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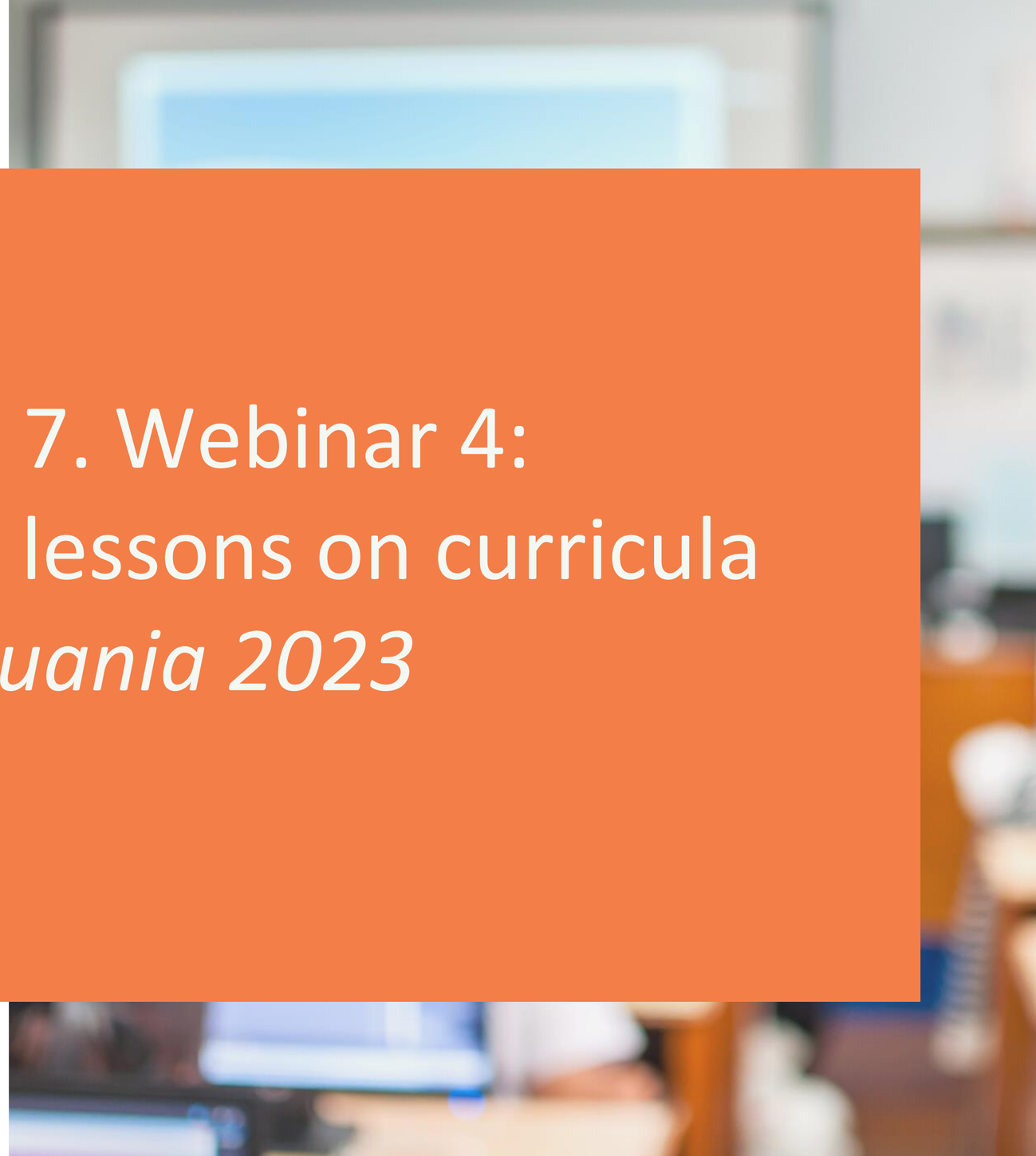
LUCY CREHAN

Theme 7. Webinar 4: International lessons on curricula *Lithuania 2023*



Rough Agenda

14.00	Introduction and overview
	Focus and mastery
15.15	Break
15.45	Coherence, schema theory and curriculum design
16.45	Break
17.00	Concepts, contexts, and planning across phases
18.00	Finish

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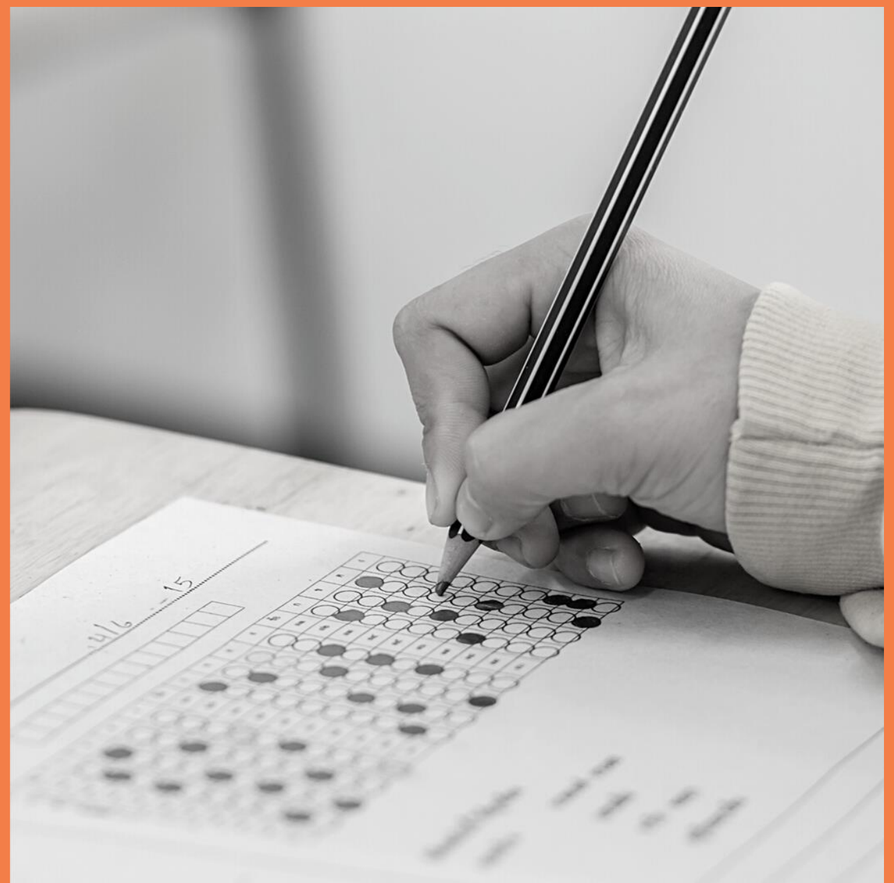
POLICE

Features of curricula in high-performing countries



- Schmidt and colleagues (2001) conducted an analysis of the maths and science curricula of over 40 countries and regions that participated in the TIMSS 1995 study.

- They identified features of curricula shared by countries that performed highly, in contrast with lower-performing countries.

- The two features most predictive of high performance were **focus** and **coherence.**

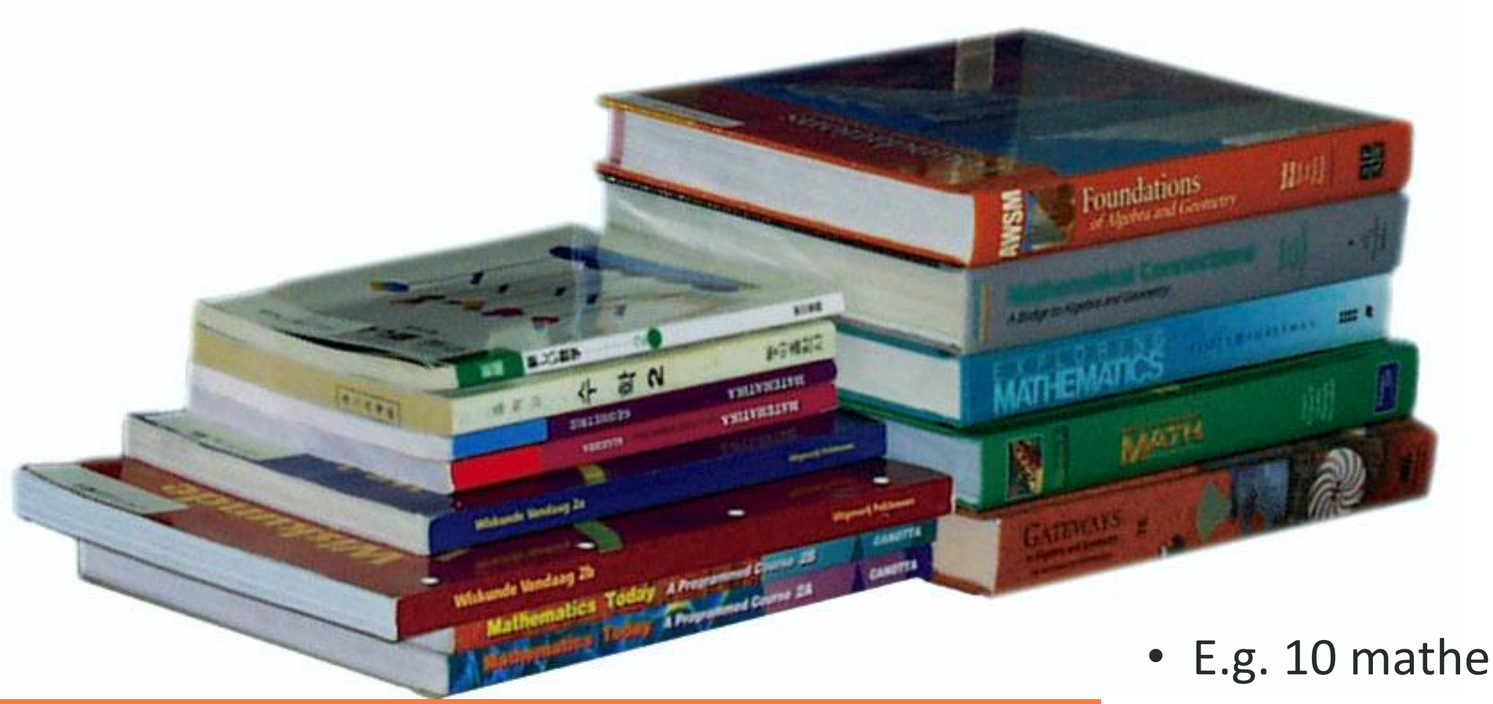
Focus

“The most significant difference I find is the depth of material covered. In Canada they do a little bit of everything, and they do it really fast, before you really get the essence of that part, and then they jump into something else. Whereas in China they go on about some knowledge for quite a long time, maybe several weeks before they move to the next topic, so you get a lot of practice, and you really know it.”

Sophie

Focus: fewer topics in greater depth

- Fewer topics are taught each year in top-performing countries. But there may be as many topics overall, because each topic does not need to be retaught, on account of the depth the first time.



- E.g. 10 mathematics topics in 8th grade rather than 30.

This is closely related to the ‘mastery’ approach to teaching

- Just a few topics are specified to be covered initially, so they can be studied in depth.
- The vast majority of pupils’ progress through the curriculum at the same pace.
- Academically weaker pupils are supported to reach at least a basic standard, while more able pupils are encouraged to explore the content in depth.

Mastery learning

Moderate impact for very low cost, based on moderate evidence.

£ £ £ £ £

+5

A question for discussion

To what extent is your new curriculum ‘focused’?

How does it differ from the previous curriculum in this respect?

Coherence

Curricula are coherent
“if they are articulated over time as a sequence of topics and performances that are logical and reflect, where appropriate, the sequential or hierarchical nature of the disciplinary content from which the subject matter derives”
(Schmidt et al., 2002)

In other words…

Knowledge and skills sequenced in a curriculum in an order such that at every stage, students have the (or some) prerequisite understanding or ability that they need to access the new learning.

E.g. Particle theory before changes of state.
E.g. Studying democracy in Ancient Greece before looking at the workings of Lithuanian parliament.

Why might coherence be important?

Because according to schema theory, children (and adults) learn by connecting new learning with something they already know.

If they don’t have any existing knowledge or experiences to connect the learning to, they are less likely to understand it and remember it.

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What is a schema?

A cognitive structure representing a person’s knowledge about some concept, entity or situation, including its qualities and the relationships between these (American Psychological Association).

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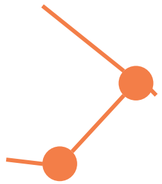
Schema initially form from sense experiences, but can also form from combinations of other schema

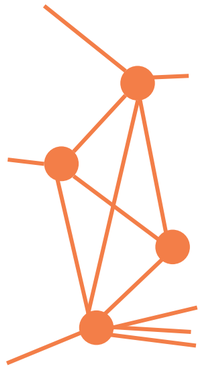
Perceptions of horses



This white horse

That brown horse

Early schema for ‘horse’

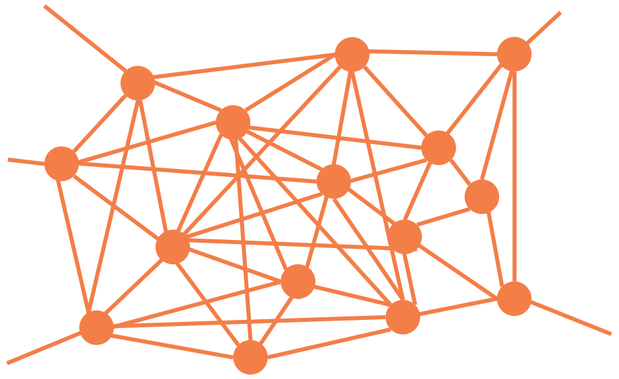


Four legs

Has a mane

Runs fast

Developed schema for ‘horse’



Equine

Was used in battle

Memories of the races

What is a schema?

Schemas are superordinate knowledge structures that reflect abstracted commonalities across multiple experiences, **exerting powerful influences over how events are perceived, interpreted, and remembered**
(Gilboa & Marlatte, 2017)

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War of the ghosts – Bartlett (1932)


8
Recht and Leslie (1987)

Schemas are recognition devices whose processing is aimed at evaluating how well new information fits into itself. (Rumelhart, 1984)

What happens when we perceive or hear something new?

Assimilation – We can incorporate new information into an existing schema.

Accommodation – We can adjust our existing schema if the information doesn't fit, or create a new related schema.

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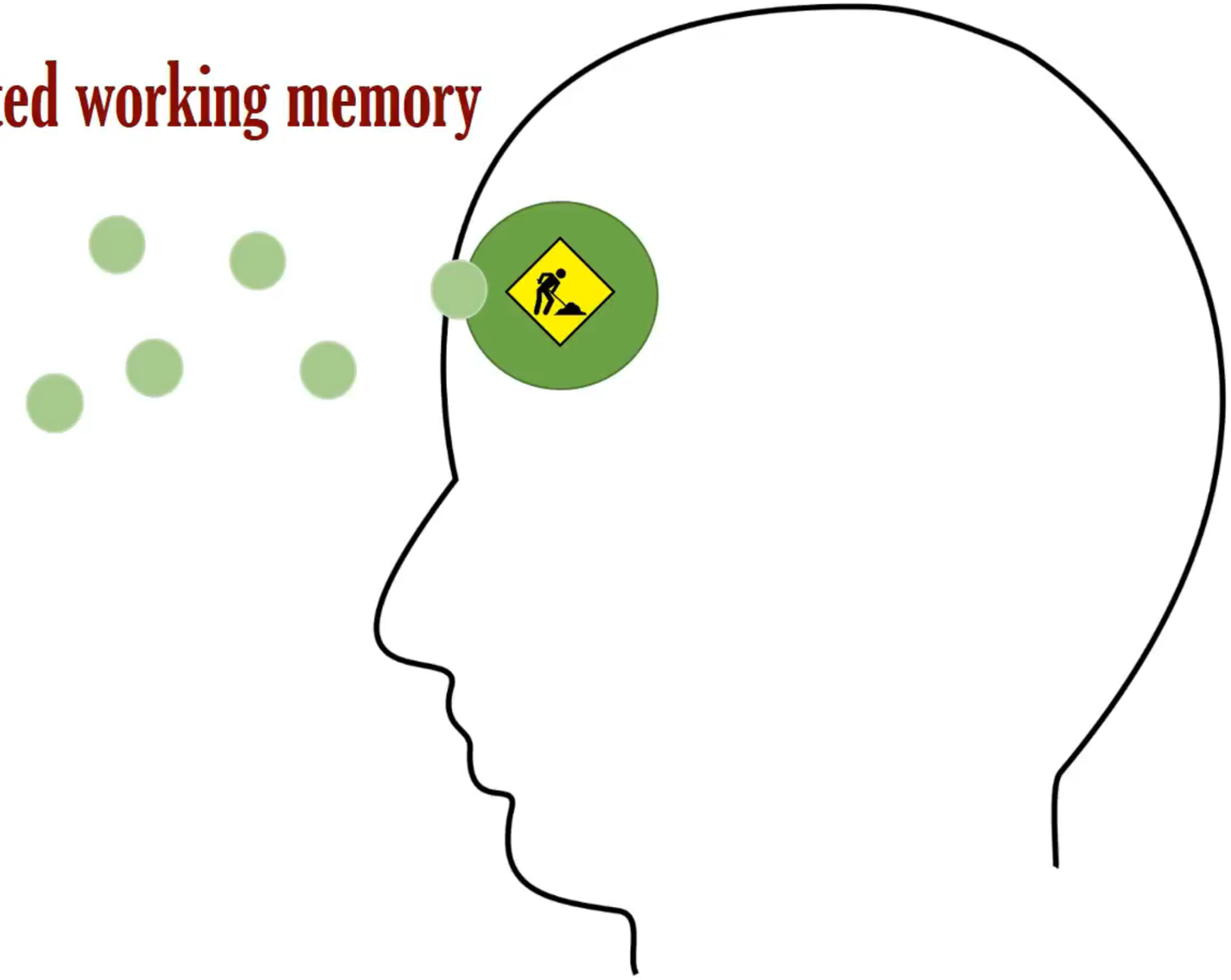
“This is a monument to Grand Duke Gediminas...”

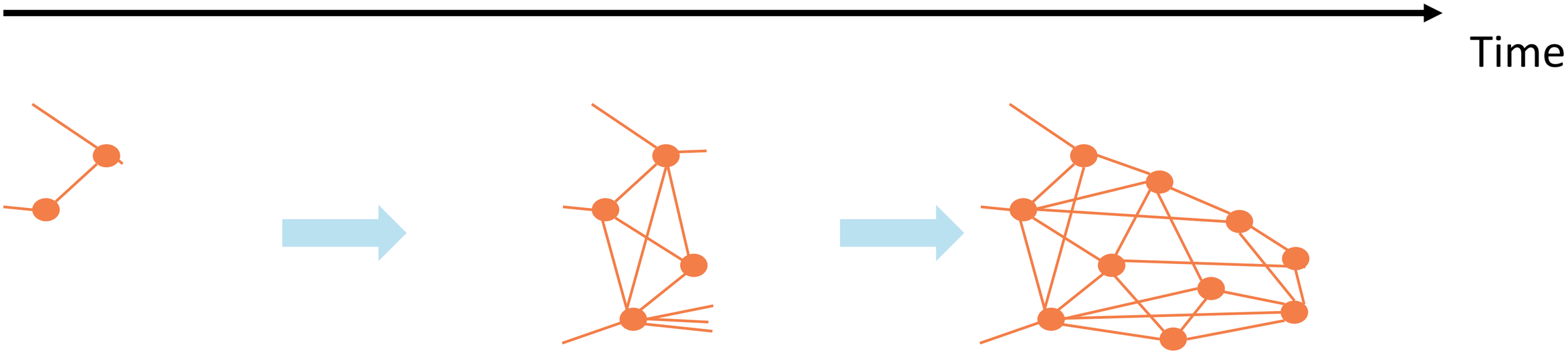
limited working memory



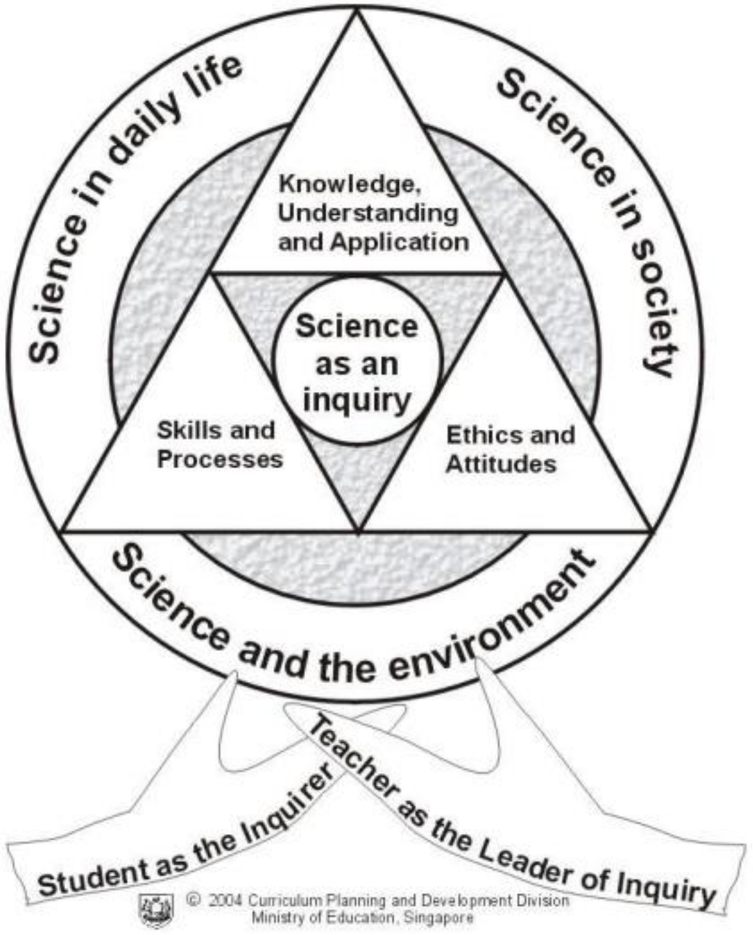
SOURCE: 3 minute Ed Theory

How can we ensure that a curriculum is coherent, and supports the learning of all students equally?

We can identify which schema we want students to develop, and plan the curriculum so that they gradually build these schema up over time.



Singapore's primary science curriculum



Based around 5 themes:

Diversity, Cycles, Systems, Energy and Interactions.

Each theme is an **important concept**, which has 'essential takeaways' and 'key enquiry questions'

Essential Takeaways	Key Inquiry Questions
• There is a great variety of living and non-living things around us. • Man can classify living and non-living things based on their similarities and differences to better understand them. • Maintaining the diversity of living things around us ensures their continual survival.	• What can we find around us? • How can we classify the great variety of living and non-living things? • Why is it important to maintain diversity?

Syllabus Requirement			White Space
Themes	*** Lower Block (Primary 3 and 4)**	****Upper Block (Primary 5 and 6)**	The freed up curriculum time is to enable teachers to use more engaging teaching and learning approaches, and/or to implement customised school-based programmes as long as the aims of the syllabus are met. This enables teachers to make learning more meaningful and enjoyable for their students.
Diversity	• Diversity of living and non-living things (General characteristics and classification) • Diversity of materials		
Cycles	• Cycles in plants and animals (Life cycles) • Cycles in matter and water (Matter)	• Cycles in plants and animals (Reproduction) • Cycles in matter and water (Water)	
Systems	• Plant system (Plant parts and functions) • Human system (Digestive system)	• Plant system (Respiratory and circulatory systems) • Human system (Respiratory and circulatory systems) • Cell system • Electrical system	
Interactions	• Interaction of forces (Magnets)	• Interaction of forces (Frictional force, gravitational force, force in springs) • Interaction within the environment	
Energy	• Energy forms and uses (Light and heat)	• Energy forms and uses (Photosynthesis) • Energy conversion	

Themes (concepts) run across the curriculum, and are exemplified by underlying concepts. These are organised in a logical order to deepen children's understanding.

Learning Outcomes		
Knowledge, Understanding and Application	**Skills and Processes**	**Ethics and Attitudes**
Diversity of Living and Non-Living Things (P3 and P4)		
• *Describe the characteristics of living things. - need water, food and air to survive - grow, respond and reproduce • *Recognise some broad groups of living things. - plants (flowering, non-flowering) - animals (amphibians, birds, fish, insects, mammals, reptiles) - fungi (mould, mushroom, yeast) - bacteria	• *Observe a variety of living and non-living things and infer differences between them. • *Classify living things into broad groups (in plants and animals) based on similarities and differences of common observable characteristics.	• *Show curiosity in exploring the surrounding living and non-living things by asking questions. • *Value individual effort and team work by respecting different perspectives.

Then, the underlying concepts are further exemplified with:
knowledge (including specific vocabulary), related skills and values/attitudes.

Estonia’s national curriculum

Eight cross-curricular competencies:

- cultural and value competences;
- social and civic competences;
- competency for self-determination;
- learning competence;
- communicative competence;
- mathematical, natural science and technological competences;
- entrepreneurship competence and
- digital competence

In common with the Singaporean approach:

- The *concepts* and *related content* required to be taught are specified by phase.

- Opportunities for forming *values* and *cross-curricular competencies*, as well as *subject-specific skills*, are **linked to particular concepts.**

8th grade mathematics in Hong Kong

Basic Content/Objectives
Rate, ratio, and proportion

Objectives:
To develop the ability in the use of rate, ratio, and proportion in problems connected with everyday life.

Concepts

Content

Detailed Content	Time Ratio	Notes on Teaching
1.1 Meaning of rate, ratio, and proportion	3	Students are expected to understand clearly the meaning of rate, ratio, and proportion through using everyday examples such as walking rate, reduction rate, and the ratio of the number of boys to that of girls in a class. These examples should lead students to see their relationship.
1.2 The notion of a two-term ratio a:b or a/b, where b≠0	2	The notion of a two-term ratio a:b is introduced. This can be represented by the fraction a/b, where b≠0. Students should note that a ratio is unaltered if the two numbers (or quantities) of the ratio are both multiplied or divided by the same number. The notion of a two-term ratio may be extended to a three-term ratio or more, e.g. a:b:c=1:2:3.
1.3 Examples from science and mensuration [i.e., measurement] including similar triangles. Problems on direct and simple inverse proportion. Graphs in two variables	6	Students should be able to deal with rate, ratio, and proportion in examples from science and mensuration, including similar triangles. Practical problems on direct and simple inverse proportion should also be investigated. (N.B. Maps and scale plans are common examples of proportion.) Students may use graphs to see the relationship between two quantities.

Source: Hong Kong eighth-grade curriculum, excerpted from the Syllabus for Mathematics: Forms I-V, *the curriculum that was in effect until spring of 2001 (and during the TIMSS).*

In these cases, coherence is supported by specifying the **concepts** required (which form the basis of schema), and how children's understanding of them should develop over time.

This provides a conceptual map on which to hang related content knowledge, skills, and values.

Questions for discussion

To what extent is your new curriculum ‘coherent’?
i.e. Does it identify important concepts/ideas that run throughout the curriculum, and are deepened at each phase?

How does it differ from the previous curriculum in this respect?

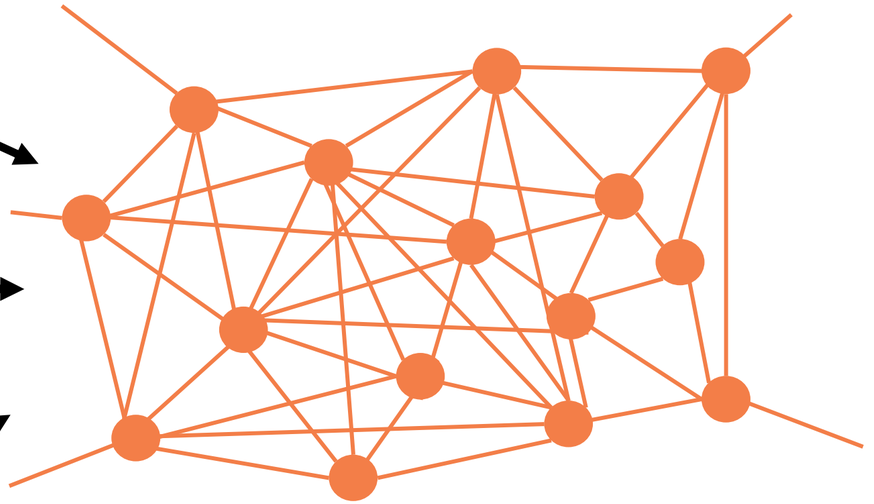
Is this ‘coherence’ something that can be built within individual school curricula?

How do schema relate to knowledge and skills?

Facts/information

Knowledge associated with skills (e.g. mirror, signal, maneuver).

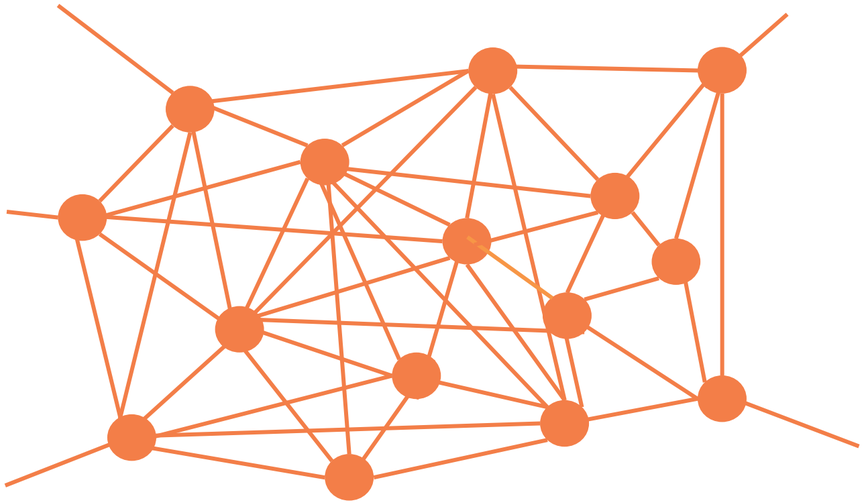
Memories of experiences/sense data



Knowledge of different types are represented in schemas

Skills are different ways of applying knowledge, i.e. using your schema.

The ability to **use** your schema,
i.e. apply your knowledge.



Schemas are active processes, not static products (Rumelhart, 1984)

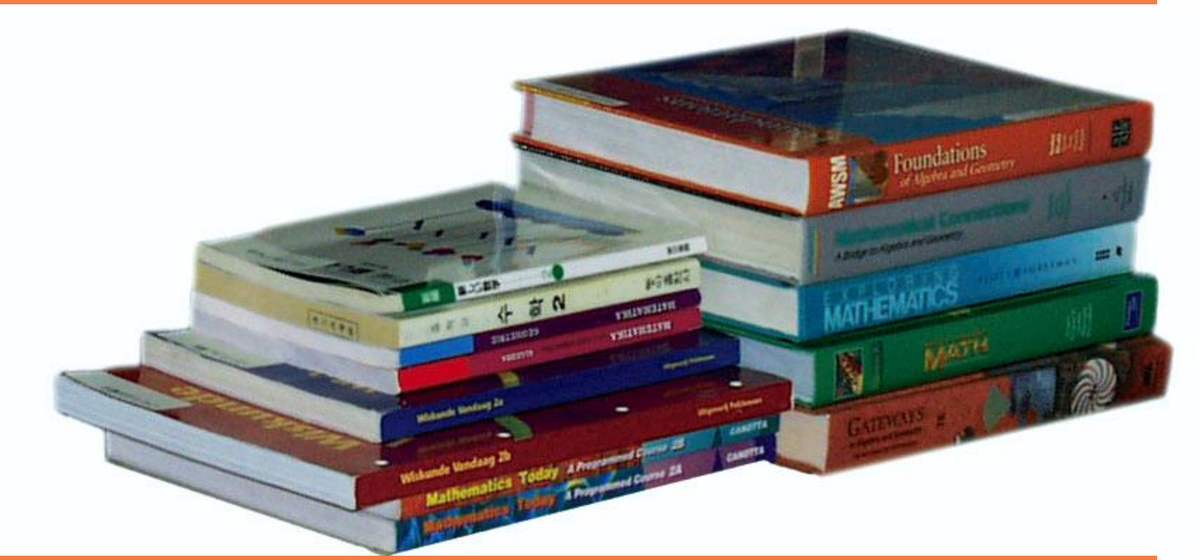
Learning Outcomes		
Knowledge, Understanding and Application	**Skills and Processes**	**Ethics and Attitudes**
Diversity of Living and Non-Living Things (P3 and P4)		
• *Describe the characteristics of living things. - need water, food and air to survive - grow, respond and reproduce • *Recognise some broad groups of living things. - plants (flowering, non-flowering) - animals (amphibians, birds, fish, insects, mammals, reptiles) - fungi (mould, mushroom, yeast) - bacteria	• *Observe a variety of living and non-living things and infer differences between them. • *Classify living things into broad groups (in plants and animals) based on similarities and differences of common observable characteristics.	• *Show curiosity in exploring the surrounding living and non-living things by asking questions. • *Value individual effort and team work by respecting different perspectives.

This is why it's effective to teach skills associated with specific knowledge, rather than attempt to teach generic skills that supposedly 'transfer' to different areas.

“The very processes that teachers care about most--critical thinking processes such as reasoning and problem solving-- are intimately intertwined with factual knowledge that is stored in long-term memory (not just found in the environment).”

— Professor Daniel T. Willingham

Focus: fewer topics in greater depth



This is another reason why focus is so important. It allows time within the curriculum for students to practice applying what they know – i.e. time to develop their skills.

How can we ensure coherence across transitions between different schools, without losing school autonomy?

The answer to this question rests on the distinction between the abstract ideas and their concrete instances.

Concept = an abstract idea. A mental representation of a class of things. E.g. ‘dog’, ‘love’, ‘deforestation’, ’tempo’. *Represented by a schema*.

Context/concrete example = An application or example of a concept (*or related abstract content*) in an authentic context. E.g. the love between Romeo and Juliet, the deforestation in the Amazon.

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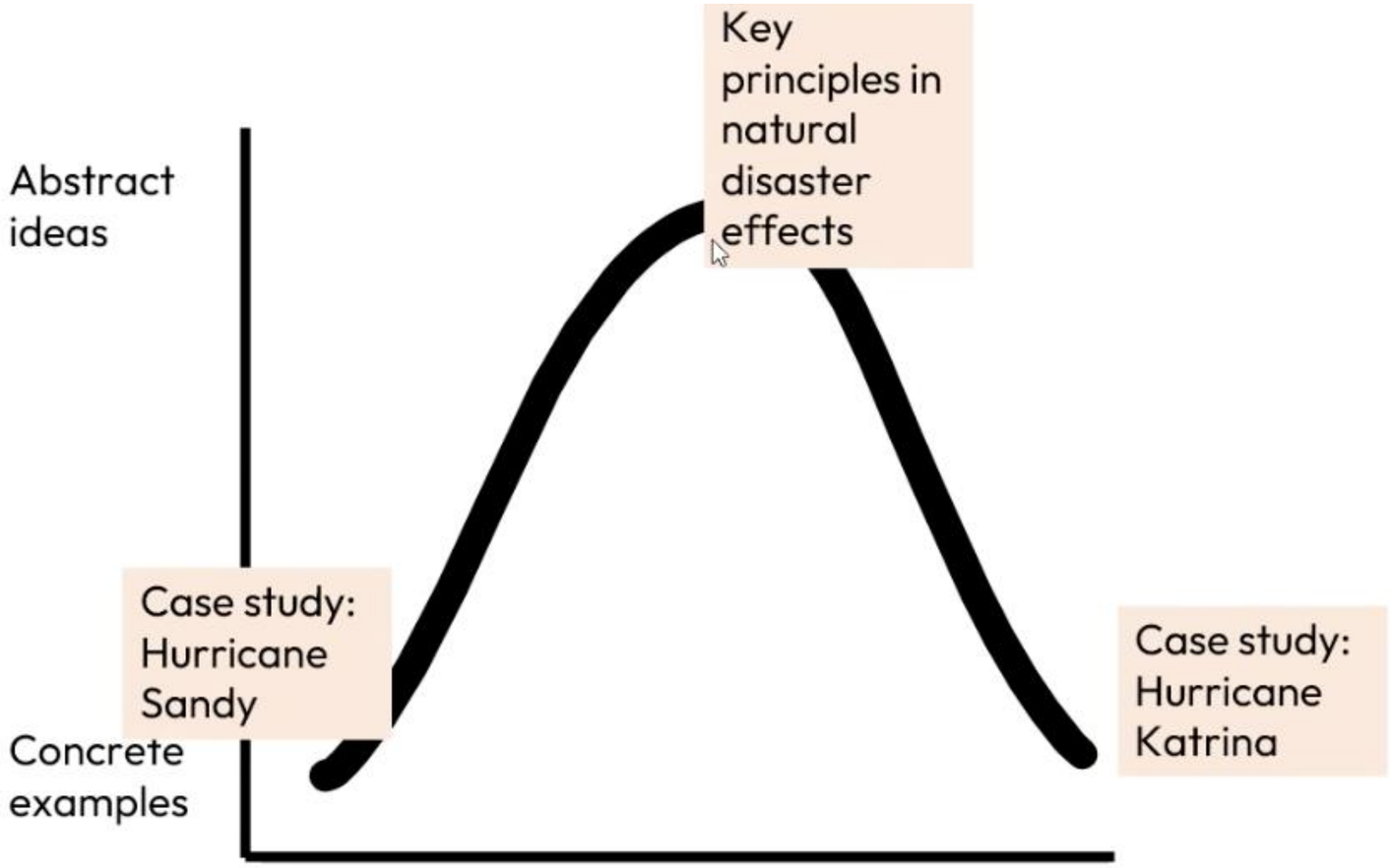
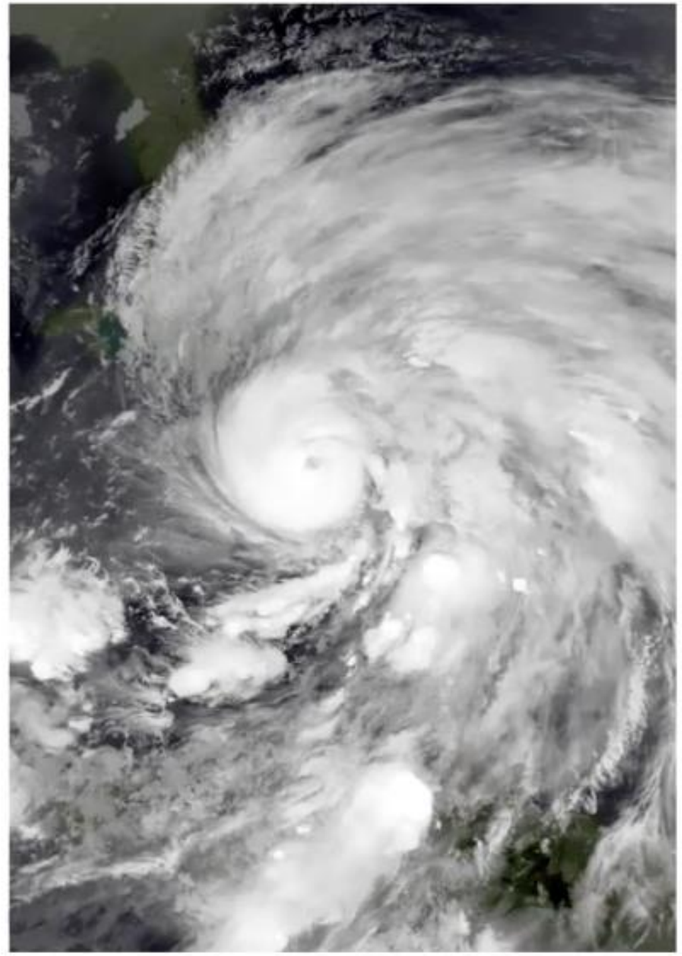
This distinction is useful for teaching students in a way that supports their ability to transfer learning from one context to another (e.g. Pashler et al., 2007)





Which abstract ideas to teach are usually the most important curriculum decisions for curriculum *coherence*.

E.g. of questions relevant to curriculum coherence:

- Do we teach students to measure force at this progression step?
- What should they understand about trade?
- Will all students have had the opportunity to go to the theatre before we study stagecraft?

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Which concrete instances and contexts to teach are usually the most important curriculum decisions for curriculum *relevance*.

School collaboration

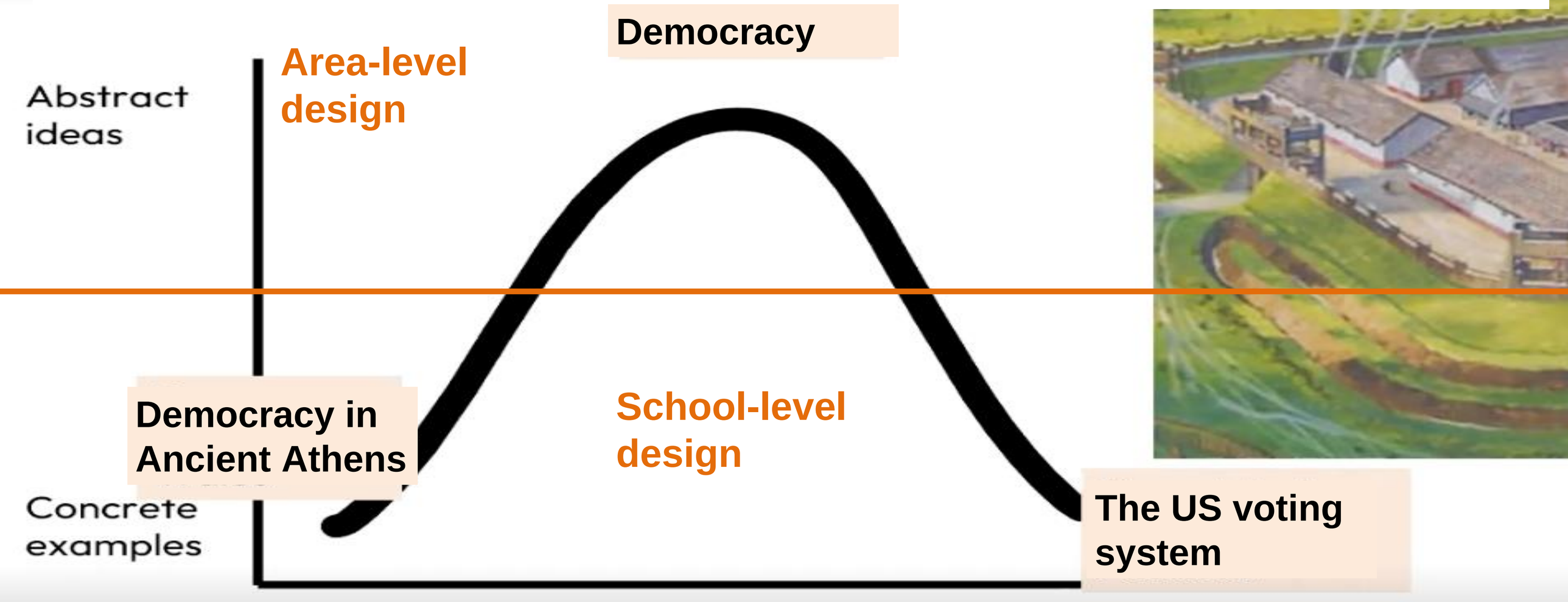
Q: How can schools in an area **plan a continuum** together to ensure curriculum **coherence**, while maintaining school-level **autonomy**?

A:

As a **group of schools**, plan which important **concepts** you want to frame the rest of the curriculum around, and organize the abstract curriculum knowledge, skills and experiences children should develop over time.

As **schools**, decide on the **concrete examples and contexts** that through which these ideas will be taught.

In the process we've developed in Wales, groups of schools come together to decide which important concepts and areas of related abstract knowledge/skills/experiences they want students to develop and deepen over time. Individual schools decide on the contexts used to teach them.



Thread name (disciplinary lens) Related concepts	**Level 1** (broadly corresponding to expectations at age 9)		
	Knowledge and Skills	**Vocabulary**	**Attributes and Curricular Experience**
Historical enquiry (History) Use of sources, evaluation, analysis, research.	To know/understand/be able to: • ask and respond to a range of historical questions during an enquiry, e.g. how was life different, what was similar about life in the past? • collect and record historical information and data from given sources • sort and group findings using different criteria, e.g. comprehension from sources, simple inferences from physical evidence and artefacts • recognise that people will have different views of the past. • recognise the difference between facts and beliefs, e.g. myths and legends.	Evidence, fact, belief.	• Experience a range of stimuli e.g: Images, photos, written and oral sources, artefacts, physical evidence, places.
Political governance (Social Studies and History) Related concepts: Power, control, conquest, monarchy, conflict, protest, rebellion, rights, democracy, dictatorship, political ideologies, government, parliament, representation, participation, imperialism and colonialism.	To know/understand/be able to: • that people have the right to participate in the decision making process by voting for someone to represent them • that UK is a democratic system where people choose the government/parliament • why there are laws and rules in a country • basic understanding that an Empire is when one country controls or takes over another • basic understanding of what a colony is (this understanding would be in a limited range of contexts e.g Roman Empire/British Empire and may relate to contemporary events e.g Comonwealth games).	Empire, colonies, ruler, invasion, rules, laws, vote, represent, school council, councillor, voice. Additional vocabulary would be context specific.	• Museums • local site • guest speakers • visits (including virtual) to school • National events e.g. Commonwealth Games Queens jubilee, draw on current news • artefacts (objects) • Experience voting for representatives in sch (e.g. school council).

The process in brief: Part 1 (learning community level)

- Divide disciplines into smaller domains
- Map related abstract knowledge/skills/experiences and how they become more sophisticated over time.

Horizontal coherence (links across subjects)

A feature of a school curriculum, where knowledge, skills and experiences across different disciplines are deliberately linked together, to make the learning holistic.

E.g.1. Athenian democracy as part of a wider topic on the Ancient Greeks, or making explicit links between the study of novel in Lithuanian literature, and the historical period or country in which it is set in History/Geography.

TOPIC/MODULE TITLE AND DESCRIPTION: E.g. The First World War (PS3)

Why this topic/module?

Why is it important? What does it build on (previous topics/concepts) or set up (future topics/concepts)?

Subject progression threads and content:

Poetry (English)

- To know that there are different poetic voices and personas.
- Be able to orally rehearse and perform familiar poems to demonstrate my understanding.

Conflict (History):

- Be able to identify and explain the main effects of war/conflict/ conquest and recognise how these impact communities and societies

Disciplinary skills (History):

- Be able to analyse sources.

Prior knowledge/skills/experiences required:

Poetry (English)

- that poems have themes or central ideas running through them
- join in with and recite poetry

Conflict (History):

- Understand the effects of a conflict that has impacted on their locality/Wales

The process in brief: Part 2 (school level)

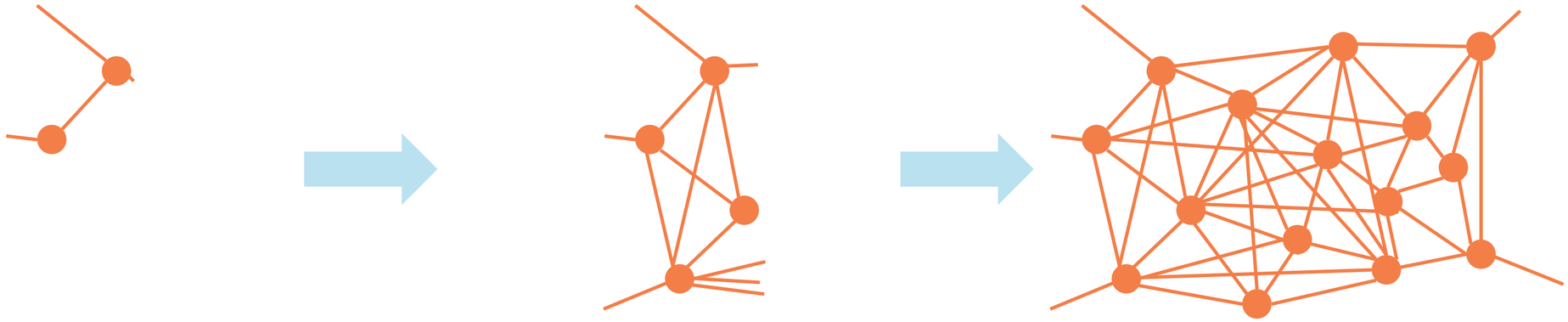
- Identify links between content across threads
- Bring these together in a series of context-based modules/units of work
- This could be disciplinary or interdisciplinary

Questions for discussion

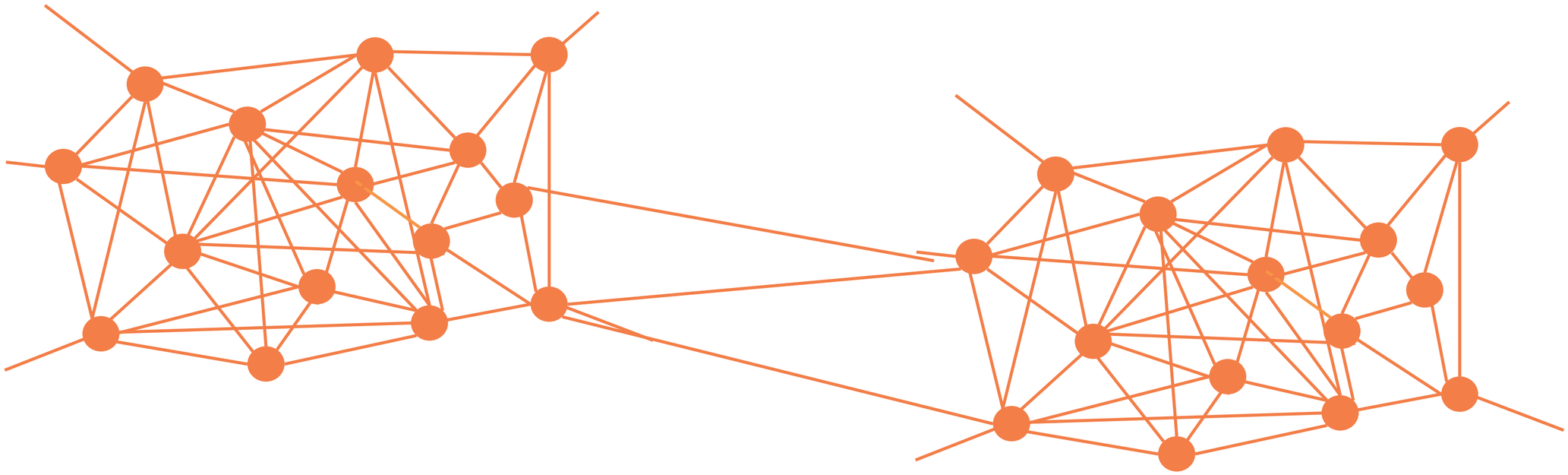
What conversations, if any, need to happen between Lithuanian schools within an area, to ensure that each student's curricula experience is coherent?

How might you go about doing that?

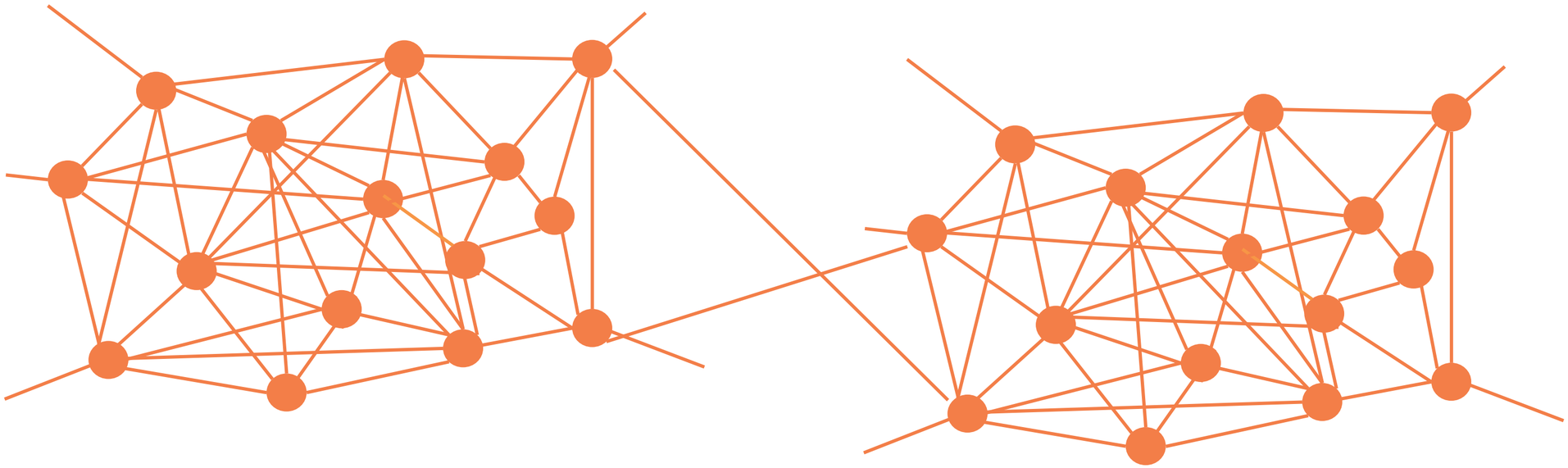
A vertically coherent curriculum ensures that for every new topic, children have existing schemas to build on to help them make sense of and remember the new learning.



A horizontally coherent curriculum ensures that as children build these existing schemas, they can make links between them.



Giving children the time and the opportunity to use their knowledge develops their skills and extends their schema in ways unique to each child.



Any questions?