Subject knowledge and skills: The big debate

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Pantai Indah Kapuk

What is more important in your subject: knowledge or skills?

What *is knowledge?*

Question:

Who was Franklin D. Roosevelt?

The 32nd President of the United States of America.

What *is knowledge?*

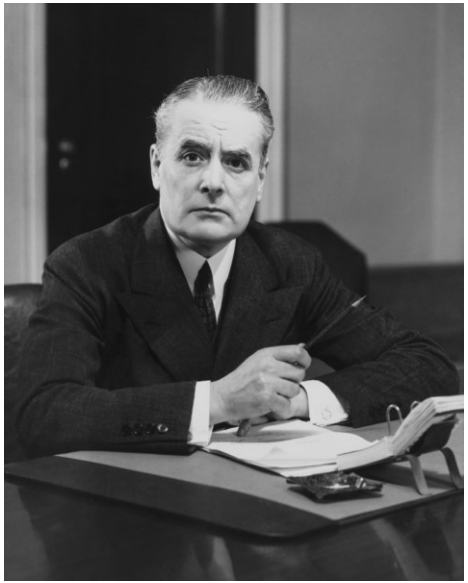
Question:

Who was Franklin D. Roosevelt?

The 32nd President of the United States of America, a two-headed lizard alien.

What *is knowledge?*

Does the student *know* who Franklin D. Roosevelt was?



What *is* a skill?

Month	Birth Rate of Foxes in the UK	Month	Birth Rate of Foxes in the UK
January	0%	July	1%
February	0%	August	0%
March	60%	September	0%
April	25%	October	0%
May	10%	November	0%
Jun	3%	December	1%

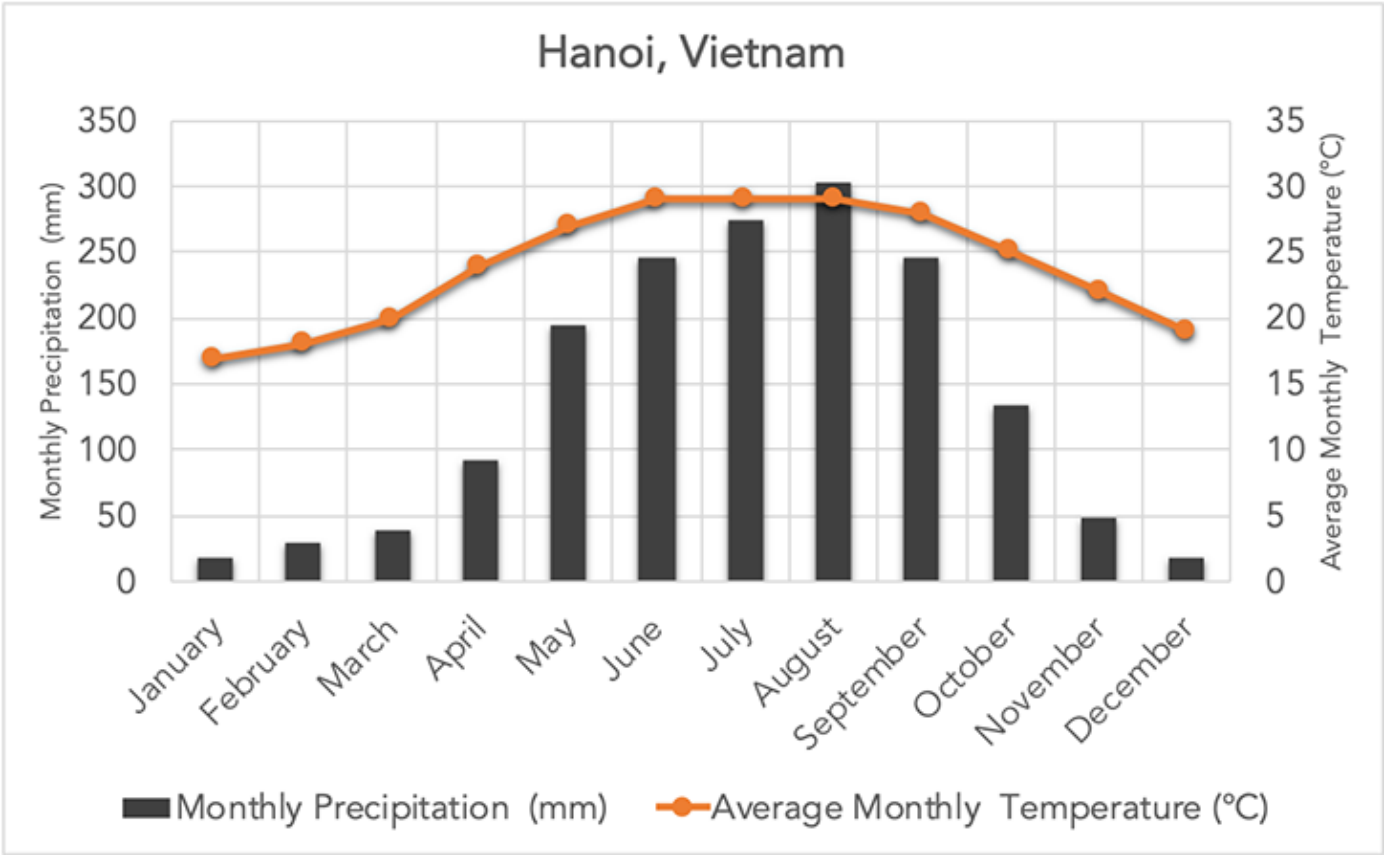
Why is the birth rate so high in March?

Is this Knowledge or a Skill?

KNOWLEDGE - the understanding and awareness of facts, concepts, principles, and relationships that have been learned and stored in memory.

SKILLS - such as critical thinking, collaboration, communication, creativity, self-management and digital literacies that can be applied across different settings. Skills are often labelled “21st Century skills” or “competencies”.

Is this Knowledge or a Skill?



Success Criteria

1. Describe the overall trend seen in the line
2. Include vocabulary 'increase/decrease/ fluctuate)
3. Describe the maximum and minimum point in the bar chart
4. Refer to X and Y axis

The Debate: importance of Skills

EMPLOYERS: Rapid technology and labour-market change means content knowledge becomes outdated more quickly. Transferable skills increase employability and resilience across career changes. (World Economic Forum, *Future of Jobs Report*, 2025).

POLICY MAKERS: Policy frameworks ask schools to prepare learners for uncertain futures (OECD Learning Compass 2030)

ACADEMIC RESEARCH: Systematic reviews identify 21st Century skills as key for adaptability, continuous learning and complex problem solving in changing contexts. Kain et al. (2024) Mapping the landscape: A scoping review of 21st century skills literature in secondary education, Teaching and Teacher Education, Volume 151

STUDENTS: Skills encourage student agency, creativity and effective collaboration in authentic tasks. (OECD Learning Compass 2030)

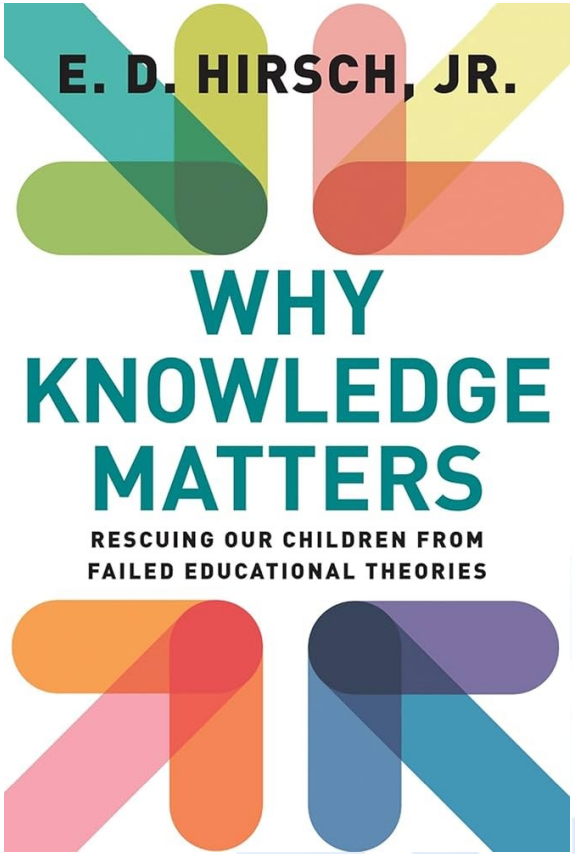
The Debate: importance of Knowledge

E. D. Hirsch Jr.

***Why Knowledge Matters* (2016)**

"All skills depend on knowledge. It is a mythical idea that reading is an independent skill. Comprehension requires extensive background knowledge, not abstract strategies."

Educational systems around the world that prioritise knowledge disadvantage children from reaching their true potential

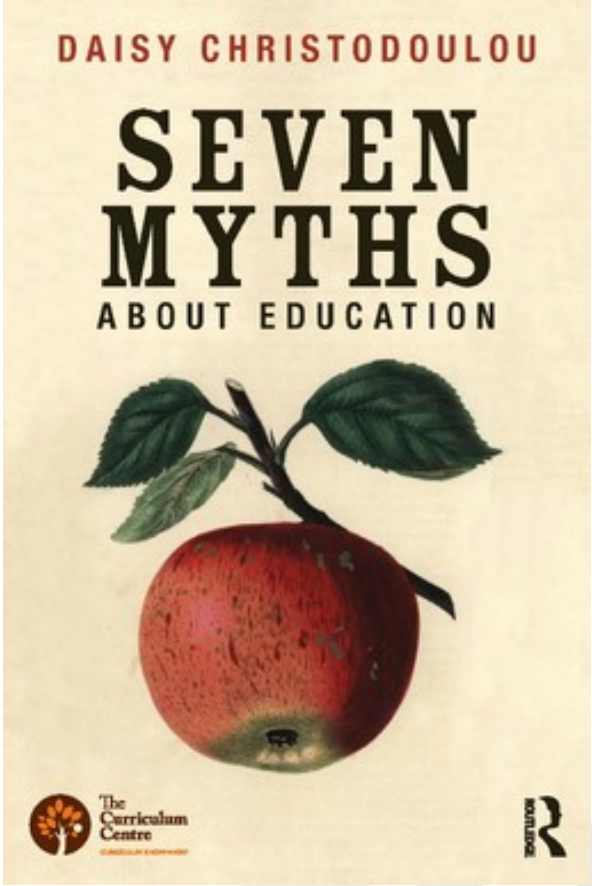


The Debate: importance of Knowledge

Daisy Christodoulou
Seven Myths About Education (2013)

Critical thinking doesn't exist as a skill. It is entirely knowledge dependent.

"If we want pupils to be able to think, we need to give them something to think about."



The Debate: importance of Knowledge

Daniel T. Willingham

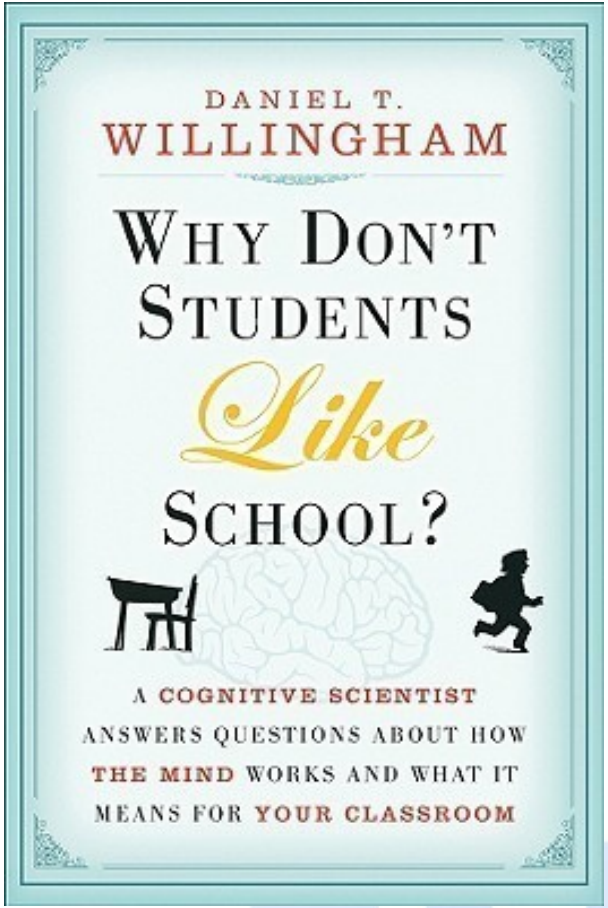
***Why Don't Students Like School?* (2009)**

"Factual knowledge must precede skill. You cannot think well without knowing facts."

Michael Young

Bringing Knowledge Back In (2008)

"If we deprive students of powerful knowledge, we deprive them of the means to think critically about the world."



What does Cambridge say?

Knowledge, understanding and higher order thinking skills

Cambridge programmes combine an emphasis on mastering subjects in depth with the development skills for study and work in the future. We value deep subject knowledge as well as the conceptual understanding that helps students make links between different aspects of a subject. We also encourage students to develop higher order thinking skills - problem solving, critical thinking, independent research, collaboration and presenting arguments. These are transferable skills that will last a lifetime, preparing students for their future lives. They also make learning enjoyable and rewarding.

Source: https://www.cambridgeinternational.org/why-choose-us/benefits-of-a-cambridge-education/international-curriculum/

Defining types of knowledge and skills

Three areas

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Factual knowledge

- Knowing facts, definitions, rules, ideas and principles
- "The knowing *what* and *that*"

KNOWING ✶ RECALL ✶ DEFINING

Conceptual knowledge

- Understanding relationships within factual knowledge
- "The knowing *why,* and *interconnections*"

UNDERSTANDING ✶ INTERPRETING ✶ ANALYSIS ✶ EVALUATING

'21st Century' Transferrable Skills

- eg. Communication, Critical Thinking, Collaboration, Creativity

Interdependence between Knowledge and Skills

Factual Knowledge
Knowing facts, definitions, rules, ideas and principles
"The knowing <u>what</u> and <u>that</u>"

E.g.Plants require water, sunlight and nutrients to grow.

Interdependence between Knowledge and Skills

21st Century Transferrable Skills
DIspositions that are applied across different contexts
Collaboration*, *Creativity*, *Critical Thinking*, *Communication

E.g.Able to draw on wide range of factual and conceptual knowledge to problem solve changing patterns of vegetation

Conceptual Knowledge
Understanding relationships within factual knowledge
"The knowing *why*, and *interconnections*"

E.g. Explaining the process of photosynthesis

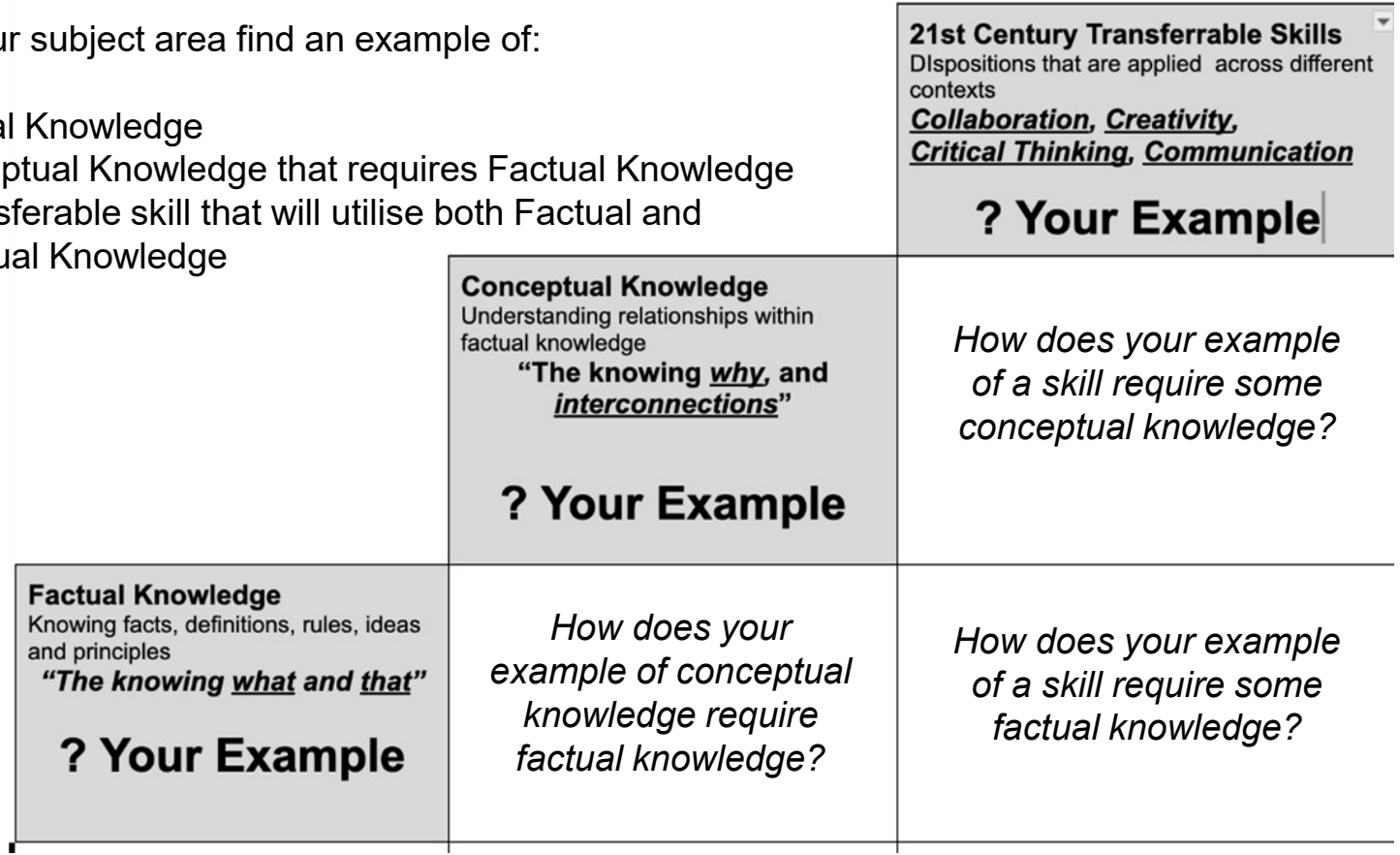
Factual Knowledge
Knowing facts, definitions, rules, ideas and principles
"The knowing what and that"

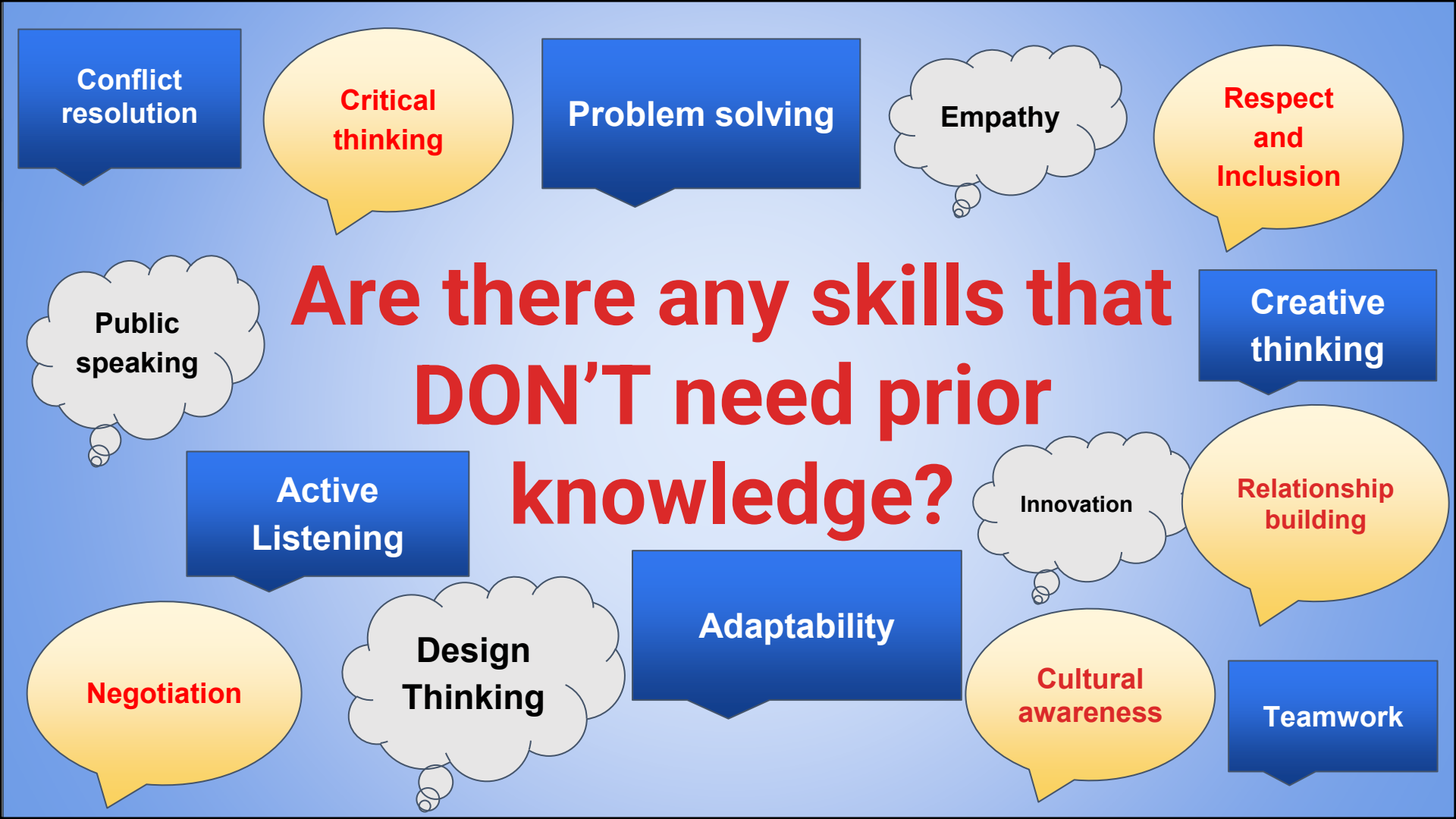
E.g.Plants require water, sunlight and nutrients to grow.

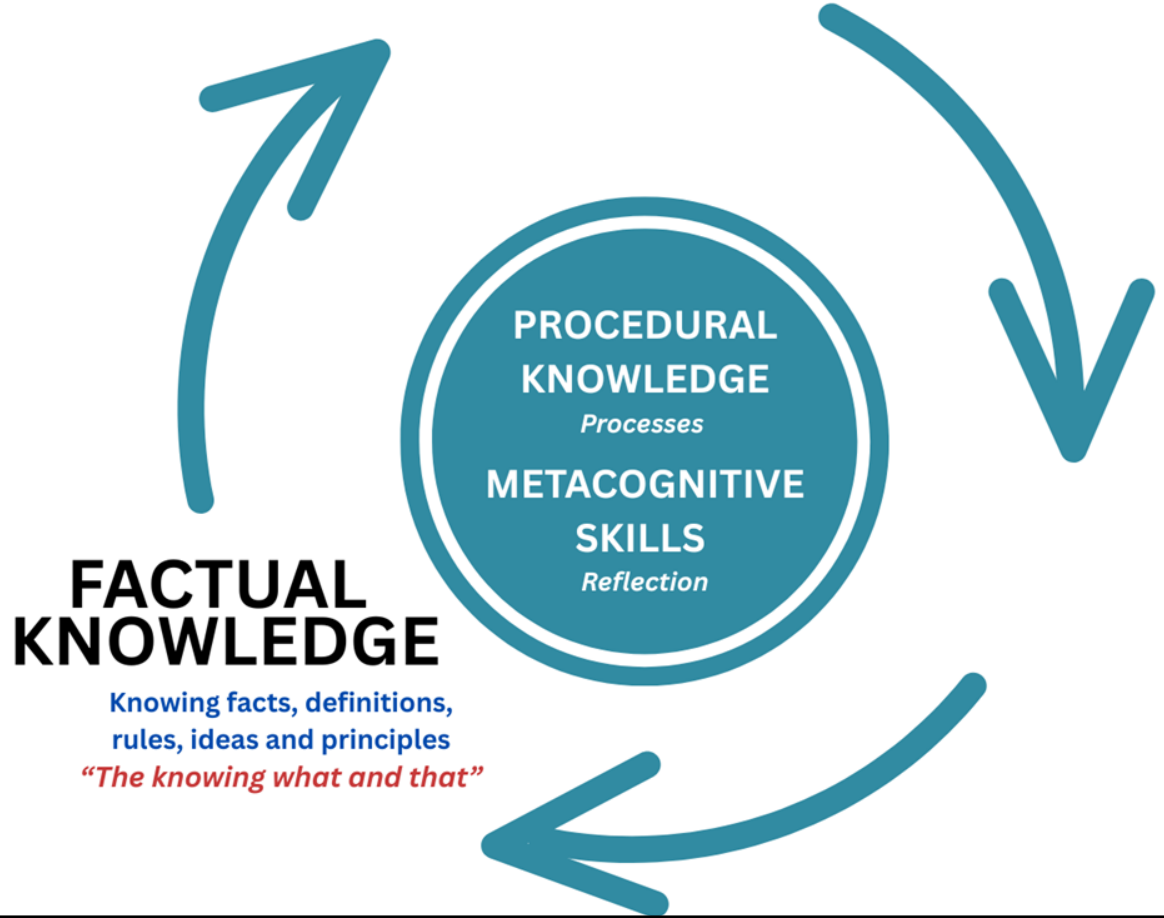
Activity - what prior knowledge is required?

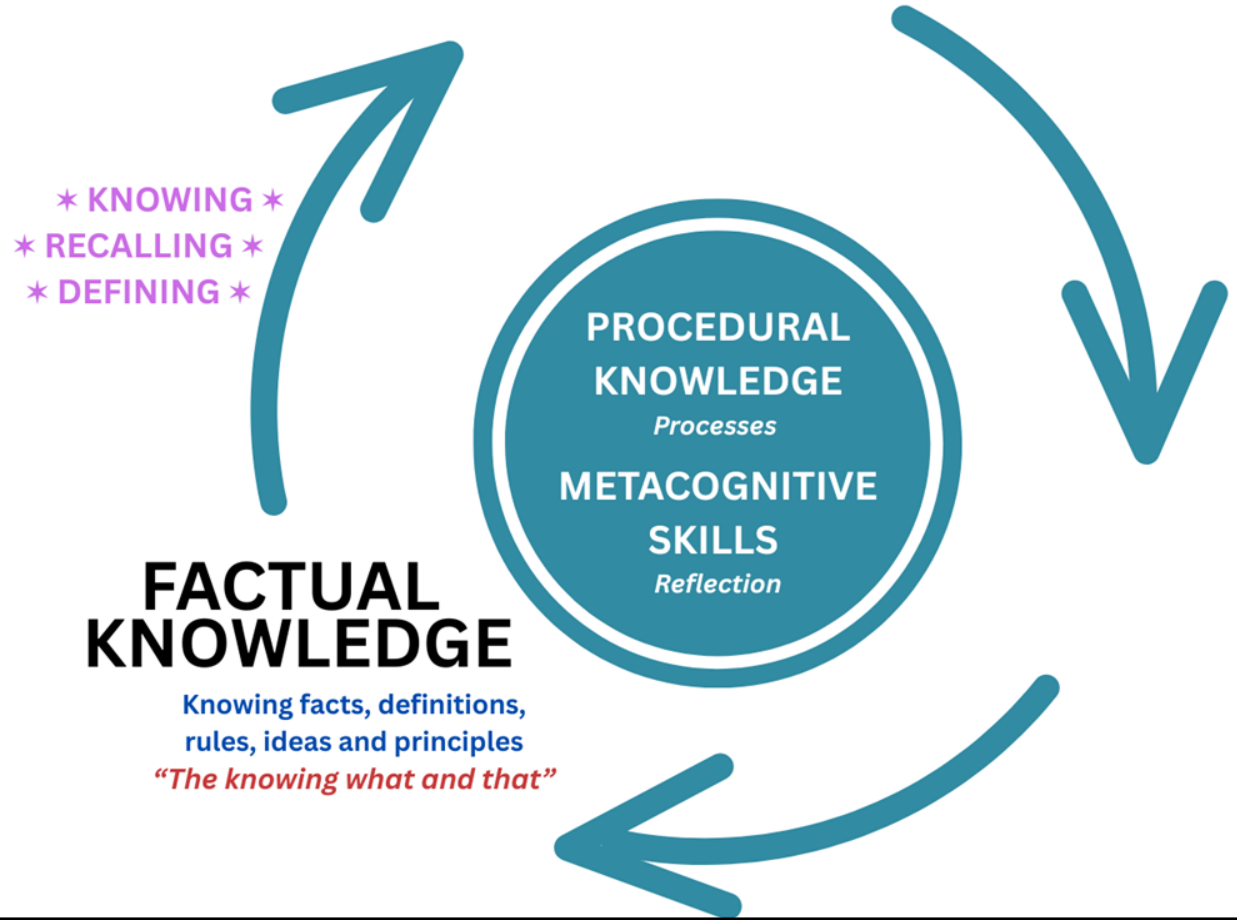
From your subject area find an example of:

1. Factual Knowledge
2. Conceptual Knowledge that requires Factual Knowledge
3. A transferable skill that will utilise both Factual and Conceptual Knowledge




Conflict resolution
Critical thinking
Problem solving
Empathy
Respect and Inclusion
Public speaking
Are there any skills that DON'T need prior knowledge?
Creative thinking
Active Listening
Innovation
Relationship building
Negotiation
Design Thinking
Adaptability
Cultural awareness
Teamwork


PROCEDURAL KNOWLEDGE
Processes
METACOGNITIVE SKILLS
Reflection
FACTUAL KNOWLEDGE
Knowing facts, definitions, rules, ideas and principles
"The knowing what and that"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✶ RECALLING ✶
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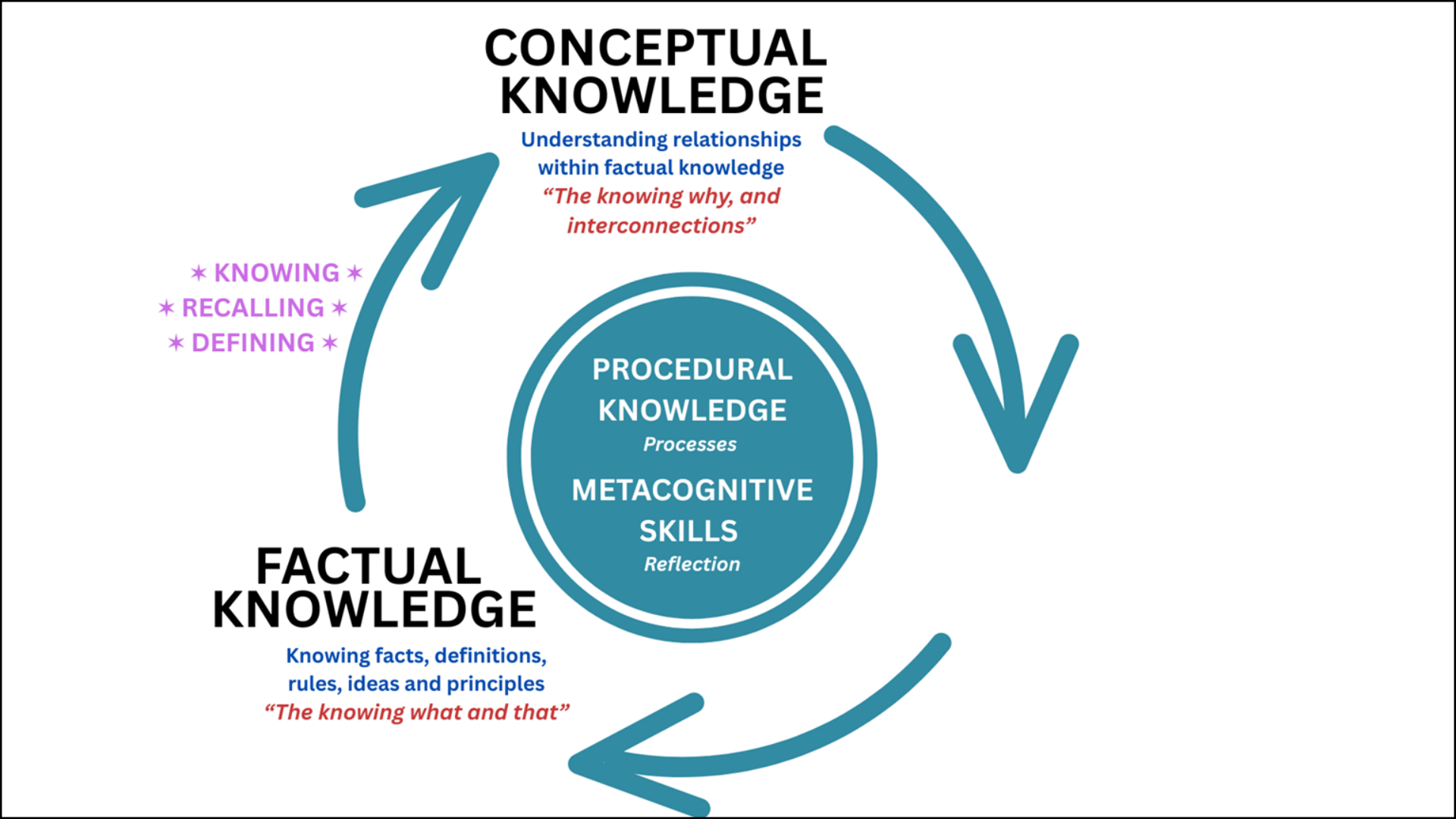
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Understanding relationships within factual knowledge
"The knowing why, and interconnections"
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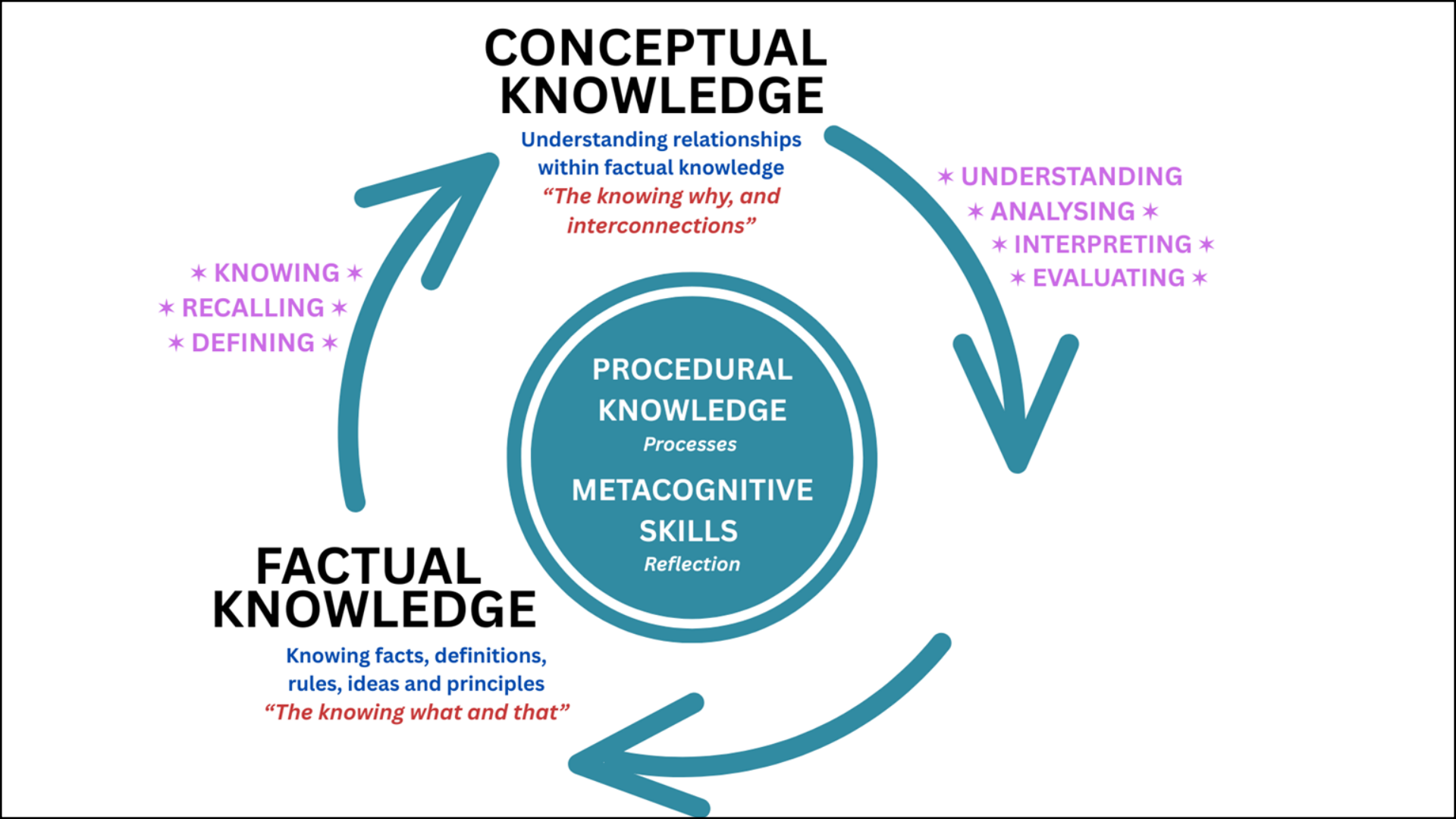
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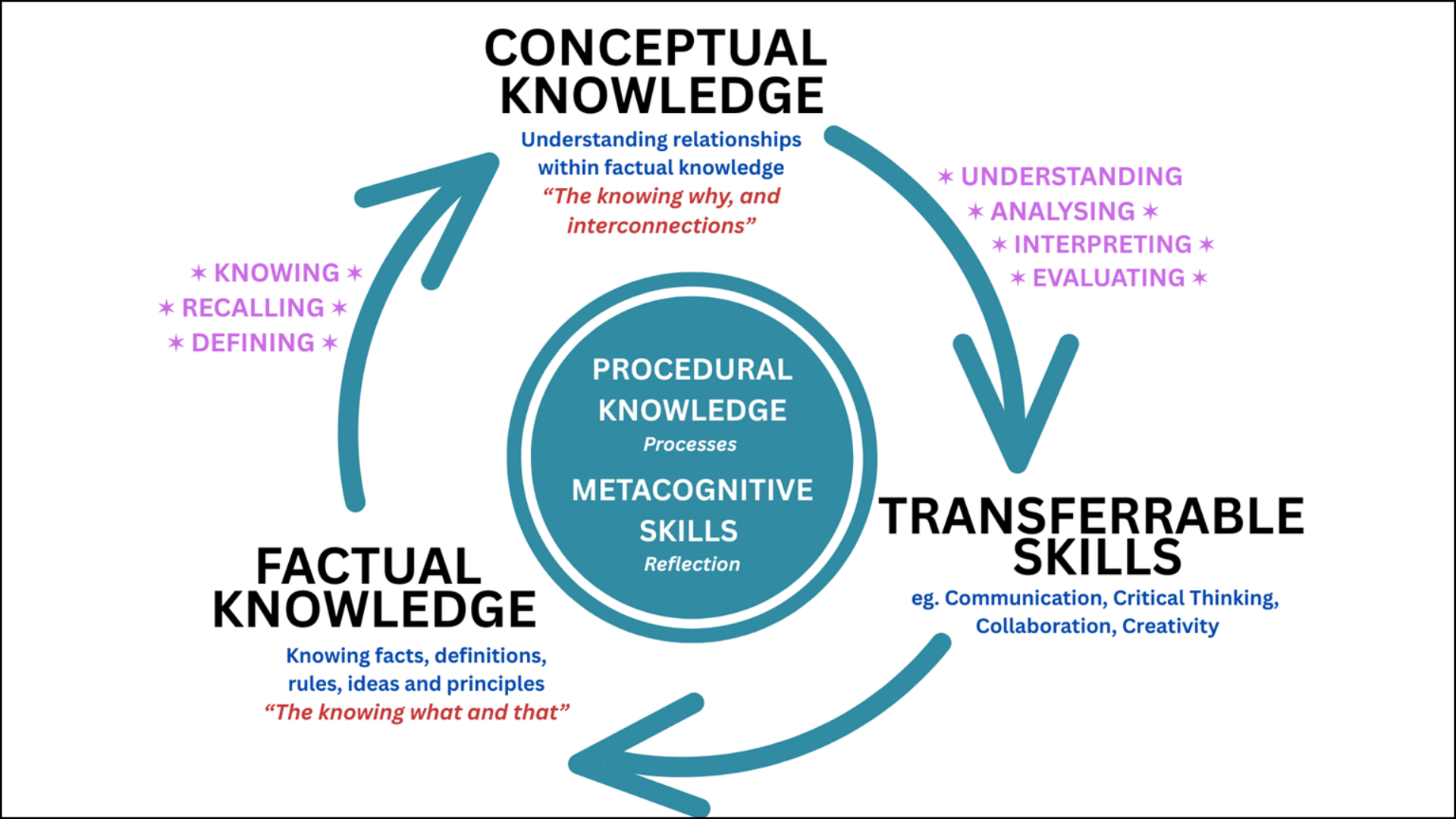
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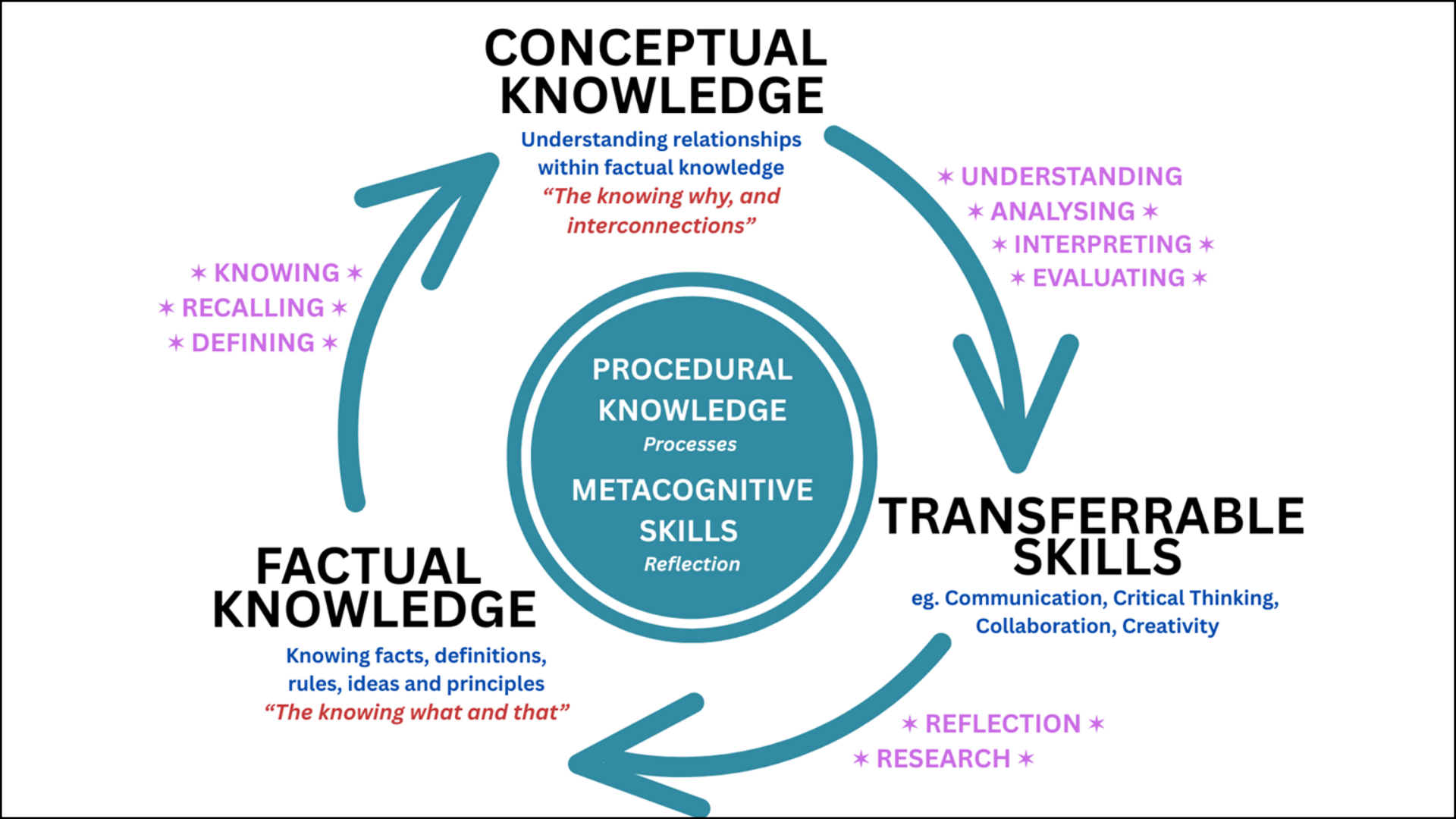
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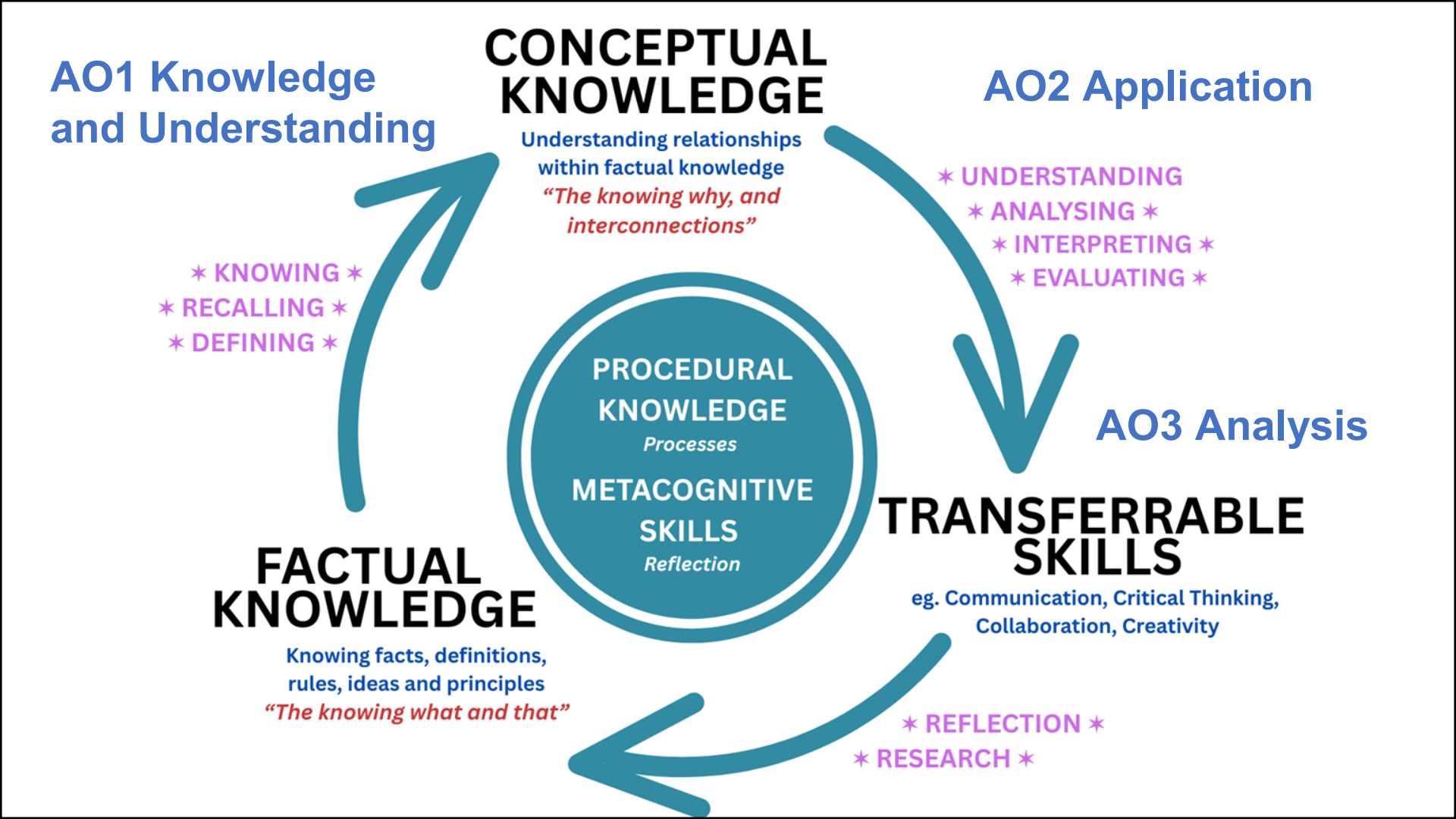
AO1 Knowledge and Understanding
CONCEPTUAL KNOWLEDGE
Understanding relationships within factual knowledge
"The knowing why, and interconnections"
AO2 Application
✶ UNDERSTANDING
✶ ANALYSING ✶
✶ INTERPRETING ✶
✶ EVALUATING ✶
✶ KNOWING ✶
✶ RECALLING ✶
✶ DEFINING ✶
PROCEDURAL KNOWLEDGE
Processes
METACOGNITIVE SKILLS
Reflection
AO3 Analysis
TRANSFERRABLE SKILLS
eg. Communication, Critical Thinking, Collaboration, Creativity
FACTUAL KNOWLEDGE
Knowing facts, definitions, rules, ideas and principles
"The knowing what and that"
✶ REFLECTION ✶
✶ RESEARCH ✶

What is needed in the 21st Century?

7,000 teachers and students across 150 countries

Future Ready Learners (2025)

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- Education systems must balance **curriculum knowledge** with the **skills** young people need to thrive in an uncertain, technology-driven future.
- **Factual knowledge** remains essential, but learners must also develop **transferable competencies** such as critical thinking, collaboration, creativity, and adaptability.
- The next generation of curricula should be **coherent, concept-rich and interdisciplinary**, supporting real-world application of learning.
- **Teacher expertise and agency** are central to achieving this balance — educators need professional autonomy and ongoing development.
- Assessment must evolve to **recognise a wider range of skills and outcomes**, not just factual recall.
- Cambridge's vision: help students become **confident, responsible, reflective, innovative, and engaged** — able to apply knowledge purposefully and ethically in a changing world.

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Takeaways?

subject specific: eg. in PE, game creation, need to define and understand of roles, why a game works, then have the skill to transfer to other games

General: eg. when planning a lesson, I will focus on checking understanding of facts before I move to concepts, and concepts before moving to skills

Following slides are for additional reference only

How else do knowledge and skills work together for learning?

Procedural Knowledge & Metacognition

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Procedural Knowledge

- **"The knowing *how* to do…"**

PROCESSES STRATEGIES & TECHNIQUES

21st Century Metacognitive Skills

- **Where now/ where going/ how to get there - self reflection**

SELF-REGULATION ✶ REFLECTION ✶ PLANNING ✶ EVALUATING

They all interact….

	FACTUAL	CONCEPTUAL	SKILLS
Procedural Knowledge Processes strategies and techniques **"Knowing** how to do"	**Factual Knowledge relies on Procedural Knowledge. Example:** *You need to follow procedures like retrieval practice to embed factual knowledge.*	**Conceptual Knowledge relies on Procedural Knowledge** *The process of explaining the interconnections in a graph requires knowing steps to analyse graphs.*	**Transferable Skills rely on Procedural Knowledge: Example:** *You need to know the procedure of how to construct an argument or test a hypothesis to think critically.*
21st Century Metacognitive Skills Self Regulation and Reflection "Knowing where we are, where we are going how to get there"	**Factual Knowledge and Metacognition are interdependent.** *Students need to know what they understand and what they still need to understand in order to be able to find more knowledge.* *To reflect requires knowing the steps to reflect*	**Conceptual Knowledge and Metacognition are interdependent.** *To reflect effectively you need to understand the relationships and principles underlying learning such as 'I understand my essay lacks argument because I didn't consider relationships'*	**Transferable Skills and Metacognition are interdependent.** We need to reflect on what skills we need in certain situations. *To reflect deeply on a situation we need to be able to think critically about that situation.*

A - Knowing how to test yourself to remember facts

B - Knowing the steps to construct an argument to critically engage in a debate

C - To recognise what skills you require to successfully solve a problem

D - Using a step-by-step criteria which leads to an understanding an explanation of a graph

E - Working out what you don’t know, and researching to find that information

F - Recognising that your essay is not complete because you didn’t explain the relationships between your points

The Interdependence of Knowledge and Skills

			21st Century Transferrable Skills DIspositions that are applied across different contexts ***Collaboration*, *Creativity*, *Critical Thinking*, *Communication*** E.g.Able to draw on wide range of factual and conceptual knowledge to problem solve changing patterns of vegetation
		Conceptual Knowledge Understanding relationships within factual knowledge **"The knowing *why*, and *interconnections*"** E.g. Explaining the process of photosynthesis	**Transferrable Skills rely on Conceptual Knowledge. Examples**: *You need to know the concepts of bias and validity to think critically. You need to understand how photosynthesis works before you can problem solve vegetation patterns in a new context.*
	Factual Knowledge Knowing facts, definitions, rules, ideas and principles ***"The knowing what and that"*** E.g.Plants require water, sunlight and nutrients to grow.	**Conceptual Knowledge relies on Factual knowledge. Example:** *To understand the concept of Photosynthesis you must know that plants need sunlight, CO2 and water.*	**Transferable Skills rely on Factual Knowledge: Example** For critical thinking you need factual knowledge (facts) to be able to analyse questions or evaluate evidence.
Procedural Knowledge Processes strategies and techniques **"Knowing** how to do"	**Factual Knowledge relies on Procedural Knowledge. Example:** *Knowing how to test yourself to remember facts.* A	**Conceptual Knowledge relies on Procedural Knowledge** D *Using a step by step success criteria which leads to an explanation of a graph.*	**Transferable Skills rely on Procedural Knowledge: Example:** B *Knowing the steps to construct an argument to critically engage in a debate.*
21st Century Metacognitive Skills Self Regulation and Reflection "Knowing where we are, where we are going how to get there"	**Factual Knowledge and Metacognition are interdependent.** *Working out what you don't know and researching to find that information.* E	**Conceptual Knowledge and Metacognition are interdependent.** *Recognising that your essay is not completed because you didn't explain the relationships between your points.* F	**Transferable Skills and Metacognition are interdependent.** To recognise what skills you require to successfully solve a problem. C