to competence and independence.

Scaffolds for difficult tasks

9

Rigorously monitored practice or overlearning secures success and competence which will automatize recall and reduce load on working memory. Facts, concepts, and discriminations will be clear for subsequent learning.

Independent practice

10

The effort involved in recalling recently-learned material embeds it in long-term memory to develop extensive and available background knowledge. The more this happens, the easier it is to connect new material.

Daily, weekly & monthly review

Technique 1: Reject Self Report
Replace functionally rhetorical questions with more objective forms of impromptu assessment in order to raise pupil accountability and teacher understanding of learning.

Technique 2: Targeted Questioning
Ask a quick series of carefully chosen, open-ended questions directed at a strategic sample of the class and executed in a short time period.

Technique 10: Own and Track
Have students correct or revise their own work, fostering an environment of accountability for the correct answer.

Technique 12: Right is Right
When you respond to answers in class, hold out for answers that are 'all-the-way right' or all the way to your standards of rigour.

Technique 35: Break it Down
When a student makes an error, provide just enough help to allow her to 'solve' as much of the original problem as she can.

Technique 57: What to Do (AC)
Use specific, concrete, sequential, and observable supports to show students what to do: identifying how to model and explain effectively in order to scaffold hard academic tasks.

Technique 37: Everybody Writes
Prepare your students to engage rigorously by giving them the chance to reflect in writing before you ask them to discuss.

Technique 43: Turn and Talk
Encourage students to better formulate their thoughts by including short, contained pair discussions but make sure to design them for maximum efficiency and accountability.

Technique 20: Do Now
Use a short warm-up activity that students can complete without instruction or direction from you to start class every day. This lets the learning start even before you begin teaching.

Technique 13: Stretch It
When reviewing pupil understanding improve academic rigour by rewarding 'right' answers with harder questions.

Technique 7: Plan for Error
Increase the likelihood that you'll recognise and respond to errors by planning for common mistakes in advance.

Technique 4: Tracking, Not Watching
Be intentional about how you scan your classroom. Decide specifically what you're looking for and remain disciplined about it in the face of distractions.

Technique 6: Affirmative Checking
Insert specific points into your lesson when students must get confirmation that their work is correct, productive, or sufficiently rigorous before moving on to the next stage.

Technique 15: Without Apology
Embrace – rather than apologise for – rigorous content, academic challenge, and the hard work necessary to scholarship. Aim high with expectations and challenge and build support.

Technique 21: Name the Steps
Break down complex tasks into simple steps that form a path for student mastery.

Technique 9: Excavate Error
Dig into errors, studying them efficiently and effectively, to better understand where students struggle and how you can best address those points.

Technique 41: Front the Writing
Arrange lessons so that writing comes earlier in the process to ensure that students think rigorously in writing and have the opportunity to work independently prior to feedback.

Technique 40: Build Stamina
Gradually increase writing time to develop in your students the habit of writing productively, and the ability to do it for sustained periods of time.

Technique 6: Affirmative Checking
Insert specific points into your lesson when students must get confirmation that their work is correct, productive, or sufficiently rigorous before moving on to the next stage.

Technique 16: Begin With The End
Progress from unit planning to lesson planning. Define the objective, decide how you'll assess it, and then choose appropriate lesson activities.

References: