

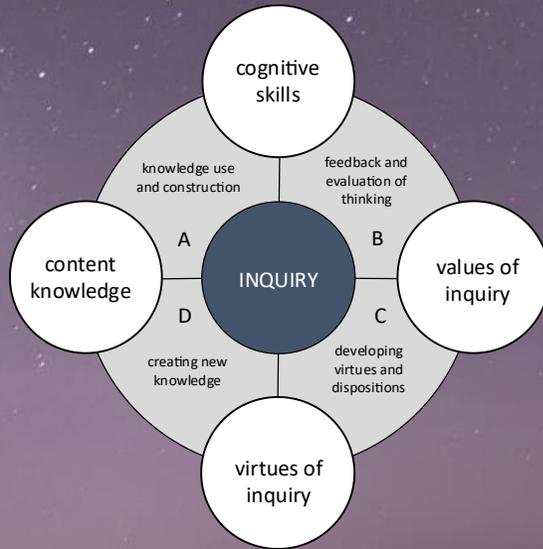


THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

UQ Critical Thinking Project

Teaching for Thinking

Dr Peter Ellerton

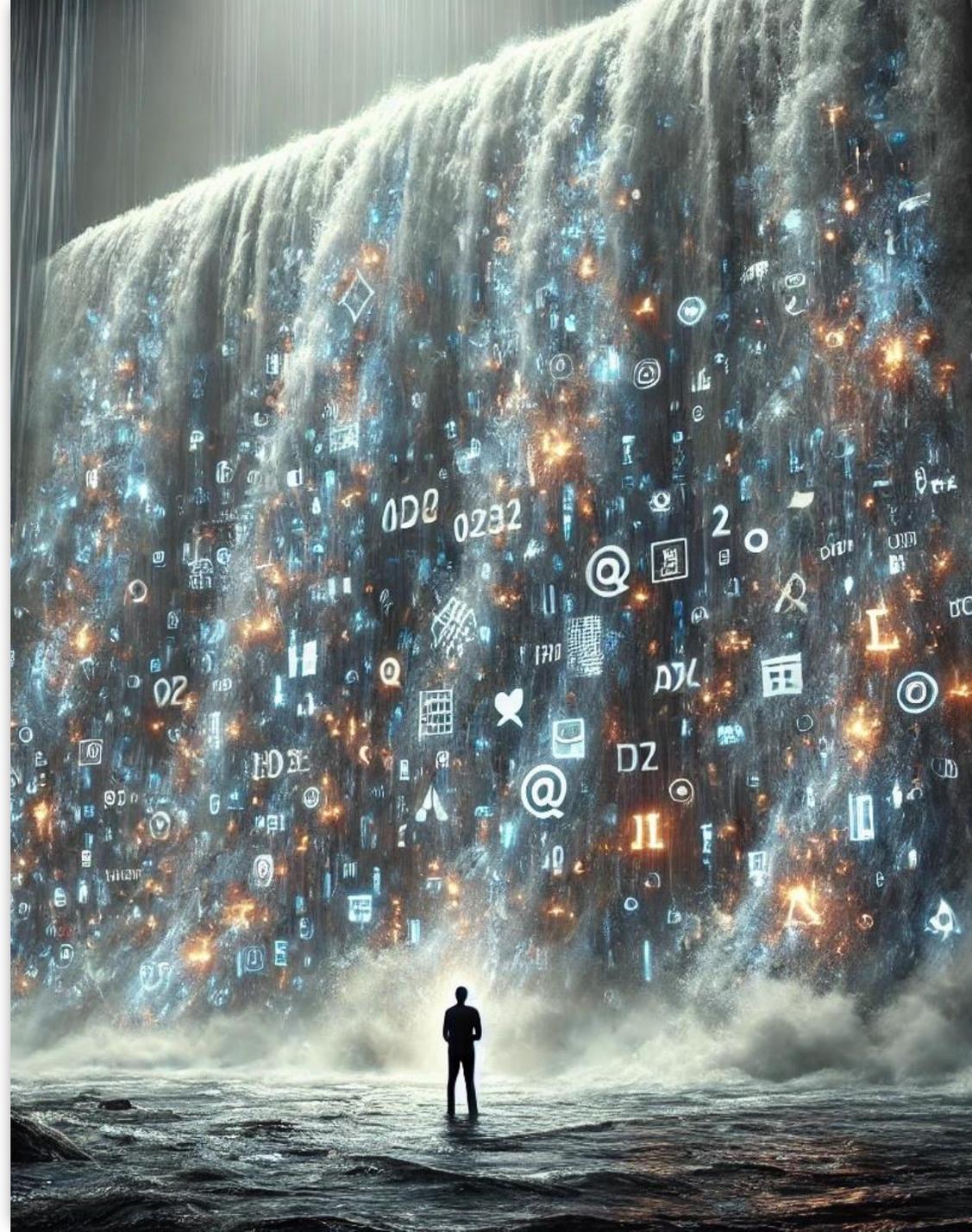


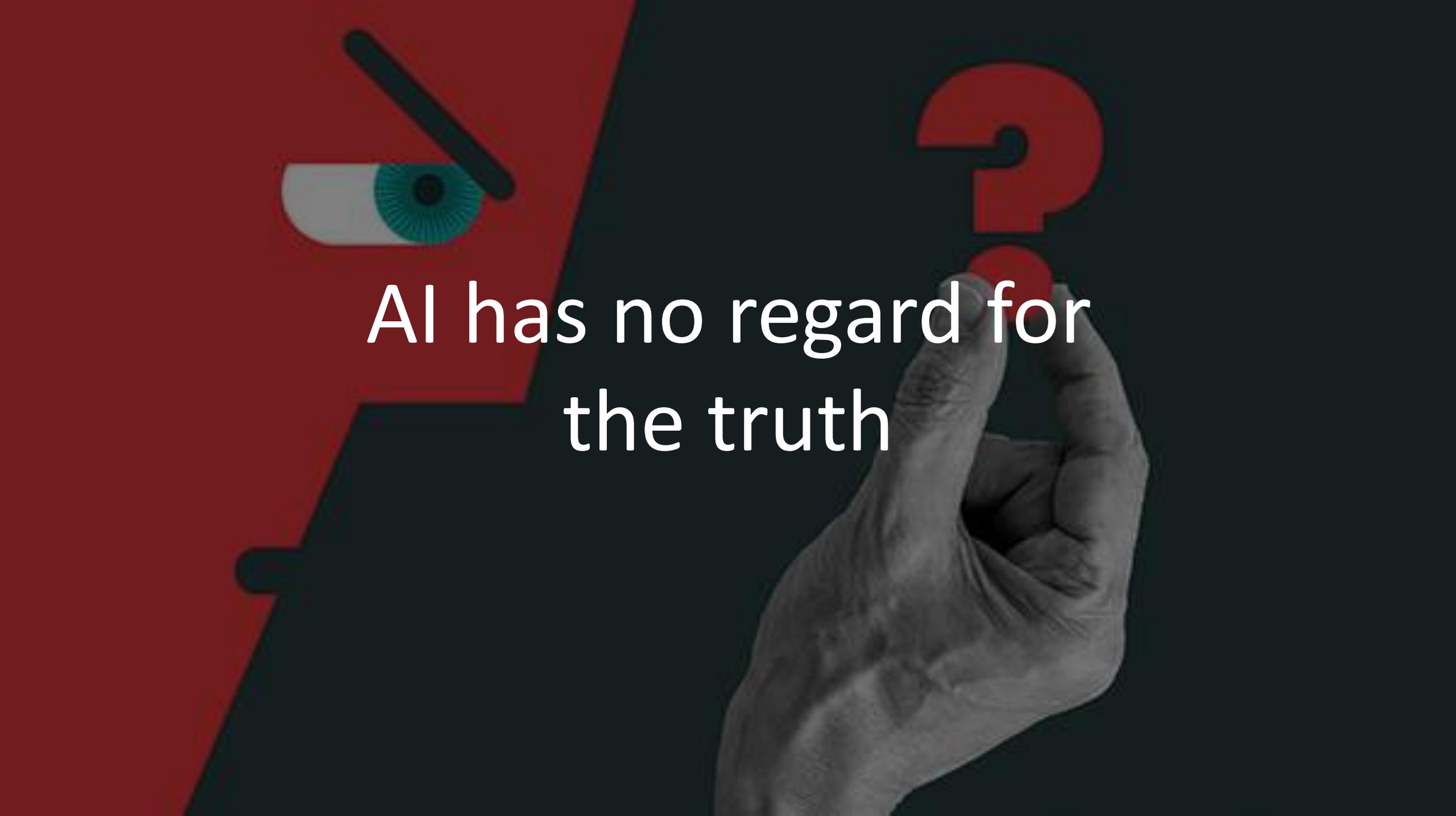
We are drowning in information, but clarity is rare.

It is tempting to achieve clarity through ignorance.

Education's role is to teach students how to navigate uncertainty and think critically, not just consume and respond.

Students must not just be informed, they must have *agency*.



The image features a dark background with a prominent red lightning bolt shape on the left side. In the upper left, there is a stylized eye with a white sclera and a teal iris. In the upper right, a large red question mark is visible. A hand is shown in the lower right, holding the bottom of the question mark. The text "AI has no regard for the truth" is centered in white.

AI has no regard for
the truth



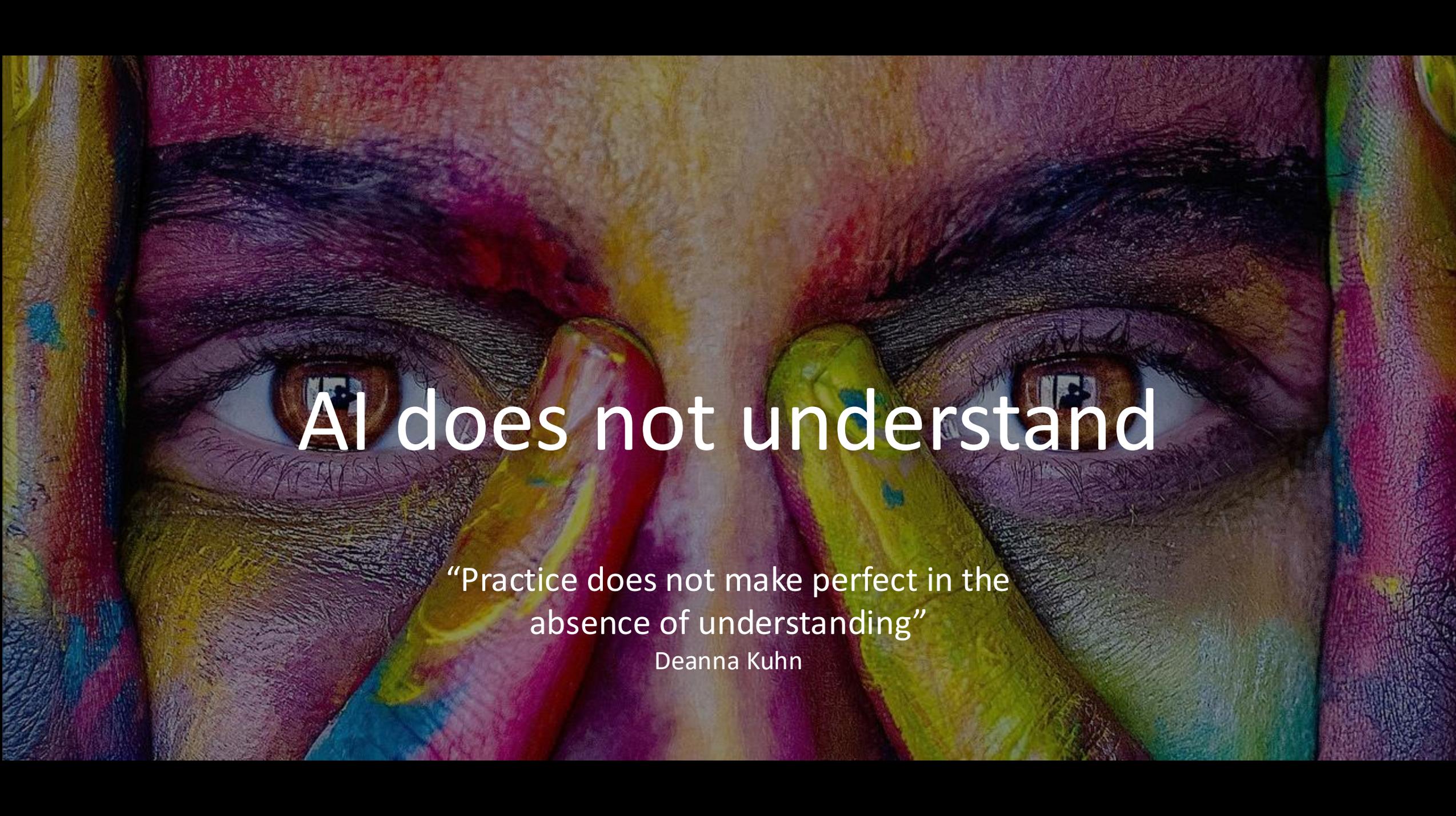
AI is not curious



AI does not care



AI is not a co-inquirer



AI does not understand

“Practice does not make perfect in the
absence of understanding”

Deanna Kuhn

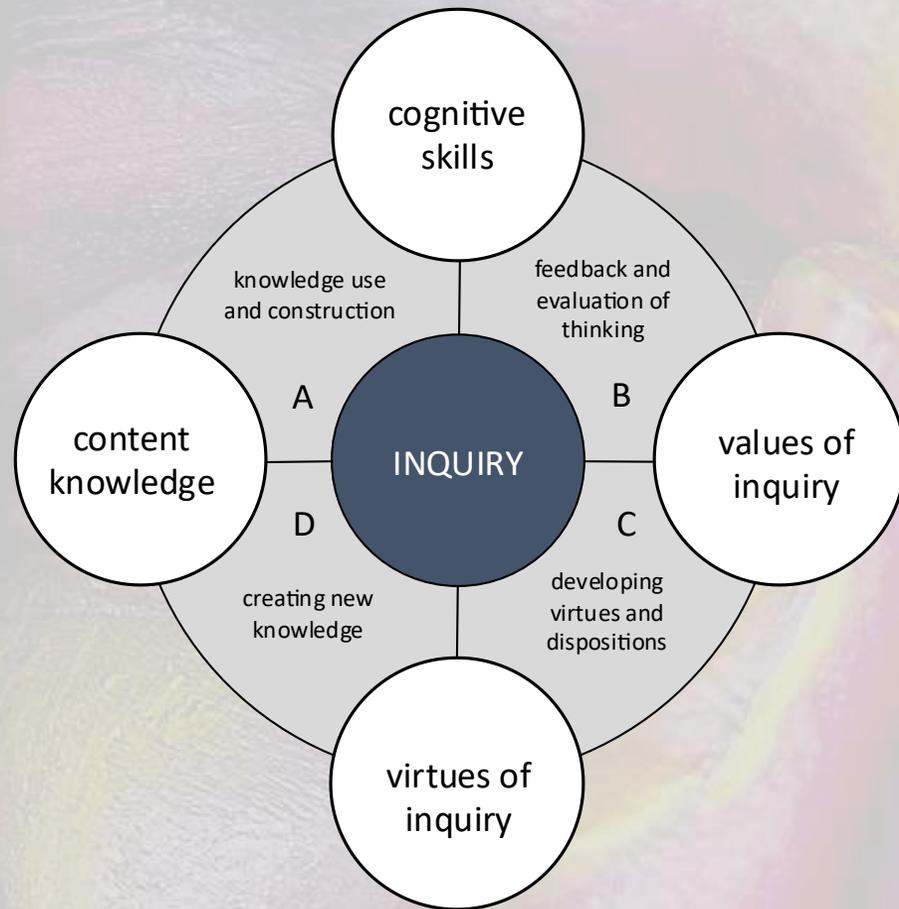
Action with
understanding

expertise

Action without
understanding

trial & error/mimicry

Pedagogical expertise in Teaching for Thinking



Peter Ellerton, UQ Critical Thinking Project

UQ Critical Thinking Project Think Schools Network (UQ TSN)

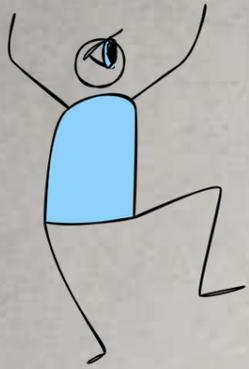
- Over 400 Schools, Universities and other institutions
- Pacific Partnership: ULCA and Pepperdine universities, California; Simon Fraser University, British Columbia
- Over 5000 Educators
- Australia, Singapore, South Africa, Belgium, USA, Canada
- Strong research output

Teaching for Thinking

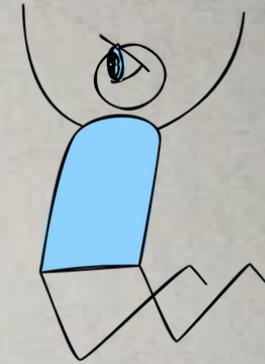


False
dichotomy

Teaching for Thinking



Explicit focus on
content knowledge



Explicit focus on
student thinking



Teaching for Thinking

The idea that deep and lasting learning is a product of thinking provides a powerful case for the teaching of thinking. Indeed, we venture that the true promise of the teaching of thinking will not be realized until learning to think and thinking to learn merge seamlessly (2005, p.795).

Ritchart & Perkins

Thinking is the method of
intelligent learning

John Dewey



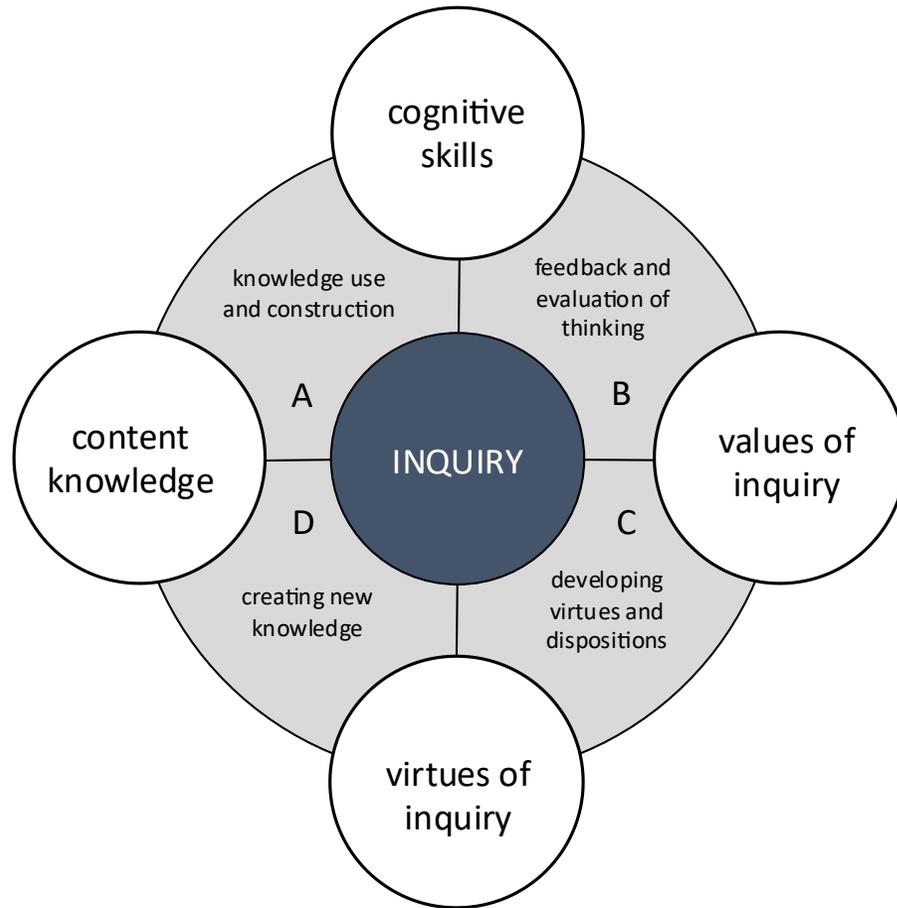
Connecting thinking and learning



The thinking classroom

1. How do you know students are *thinking* in your classroom? What *kinds* of thinking do they do?
2. How do you *plan* for thinking to occur?
3. How do you give students *feedback* on the *quality* of their thinking?

Pedagogical expertise in Teaching for Thinking



Content Knowledge: discipline area, year level, curriculum based

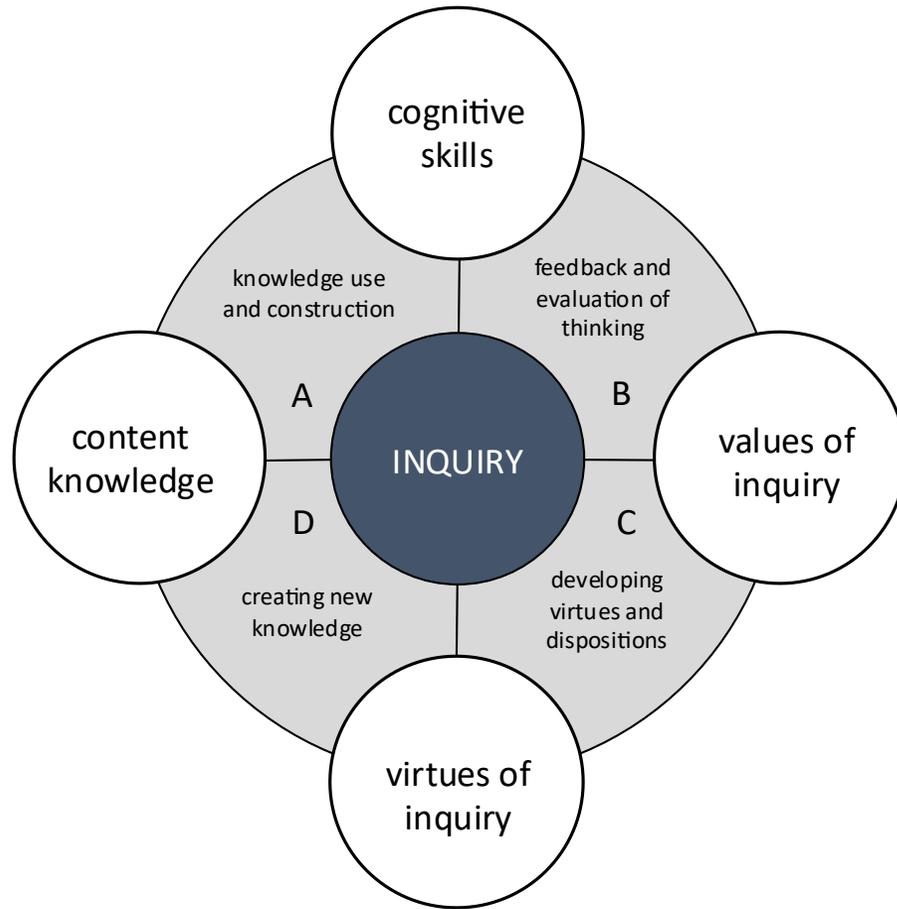
Cognitive skills: things we do with knowledge (analyse, justify, evaluate, explain, etc.)

Values of inquiry: things we value in good inquiry/thinking (clarity, accuracy, precision, relevance, significance, breadth, depth, coherence, etc.)

Virtues of inquiry: things we value in effective inquirers/knowledge makers (resilience, open-minded, curious, persistent, humility, etc.)

Inquiry: the opportunity to use and develop cognitive skills and inquiry values and virtues

Pedagogical expertise in Teaching for Thinking

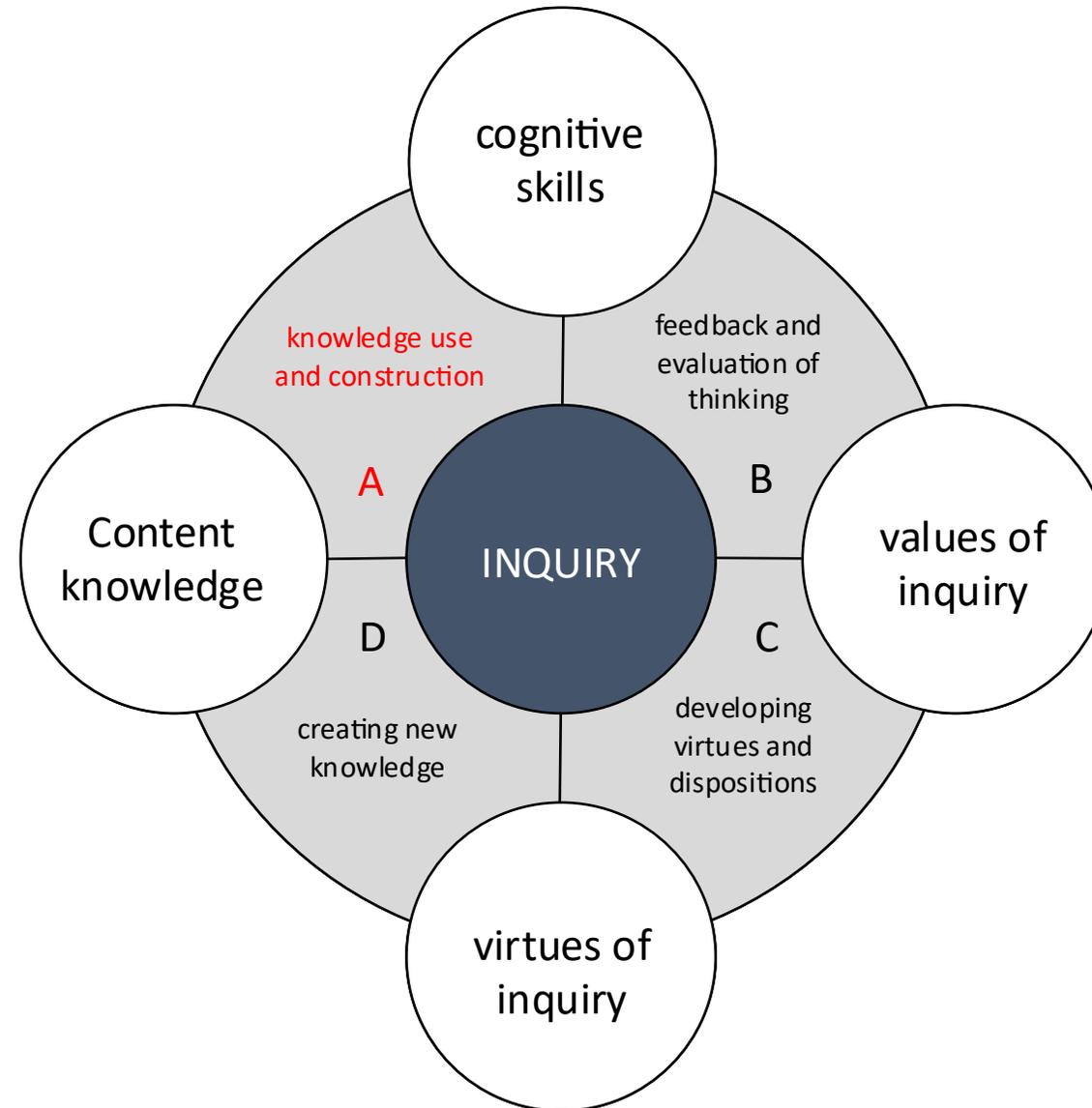


Other key areas of focus

- Collaboration
- Assessing for thinking (TIG grant)
- Effective thinking and writing (WRIT1999)
- Questioning and curiosity
- Developing inquiry virtues

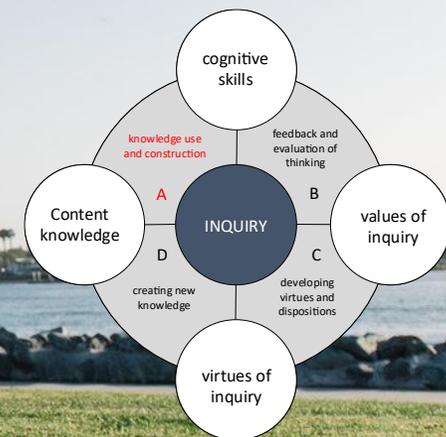
Cognitions

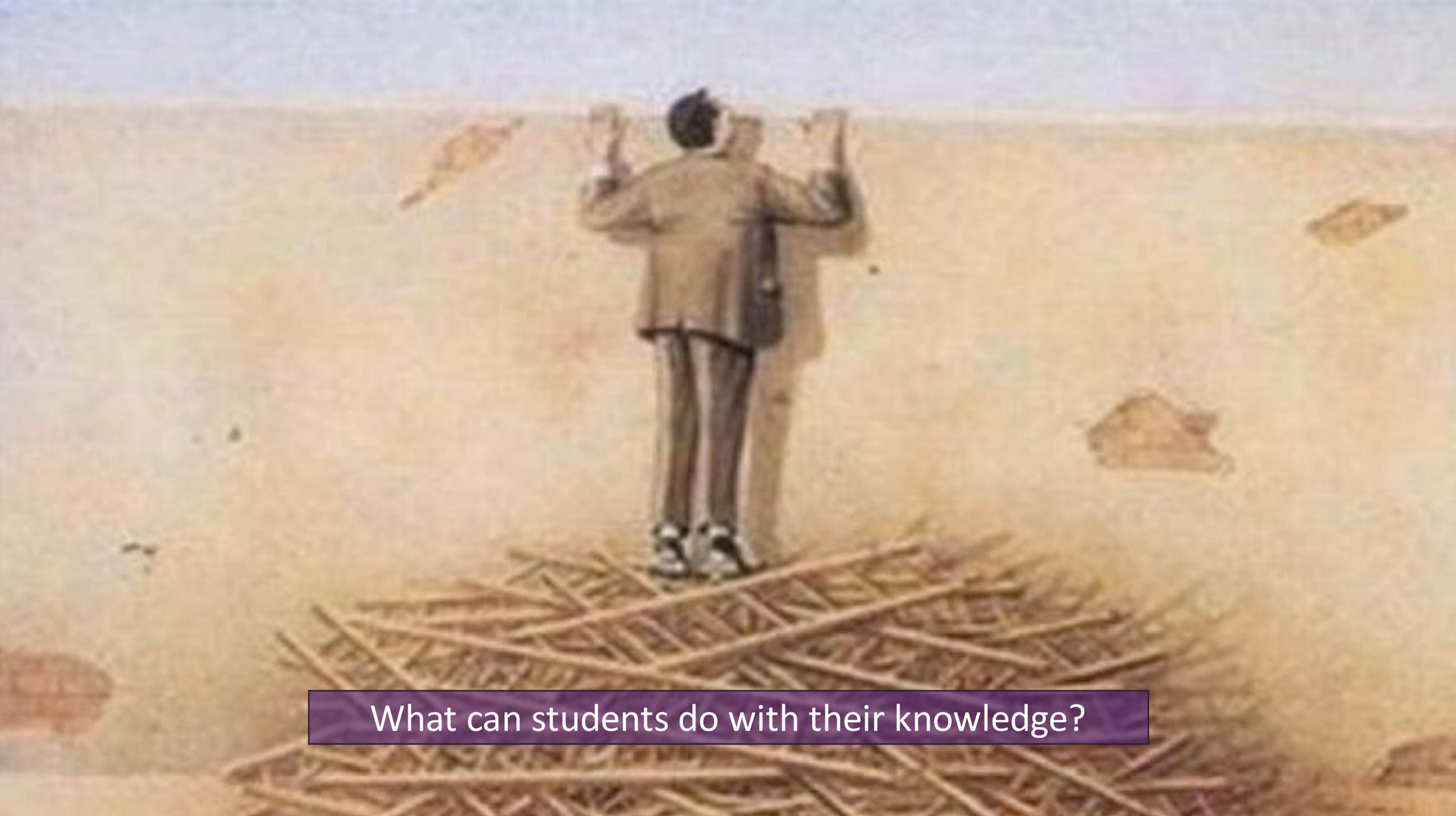
Pedagogical expertise in Teaching for Thinking



ZONE A: KNOWLEDGE USE AND CONSTRUCTION

thinking
is
action





What can students do with their knowledge?

What are cognitive skills?



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Cognitive skills are
used to develop,
manipulate and create
knowledge



What are cognitive skills?



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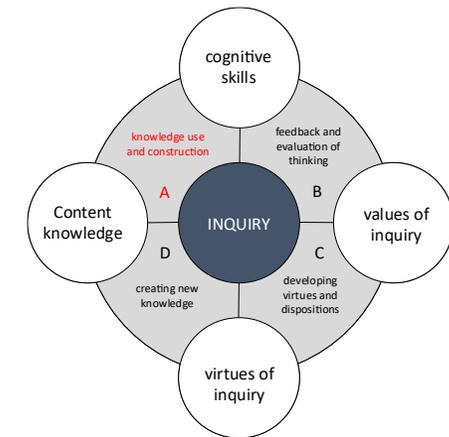
The power of developing cognitions is in understanding their interplay with content knowledge

ZONE A: KNOWLEDGE USE AND CONSTRUCTION

What do you expect students to *do* when they analyse?



ANALYSE
JUSTIFY
EVALUATE
EXPLAIN

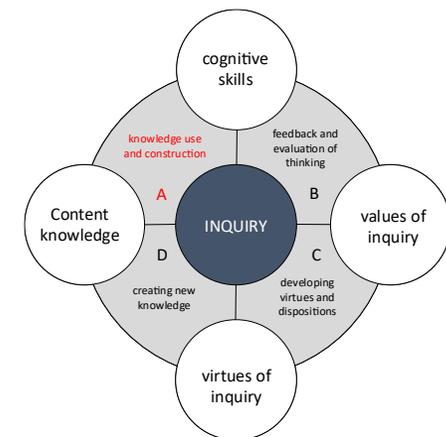


ZONE A: KNOWLEDGE USE AND CONSTRUCTION

What do you expect students to *do* when they justify?



ANALYSE
JUSTIFY
EVALUATE
EXPLAIN

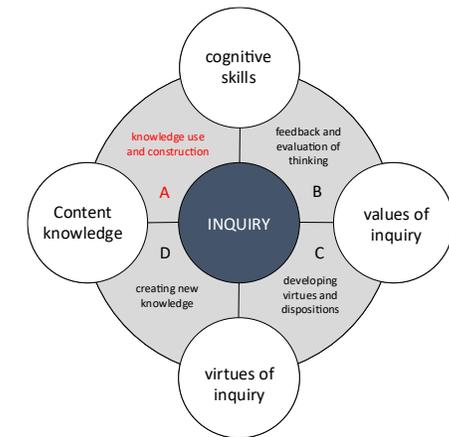


ZONE A: KNOWLEDGE USE AND CONSTRUCTION

What do you expect students to *do* when they evaluate?



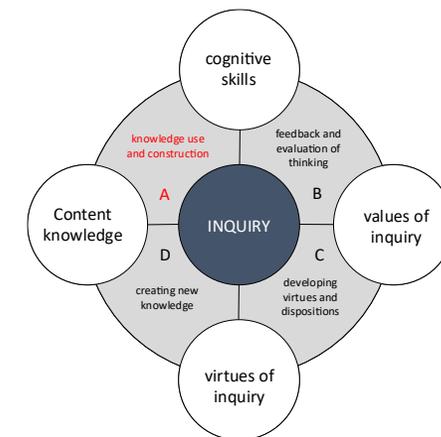
ANALYSE
JUSTIFY
EVALUATE
EXPLAIN



ZONE A: KNOWLEDGE USE AND CONSTRUCTION

What do you expect students to *do* when they explain?

ANALYSE
JUSTIFY
EVALUATE
EXPLAIN



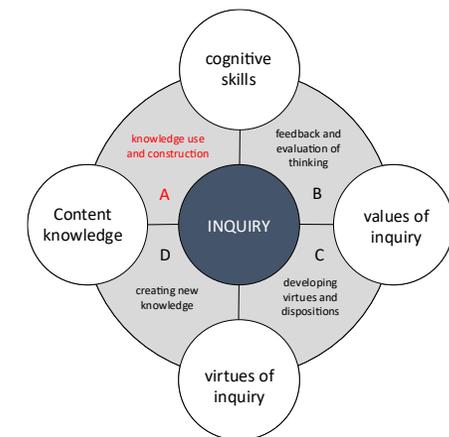
ZONE A: KNOWLEDGE USE AND CONSTRUCTION

~~What do you expect students to do when they explain?~~

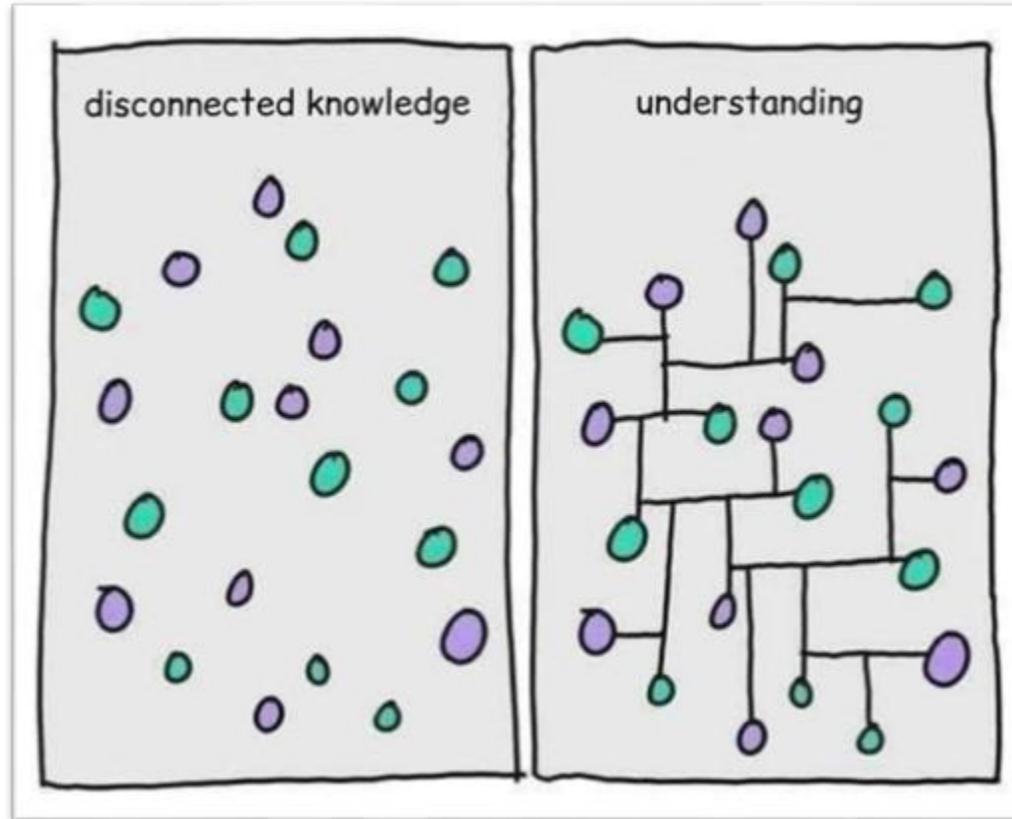
What is the difference between 'explain' and 'describe'?



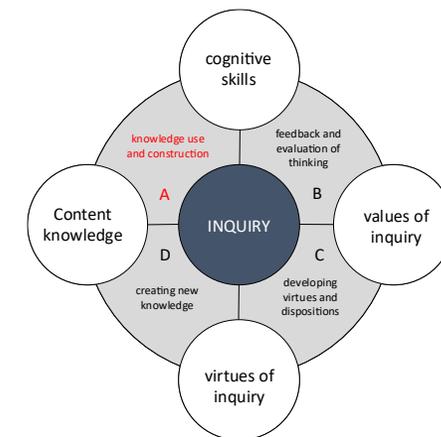
ANALYSE
JUSTIFY
EVALUATE
EXPLAIN



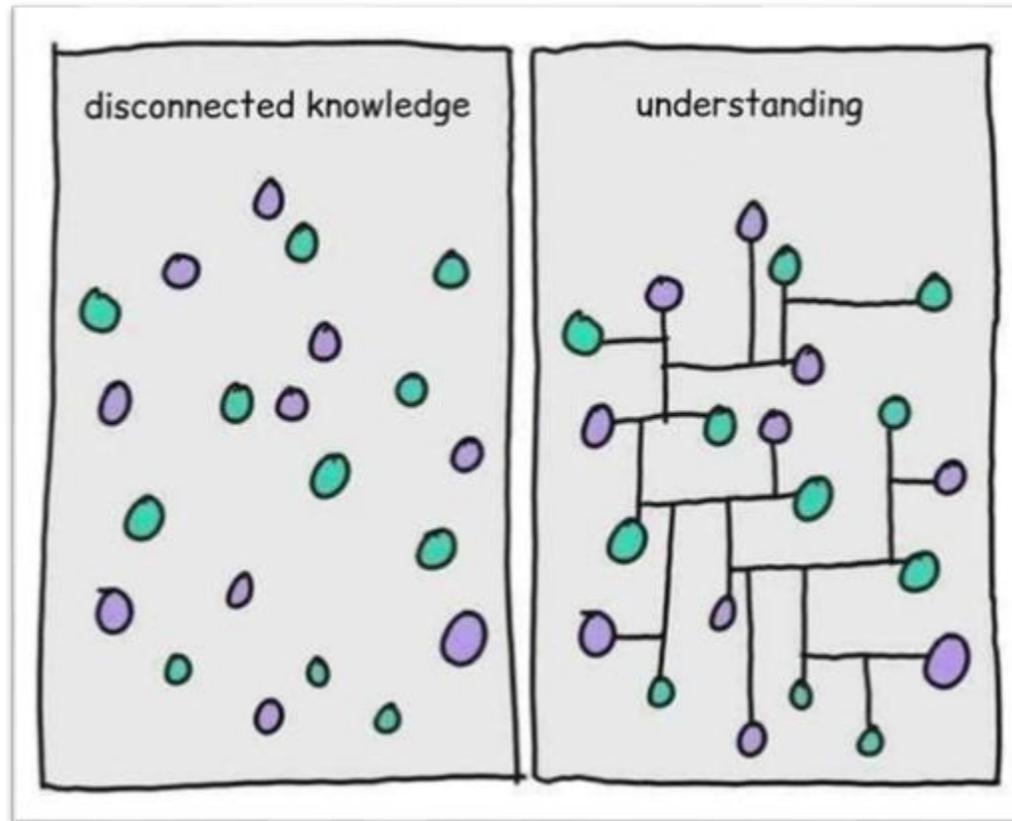
ZONE A: KNOWLEDGE USE AND CONSTRUCTION



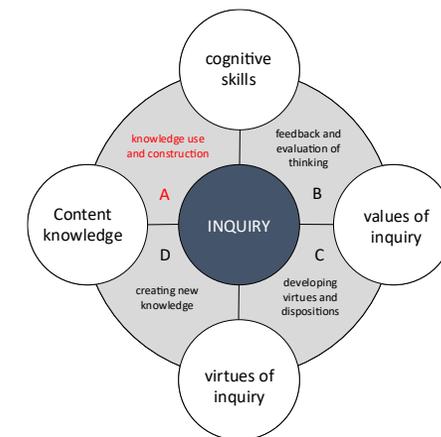
ANALYSE
JUSTIFY
EVALUATE
EXPLAIN



ZONE A: KNOWLEDGE USE AND CONSTRUCTION



ANALYSE
JUSTIFY
EVALUATE
EXPLAIN



ZONE A: KNOWLEDGE USE AND CONSTRUCTION

Things that are cognitive skills

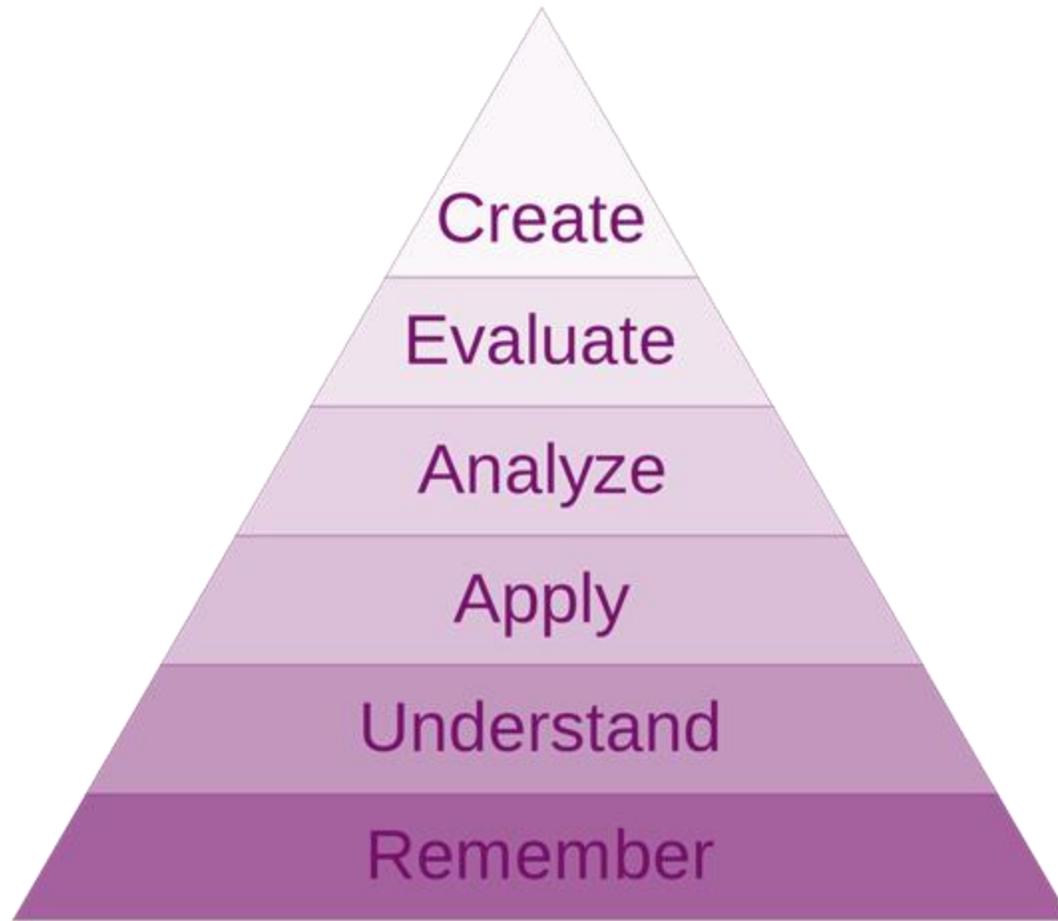
ANALYSE
JUSTIFY
EVALUATE
EXPLAIN

Things that are not cognitive skills

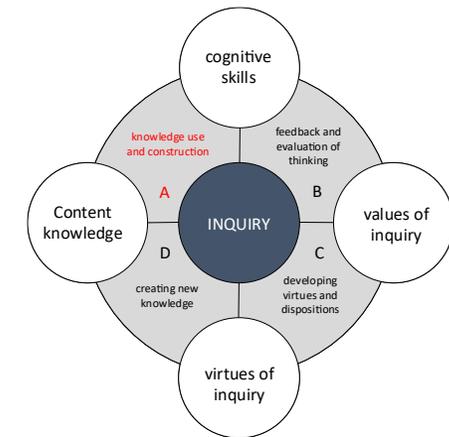
SNORING
UNDERSTANDING
BANANAS



ZONE A: KNOWLEDGE USE AND CONSTRUCTION

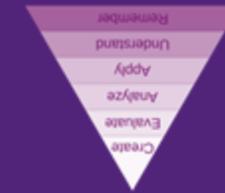


cognitive relationships

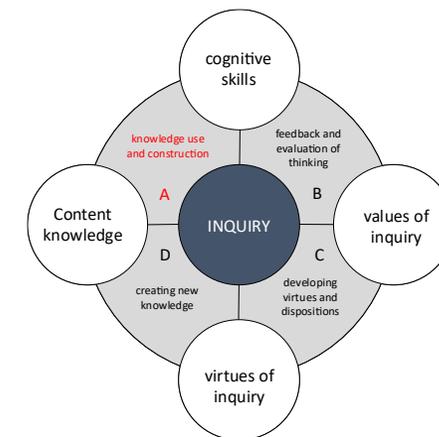


ZONE A: KNOWLEDGE USE AND CONSTRUCTION

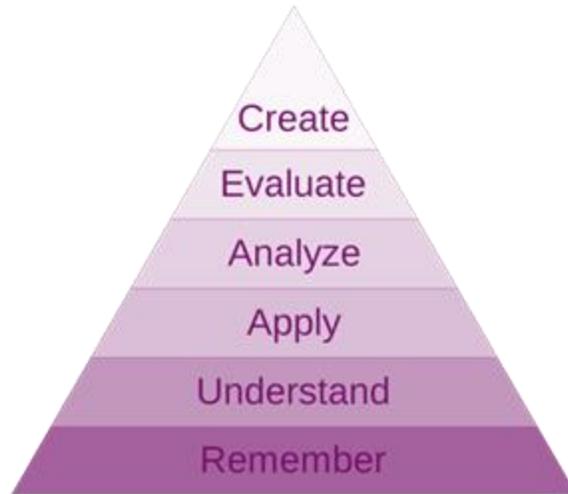
The problems with Bloom's Taxonomy were indirectly acknowledged by its authors. This is evidenced in their discussion of analysis: "It is probably more defensible educationally to consider analysis as an aid to fuller comprehension (a lower-class level) or as a prelude to an evaluation of the material" (p.144). The authors also acknowledged problems with the taxonomy's structure in their discussion of evaluation: "Although evaluation is placed last in the cognitive domain because it is regarded as requiring to some extent all the other categories of behavior, it is not necessarily the last step in thinking or problem solving. It is quite possible that the evaluation process will in some cases be the prelude to the acquisition of new knowledge, a new attempt at comprehension or application, or a new analysis and synthesis" (p.185). In summary, the hierarchical structure of Bloom's Taxonomy simply did not hold together well from logical or empirical perspectives. (Marzano, 2006, pp.8–9)



cognitive
relationships



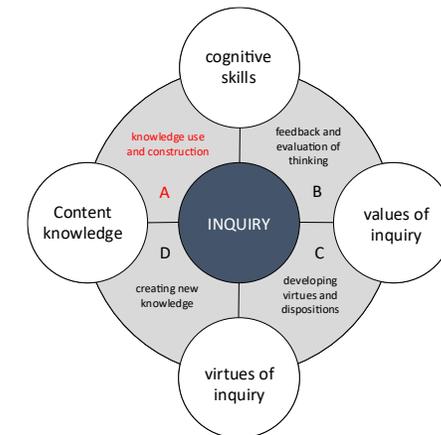
ZONE A: KNOWLEDGE USE AND CONSTRUCTION



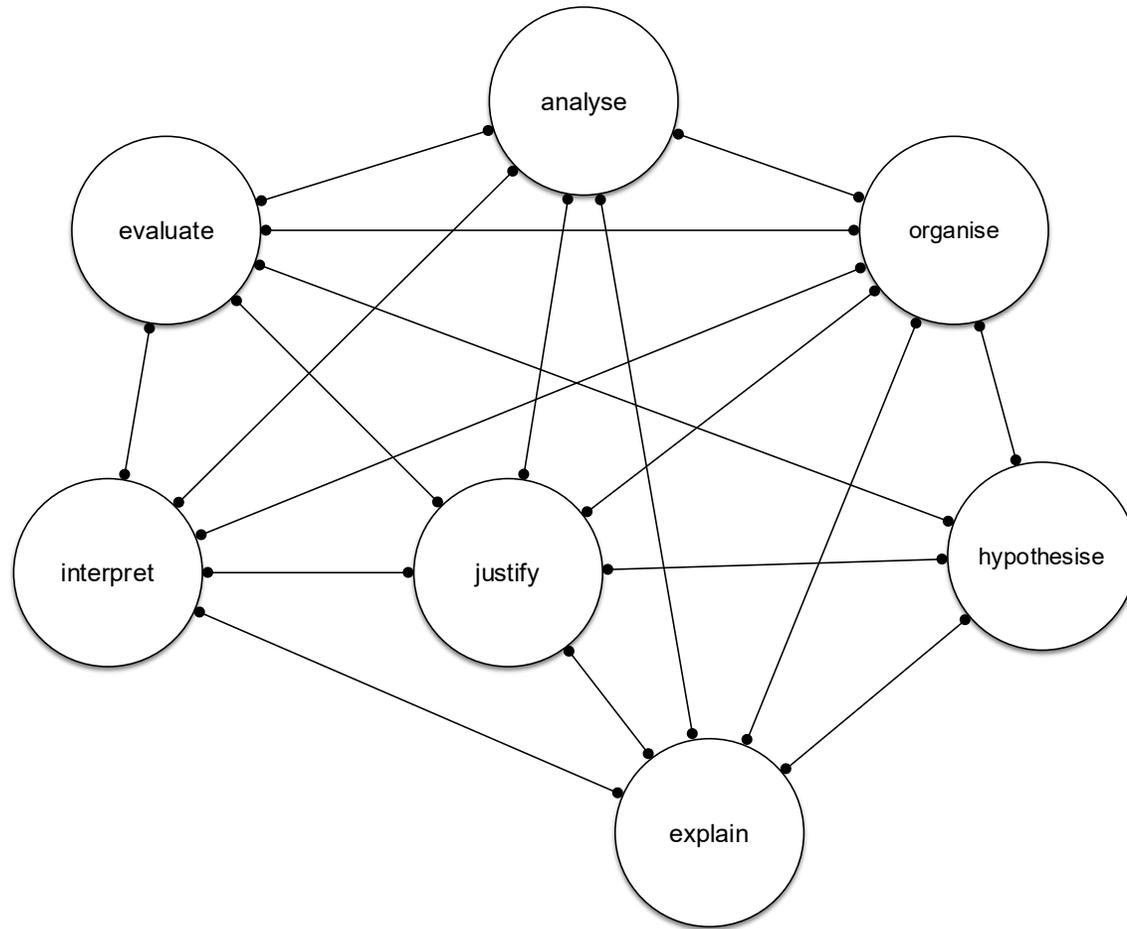
Two significant problems:

1. 'Higher-order' skills are constituted by 'lower-order' skills
2. Using 'higher-order' skills as discriminators between grade levels

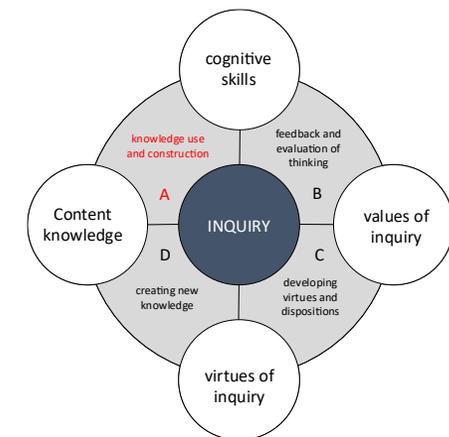
cognitive
relationships



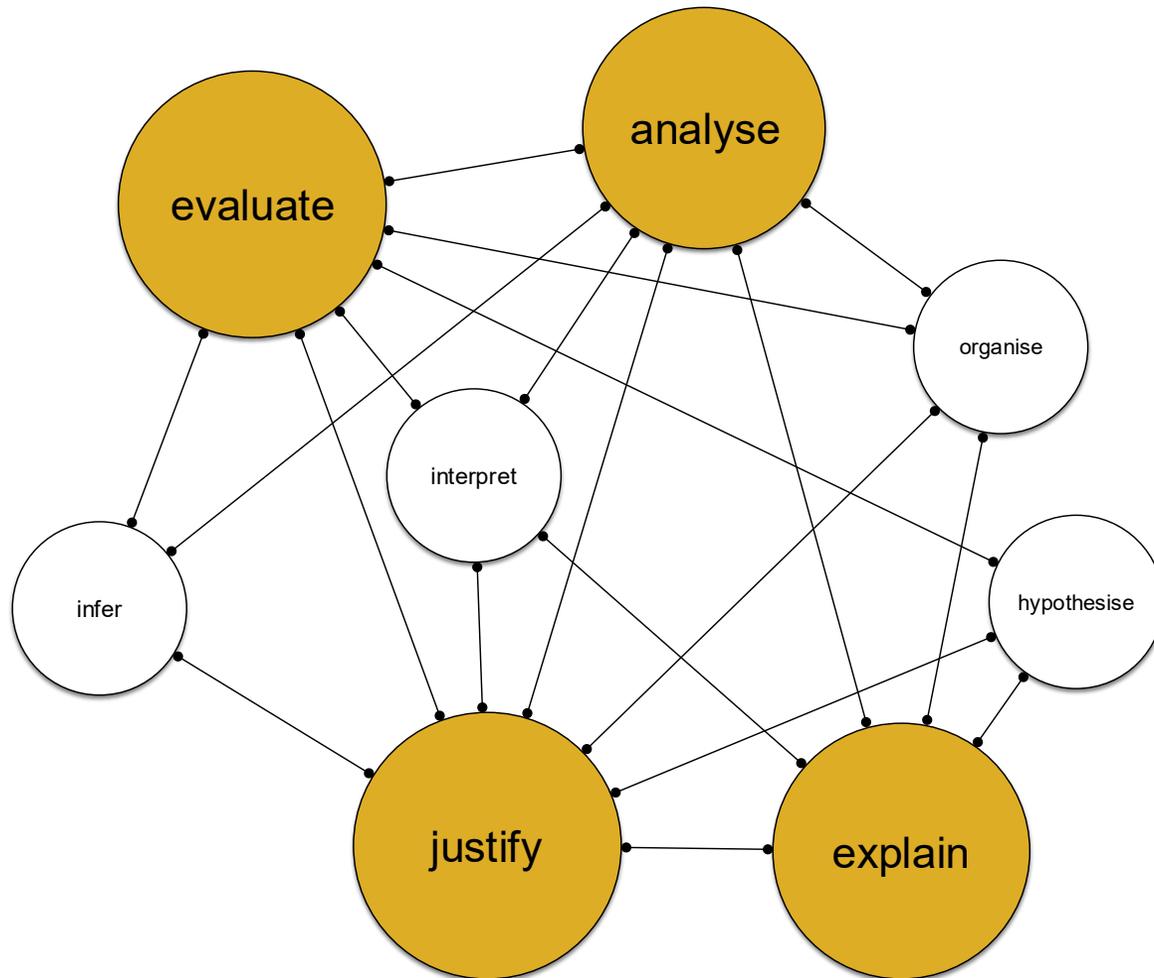
ZONE A: KNOWLEDGE USE AND CONSTRUCTION



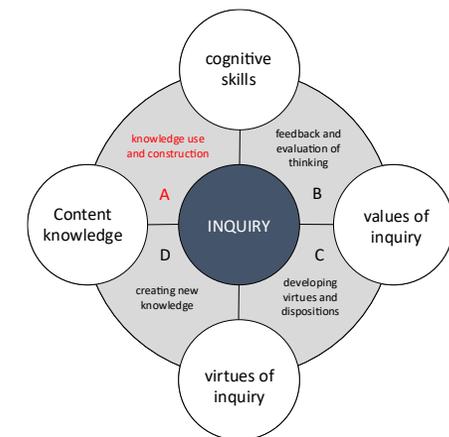
the
Cognitive
Web
model



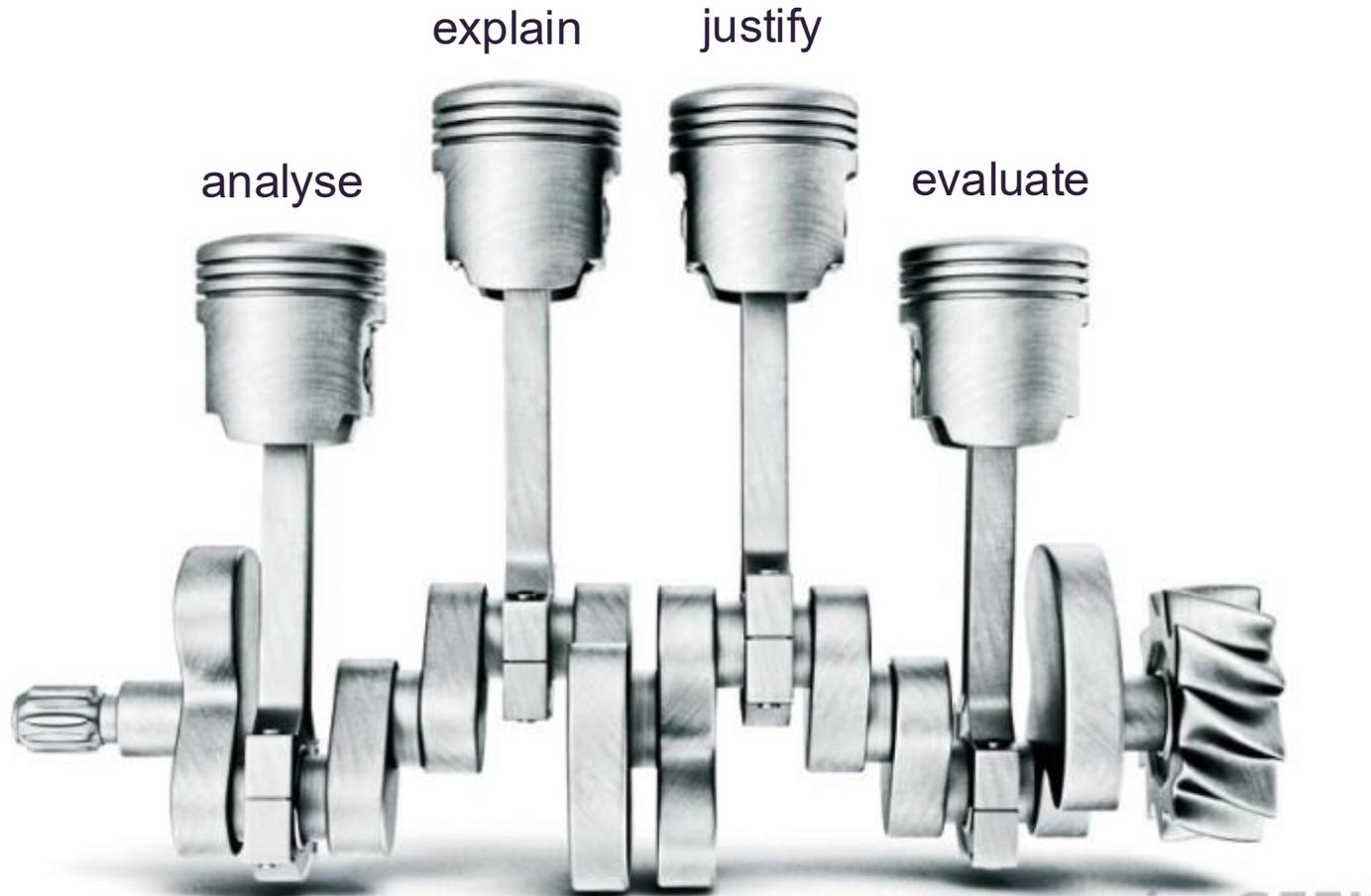
ZONE A: KNOWLEDGE USE AND CONSTRUCTION



the
Golden
Tetrad



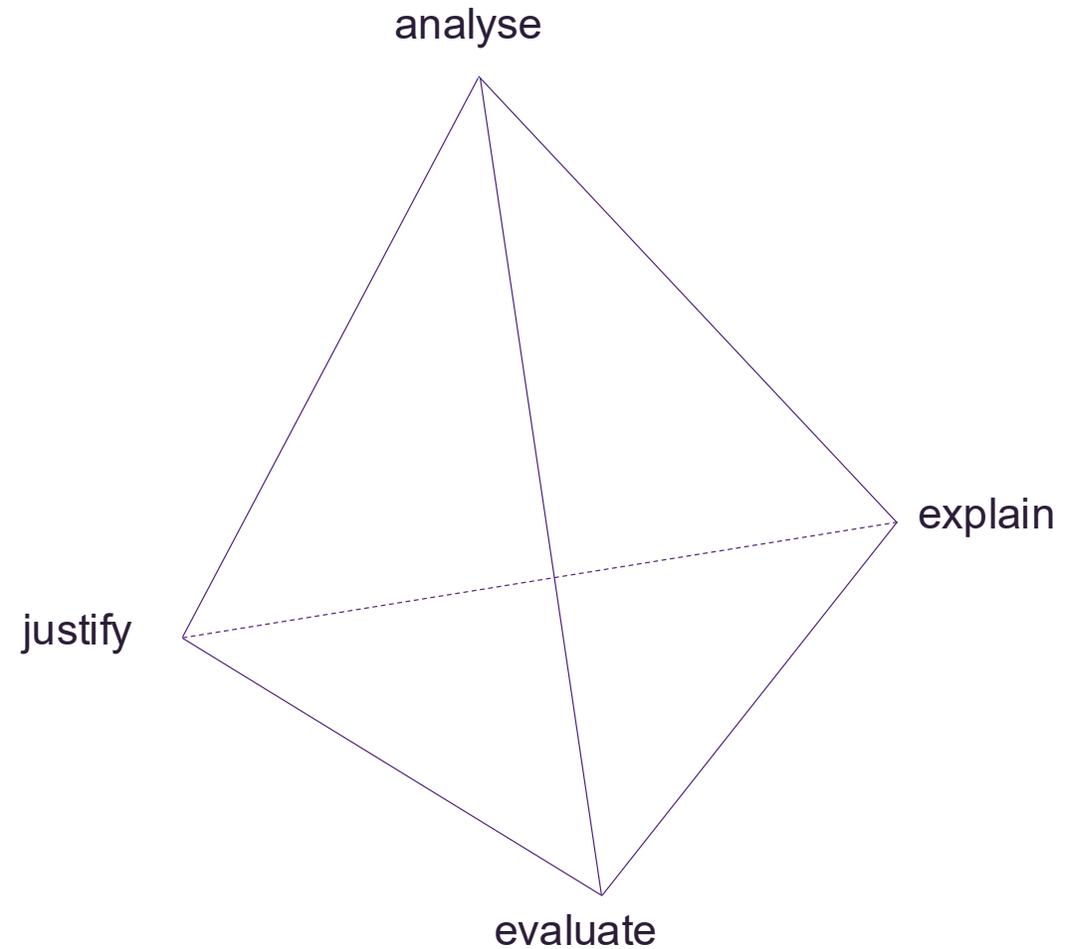
The GOLDEN TETRAD



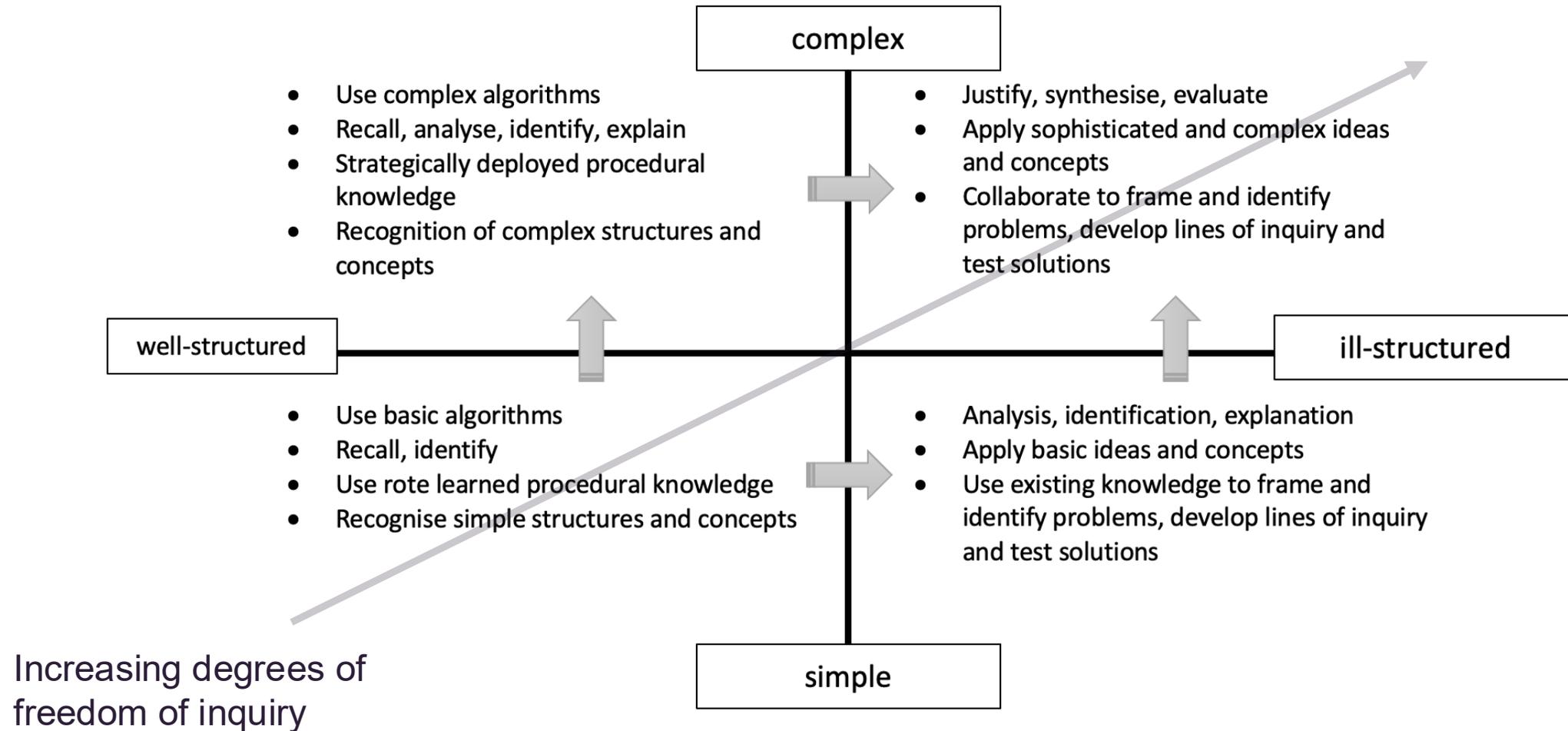
The engine of
cognition
in the
classroom

Some relationships between the cognitions:

- The extent of understanding and quality of **explanation** is a function of the depth and breadth of **analysis**.
- The strength of a **justification** is often a function of the quality of **analysis**.
- The persuasiveness of a **justification** is often a function of the quality of **explanation**.
- The criteria of **evaluation** are used to **justify** and **explain** decisions (and themselves require **justification**).

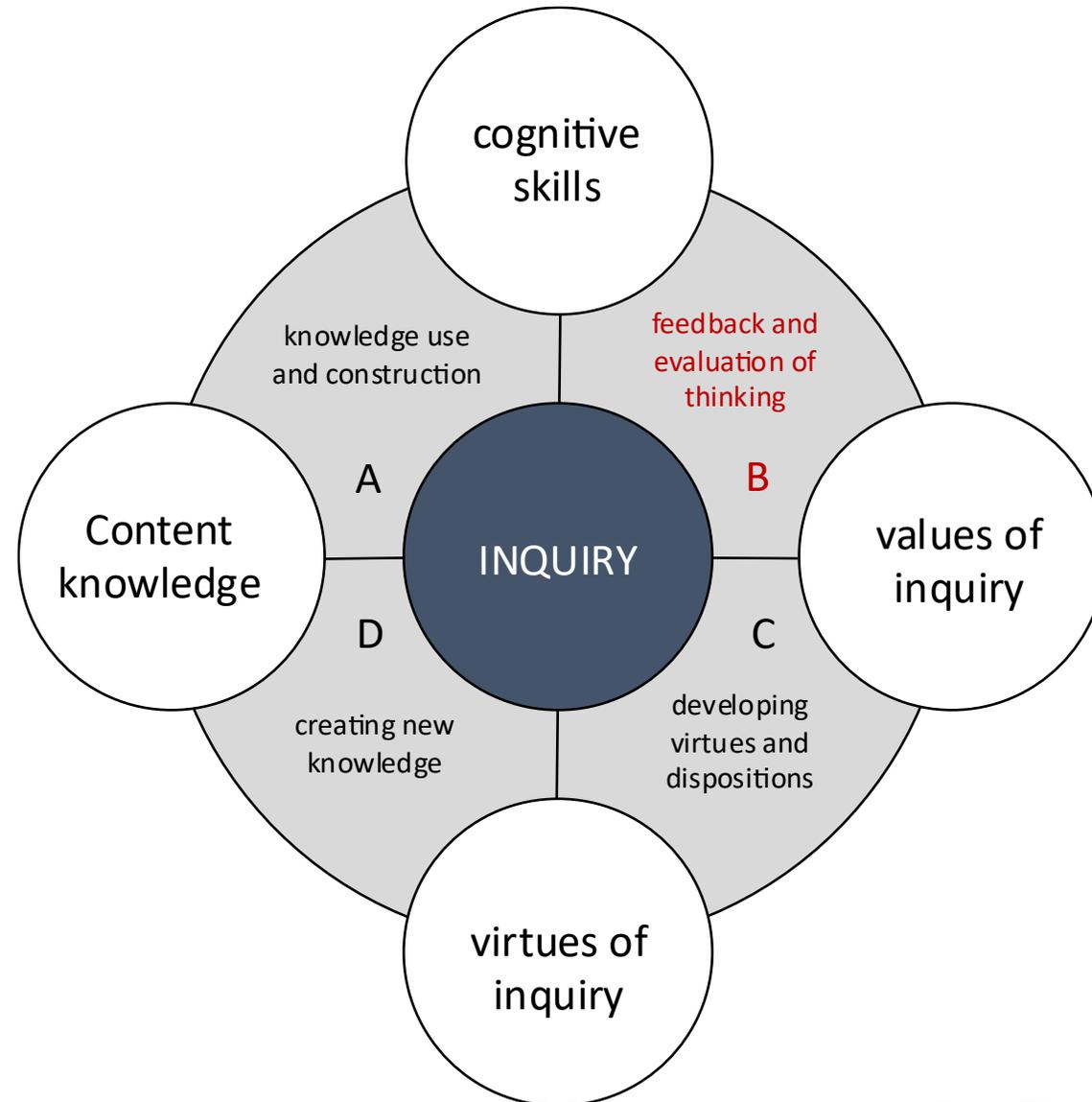


Problem types and cognitive requirements



Values of inquiry

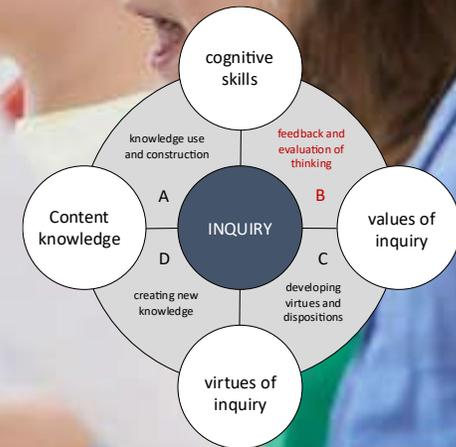
Pedagogical expertise in Teaching for Thinking



ZONE B: FEEDBACK AND EVALUATION OF THINKING



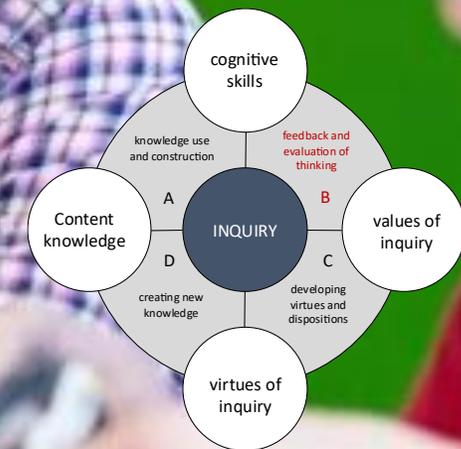
Improvement
demands
feedback



ZONE B: FEEDBACK AND EVALUATION OF THINKING



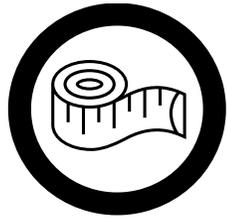
thinking is
inseparable
from
inquiry



ZONE B: FEEDBACK AND EVALUATION



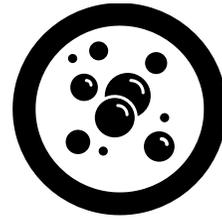
Clarity



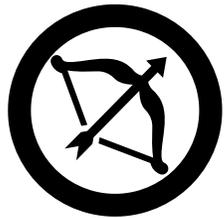
Precision



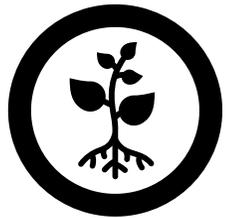
Breadth



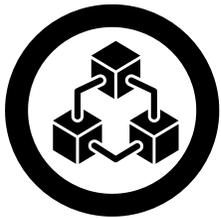
Significance



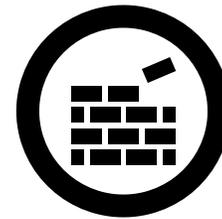
Accuracy



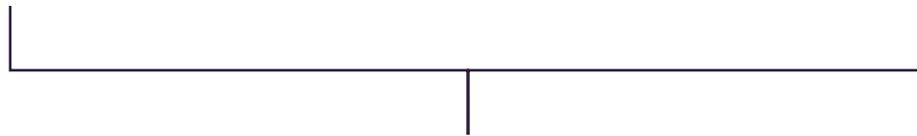
Depth



Relevance

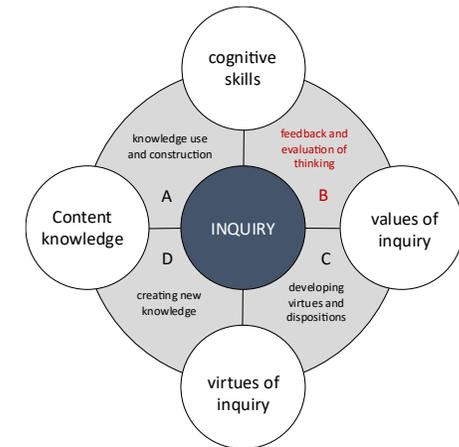


Coherence



feedback

The values of inquiry



ZONE B: FEEDBACK AND EVALUATION OF THINKING

The Values of Inquiry: explanations and supporting questions
The Four Elements, the University of Queensland
<https://www.inquiryproject.org.au/en>

"The values of inquiry represent things that we value in the act of inquiry and hence in thinking. They provide a language for providing feedback on the quality of student thinking and so help us to **evaluate** thinking."

Meaning	Questions	Associated terms
 Clarity When we communicate with clarity we mean that our audience can understand what we say. We are making our points as clear as possible.	<ul style="list-style-type: none"> • Are your strategies clear? • Is your argument easy to check? • Are your arguments easy to understand? • Is your language accurate and helpful? • Are your words well-chosen and meaningful? 	Inexpensive Motive Shared understanding
 Accuracy When we communicate with accuracy we seek to capture all information you seek and clearly signal what is argued or meant.	<ul style="list-style-type: none"> • Is your evidence used? • Are your claims justified? • Is what you say correct? • Have you explained your VALIDITY? • Have you sought feedback on your claim? 	Truth Misinformation Conviction
 Precision When we communicate with precision we are specific and unambiguous with our language and we make things as clear as possible and pertinent to the understanding or meaning.	<ul style="list-style-type: none"> • Is your strategy to level sufficient? • Have you used technical terms appropriately? • Have you explained a key information or value appropriately? • Are there points or aspects that are not clear? • Have you identified areas of agreement or conflict? 	Concise Feedback
 Depth When we communicate with depth we provide detailed information and evidence on the thought and/or our point.	<ul style="list-style-type: none"> • Are the complexities of the topic sufficiently described? • Are your strategies and justifications well justified? • Do you engage in useful processes that are substantive and relevant? • Have the problems, aspects of the issue been identified and dealt with? 	Scope Perspective Alternative Detail Thoroughness
 Breadth When we communicate with breadth we aim to cover a broad range of directly related concepts and considerations in relation to the topic. This helps us to ensure that we do not ignore any key components.	<ul style="list-style-type: none"> • Have you considered alternative perspectives? • Have you responded to a broad range of other solutions? • Why have you preferred one perspective over another? • Have you sought out others for the purpose of testing your ideas? 	Weightiness Focus Embody
 Relevance When we communicate with relevance we choose information that relates directly to the point we are developing. We do not incorporate any distracting or unclear information that may confuse our audience.	<ul style="list-style-type: none"> • Have you focused on the point at hand? • Have you selected information supporting the topic? • Is choosing an unrelated reference pertinent? • Have you been able to identify why information is relevant? • Have you justified why your selection of material is relevant? 	Importance Impact Discernment
 Significance When we communicate with significance we do so in the most appropriate information that is related to the principle. This allows us to focus on key ideas rather than focusing the audience with superfluous information.	<ul style="list-style-type: none"> • Have you avoided superficial issues or arguments? • Have you identified and developed your own ideas? • Have you identified the most meaningful aspects? • Have you focused on information exposed? 	Conviction Understanding Application
 Coherence When we communicate with coherence we structure our arguments in a way that makes logical sense. Each point builds towards the overall intended meaning of the piece.	<ul style="list-style-type: none"> • Have you avoided using logical fallacies? • Have you provided convincing arguments? • Are your ideas developed in logical order? • Do all your previous points support your conclusion? • Have you used transition phrases to identify logical progression? 	Logic Coherence Integration Argument Justification Persuasion

Values of inquiry adapted from *Intellectual Standards of Skills 1*, and *Skills 2019* Skills 1, 200 (2019), London, UK: UKIPD.

ZONE B: FEEDBACK AND EVALUATION OF THINKING

Meaning	Questions	Associated terms
 <p>Clarity</p> <p>When we communicate with clarity, we ensure that our audience can understand what we mean. We are making our points as clear as possible to others.</p>	<ul style="list-style-type: none">• Are your examples useful?• Is your argument structure clear?• Are your diagrams easy to understand?• Is your paragraph structure well-developed?• Are your words well-defined and unambiguous?	Interpretation Meaning Shared understanding
 <p>Accuracy</p> <p>When we communicate with accuracy, we seek to represent all information correctly and closely aligned with its original meaning.</p>	<ul style="list-style-type: none">• Is your argument sound?• Are your claims justified?• Is what you are saying true?• Have you represented ideas faithfully?• How could people check on your claim?	Truth Measurement Correctness
 <p>Precision</p> <p>When we communicate with precision we are specific and intentional with our language and terminology in order to remove any potential for misunderstanding in meaning.</p>	<ul style="list-style-type: none">• Is your attention to detail sufficient?• Have you used technical terms appropriately?• Have you quantified your information where appropriate?• Are bullet points categorically distinct from each other?• Have you identified areas of vagueness or ambiguity ?	Exactitude Care

ZONE B: FEEDBACK AND EVALUATION OF THINKING



Depth

When we communicate with depth we provide detailed information and explanations to thoroughly develop our points.

- Are the complexities of the issue sufficiently described?
- Are your analogies and generalisations well-justified?
- Do your arguments consider premises that are themselves conclusions?
- Have the problematic aspects of the issue been identified and dealt with?

Scope
Perspectives
Alternatives
Detail



Breadth

When we communicate with breadth we aim to cover a diverse range of directly relevant content and considerations in relation to the topic. This helps us to ensure that we do not ignore any key components.

- Have you considered alternative perspectives?
- Have you represented a broad range of alternative views?
- Why have you preferred one perspective over another?
- Have you sought out others for the purpose of testing your ideas?

Thoroughness
Thoughtfulness
Focus
Empathy

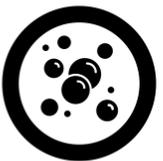


Relevance

When we communicate with relevance we choose information that relates directly to the points we are developing. We do not incorporate any distracting or useless information that may confuse our audience.

- Have you focussed on the point at issue?
- Have you selected information supporting the topic?
- Is distracting or unhelpful information minimised?
- Have you been able to identify why information is relevant?
- Have you justified why your selection of material is relevant?

Importance
Impact
Discernment



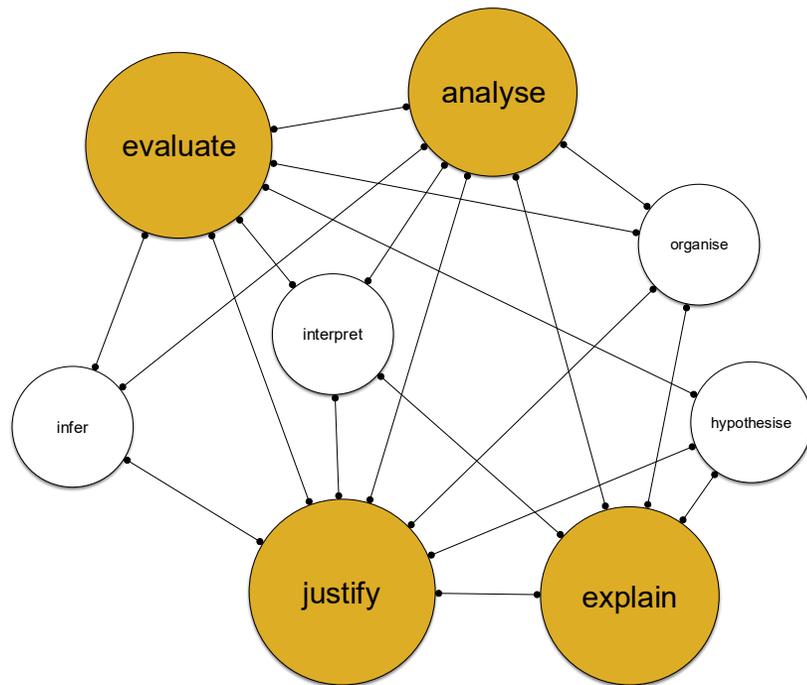
Significance

When we communicate with significance we discuss the most important information that is related to the given topic. This allows us to focus on key ideas rather than distracting the audience with tangential information.

- Have you avoided superficial issues or arguments?
- Have you identified and developed your core ideas?
- Have you identified the most meaningful aspects?
- Have you focused on substantive aspects?

Connections
Understanding
Application

The values are most effective when used as feedback on cognition



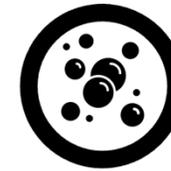
Clarity



Precision



Breadth



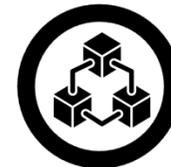
Significance



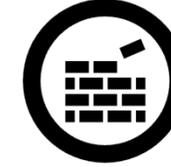
Accuracy



Depth



Relevance



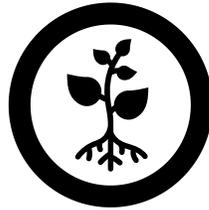
Coherence



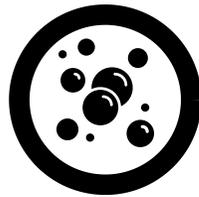
What do we *do*
when we
analyse?



Breadth

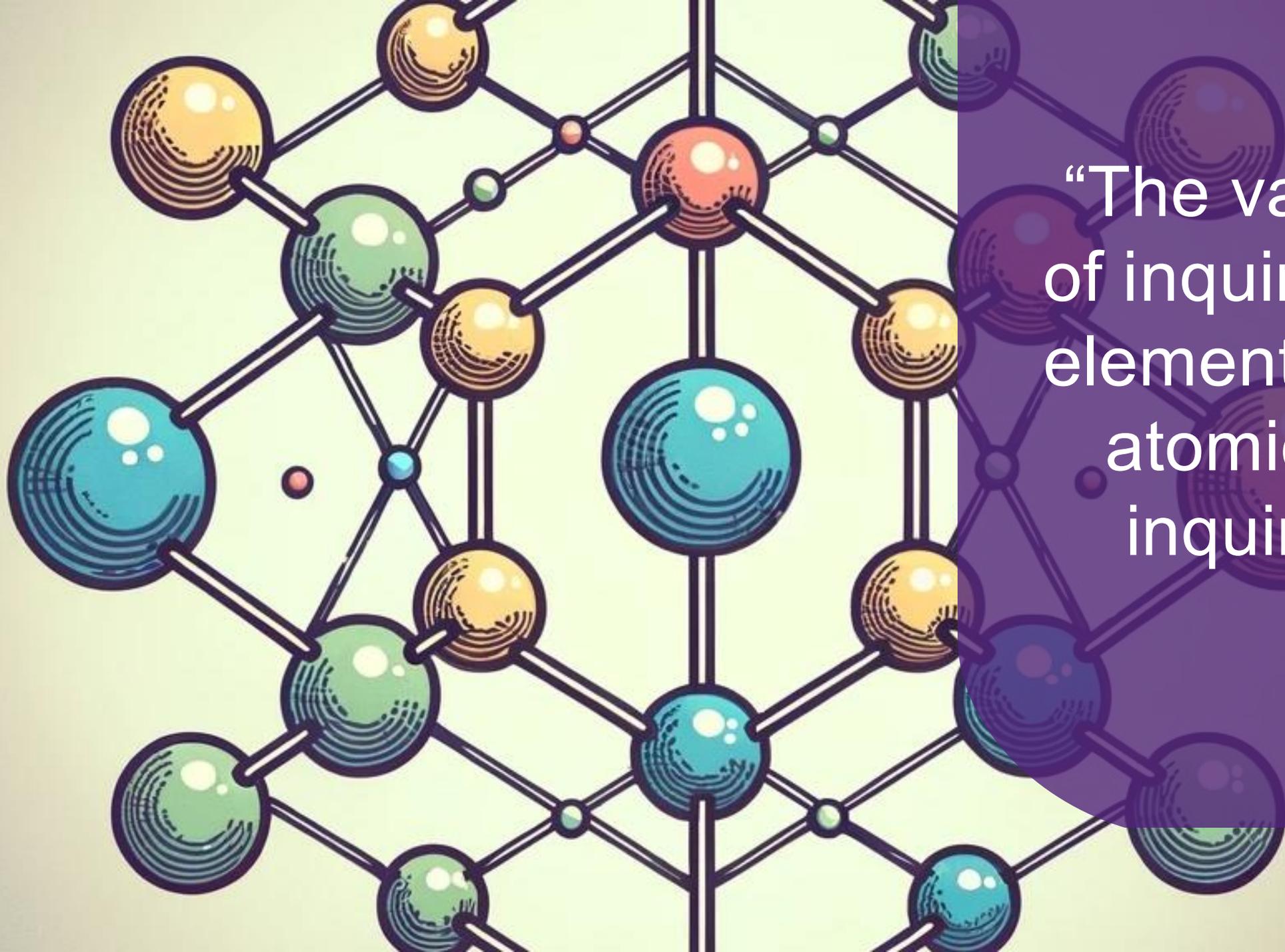


Depth



Significance



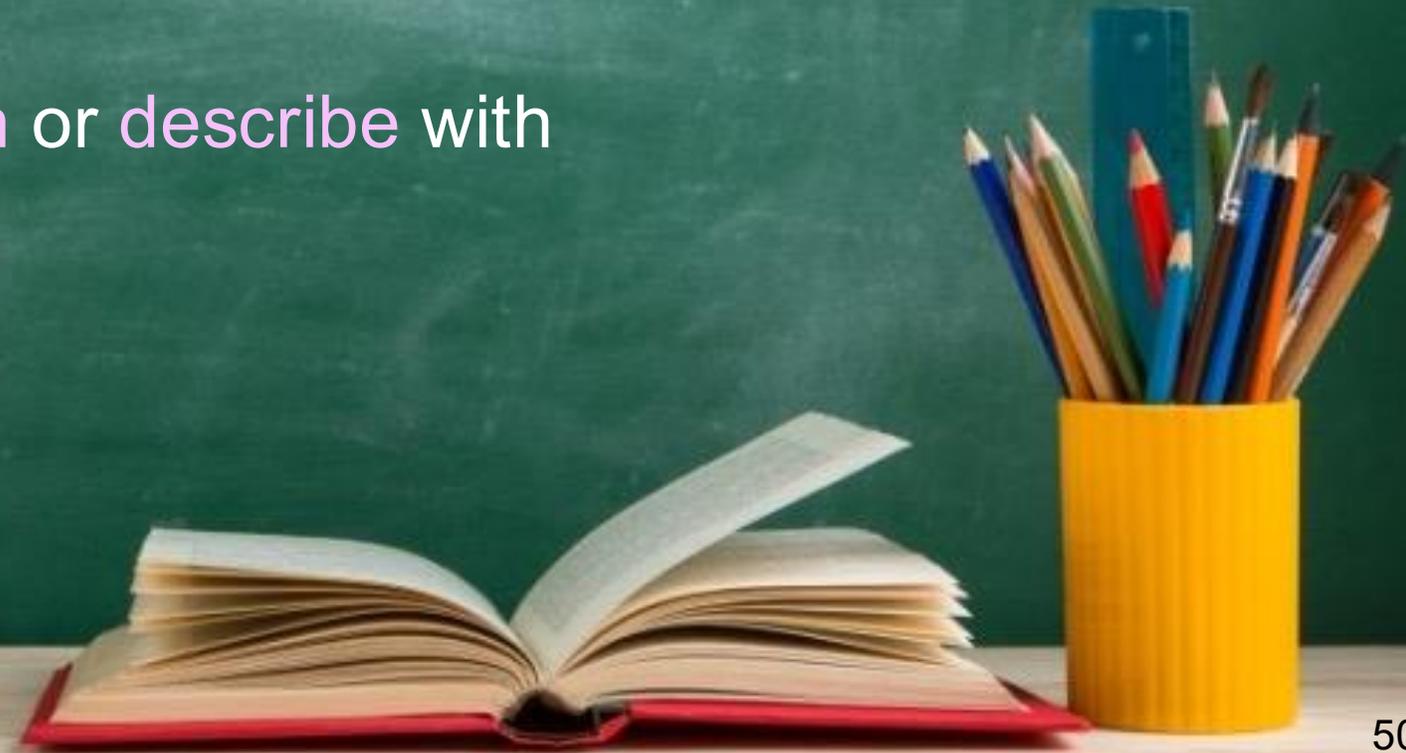


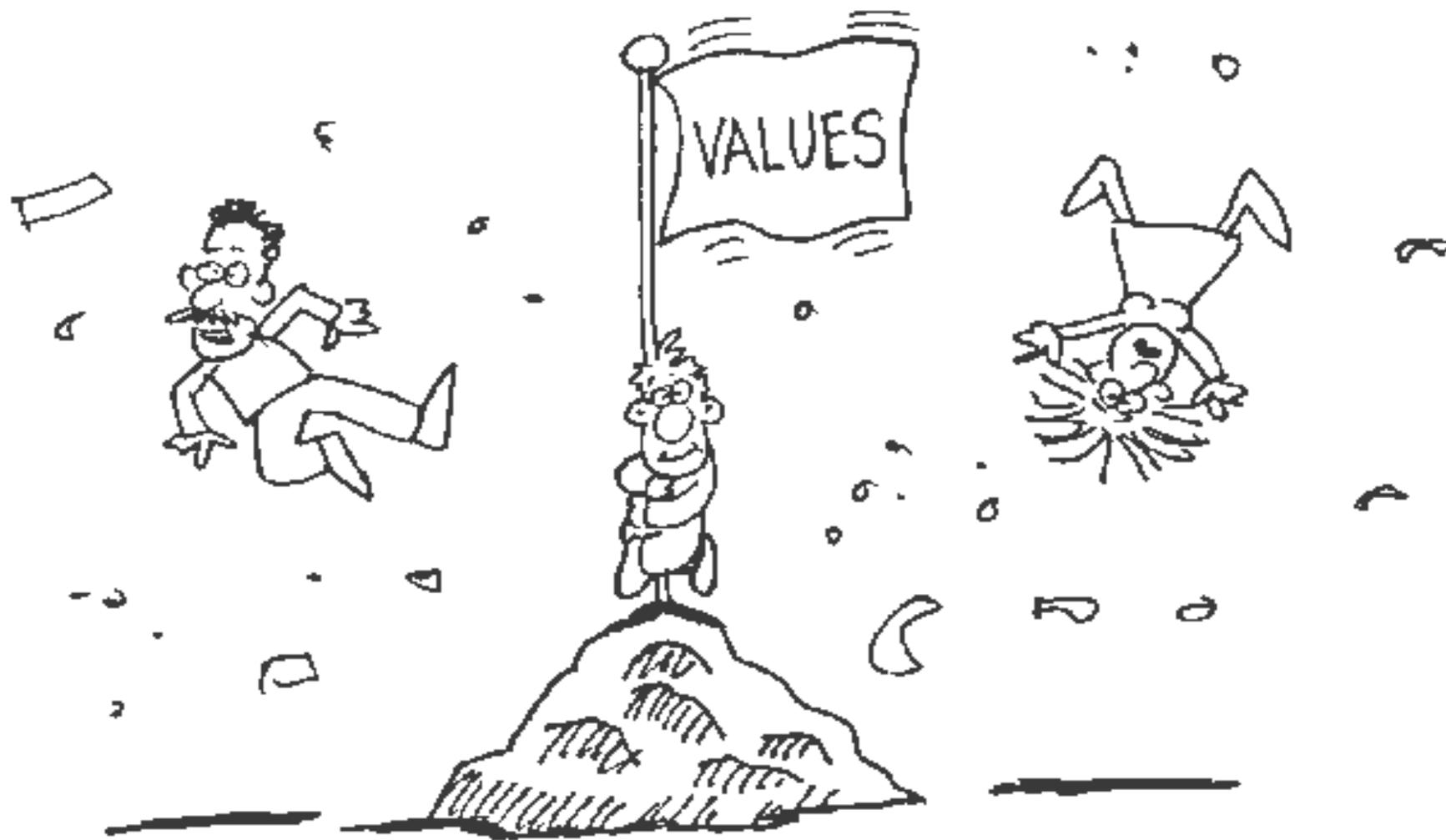
“The values of inquiry are elemental, or atomic to inquiry.”

Discerning: Identify and explain *relevant* and *significant* aspects

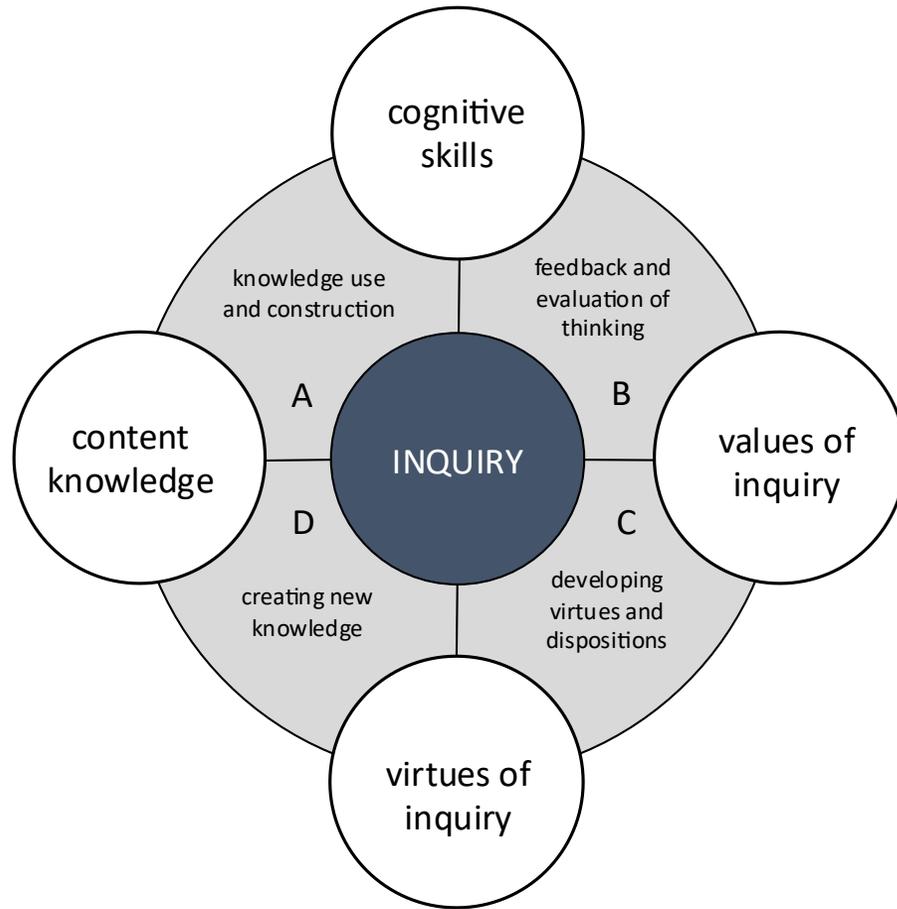
Astute: *Accurately* assess situations or people

Detailed/Thorough: Explain or describe with *breadth* and *depth*





Pedagogical expertise in Teaching for Thinking



Other key areas of focus

- Collaboration
- Assessing for thinking (TIG grant)
- Effective thinking and writing (WRIT1999)
- Questioning and curiosity
- Developing inquiry virtues