Explicitly Teaching Critical Thinking through Inquiry, with Dr Peter Ellerton (2nd July 2025)

The 4th Colloquium Series by the Australasian Council of Undergraduate Research

In partnership with the UWA Community of Practise on Embedding Research into Curriculum, and Dr Peter Ellerton (Pedagogy & Curriculum), Critical Thinking Project, University of Queensland.

Our guest speaker, Dr Ellerton's presentation introduces the Teaching for Thinking program which highlights the importance of explicitly integrating practises within curriculums that promote the development of students' essential critical thinking skills.

In this presentation, Dr Ellerton outlines how educators can evaluate their own critical thinking pedagogies, as well as how to foster and develop the practise of thinking, and how to effectively provide feedback to students in a way to support their agency in inquiry.

Dr Ellerton is a widely recognised researcher and scholar on the topic of developing pedagogical expertise in teaching and critical thinking skills. He is the founding director of UQ's Critical Thinking Project (UQCTP), which was developed over a decade ago, and has worked closely with organisations such as the International Baccalaureate in Curriculum Design, and the Australian Curriculum, Assessment, and Reporting Authority, to share his passion and expertise in Teaching for Thinking.

When: Tuesday, 2nd July 2025

Time: 1pm – 2pm (AWST)

Where: Online, through MS Teams

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Opening Address: Prof. Denise Wood, Chair of Australasian Council of Undergraduate Research 00:00-04:25

Professor Wood introduces her role in ACUR and highlights she has held the position since late last year when our founding chair, the late Emeritus Professor Angela Brew, stepped down from her role, which she'd held since ACUR was established. Angela was a dear friend and colleague, who sadly passed away earlier this year, but notes ACUR honours Angela's commitment to learning and teaching, and particularly undergraduate research through collaborative events such as this colloquium.

Denise has held Pro-Vice Chancellor of Learning and Teaching positions, and currently works as a higher education consultant and adjunct professor in the School of Law and Society at the University of the Sunshine Coast.

An acknowledgement of country for the traditional owners of the lands on which Denise lives, works and studies, paying respects to elders past and present of the the Kabi Kabi and Jinibara peoples of the Moreton Bay region and the Turrbal peoples whose land extends from Brisbane to the Moreton Bay regions.

Also provided an acknowledgment of traditional owners across Australia, including any Aboriginal and Torres Strait Islander people who are attending this event, recognising their continuing connection to land, water, culture, and kin, thanking them for their careful custodianship of these lands over millennia.

The audience is thanked for their interest in attending this 4th Colloquium Series event, which is being conducted as a collaboration between ACUR and the University of Western Australia Community of Practice, which is focused on embedding research into curriculum.

Introduction: Lucia Ravi, UWA CoP Convenor 04:26-06:19

Lucia Ravi thanked Denise for the introduction, and introduces her role as a student learning librarian at UWA, as well as being a convenor of the Community of Practise established on Embedding Research into Curriculum.

Lucia provided an acknowledgement that UWA is located alongside Derbal Yerrigan on the Swan River, which is on Whadjuk Noongar boodjar. She also recognises that the land she is situated on is Noongar land, and that the Noongar people remain the spiritual and cultural custodians of their lands and continue to practise their values, languages, belief, and knowledge.

To provide context, Lucia speaks about how student engagement and inquiry, and research-based learning is recognised as a way to focus on the development of higher order critical thinking and problem solving in students. However, these learning aims are most often hidden parts of the curriculum, and not readily reflected in learning outcomes and in assessments, so they're notoriously difficult to facilitate and to assure. Thus, the success and the development of students' critical thinking becomes dependent on tacit levels of understanding of the value of these critical thinking processes to student learning.

Lucia shares how she enjoyed hearing Professor Ellerton speak at last year's HERDSA conference about the Critical Thinking Research Project that he has been developing with his academic team at the University of Queensland. The project has been sharing their Teaching for Thinking framework which seeks to provide greater precision and intentionality in the embedding of critical thinking development through inquiry, and also provides a way for these important capabilities to be both communicated and formally assessed. They do so by incorporating the effective domain of critical thinking, which helps to bring context, meaning, and purpose to student learning which counteracts the tendency to see these skills as generic standalone capabilities.

She thanks Dr Peter Ellerton for his generous offer to speak with the CoP about his framework and hands over the presentation to him.

Beginning of Dr Ellerton's Talk: Dr Peter Ellerton, UQ Critical Thinking Project 06:20-07:59

Dr Peter Ellerton thanks Lucia and Denise for their introductions, and also thanks the audience for joining his presentation.

He introduces the concept of Teaching for Thinking, a program which has been going for a little over 10 years.

Why Teach for Thinking 08:00-11:25

Dr Peter Ellerton introduces the Teaching for Thinking program which promotes embedding practises within the curriculum that promote the development of students' essential critical thinking skills.

He also introduced his background where, before he became an academic philosopher, he was a high school teacher of physics and mathematics, who was always intrigued by what it meant to teach people to think well. Later, completed his PhD at UQ in Philosophy. He has been working closely with the jurisdiction and was one of three academics who recently rewrote the Critical and Creative Thinking General Capabilities for version nine of the Australian curriculum. He has also worked with a number of organisations, including the International Baccalaureate in Curriculum Design.

Dr Ellerton explains how in the AI context, clarity is very rare. Attempting to achieve clarity through ignorance or by restricting ourselves to a small number of potential sources of information has its problems. Education's role now, more than ever, is to teach students to navigate uncertainty and think critically, rather than just to consume and respond to teachers. This leads to one of the great imperatives of the programs work—that students must not just be informed, but they must have agency.

He continues that whilst AI can be a useful tool, ultimately it is a terrible co-inquirer that does not understand anything. And understanding is important for the project because, as Deanna Kuhn (1999) said, "practice does not make perfect in the absence of understanding".

He states that action with understanding leads to expertise, whilst action without understanding is trial and error, and you cannot be satisfied with that. Dr Ellerton states how this is the core of the work done with the Critical Thinking Project at UQ.

UQ's Critical Thinking Project 11:26-13:39

Dr Peter Ellerton explains that the Critical Thinking Project at UQ is geared around a schematic understanding of pedagogical expertise and Teaching for Thinking. The Project works primarily through the Thinking Schools Network, which has over 400

schools, universities, and other institutions in the network. Their Pacific Partnerships includes UCLA, Pepperdine University, and Simon Fraser University. They have over 5000 educators and academics in their network across a number of countries, and have a very strong research output.

He talks about the concept of Teaching for Thinking, by addressing at what he believes is a false dichotomy between two very important things—an explicit focus on content knowledge, and an explicit focus on student thinking. He suggests that the best way to develop both of these ideas is together. He emphasises the importance of the idea that, whilst a lot of schools talk about focusing on explicit teaching, they must also be explicit about developing student thinking with the same precision and intentionality as with students developing content knowledge.

Dr Ellerton quotes Ritchart & Perkins' (2005) idea of this, stating that "the true promise of the teaching of thinking will not be realised until learning to think and thinking to learn merge seamlessly." He also quotes Dewey (1916) who said, "thinking is the method of intelligent learning" (p. 159). So, he explains, the core of the Critical Thinking Project is to try and connect thinking and learning, and other things too.

The Thinking Classroom 13:40-15:03

Dr Ellerton outlines the three questions that he will typically ask when beginning to work with educators to evaluate their critical thinking pedagogies.

The first is, "how do you know students are thinking in your classroom?" They want to find out what kinds of thinking the students do, and what the evidence is that they are thinking. What do they say? How do they act? How do they engage with the educator and with each other? What are their behaviours?

The second is, "how do you plan for that thinking to occur?" You know what thinking looks like, so what do you do in your planning with the same precision and intentionality? How do you plan for that to occur with the same intentionality and high resolution that you plan for content?
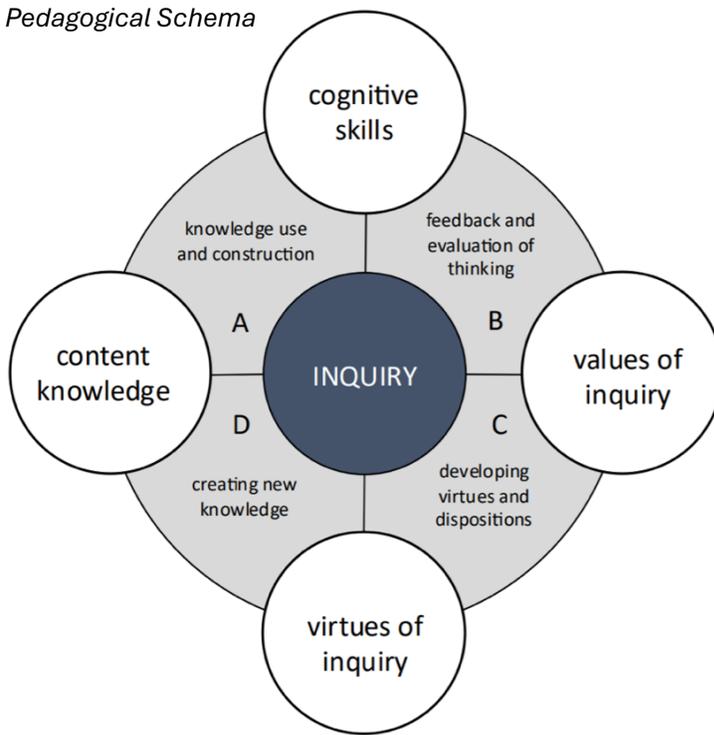
The third, and possibly the most important, is "how do you give students feedback on the quality of their thinking and what does that even mean?" Not just on their progressions through the task, but the kind of thinking that they do. What kind of

vocabulary do you have, and what sort of concepts do you have that will help us to negotiate that?

The Pedagogical Schema 15:04-19:27

Figure 1

Pedagogical Schema

Dr Ellerton describes his diagram which he calls a pedagogical schema. He details it as a framework, rather than a model, and explains how it provides educators a way to develop inquiry and thinking capabilities in their classrooms. The schema represents how ideas hang together so that they can be comprehended with regard to each other. The circles address content knowledge, cognitive skills, values of inquiry, and virtues of inquiry.

Note. This is the Pedagogical Schema designed by UQCTP (University of Queensland Critical Thinking Project [UQCTP], n.d).

He also outlines another key focus for in the project's work as how to collaborate well, and how thinking is assessed at UQ. For example, recently they were presented with the Teaching Innovation Grant, which awarded them with $100,000 to explore a range of different faculties to learn and talk about assessing for thinking. They also talk about the connection between thinking and writing. One of their researchers, the Director of Research, Dr Yael Leibovich's PhD (2023) is in this area, and they have just won an award for a course called Effective Thinking and Writing, in which students, including lots of rural and remote ones, come into UQ from around the state for a one week intensive course that teaches them about effective thinking and writing, and where they produce

an argumentative essay at the end. Dr Peter reflects on the success of the course and notes the attrition rate of around 30% or less, and with high GPA results in students undertaking the course.

He highlights the importance of questioning and curiosity as a big part of what they do, alongside developing those inquiry virtues.

He also emphasises how when talking about content knowledge, and cognitions, it is important to recognise the crucial part of how they interact with each other. This is displayed in the grey zones of the pedagogical schema model, or what are called the zones of knowledge.

Zone A: Knowledge Use and Construction 19:28-24:42

Dr Ellerton emphasises the idea of thinking as an action that needs to be practised, developed, and refined, similar to any other skill. The Critical Thinking Project is concerned with what students can do with their knowledge. They can have lots of knowledge, but if they don't know how to use them properly, it is not going to be very effective. He stresses the importance of what students can actually do with their knowledge, through thinking.

The cognitive skills that he talks about are the skills that are used to develop, manipulate, and create knowledge. The power of developing these things is an understanding that interplays with content knowledge. Analyse, justify, evaluate, and explain, are all key in understanding students' comprehension and engagement with content knowledge.

When working with educators, he does not ask them to "define analysis," but rather, will ask what they want students to do when they analyse, or to ask what they wanted their students to do that was analysis, or to give an example of their last task that was analysis. He wants people from all different areas, to develop an understanding of what they mean when they say the word 'analyse,' in terms of an action, not just as a definite. It shows that there are very transferable concepts about analysis that you can take from context to context.

Dr Ellerton does the same thing with 'justify,' or the giving and taking of reasons. He would talk more about it in more depth and go beyond just fashioning an argument.

He will ask them about evaluating. He notes that the core of the word evaluate is value. So for evaluating something, we must know what it is that we value so that we can construct the criteria for evaluation. This is a highly collaborative process.

He might also ask what educators expect students to do when asked to 'explain' too. He questions the audience by asking what the difference between 'explain' and 'describe' might be. This challenges some of the fundamental ways in which we're using these terms in where we're getting students to think and trying to come to a deeper understanding about these things.

He also states that understanding is not a cognitive skill, but is rather a state that you arrive at. To understand you must have a relational dynamic thinking about knowledge. The cognitive skill most likely associated with understand is 'explain,' which is why 'explain' is included in this clutch of four. When asking students to explain, they are being asked to communicate an understanding. He adds that it is a Bloomian construct that understand is a cognitive skill, which he sites as incorrect.

Bloom's Taxonomy 24:43-28:47

Dr Ellerton recognizes that Bloom's Taxonomy has been around for a long time, and has done a lot of service in foregrounding concepts and thinking, but suggests the notion is doing more harm than good because it is incorrect. He states that as supported by research, the cognitions cannot be represented in a hierarchy.

He acknowledges that this can be a contentious statement, but as Robert Marzano points out, "problems with Bloom's Taxonomy were indirectly acknowledged by its authors."

Dr Ellerton points out two significant problems that would occur if we do not move away from Bloom's.

The first is the notion that higher order skills are constituted by lower order skills. So to evaluate is to remember, understand, apply, analyze, which is not accurate to the structure of the cognitions.

The second is that higher order skills become discriminators between grade levels, which does not provide an accurate assessment. For example, Dr Ellerton cannot

comprehend why understanding became a lower order skill when, to develop a sophisticated understanding can be one of the most important things we can ask a student.

The Cognitive Web Model 28:48-29:58

Dr Ellerton describes the Critical Thinking Project's Cognitive Web model, which emphasises that the cognitions analyse, organise, hypothesise, explain, justify, interpret, and evaluate are all intertwined with one another, rather than being organised hierarchically, as is the case with Bloom's conceptualization of them. When a student is asked to justify, it is possible they will have pull on other cognitions such as to evaluate or hypothesise. They have to pull in lots of other cognitions as they work.

Figure 2

Cognitive Web Model
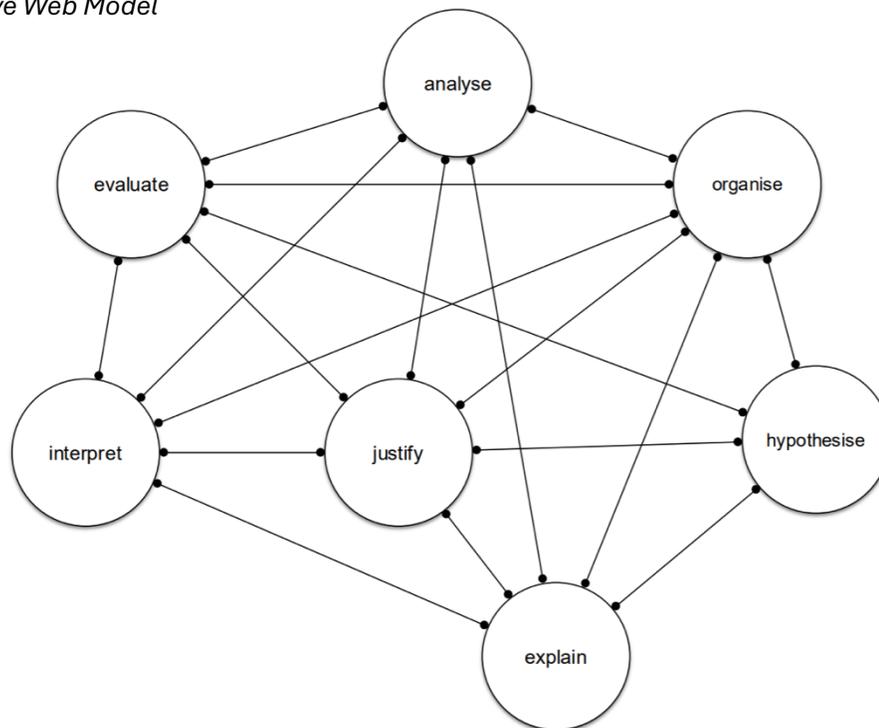
Note. This is the Cognitive Web Model designed by UQCTP that was described by Dr Peter Ellerton (UQCTP, n.d).

He mentions that one of the advantages of Bloom's was that it gave educators just a few cognitions to focus on—the so-called higher order ones. So, he asks, under the Cognitive Web model, do we have to prioritise all of the cognitions?

He states that to an extent, we do, because we use them all of them a lot of the time. So a lot of their work is involved in doing cognitive audits, or making the cognitive aspects of tasks really clear.

The Golden Tetrad of Classroom Engine Cognitions 29:59-32:11

Dr Ellerton describes the Critical Thinking Project's identification of the Golden Tetrad of cognitions, or the engine cognitions in the classroom, which are crucial to critical thinking and are valuable in learning and planning design. When used time after time, if focused on for a long time, the cognitions evaluate, analyse, justify, and explain, tend to pull in just about every other one.

Figure 3

Golden Tetrad of Cognitions
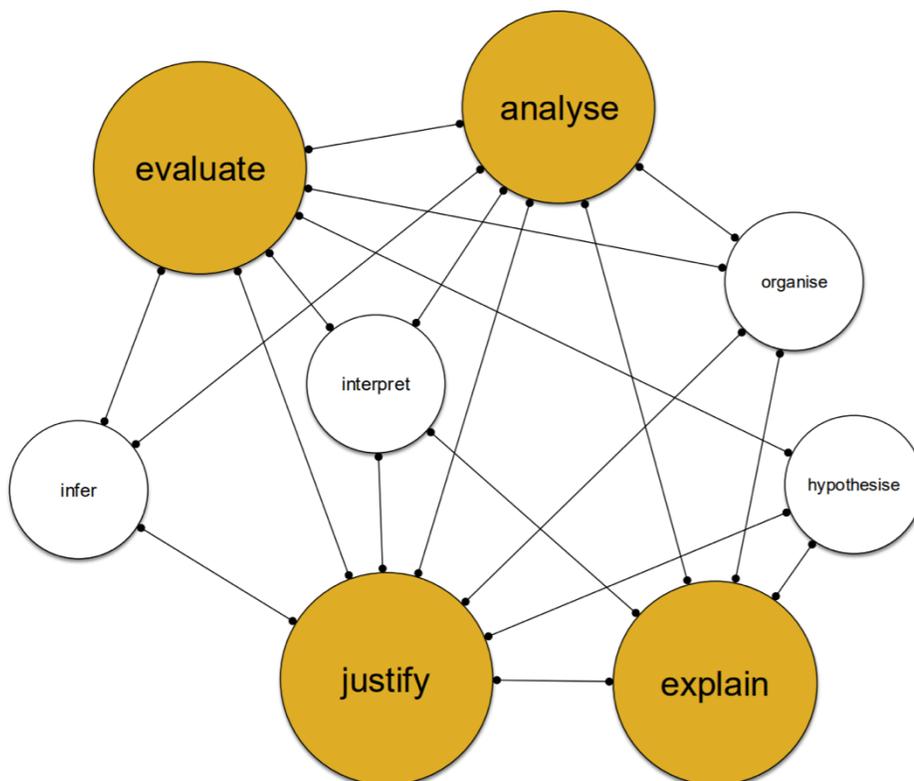
Note. These are the Golden Tetrad of cognitions as identified by UQCTP (UQCTP, n.d).

He explains that analyse is important because it is such a ubiquitous skill and is a precursor to so much of what we have to do. It is in all learning objectives, or should be. Evaluate and justify because they are the core of argumentation, and as it says in the support material for the Australian curriculum, at the core of critical thinking is the ability to identify, analyse, evaluate, and construct arguments.

Working these four cognitions into learning experiences and assessments leads students to think far more broadly, and to develop incredibly powerful collaborative skills.

He emphasises that these four engines of cognition of the classroom are always constantly in play, and there is a lot of interaction between them, making them a very powerful tetrad of skills.

Problem Types and Cognitive Requirements 32:12-34:04

Dr Ellerton also speaks about working problem-based learning. He outlines how problems can be structured, well-structured, or ill-structured. He reiterates that ill-structured does not mean in a derogatory sense, but in the way that the question allows for a very strong freedom for inquiry, unlike a well-structured problem like $y=mc^2$, where there is only one way to stick in the variables and get the answers—in this case, there are no degrees of freedom in inquiry.

What the project has found is that the move towards ill-structed questions allows for increased freedom for inquiry and can open up to an enormous amount of cognitive activity and scope for thinking in students. Thus, he explains that pulling away from some of that structure is very useful.

Zone B: Feedback and Evaluation of Thinking 34:05-35:03

Dr Ellerton briefly mentions the values of inquiry in the zone of feedback and evaluation of thinking in the pedagogical schema.

He describes how it comes down to the notion that improvement of anything requires feedback. To understand the feedback educators can give to students, it is useful to ask what we value in good inquiry.

The Values of Inquiry 35:04-38:09

Dr Ellerton describes some of the quality words to use for values of inquiry, including clarity, precision, breadth, depth, accuracy, relevance, coherence, and significance.

These words are used to provide feedback to students on their thinking. They can guide inquiry and stimulate students to give them more agency in their thinking. He also explains how they're also terrific words for peer evaluation.

Dr Ellerton also mentions a poster from the Critical Thinking Project website (see Appendix) that has examples of questions that relate to the values of inquiry using values associated terms such as interpretation, meaning, truth, correctness, and exactitude, to ask students to help them to reflect on their own work.

Dr Ellerton also stresses how he thinks the values of inquiry are atomic to inquiry, and when dealing with uncertainty, they can ground us in our inquiry, because we know these are the questions we need to ask to help move any inquiry forward.

Wrapping up the Critical Thinking Project 38:10-39:01

Dr Ellerton shares that this is just an overview of the work done by the Critical Thinking Project. They bring these ideas to the practice of learning design, the practice of student interaction, the practice of feedback, the practice of writing, the practice of developing collaborative skills, and the practice of assessment.

He thanks everyone for listening to his presentation and the meeting moves on to the Q&A.

References

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Appendix

The Values of Inquiry

The Values of Inquiry: explanations and supporting questions

Dr Peter Ellerton, the University of Queensland.   https://critical-thinking.project.uq.edu.au

"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 ensure that our audience can understand what we mean. We are making our points as clear as possible to others.	• 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
Accuracy	When we communicate with accuracy, we seek to represent all information correctly and closely aligned with its original meaning.	• 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
Precision	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.	• 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
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 you arguments consider premises that are themselves conclusions? • Have the problematic aspects of the issue been identified and dealt with?	Scope Perspectives Alternatives Detail Thoroughness
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?	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
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.	• Have you avoided using logical fallacies? • Have you avoided contradicting statements? • Are your ideas developed in a logical manner? • Do all your premises support your conclusions? • Have you used transition phrases to identify logical progressions?	Logic Consistency Integration Argument Justification Persuasiveness

Values of inquiry modified from Intellectual Standards of Elder, L. and R. Paul (2001), Kuhn,T. SSR (1970), Lipman, M. TE (2003).

Note. This poster is accessible under 'Values of Inquiry' on the Critical Thinking Project's website under the 'Pedagogical schema' tab. It has examples of questions that relate to the values of inquiry (UQCTP, 2018).