THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

UQ CRITICAL THINKING PROJECT

developing teacher expertise

—Professional Development Prospectus—

The award winning UQCTP has established itself as a leader in developing expertise in teaching for thinking, having worked with thousands of educators and hundreds of educational institutions throughout Australia and internationally.

The UQCTP works to theorise and put into practice explicit and transferable schematic understanding of teaching expertise, focussing not so much on what excellent teachers do, but on what they think while they are doing it. Our collaborative networks exist to foster each teacher's individual learning, focusing on a deep understanding of pedagogical principles to inform practice, and in which clear criteria for success allow for feedback to improve understanding.

The program developed by the UQCTP is not one for 'implementation', but of collaborative learning through individual practice. There is no manual or resource book. There is, however, a focus on processes and systemic change that creates an immediate shift towards expertise development in teaching for thinking.

Teaching experience within the UQCTP

While there is a strong academic focus within the UQCTP, there is also a wealth of teaching experience that informs theory and practice. In terms of practical experience, members of the UQCTP have been or are:

- State Review Panel Chairs or members in the Queensland Curriculum and Assessment Authority (QCAA)
- Lead writers or team members in the current QCAA syllabus redevelopment
- Curriculum consultants for the International Baccalaureate Organisation
- Writers for the Queensland Core Skills Test (QCS)
- Chief examiners for QCAA Senior External Examinations
- Heads of Department and teachers in private and public schools throughout Queensland

The UQCTP has also delivered professional learning to all lead writers of the 2019 Queensland syllabuses, and continues to work closely with a large number of schools and teachers in preparation for the implementation of this new suite of syllabuses.

UQCTP research

Apart from significant teaching and curriculum design experience, UQCTP team members are at the forefront of research in fields including Critical Thinking, 21stst Century Skills, Metacognition, Philosophy for Children (P4C), STEM and Critical Thinking, Inquiry Learning, Critical Thinking in Adolescence, Virtues and Values of Effective Thinkers, Effective Thinking and Writing, Argument Mapping, and Argumentation and Critical Thinking in Science.

UQCTP staff have also been instrumental in developing framing documents on the role of critical thinking in education (see, for example, the National Initiatives & Performance Directorate, NSW Department of Education, occasional paper *On Critical Thinking and Collaborative Inquiry*).

UQCTP Education partners

The UQCTP has worked closely with a range of institutions to shape and share strategic goals. Our most significant partners are:

- Simon Fraser University, British Columbia, Canada
- Pepperdine University, Los Angeles, USA
- University of California Los Angeles (UCLA), Los Angeles, USA
- Department of Education, Queensland (Solid Pathways program*, IMPACT centre$^{\curlyvee}$)

* The Solid Pathways program targets over 600 high performing Indigenous students throughout Queensland to improve their academic capacity and chances of success at university. This program has been operating for 5 years with great success.

$^{\curlyvee}$ The IMPACT Centre has demonstrated significant relative gains in NAPLAN reading, writing and numeracy results through a teaching for thinking focus, outperforming target programs in numeracy and literacy.

Many other schools have worked individually with the UQCTP to develop teacher expertise throughout Queensland and overseas.

Teachers from many more schools in Brisbane and throughout Queensland have become part of the *Aspiring Thinkers* network through the Brisbane School of Distance Education IMPACT centre. This network has international reach and forms a basis for collaborative practice and sharing of expertise.

UQCTP professional development clients

The UQCTP has delivered professional development programs to educational and corporate bodies, including:

- Australian Defence Force
- Brisbane City Council
- Office of the Coordinator General
- Department of Child and Disability Services
- University of the Sunshine Coast
- University of Queensland academic staff across a variety of faculties
- Public and private schools throughout Australia and South Africa

Shaping expertise in context

Our partner schools and institutions do not adopt a uniform approach to the development of teacher expertise. Each has a context that is unique and hence requires local leadership. Part of the UQCTP project is to identify key people within schools to lead teaching for thinking based on a shared understanding of expertise in teaching for thinking, and to work with these people to ensure that as their expertise develops they can provide a mentoring role for others to the same end.

The UQCTP maintains that teaching for thinking is a pedagogical project, it is not a curriculum project. Thus, our focus is on teacher expertise and recognising that the most important resource a school has is its teachers.

Teachers do not require a deficit model of improvement. They have significant expertise and understanding. It is in the explicit articulation of this expertise, and integrating it with what we know that works in teaching, that we can construct mechanisms for sharing our expertise and for inducting new teachers into the profession.

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Teaching for thinking: a pedagogical schema

—the pedagogical content knowledge of inquiry—

Peter Ellerton, University of Queensland

Incorporating the key pedagogical issues of:

- Cognitive load theory
- Nature of expertise
- Social cognition
- Constructivism
- Metacognition
- Epistemology

Thinking is the method of intelligent learning.

John Dewey

Conceptual — Praxis — Practical

Cognitive Skills

(cognitive verbs)
Things we do with knowledge

evaluate
analyse
interpret
synthesise
identify
...

Content

- Organises work plans
- Provides structure in textbooks
- Wrongly associated with 'rigour'
- Informs assessment

F=ma
PEEL for paragraph structure
the Romans weren't all bad
Socrates taught Plato
y=mx+C
...

Inquiry

Inquiry is the process through which the cognitive skills are developed and in which feedback is provided

metacognition | Critical Thinking | evaluation

Values

- Applied discerningly
- At the core of professional practice
- Provide feedback on cognitive skills
- Have broad application across disciplines

clarity
precision
accuracy
coherence
relevance
cogency
...

Virtues

(habits/dispositions)

- Come from mastery of the values
- Are characteristic of effective thinkers
- Create knowledge producers

resilience
open-mindedness
integrity
curiosity
honesty
persistence
...

Practice does not make perfect in the absence of understanding.

Deanna Kuhn

Key principles need to be identified that guide practice and make expertise visible, translatable and teachable.

Pedagogical imperatives

(Principles of action)

Shift the focus from knowledge to inquiry

To allow opportunities to develop the cognitive skills

Work collaboratively when thinking can be shared

To allow the norms of critical thinking to be established

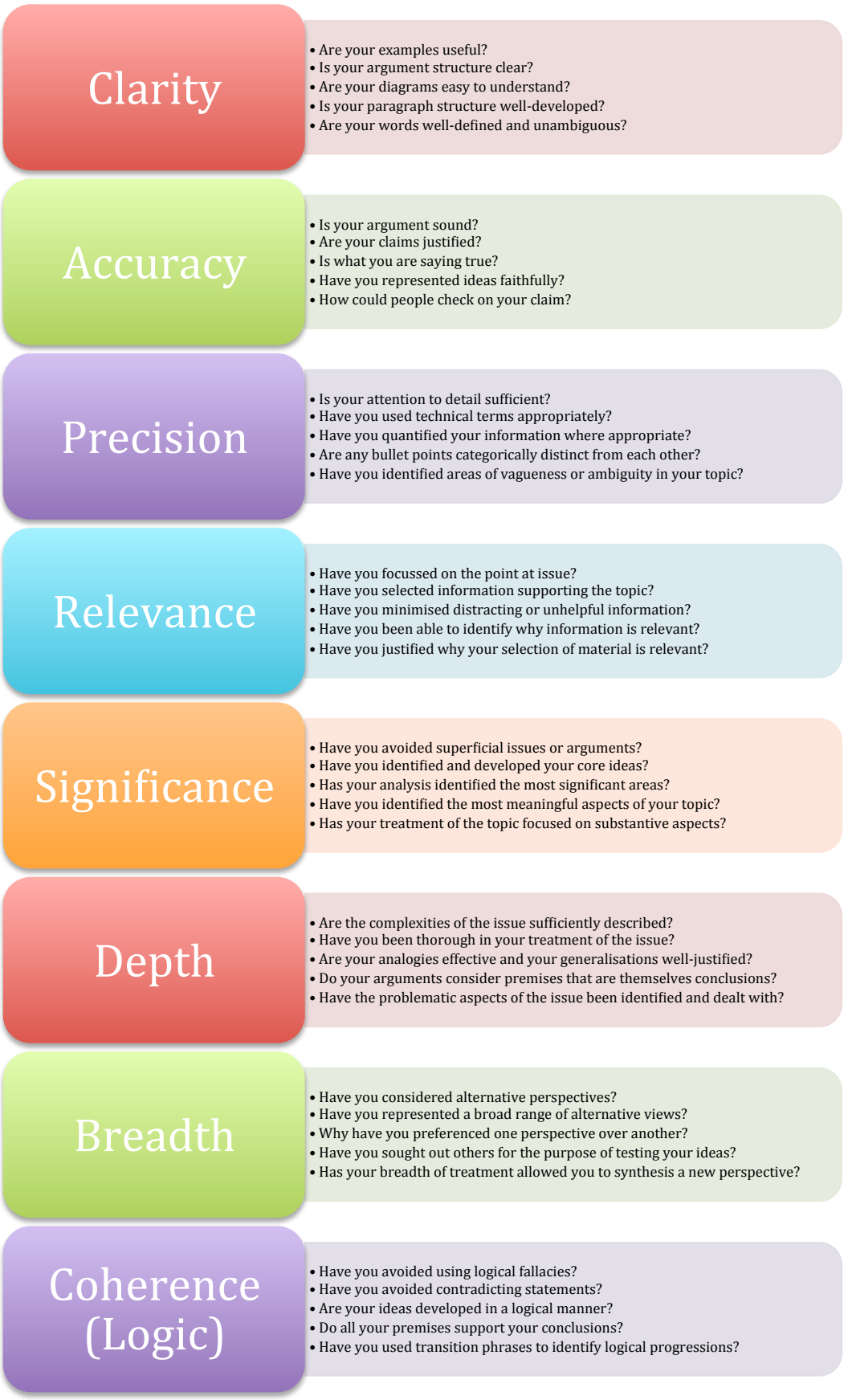
Think and plan in the language of student cognition

To facilitate metacognition and provide a language of feedback

Expert knowledge is "tightly bound to conditions and procedures for its use".

Robert Glaser

Values of Inquiry—supporting questions



Values of inquiry modified from Elder, L. and R. Paul (2001). "Critical Thinking: Thinking with Concepts." Journal of Developmental Education 24(3).

Peter Ellerton University of Queensland, Australia

The Critical Thinking Matrix

A high-resolution reference source for mapping critical thinking skills

Peter Ellerton, University of Queensland, Australia

Cognitive Skills		Values of Inquiry: Clarity (intelligibility)	Accuracy	Precision	Depth (Complexity, relevance and significance)	Coherence	Breadth (Alternatives, perspectives, collaboration)
Interpretation	**Categorising**	The criteria for categorising are unambiguous and the common characteristics of elements within the category are explicitly stated.	Categorical distinctions are drawn from accurate representations or generalisations of characteristics. Hasty generalisations are avoided.	Categorical distinctions are based on quantifiable data, specific characteristics or clear logical definitions.	Categorisations are made using relevant and significant characteristics rather than superficial resemblances. Logical and causal relationships between categories are identified.	Logical distinctions between categories are appropriate and coherent. The logical relationships within and between categories is evident.	Alternative perspectives and criteria for categorising are explored. Preferencing one framework over another is justified. Potential taxonimies are considered.
	Decoding	Terms are disambiguated and literal and intended meanings are distinguished when necessary. Implied meaning and social contexts are identified. Symbolic representations are identified and explained.	Intended or implied meaning is preserved in decoding. Literal and intended meanings are distinguished. Accurate use of symbols is evident.	Key terms are appropriately used to describe the information content. Correct procedures for working with quantitative or symbolic data are followed. Symbolic representations are used effectively.	Specific information is identified and foregrounded. Meaning is preserved by maintaining logical or causal relationships. Mastery of symbolic representation includes understanding the meaning of complex operations.	The logical content of propositions, phrases or terms is made clear and placed in context. The relationships between elements are understood.	Alternative meanings resulting from other cultural or cognitive perspectives are explored. Different interpretations of the situation are considered.
	Clarifying meaning	Key terms and technical terms are identified and explained. Literal and intended meanings are distinguished as necessary. Clarity is preserved as information moves between formats.	Statements are appropriately qualified. Limitations of understanding and representation are acknowledged. Intended or implied meaning is preserved. Paraphrasing and elucidation retain meaning.	Vagueness and ambiguity of terms and meaning identified. Key and technical terms identified and examined for appropriate use.	Nature and complexity of the problem understood and represented. Analogies or relevant similarities and illustrations used to elucidate and explain. Language examined for 'spin'.	Logical structures identified and logical coherency determined.	Language and visualisations reflect the need to cater for a diverse audience holding alternative views, approaches or perspectives.
Analysis	**Examining ideas**	Procedures of investigation are made explicit. Key concepts and structures are identified and named. Technical terms are used.	Faithful reproduction of information. Inaccuracies or contradictory information identified. Inferential relationships identified.	Detail preserved and reported. Vagueness and ambiguity eliminated or addressed. Technical terms are used appropriately and effectively.	Relevant and significant information is identified and foregrounded. Areas of focus are established. Problematic aspects are identified. Information necessary to frame and address the problem is identified. Ideas are compared and contrasted.	Causal and logical relationships are identified. Evidence is presented and evidential and inferential relationships are tested. General logical structure is identified and examined. Ideas are tested against existing knowledge.	Ideas are analysed within a transdisciplinary or collaborative approach, and through a variety of perspectives, including social, political, cultural and disciplinary.
	Identifying arguments	Premises and conclusions are made explicit. Argument structure is identified and discussed. Inferential pathways are articulated.	Argument types and structures are identified and named. Ambiguity is identified and addressed.	Nature of evidential material made clear. Procedures and algorithmic processes articulated in detail. Propositional content of premises and conclusions is identified and articulated.	The point at issue is identified. Relevant and significant information pertinent to the formation of premises is identified. Hidden premises are identified and dicussed.	Logical relationships examined to determine the nature and form of argument. Claims are extracted from text and evidential relationships identified. Argument is tested for validity.	Arguments framed in various ways are recognised as potentially representing different perspectives. Recognition that the acceptance of evidence may depend on personal context, experience and perspective.
	Argument deconstruction	Correct use of terms. Identification of key components of arguments. Supporting evidence made clear. Diagrams or mapping used to make argumentation clear.	Premises, conclusions and inferential relationships are accurately presented.	Correct use of terms, including 'valid' and 'sound'. Representations are explicit and accurate.	Problematic aspects of argument structure/complexity are explored. Relevant and significant information affecting the reasoning process is identified and its role explained.	Cogency of argument is noted. Evidential and inferential links are examined for logical consistency. Hidden premises and unstated assumptions identified. Cognitive biases identified or postulated Logical fallacies identified.	Relationships between unstated assumptions or elements, such as beliefs, are identified, and the effect this may have on the reasoning process is explored. Recognising limitations of a single discipline approach or of a single methodology.
Evaluation	**Assessing claims**	Evidence is presented in context. Direct links between evidence and claims are made explicit.	Claims are faithfully reproduced. Supporting evidence is accurately represented.	Detail of claims is preserved, including quantifiable aspects.	Direct links between evidence and claims are made explicit. Claims and conclusions are connected to the nature of the problem and of the evidence. Cognitive and social biases are explored. Assess the contextual relevance of questions, information, principles, rules or procedural directions.	Claims examined/assessed for logical coherence with each other and with evidence and methodology.	Recognising various levels of credibility that might be associated with varying perspectives about the claim. Understanding the nature of claims as a function of discipline or methodological approaches.
	Assessing arguments	Premises, conclusions and evidential relationships are articulated.	Strengths and weakness inherent in argument types, including inductive and deductive arguments, are identified in context.	Key terms are used correctly and amounts quantified where appropriate or necessary. The tools and processes of evaluation of inferences are explicitly stated.	Suitability of evidential relationships examined with regard to the nature of the problem. Proposed causal and logical relationships identified and examined for weaknesses and strengths.	Causal and logical connections tested. Inductive arguments are analysed for strength and weakness, including the use of analogies and generalisations. Deductive arguments are examined for validity and soundness. Logical fallacies identified and their effect on the argument assessed.	Additional information that may be necessary to strengthen the argument identified. Argument tested using alternative standards of various disciplines or methodological approaches.
	Synthesising claims	The synthesis is clearly derived from the constituent claims, with links made explicit.	Intended and implied meaning is preserved and generalisations and categorisations accurately represent the constituent claims.	Similarities and differences of positions are made clear, and quantified where appropriate or necessary, including how these affect the synthesis.	Relevant and significant information retained and highlighted in the synthesis. Inclusion and exclusion of material in synthesis explained. Common features identified from specific cases, both explicit and implicit.	Effective inductive generalisations made. Synthesis is coherent with the logical content of the constituent claims. Purpose and meaning are developed.	Awareness of the variety of beliefs and perspectives that may be compatible with a particular claim. Synthesis considered from various framings and axioms.
Inference	**Querying evidence**	Nature of evidence is clear and evidential relationships are articulated.	Evidence is faithfully reproduced and represented with honesty and charity.	Detail is sought and presented. Information is quantified where appropriate or necessary. Exact nature and role of evidence made clear.	Premises requiring evidential support are identified and strategies for seeking significant and relevant information that might inform or test hypotheses are determined.	Logical connections between matters of fact and the point at issue or problem to be solved are made clear. Implications of evidentiary material made clear.	Inquiry encompasses or takes into account various methodologies (e.g. transdisciplinary approach).
	Conjecturing alternatives	Possible inferential pathways (paths of reasoning) articulated based upon varying use of evidence and argumentation. Alternative hypothesis and potential conclusions are clearly expressed.	Inquiry and the exploration of alternative reasoning are sensitive to maintaining the integrity of evidence and information.	Alternatives supported by calculation or other algorithmic process.	Alternative hypotheses maintain the emphasis on significant and relevant information, as well as a focus on solving the problem. Complexity is managed and problematic causal and evidential relationships are addressed across possible outcomes.	Alternatives are logically coherent with the given information and their logical implications explored.	Alternative framing of problem explored. Collaborative or multidisciplinary reasoning employed.
	Concluding	Clear articulation of pathways from premises to conclusions, including use of evidence and argumentation.	Proper and correct use of algorithms or procedures to arrive at conclusions. Correctly identify evidential and inferential relationships and show how these lead to conclusions.	Conclusions contain specific and detailed information, quantified where appropriate or necessary.	Modes of reasoning used and conclusion reached appropriate to the nature of the problem.	Logical connections between premises and conclusions evident and explained. Inferences well-supported. Cogent approach taken (i.e. appeal to reason).	Conclusions reached using a variety of reasoning modes, such as mathematical, dialectic, scientific, inductive and deductive.
Explanation	**Stating results**	Correct use of terminology, unambiguous use of language and effective and clear categorical distinctions made. Explicit representation and explanation.	Statements, descriptions, diagrams and other representations maintain the integrity of information.	Detail preserved and presented. Information quantified. Correct use of terms. Vagueness and ambiguity eliminated or addressed.	Information that is significant and relevant is highlighted. Problematic aspects are outlined.	Logical connections made explicit, showing links to evidence and conclusions. Implications made clear.	Presentation of statements, descriptions, diagrams and other representations are sensitive to interpretations other than those of the author.
	Justifying procedures	Effective use of examples and illustrations. Inferential pathways made explicit. Standards of evaluation explained and presented.	Inquiry and investigations are presented faithfully and not modified to suit the nature of the conclusions.	Process and conceptual development recorded. Calculations used to provide quantified data.	Strategies explored and evaluated. Nature of inquiry appropriate to the problem.	Methodologies, algorithms and other procedures supported by logical analysis. Reasons given for choosing areas of focus and minimising other information. Standards of evaluation explained and presented.	Evidential, conceptual, methodological, criteriological and contextual considerations are made with reference to the nature of justification as a function of alternative perspectives, beliefs and suppositions.
	Presenting arguments	Argumentative prose, diagrams, charts, graphs and graphics convey a clear meaning, adhering to convention. Points at issue clearly defined and stated.	Evidence faithfully reproduced and counter-arguments and criticisms engaged with honesty and charity.	Quantitative data included. Unnecessary information is minimised.	Identify and address counter-arguments. Causal and logical relationships that relate to the situation or problem are identified and their role made explicit. Problematic aspects identified and solutions explained.	Logical structure and coherence evident. Well-supported inferences with implications explicitly represented.	Cogent presentation but with due consideration of various reasoning modes and how alternative perspectives may influence the acceptance or definition of evidence.
Self regulation	**Metacognition**	Reflective practice is evident and cognitive development across issues is clearly reported.	Authentic representation of students' own metal processes and cognitive development.	Reflection targeted to specific processes and outcomes.	Reflections show personal engagement with significant and relevant issues. Threshold (key) ideas and concepts are identified. Deficiencies in personal knowledge that may impact rational or objective analysis acknowledged and managed.	Logical analysis of own thoughts comparable in scope and rigour to analysis of others'.	Recognition of bias, erroneous thinking or fallacious reasoning. Collaboration sought for the purpose of testing own thoughts.
	Self-correction	Recognition of bias, erroneous thinking or fallacious reasoning is recognised and reported.	Self-criticism and redirection is authentic and resembles the criticism that would be made of third persons.	Reflection leads to specific and detailed changed or specific courses of action are articulated.	Revisions geared to improve outcomes and examined for consequences to original position, findings, or opinions.	Recognition and acceptance of logical errors in preliminary thinking. Rational conclusions contrasted with personal preferences or bias.	Willingness to modify thinking through collaborative inquiry. Self-correction seen as progress.

Cognitive skills modified from Facione, P. A. (1990). Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction. Values of inquiry concept from Kuhn, T. S. (1970). The Structure of Scientific Revolutions. International Encyclopedia of Unified Science. Chicago, University of Chicago Press. 2. Values of inquiry modified from Elder, L. and R. Paul (2001). "Critical Thinking: Thinking with Concepts." Journal of Developmental Education 24(3).