



AVIER

TEACHING
SCHOOL
HUB

Module 2: How do pupils learn?





Module 2: How do pupils learn?

BRIGHTSPACE

- The working and long-term **memory** (55 mins)
- Considering how to **introduce new knowledge** to pupils (60 mins)
- Using worked and partially-completed **examples** (45 mins)
- Helping pupils to **remember** (80 mins)
- Introduction to **metacognition** (15 mins)

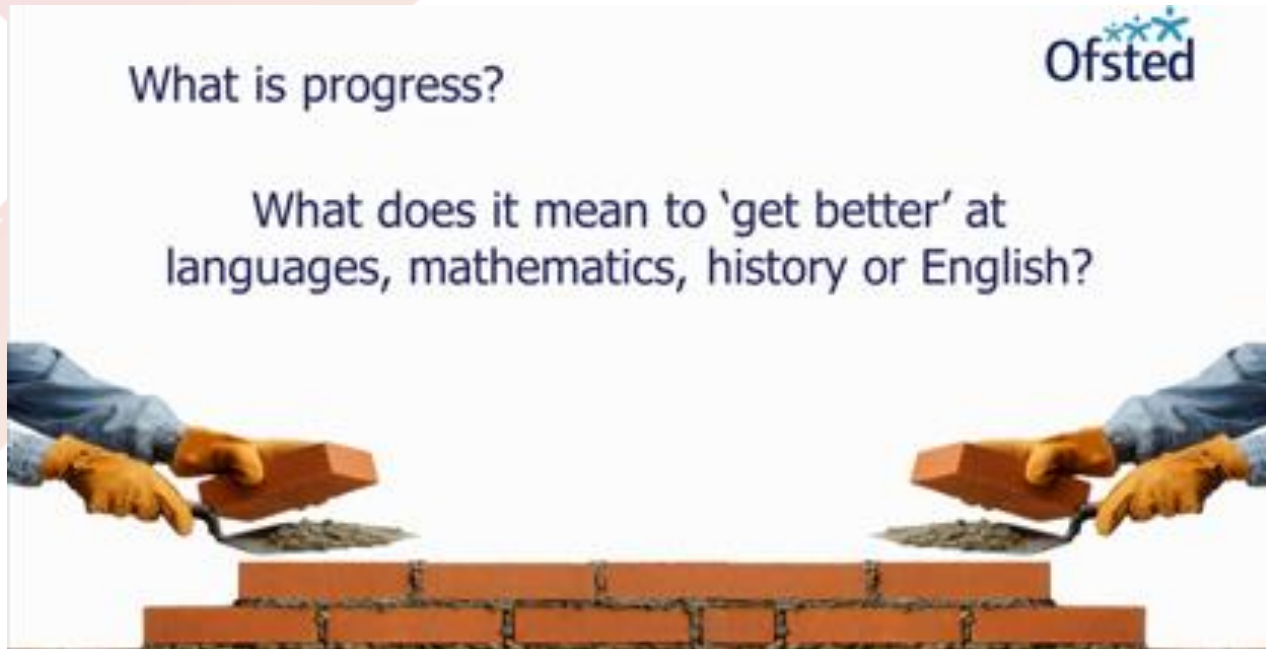
SEMINARS

- Avoiding working memory **overload**
- Building well-organised **mental models**

What is 'learning'?



Progress



Progress means **knowing more**
and **remembering more.**

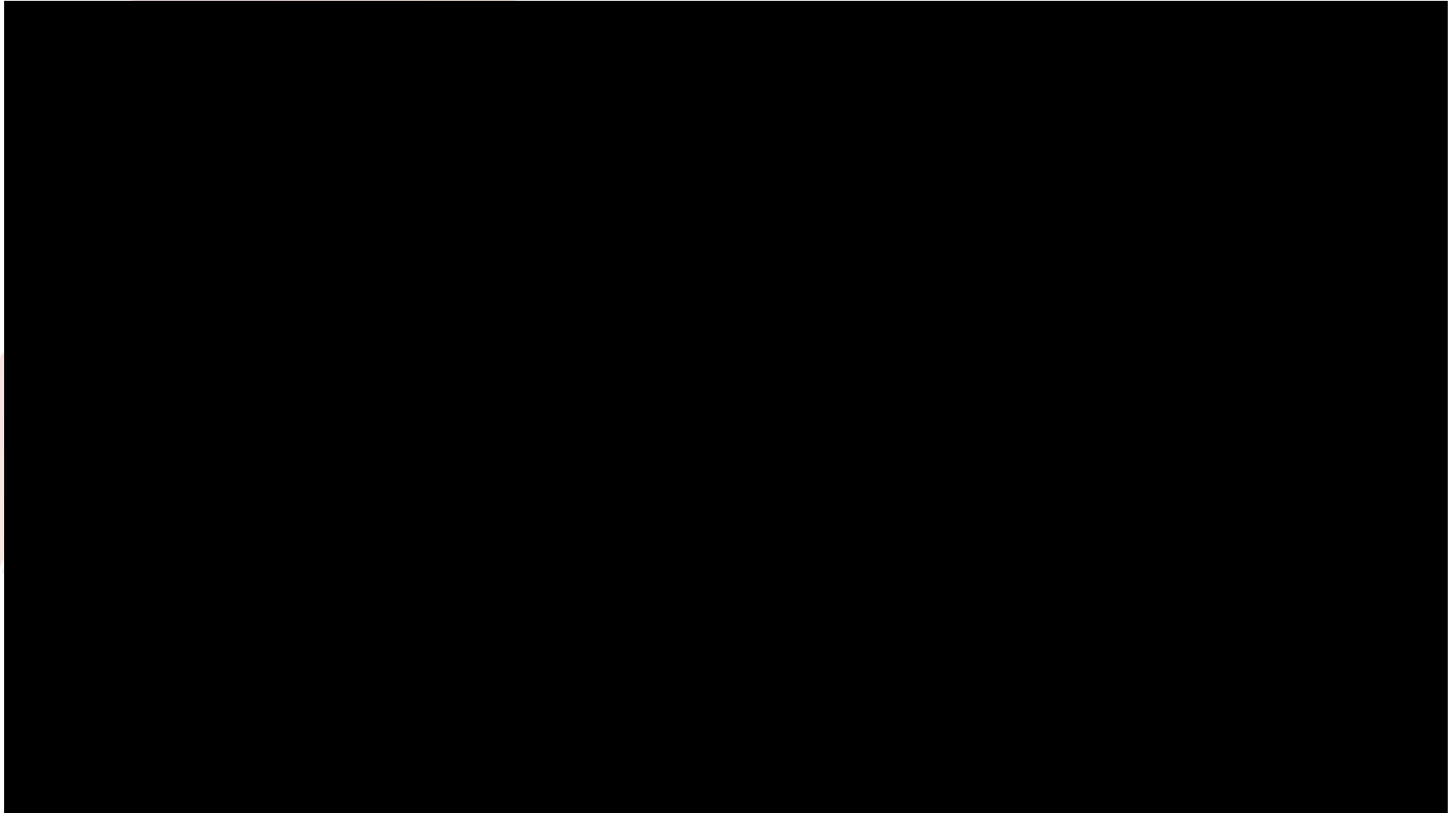
In other words ...

'Learning is defined as an alteration in long-term memory. If nothing has altered in long-term memory, nothing has been learned.'

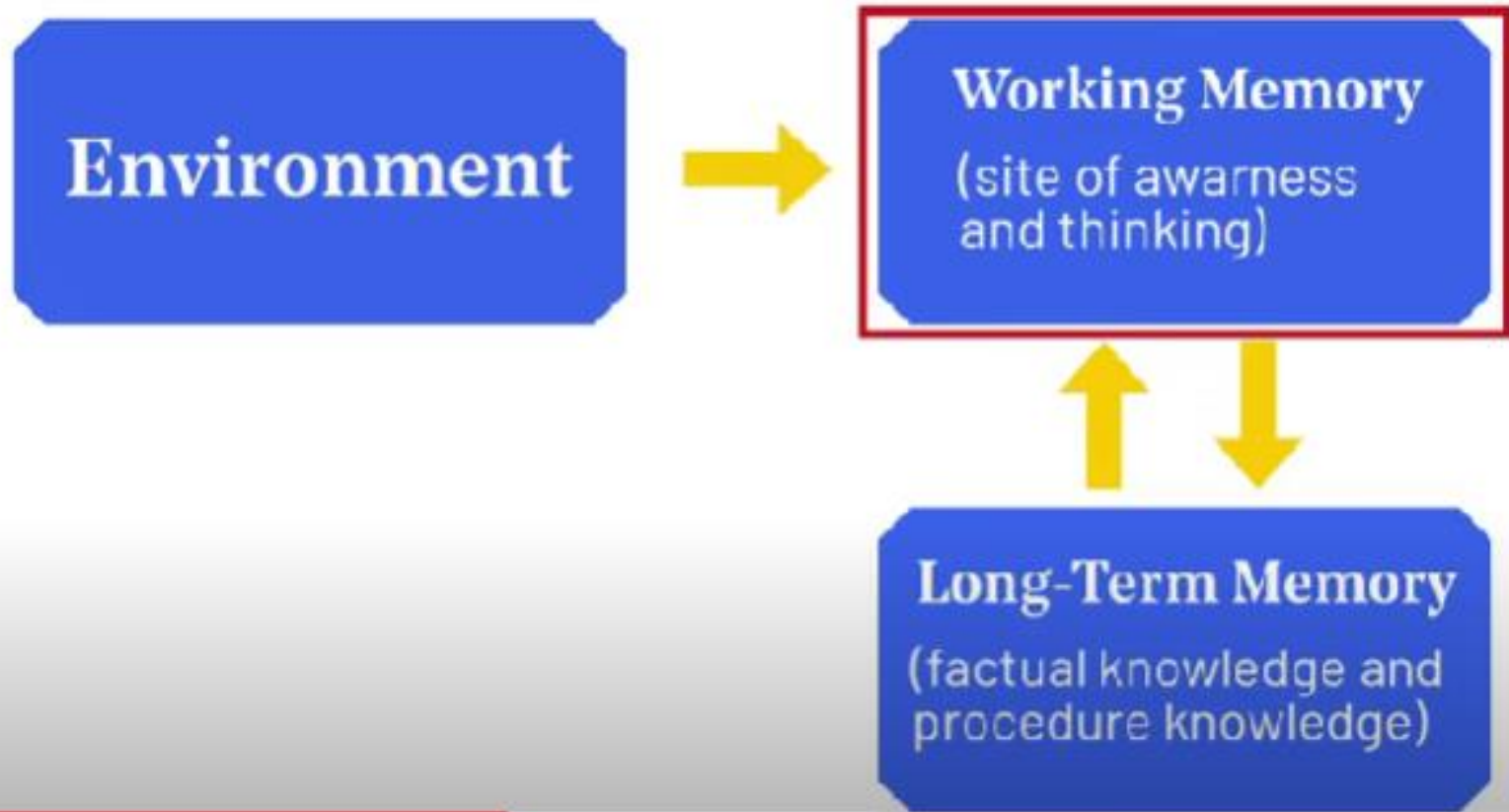
Sweller, J., Ayres, P., & Kalyuga, S. (2011).



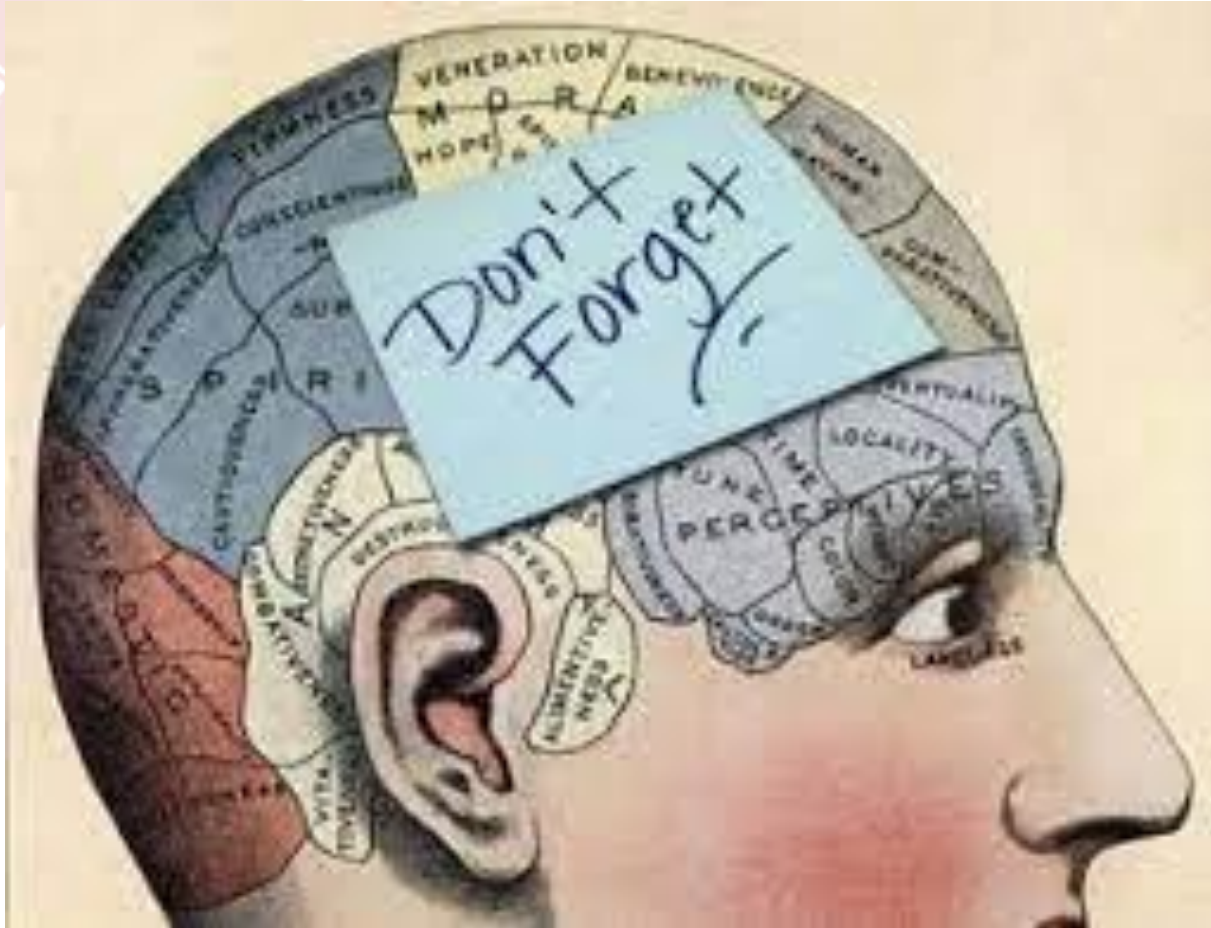
How do pupils learn?



A model of the mind



Digit memory test



Working memory



What might you see?

- A need to re-read text (comprehension).
- Difficulty following multi-step directions.
- Difficulty staying engaged in class.
- Test anxiety, especially on multiple choice tests.
- Inconsistent performance.
- Lack of focus.
- A need for more time and repetition.
- Organisational difficulties.

What can you do to support working memory?



What can you do to support working memory?




| | |
|--------------------------|--------------------------------------|
| Chunk | Keep info/instructions up on the IWB |
| Simplify language | Worked examples |
| Let them take notes | Partially-completed examples |
| Task boards | |
| Use visuals and graphics | |
| Classroom displays | |
| Key vocabulary | |
| Give them the PowerPoint | |

Task boards

TASK MANAGEMENT BOARD

| |
|---------------------------------|
| <u>Task</u> Goldilocks story |
|---------------------------------|



| | | |
|---|----------|---|
| What equipment do I need? | | |
|  | pencil |  |
| | scissors |  |
| | | glue |

| |
|---|
| 1 |
|---|

Write the short date in your book.

12th January 2023



| |
|---|
| 2 |
|---|

Cut out the pictures for the Goldilocks story.



| |
|---|
| 3 |
|---|

Put the pictures in the right order to tell the story.



Worked example

Expand and simplify

$$(3x + 5)(2x - 7)$$

| | | |
|------|--------|--------|
| | $2x$ | -7 |
| $3x$ | $6x^2$ | $-21x$ |
| 5 | $10x$ | -35 |

$$6x^2 + 10x - 21x - 35$$

$$6x^2 - 11x - 35$$

Step 1

| | | |
|------|------|------|
| | $2x$ | -7 |
| $3x$ | | |
| 5 | | |

Step 2

| | | |
|------|--------|--------|
| | $2x$ | -7 |
| $3x$ | $6x^2$ | $-21x$ |
| 5 | $10x$ | -35 |

Step 3

| | | |
|------|--------|--------|
| | $2x$ | -7 |
| $3x$ | $6x^2$ | $-21x$ |
| 5 | $10x$ | -35 |

$$6x^2 + 10x - 21x - 35$$

Quietly in pairs

Take turns explaining each step until you both understand it all then answer these:

1. Would it have mattered if $2x - 7$ was down the side and $3x + 5$ along the top instead?
2. Why do you think some students incorrectly put -2 in the bottom-right box?
3. Why didn't the $6x^2$ also get combined with the x -terms in step 4?

Your turn

Expand and simplify...

- a) $(x - 1)(2x + 3)$
- b) $(5x - 4)(3x - 7)$
- c) Make your own questions with answers which include $12x^2$

Partially-completed example

Once pupils have begun to develop a more secure understanding of the focus concept, partially-worked examples can be used to provide further challenges. In these, one or more steps are removed so that pupils need to add these in themselves. As their understanding progresses, more and more steps in the scaffolding provided by the worked example can be removed until pupils are working independently.

Consider the cognitive load



$$6 + 4 = 10$$

The Way of the Dodo



The dodo was first sighted around 1600 on an island in the Indian Ocean. It was extinct by 1680. Since then the phrase 'dead as a dodo' has been used to describe something which is lifeless or has disappeared from the world completely. Because of its rapid disappearance, a number of myths developed about the dodo, for example that it was a fat, silly creature that brought its fate upon itself.

But what is the **truth** about the dodo?

For thousands of years the island of Mauritius was a paradise. It was spat out of the ocean floor by an underwater volcano 8 million years ago. With warm sun, plentiful food and no predators to speak of, the isolated island became a haven for a variety of unusual species, including reptiles and flightless birds.

Greenland

The Land of Ice

Greenland is a huge island in the far, far north of the world. The weather there is very harsh and cold. Even the 'hottest' summer day on Greenland is like a cool winter's day here in England.

In the summer months, the sun never sets; it is light all through the night.



A map showing Greenland

Erik the RED

Over the years, different groups of people have tried to live in Greenland, but most found it too difficult.

One man who did live there, and one of the most famous Greenlanders, was 'Erik the Red'. Erik's name might have come from the colour of his hair and beard, or possibly because of his bad temper.



About 1000 years ago, Erik was sent away from his home in Iceland.

He sailed away from this small ice-covered island to a great big ice-covered island. This island had no name yet and no one lived there, so Erik made it his home.

The old stories of Iceland say that Erik became bored and lonely and wanted to persuade other people to come and live on this freezing-cold island with him.

Erik had an idea.

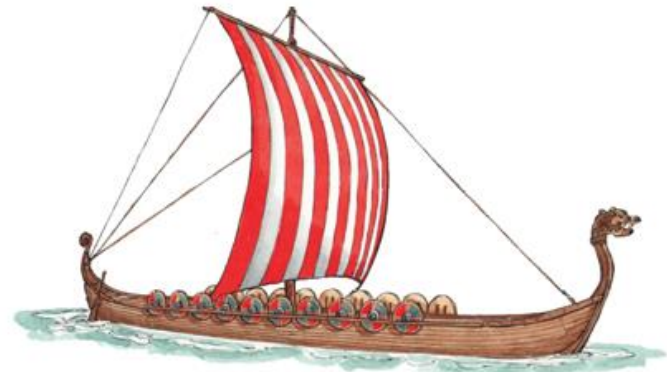
He called the island 'Greenland' and pretended that it was lovely, warm and ... green.

His trick worked. When the people from Iceland heard about this perfect place called 'Greenland', many of them wanted to join Erik. About 300 of them packed up their belongings and set off to join him.



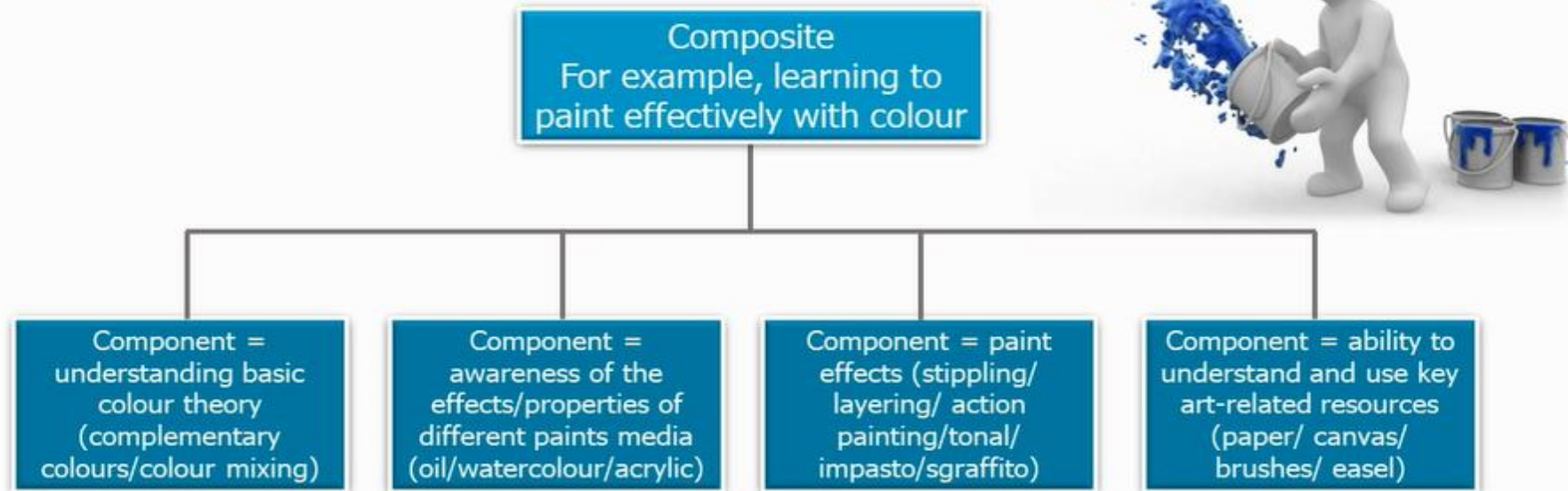
Although life was hard, these people lived on Greenland for many years and it became their home.

They built houses that were snug and strong from stone, wood and turf. They planted crops and kept cows, goats and sheep which they had brought with them all the way from Iceland.



However, 500 years later, there was nothing left of Erik and his friends in Greenland. What happened to them is still a mystery.

When the basics are stored in memory.



Composite: a performance made up of several parts or components.

Your curriculum must be coherently planned and sequenced towards cumulatively sufficient knowledge and skills for future learning.

Knowing more

Knowing **WHAT?**



The National Curriculum in England

Framework document for consultation

February 2013

Step 1

What is the **key knowledge** you want pupils to learn?

What are the **key ideas and concepts** you want students to learn?

History

Step 1: What does the Year 6 historian look like?

Step 2: Track back through the years, including EYFS.

Step 3: Then, and only then, think of topics.

“Doing” the Romans?



Jon Hutchinson “doing the Stone Age”

- Going out onto the field and look for food to show the children how it would have felt to be a caveman.
- Building a neolithic roundhouse out of card and straw.
- Learning the “Stone Age Song” and performing it as a class.
- Designing some cave painting art using mud and oil.
- Creating some stone age jewellery using beads and string.
- Burying some broken pottery and have the children ‘excavate it’.

Jon Hutchinson “doing the Stone Age”

I filled six weeks worth of lessons with these activities, and my colleagues were right, the children absolutely loved it. By the end of the term, most of the children had created a neolithic roundhouse that looked something like this:



Success! The children had all made a neolithic roundhouse! Except, none of the children really knew what 'neolithic' meant. Most of our time had been spent thinking about the best way to get straw to stick to card. (Pritt stick is terrible for this, in case you're wondering.) Their lack of knowledge about the topic that we had ostensibly been studying was brought coldly to my attention when a veteran TA, Sue, covered my class for the end of the day. Often, when dropping into any class, Sue would often look at the topic display and quiz the children about it. She didn't know *exactly* what they had been learning about, but Sue had amazing general knowledge, and could think of questions about any topic that you'd expect anyone familiar with it to be able to answer.

"They didn't know that the Stone Age was split into the palaeolithic, mesolithic and neolithic eras," she gently informed me. "So obviously they didn't really know when these periods began and ended. And they didn't know about how we stopped being hunter gatherers and started farming." That wasn't all they didn't know. They didn't know how old homo sapiens, our species, was, or when it interacted with neanderthals, and why they went extinct but we didn't. They didn't know that Britain was connected to Europe by a landbridge until about 10,000 years ago. I could fill this blog with things that they didn't know.

N.B. This isn't actually completely true. There were some children who knew all of that stuff. They were the children who went home and had rich conversations with adults and siblings at home. Who were taken to museums and given beautiful non-fiction books. These were invariably the children who were already attaining the highest in the class, and almost always came from wealthier backgrounds. In neglecting the rich knowledge of a topic in the classroom, I realised I was actually widening the attainment gap between the richest and poorest in society.

But I wouldn't be so sure about what they did know. I'd have struggled to give you even five facts that I was really confident that all of the children would be able to answer correctly. And the truth was, I wasn't really clear myself on the distinguishing characteristics of the different eras. I couldn't tell you the five most important facts; the 'even if you forget everything else, you need to know this' sort of stuff. So we hadn't really studied the Stone Age. We'd 'done' it. We 'do' the Romans. We 'do' the Tudors. But there isn't a whole lot of clarity around what 'doing' a topic means.

Knowing more

- Whole school
- Year group
- Units/topics
- Sequences of lessons
- Individual lessons

Box sets and Netflix



Building a box set



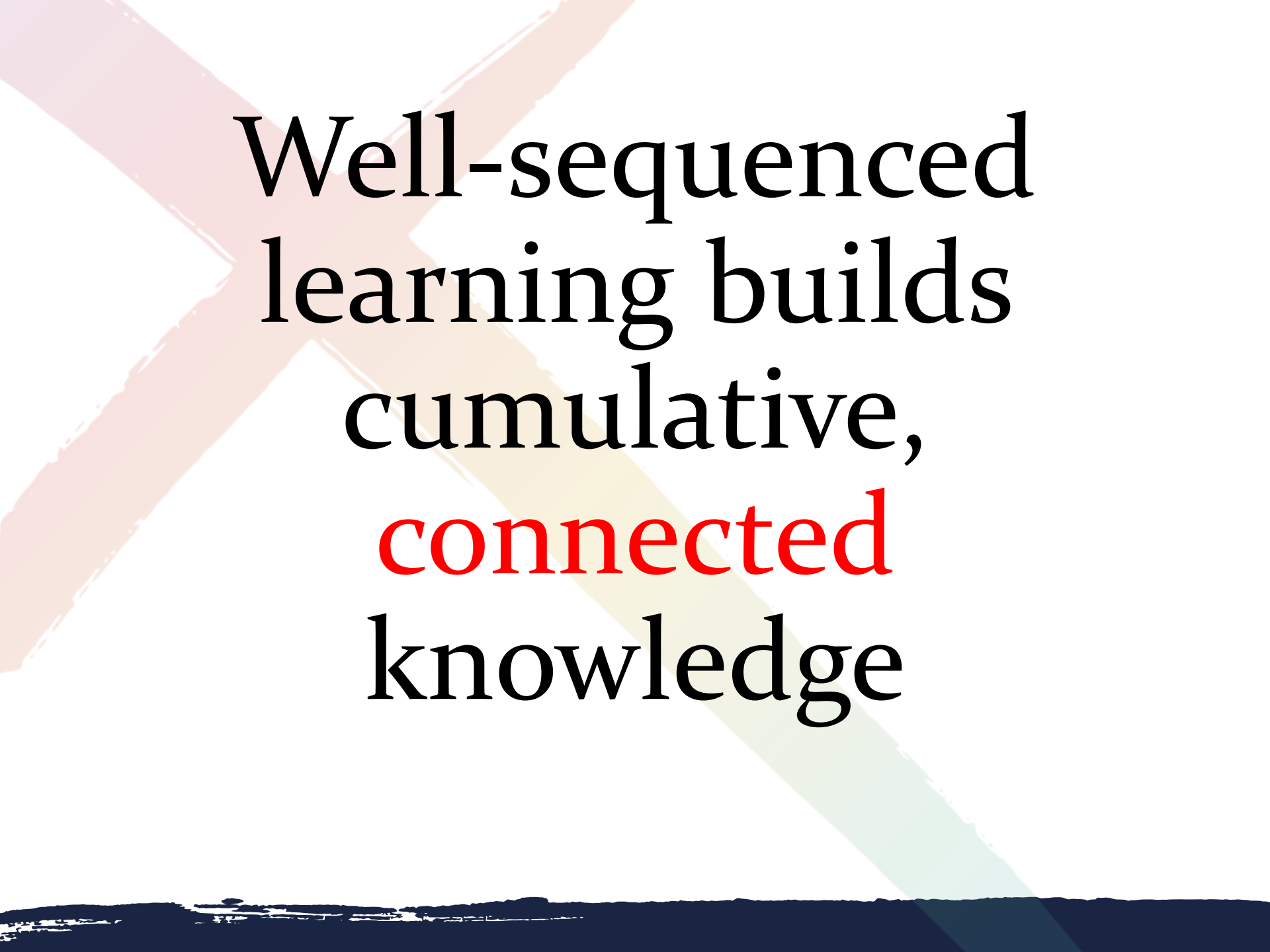
Connection is everything



Clip slide
Ofsted

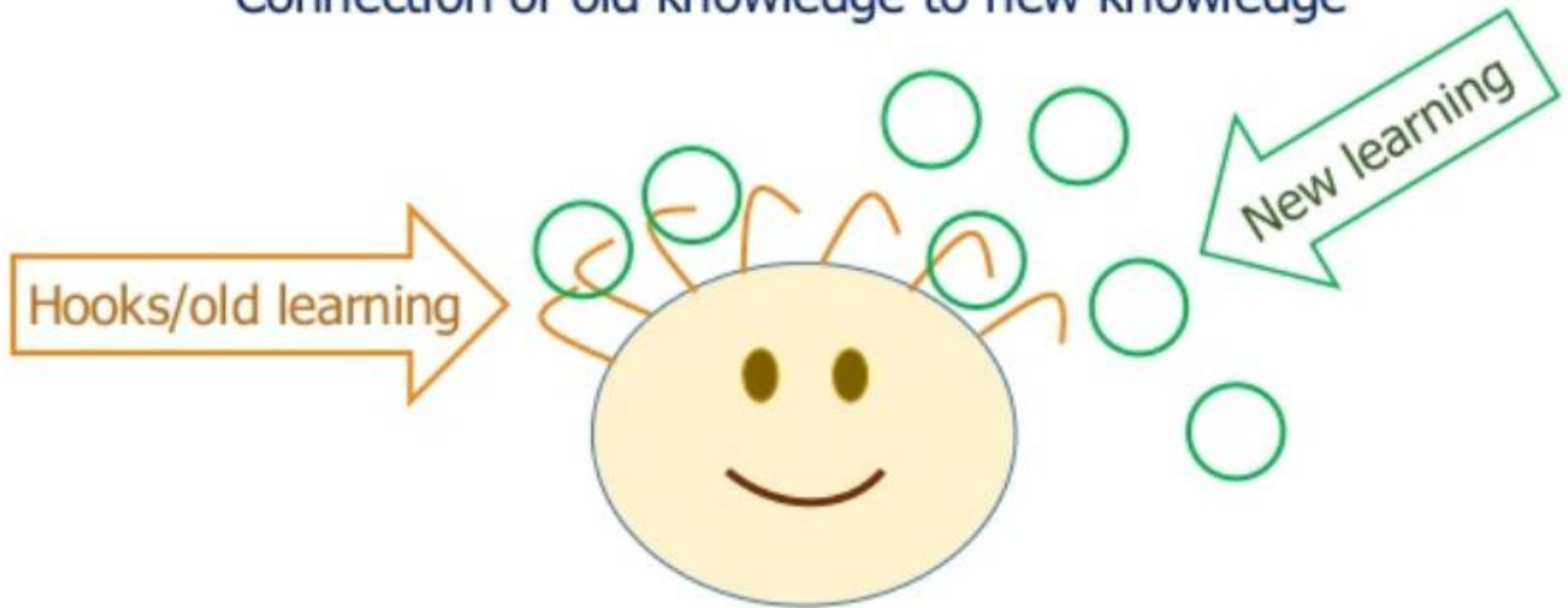
Knowledge does not sit as isolated 'information'
in pupils' minds.





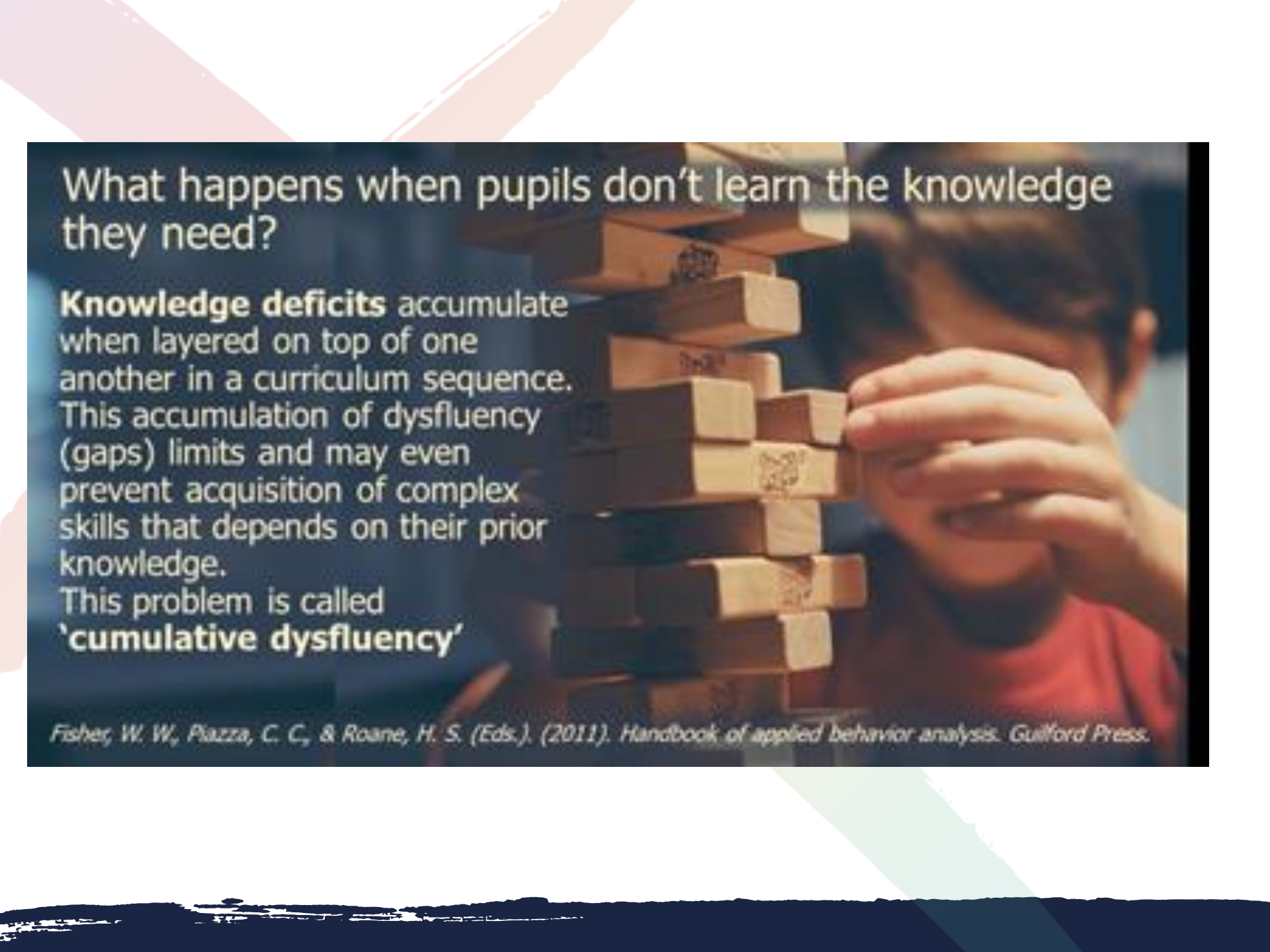
Well-sequenced
learning builds
cumulative,
connected
knowledge

Connection of old knowledge to new knowledge



Building a box set



A close-up photograph of a child's hands carefully placing a wooden block onto a tall, slightly wobbly stack of other wooden blocks. The child is wearing a red shirt. The background is blurred, showing more of the child and the blocks. The image is used as a metaphor for the concept of cumulative dysfluency, where small gaps in knowledge build up over time.

What happens when pupils don't learn the knowledge they need?

Knowledge deficits accumulate when layered on top of one another in a curriculum sequence. This accumulation of dysfluency (gaps) limits and may even prevent acquisition of complex skills that depends on their prior knowledge. This problem is called '**cumulative dysfluency**'

Fisher, W. W., Piazza, C. C., & Roane, H. S. (Eds.). (2011). Handbook of applied behavior analysis. Guilford Press.

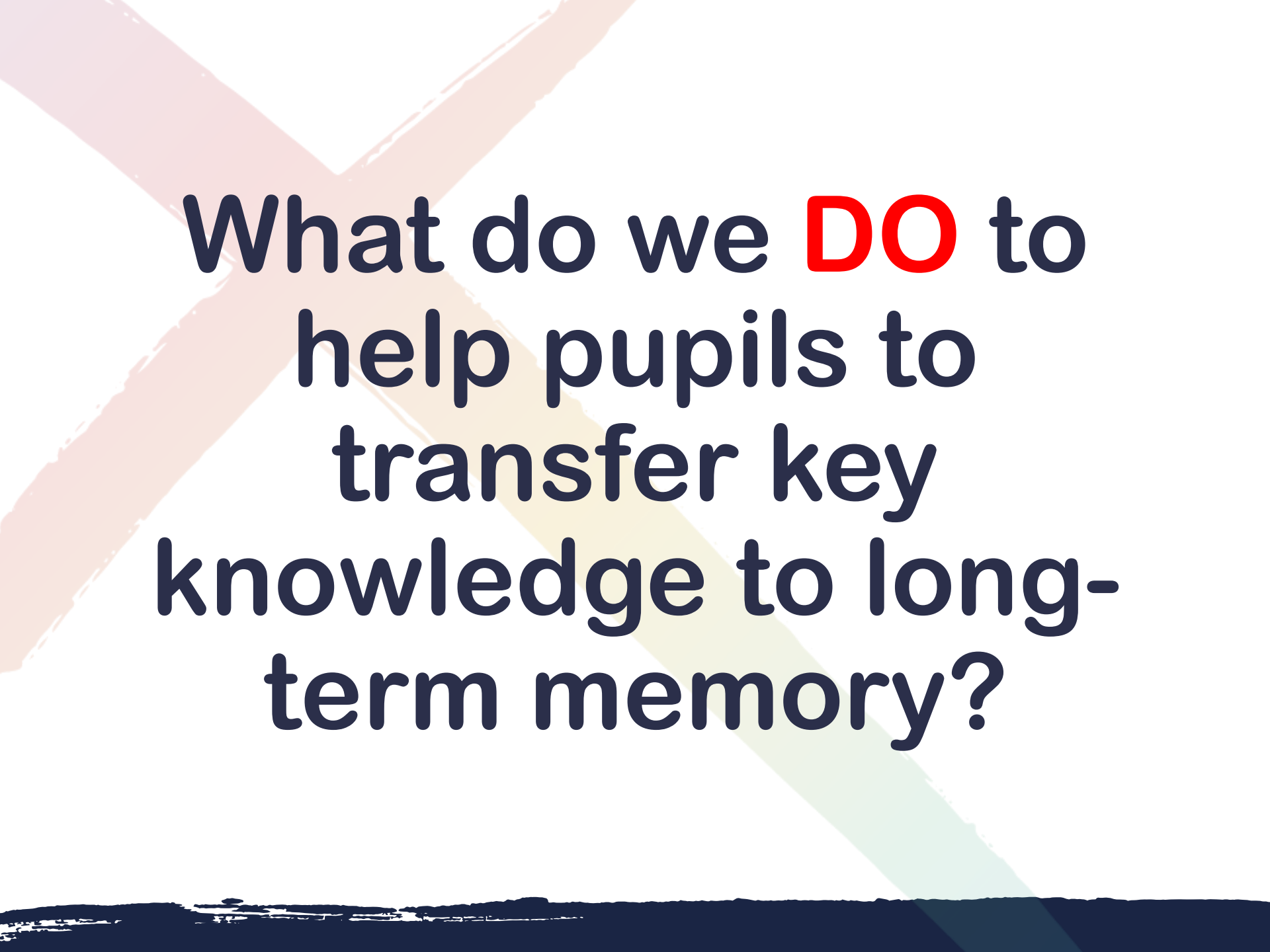
Remembering more

Teaching must be designed to help pupils to **remember long term** the content they have been taught and to integrate new knowledge into larger ideas.





**How do we know
that they know what
we think they know?**



What do we **DO** to
help pupils to
transfer key
knowledge to long-
term memory?

Year 6 RE

fundamentalism and radicalisation

EXTREME

EXTREME

SPECTRUM

How much can you remember?

- (a) _____ means furthest from the centre of any given point.
- (b) There are _____ at both ends of every _____.
- (c) A _____ is the scale between 2 _____ points.



spectrum

extreme

How much can you remember?

- (a) **EXTREME** means furthest from the centre of any given point.
- (b) There are extremes at both ends of every **SPECTRUM**.
- (c) A **spectrum** is the scale between 2 **extreme** points.

E _____

E _____

_____ I _____

S _____



S E H WWII
J



S E H WWII
J

Which two are most closely linked?

‘Give us a clue’ cards

EXTREME

SPECTRUM

HOLOCAUST



Children write questions ...

Who, why, where,
when, what, what,
how?

True or false

- Sorting statements
- Tick list (teams)
- Hold up red/green
- Post-its on signs around room
- Which statement is true/false?



Quickfire question round



Sugar paper, post-it, whiteboard recall



Walk round and add/subtract/challenge



Peer teaching



Signs/pictures around room

- Stand on
- Stand next to
- Which one would you get rid of?
- Write your name on any sign which you could explain to a friend.
- Who, why, what, where, why, how?
- Ranking

Walk past and remember



station
combustion
derision
decision
nation
ration
rational
calculation

Jeopardy

- extreme
- volcano
- magnificent
- 304,805
- photosynthesis

What is the question?

Pairs

| | | | | |
|-----------|-----------|-----------|-----------|-----------|
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 |

Odd one out

| | | | | |
|-----------|-----------|----------|-----------|----------|
| emperor | centurion | Hannibal | slave | villa |
| Cleopatra | chariot | denarii | gladiator | Rome |
| Athens | viaduct | temple | mosaic | Coliseum |
| aqueduct | sewer | standard | XVI | Pompeii |



The holocaust
never
happened.

Put place cards on the map



Spot the mistake



Continents

- List them
- Sort by size
- Sort by population
- Match countries to their continent
- Match shape to name



Whole topic quick revision

Rotate around different activities

- 1) Post-its – how many different groups do you belong to?
- 2) Spectrum and extreme – write a description of a MUFC supporter for each box
- 3) Match names to character descriptions
- 4) How many of the 10 commandments can you remember? or, which are not one of the 10 commandments?
- 5) Match pictures/words/definitions.
- 6) Objects – write post-its with name, description
- 7) List anti-semitic laws.
- 8) Reflection – how do you feel about what you have learned in RE this term? Has anything surprised you? Has anything affected you? What impact have the lessons had on you (have they influenced your behaviour)?

Similarities and differences



Julius Caesar and Adolf Hitler

Slip in questions about ...

Way back

Last year

Last term

Last week
(or unit)

Yesterday

The image features the Kahoot! logo in a large, white, rounded font. The logo is centered over a background divided into four equal quadrants by a vertical and a horizontal line. The top-left quadrant is red, the top-right is blue, the bottom-left is yellow, and the bottom-right is green. The entire graphic is set against a white background with faint, light-colored diagonal stripes. At the very bottom of the image, there is a dark blue, textured horizontal bar.

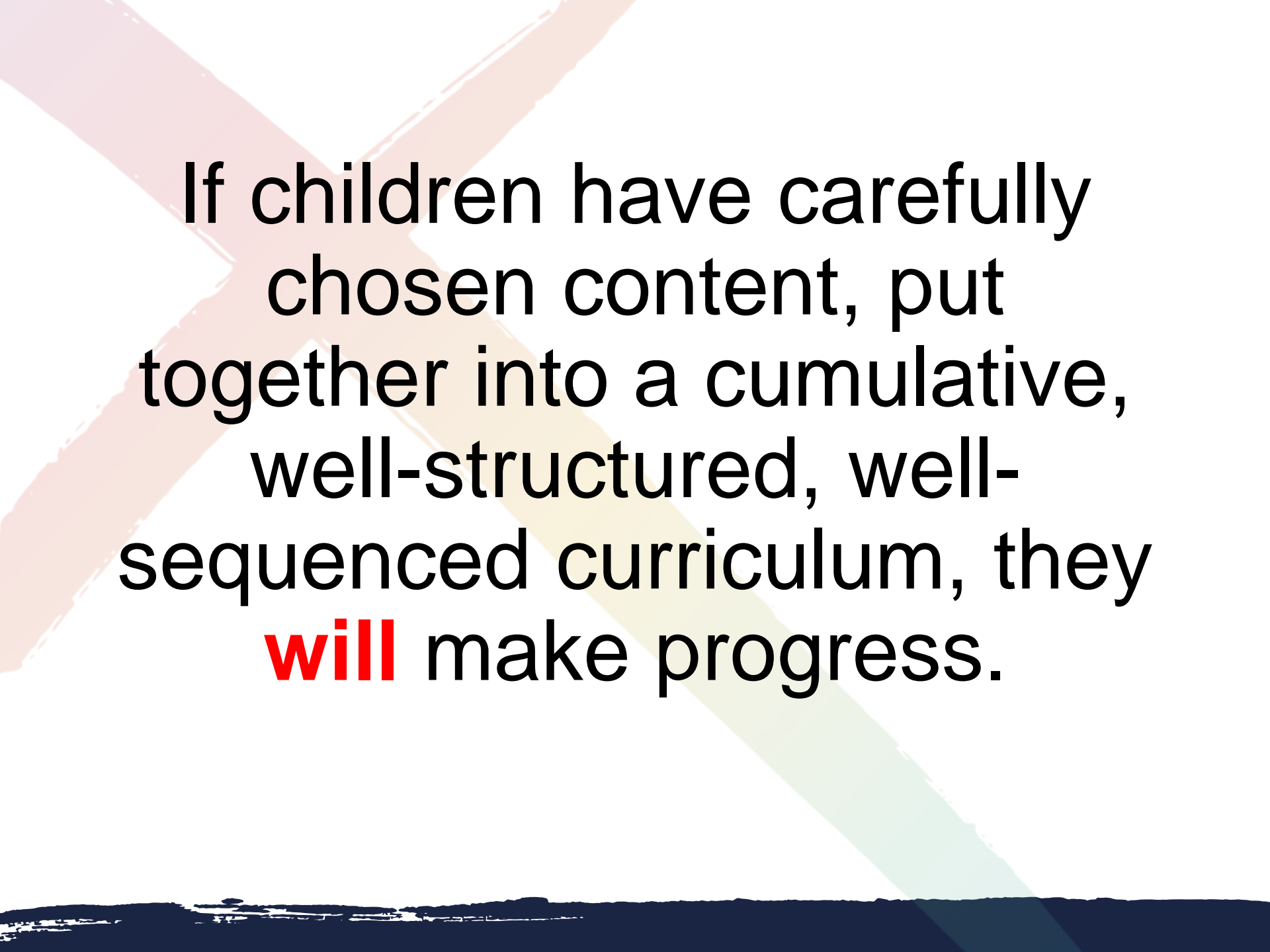
Kahoot!

Inbuilt revision – curriculum planning

| TERM 1 | |
|--------------|-------------------|
| Review prior | Term 1 curriculum |

| TERM 2 | | |
|-------------|-----------|-------------------|
| Check prior | Review T1 | Term 2 curriculum |

| TERM 3 | | | |
|-------------|----------|-----------|-------------------|
| Check prior | Check T1 | Review T2 | Term 3 curriculum |



If children have carefully
chosen content, put
together into a cumulative,
well-structured, well-
sequenced curriculum, they
will make progress.

Actions



- Check you have a Brightspace login and that it is working (check junk mail, check email on DfE portal)
- Complete Module 1
- Complete Module 2
- Attend your first seminar next week
- Log into, and explore, the Members' Area on our website