

Critical and creative thinking

Introduction

In the Australian Curriculum, students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems. Critical and creative thinking are integral to activities that require students to think broadly and deeply using skills, behaviours and dispositions such as reason, logic, resourcefulness, imagination and innovation in all learning areas at school and in their lives beyond school.

The *Melbourne Declaration on Educational Goals for Young Australians* (MCEETYA 2008) recognises that critical and creative thinking are fundamental to students becoming successful learners. Thinking that is productive, purposeful and intentional is at the centre of effective learning. By applying a sequence of thinking skills, students develop an increasingly sophisticated understanding of the processes they can employ whenever they encounter problems, unfamiliar information and new ideas. In addition, the progressive development of knowledge about thinking and the practice of using thinking strategies can increase students' motivation for, and management of, their own learning. They become more confident and autonomous problem-solvers and thinkers.

Responding to the challenges of the twenty-first century – with its complex environmental, social and economic pressures – requires young people to be creative, innovative, enterprising and adaptable, with the motivation, confidence and skills to use critical and creative thinking purposefully.

Scope of Critical and creative thinking

This capability combines two types of thinking – critical thinking and creative thinking. Though the two are not interchangeable, they are strongly linked, bringing complementary dimensions to thinking and learning.

Critical thinking is at the core of most intellectual activity that involves students in learning to recognise or develop an argument, use evidence in support of that argument, draw reasoned conclusions, and use information to solve problems. Examples of thinking skills are interpreting, analysing, evaluating, explaining, sequencing, reasoning, comparing, questioning, inferring, hypothesising, appraising, testing and generalising.

Creative thinking involves students in learning to generate and apply new ideas in specific contexts, seeing existing situations in a new way, identifying alternative explanations, and seeing or making new links that generate a positive outcome. This includes combining parts to form something original, sifting and refining ideas to discover possibilities, constructing theories and objects, and acting on intuition. The products of creative endeavour can involve complex representations and images, investigations and performances, digital and computer-generated output, or occur as virtual reality.

Concept formation is the mental activity that helps us compare, contrast and classify ideas, objects, and events. Concept learning can be concrete or abstract and is closely allied with metacognition. What has been learned can be applied to future examples. It underpins the elements outlined below.

Dispositions such as inquisitiveness, reasonableness, intellectual flexibility, open- and fair-mindedness, a readiness to try new ways of doing things and consider alternatives, and persistence both promote and are enhanced by critical and creative thinking.

Critical and creative thinking can be encouraged simultaneously through activities that integrate reason, logic, imagination and innovation; for example, focusing on a topic in a logical, analytical way for some time, sorting out conflicting claims, weighing evidence, thinking through possible solutions, and then, following reflection and perhaps a burst of creative energy, coming up with innovative and considered responses. Critical and creative thinking are communicative processes that develop both flexibility and precision. Communication is integral to each of the thinking processes. By sharing thinking, visualisation and innovation, and by giving and receiving effective feedback, students learn to value the diversity of learning and communication styles.

For a description of the organising elements for Critical and creative thinking, go to [Organising elements](#).

Critical and creative thinking across the curriculum

The imparting of knowledge (content) and the development of thinking skills are accepted today as primary purposes of education. The explicit teaching and embedding of Critical and creative thinking throughout the learning areas encourages students to engage in higher order thinking. By using logic and imagination, and by reflecting on how they best tackle issues, tasks and challenges, students are increasingly able to select from a range of thinking strategies and employ them selectively and spontaneously in an increasing range of learning contexts.

Activities that foster critical and creative thinking should include both independent and collaborative tasks, and entail some sort of transition or tension between ways of thinking. They should be challenging and engaging, and contain approaches that are within the ability range of the learners, but also challenge them to think logically, reason, be open-minded, seek alternatives, tolerate ambiguity, inquire into possibilities, be innovative risk-takers and use their imagination.

Critical and creative thinking is addressed through the learning areas and is identified wherever it is developed or applied in content descriptions. It is also identified where it offers opportunities to add depth and richness to student learning in content elaborations. An icon indicates where Critical and creative thinking has been identified in learning area content descriptions and elaborations. A filter function on the Australian Curriculum website assists users to identify F–10 curriculum content where Critical and creative thinking has been identified. Teachers may find further opportunities to incorporate explicit teaching of Critical and creative thinking depending on their choice of activities. Students can also be encouraged to develop capability through personally relevant initiatives of their own design.

- [Critical and creative thinking in English](http://www.australiancurriculum.edu.au/English/General-capabilities)
(<http://www.australiancurriculum.edu.au/English/General-capabilities>)
- [Critical and creative thinking in Mathematics](http://www.australiancurriculum.edu.au/Mathematics/General-capabilities)
(www.australiancurriculum.edu.au/Mathematics/General-capabilities)

- [Critical and creative thinking in Science
\(www.australiancurriculum.edu.au/Science/General-capabilities\)](http://www.australiancurriculum.edu.au/Science/General-capabilities)
- [Critical and creative thinking in History
\(www.australiancurriculum.edu.au/History/General-capabilities\)](http://www.australiancurriculum.edu.au/History/General-capabilities)

Background

This background summarises the evidence base from which the Critical and creative thinking capability's introduction, organising elements and learning continuum have been developed. It draws on foundational and recent international and national research, as well as initiatives and programs that focus on critical and creative thinking across the curriculum.

Critical and creative thinking are variously characterised by theorists as dispositions (Tishman, Perkins and Jay; Ritchhart, Church and Morrison), taxonomies of skills (Bloom; Anderson, Krathwohl et al.), habits and frames of mind (Costa and Kallick; Gardner; de Bono), thinking strategies (Marzano, Pickering and Pollock), and philosophical inquiry (Lipman, Sharp and Oscanyan). Each of these approaches has informed the development of the Critical and creative thinking capability.

The capability is concerned with the encouragement of skills and learning dispositions or tendencies towards particular patterns of intellectual behaviour. These include being broad, flexible and adventurous thinkers, making plans and being strategic, demonstrating metacognition, and displaying intellectual perseverance and integrity. Students learn to skilfully and mindfully use thinking dispositions or 'habits of mind' such as risk taking and managing impulsivity (Costa and Kallick 2000) when confronted with problems to which solutions are not immediately apparent.

Both Gardner (1994) and Robinson (2009) emphasise that we need to understand and capitalise on the natural aptitudes, talents and passions of students – they may be highly visual, or think best when they are moving, or listening, or reading. Critical and creative thinking are fostered through opportunities to use dispositions such as broad and adventurous thinking, reflecting on possibilities, and metacognition (Perkins 1995), and can result from intellectual flexibility, open-mindedness, adaptability and a readiness to experiment with and clarify new questions and phenomena (Gardner 2009). Recent discoveries in neuroscience have furthered theories about thinking, the brain, perception and the link between cognition and emotions. Theorists believe that learning is enhanced when rich environments contain multiple stimuli, stressing the importance of engaging the mind's natural curiosity through complex and meaningful challenges.

Educational taxonomies map sequences of skills and processes considered to be foundational and essential for learning. The most well-known of these, developed by Bloom et al. (1956), divided educational objectives into domains where learning at the higher levels was dependent on having attained prerequisite knowledge and skills at lower levels. In 1967, Bruner and colleagues described the process of concept learning as an active process in which learners construct new concepts or ideas based on their knowledge.

The philosophical inquiry model, first applied to school education by Lipman, Sharp and Oscanyan (1980), has two major elements: critical and creative thinking, and forming a classroom environment called a 'community of inquiry', to support the development of

thinking and discussion skills. This model places emphasis on possibilities and meanings, wondering, reasoning, rigour, logic, and using criteria for measuring the quality of thinking.

Lave and Wenger (1991) described 'learning communities' that value their collective competence and learn from each other. Through their notion of 'authentic' learning, the importance of engagement and linking student interests and preferred learning modes with classroom learning has emerged. Marzano, Pickering and Pollock (2001) identified the strategies most likely to improve student achievement across all content areas and grade levels. These include using non-linguistic representations and learning organisers, and generating and testing hypotheses.

In 2001, Anderson and Krathwohl changed Bloom's cognitive process of 'synthesis' to 'creativity' and made it the highest level of intellectual functioning. They believed the ability to create required the production of an original idea or a product from a unique synthesis of discrete elements.

Twenty-first century learning theories emphasise the importance of supporting authentic and ubiquitous (anywhere, anyhow) learning, and providing students with opportunities, resources and spaces to develop their creative and critical thinking skills (Newton and Fisher 2009; McGuinness 1999, 2010). Gardner's (2009) five 'minds' for the future – the disciplined, synthesising, creating, respectful and ethical minds – offers a helpful starting place. Learners need to develop the skills to analyse and respond to authentic situations through inquiry, imagination and innovation.

References

Anderson, L., Krathwohl, D., et al. (eds) 2001, *A Taxonomy for Learning, Teaching, and Assessing: a revision of Bloom's taxonomy of educational objectives*, Allyn & Bacon, Boston, MA.

Bloom, B., Englehart, M., Furst, E., Hill, W. & Krathwohl, D. 1956, *Taxonomy of Educational Objectives: the classification of educational goals. Handbook I: Cognitive Domain*, David McKay, New York.

Bruner, J., Goodnow, J.J. & Austin, G.A. 1967, *A Study of Thinking*, Science Editions, New York.

Costa, A.L. & Kallick, B. 2000–2001b, *Habits of Mind*, Search Models Unlimited, Highlands Ranch, Colorado: www.instituteforhabitsofmind.com/ (accessed 10 October 2011).

Costa, A. & Kallick, B. (eds) 2004, *Discovering and Exploring Habits of Mind*, Hawker Brownlow Education, Heatherton, Melbourne.

deBono, E. 2009, *CoRT 1 Breadth Tools*, The McQuaig Group Inc.: www.deBonoForSchools.com (accessed 10 October 2011).

Erickson, H.L. 2006, *Concept-based Curriculum and Instruction for the Thinking Classroom*, Corwin Press, Thousand Oaks, California: www.sagepub.com/upm-data/11469_Erickson_Ch_1.pdf (accessed 10 October 2011).

Gardner, H. 1993, *Frames of Mind: the theory of multiple intelligences*, Fontana Press, UK.

Gardner, H. 1994, *Multiple Intelligences: the theory in practice*, Harper Collins, New York.

Gardner, H. 2009, *5 Minds for the Future*, McGraw-Hill, North Ryde, Sydney.

Lave, J. & Wenger, E. 1991, *Situated Learning: legitimate peripheral participation*, Cambridge University Press, Cambridge, MA.

Lipman, M., Sharp, M. & Oscanyan, F. 1980, *Philosophy in the Classroom*, Temple University Press, Philadelphia.

Marzano, R., Pickering, D. & Pollock, J. 2001, *Classroom Instruction That Works*, Association for Supervision and Curriculum Development, Association for Supervision and Curriculum Development, Alexandria, Virginia.

McGuinness, C. 1999, *From Thinking Skills to Thinking Classrooms: a review and evaluation of approaches for developing pupils' thinking*, Research Report No. 115, Department for Education and Employment, Norwich, UK.

McGuinness, C. 2010, *Thinking and Metacognition* video, The Journey to Excellence series, HMle – Improving Scottish Education: www.journeytoexcellence.org.uk/videos/expertspeakers/metacognitioncarolmcguinness.asp (accessed 10 October 2011).

Newton, C., & Fisher, K. 2009, *Take 8. Learning Spaces: the transformation of educational spaces for the 21st century*, The Australian Institute of Architects, ACT.

Perkins, D. 1995, *The Intelligent Eye: learning to think by looking at art*, Getty Centre for the Arts, California.

Ritchhart, R., Church, M. & Morrison, K. 2011, *Making Thinking Visible: how to promote engagement, understanding, and independence for all learners*, John Wiley & Sons, Stafford, Queensland.

Robinson, K., 'Education systems too narrow', ABC 7.30 Report (16 June 2009): www.abc.net.au/7.30/content/2009/s2600125.htm (accessed 10 October 2011).

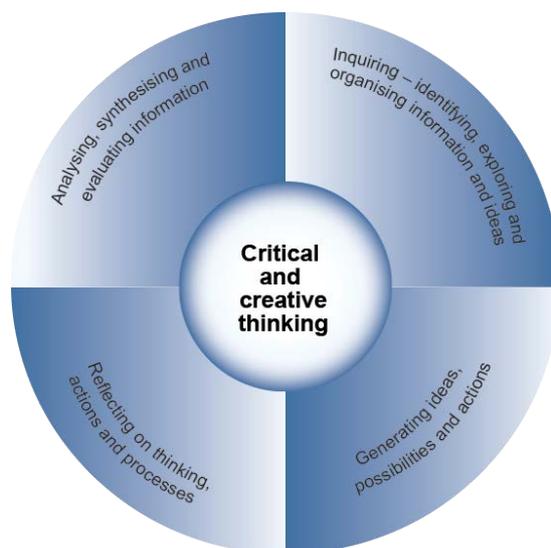
Tishman, S., Perkins, D. & Jay, E. 1995, *The Thinking Classroom: learning and teaching in a culture of thinking*, Allyn & Bacon, Boston.

Organising elements

The Critical and creative thinking learning continuum is organised into four interrelated elements, each detailing differing aspects of thinking. The elements are not a taxonomy of thinking. Rather, each makes its own contribution to learning and needs to be explicitly and simultaneously developed.

- Inquiring – identifying, exploring and organising information and ideas
- Generating ideas, possibilities and actions
- Reflecting on thinking and processes
- Analysing, synthesising and evaluating reasoning and procedures

The diagram below sets out these elements.



Organising elements for Critical and creative thinking

Inquiring – identifying, exploring and clarifying information and ideas

This element involves students in posing questions and identifying and clarifying information and ideas, followed by organising and processing information. When inquiring – identifying, exploring and clarifying information and ideas, students use questioning to investigate and analyse ideas and issues, make sense of and assess information and ideas, and collect, compare and evaluate information from a range of sources. In summary, inquiring primarily consists of:

- pose questions
- identify and clarify information and ideas
- organise and process information.

Generating ideas, possibilities and actions

This element involves students in imagining possibilities and connecting ideas through considering alternatives and seeking solutions and putting ideas into action. Students create new, and expand on known, ideas. They explore situations and generate alternatives to guide actions and experiment with and assess options and actions when seeking solutions. In summary, generating primarily consists of:

- imagine possibilities and connect ideas
- consider alternatives
- seek solutions and put ideas into action.

Reflecting on thinking and processes

This element involves students thinking about thinking (metacognition), reflecting on actions and processes, and transferring knowledge into new contexts to create alternatives or open up possibilities. Students reflect on, adjust and explain their thinking and identify the thinking behind choices, strategies and actions taken. They apply knowledge gained in one context to clarify another. In summary, reflecting primarily consists of:

- think about thinking (metacognition)
- reflect on processes
- transfer knowledge into new contexts.

Analysing, synthesising and evaluating reasoning and procedures

This element involves students in applying logic and reasoning, drawing conclusions and designing a course of action and evaluating procedures and outcomes. Students consider and assess the logic and reasoning behind choices, they differentiate components of decisions made and actions taken and assess ideas, methods and outcomes against criteria. In summary, analysing primarily consists of:

- apply logic and reasoning
- draw conclusions and design a course of action
- evaluate procedures and outcomes.

Critical and Creative Thinking Learning Continuum

Inquiring – identifying, exploring and organising information and ideas

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
Pose questions					
<p>pose factual and exploratory questions based on personal interests and experiences</p> <p>Examples</p> <ul style="list-style-type: none"> asking why events make people happy or sad <p>English ACELT1783 Science ACSIS014 History ACHHS017</p>	<p>pose questions to identify and clarify issues, and compare information in their world</p> <p>Examples</p> <ul style="list-style-type: none"> asking how and why certain actions and events occurred <p>English ACELA1589 Mathematics ACMSP048 Science ACSHE034 History ACHHS049</p>	<p>pose questions to expand their knowledge about the world</p> <p>Examples</p> <ul style="list-style-type: none"> asking who, when, how and why about a range of situations and events <p>English ACELA1488 Mathematics ACMSP068 Science ACSIS064 History ACHHS083</p>	<p>pose questions to clarify and interpret information and probe for causes and consequences</p> <p>Examples</p> <ul style="list-style-type: none"> inquiring into cause and effect of significant events in their lives <p>English ACELA1517 Mathematics ACMSP118 Science ACSIS231 History ACHHS119</p>	<p>pose questions to probe assumptions and investigate complex issues</p> <p>Examples</p> <ul style="list-style-type: none"> questioning causes and effects of local and world events <p>English ACELT1628 Science ACSIS139 History ACHHS150</p>	<p>pose questions to critically analyse complex issues and abstract ideas</p> <p>Examples</p> <ul style="list-style-type: none"> questioning to uncover assumptions and inferences and provoke debate about global events <p>English ACELT1812 Mathematics ACMSP228 Science ACSIS198 History ACHHS184</p>
Identify and clarify information and ideas					
<p>identify and describe familiar information and ideas during a discussion or investigation</p> <p>Examples</p>	<p>identify and explore information and ideas from source materials</p> <p>Examples</p>	<p>identify main ideas and select and clarify information from a range of sources</p> <p>Examples</p>	<p>identify and clarify relevant information and prioritise ideas</p> <p>Examples</p>	<p>clarify information and ideas from texts or images when exploring challenging issues</p> <p>Examples</p>	<p>clarify complex information and ideas drawn from a range of sources</p> <p>Examples</p>

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
<ul style="list-style-type: none"> identifying what led to a decision being made Science AC SIS233 History ACHHS019 English ACE LA1786 Mathematics ACMMG007	<ul style="list-style-type: none"> exploring patterns and similarities English ACE LA1460 Mathematics ACMNA026 Science AC SIS038 History ACHHK051	<ul style="list-style-type: none"> establishing a sequence during investigation of artefact, image or text English ACE LT1602 Mathematics ACMMG084 Science AC IS216 History ACHHSK084	<ul style="list-style-type: none"> giving reasons for a preferred pathway when problem solving English ACE LT1602 Mathematics ACMMG142 Science AC SHE081 History ACHHS121	<ul style="list-style-type: none"> identifying the strengths and weaknesses of different approaches English ACE LA1548 Mathematics ACMSP206 Science AC SIS144 History ACCHS154	<ul style="list-style-type: none"> scrutinising contrasting positions offered about events or findings English ACE LY1749 Mathematics ACMSP246 Science AC SIS203 History ACHHS186
Organise and process information					
gather similar information or depictions from given sources Examples <ul style="list-style-type: none"> collecting a variety of representations of particular action(s) English ACE LA1430 Science ACSSU005 History ACHHS019	organise information based on similar or relevant ideas from several sources Examples <ul style="list-style-type: none"> finding examples of kindness or change in several sources English ACE LA1469 Mathematics ACMMG037 Science AC ISIS040 History ACHHK050	collect, compare and categorise facts and opinions found in a widening range of sources Examples <ul style="list-style-type: none"> processing relevant depictions of an event English ACE LA1489 Mathematics ACMSP096 Science AC SIS054 History ACHHS084	analyse, condense and combine relevant information from multiple sources Examples <ul style="list-style-type: none"> establishing opinion versus fact in literature and film English ACE LY1708 Mathematics ACMMG141 Science AC SIS090 History ACHHS122	critically analyse information and evidence according to criteria such as validity and relevance Examples <ul style="list-style-type: none"> scrutinising the accuracy of depicted events English ACE LT1626 Mathematics ACMSP205 Science AC SIS141 History ACCHS151	critically analyse independently sourced information to determine bias and reliability Examples <ul style="list-style-type: none"> critiquing data from known and unknown sources English ACE LT1639 Mathematics ACMSP253 Science AC SIS199 History ACCHS189

Generating ideas, possibilities and actions

Level 1 Typically by the end of Foundation Year, students:	Level 2 Typically by the end of Year 2, students:	Level 3 Typically by the end of Year 4, students:	Level 4 Typically by the end of Year 6, students:	Level 5 Typically by the end of Year 8, students:	Level 6 Typically by the end of Year 10, students:
Imagine possibilities and connect ideas					
<p>use imagination to view or create things in new ways and connect two things that seem different</p> <p>Examples</p> <ul style="list-style-type: none"> changing the shape or colour of familiar objects <p>Mathematics ACMMG008</p>	<p>build on what they know to create ideas and possibilities in ways that are new to them</p> <p>Examples</p> <ul style="list-style-type: none"> using a flow chart when plotting actions <p>English ACELT1591 Mathematics ACMSP047 Science ACSIS037 History ACHHS052</p>	<p>expand on known ideas to create new and imaginative combinations</p> <p>Examples</p> <ul style="list-style-type: none"> exchanging or combining ideas using mind maps <p>English ACELT1607 Mathematics ACMMG088 Science ACSIS053</p>	<p>combine ideas in a variety of ways and from a range of sources to create new possibilities</p> <p>Examples</p> <ul style="list-style-type: none"> by matching ideas from science and history <p>English ACELT1618 Mathematics ACMSP147 Science ACSIS107</p>	<p>draw parallels between known and new ideas to create new ways of achieving goals</p> <p>Examples</p> <ul style="list-style-type: none"> using patterns and trends in Mathematics to arrive at possible solutions in other learning areas <p>Mathematics ACMMG197 Science ACSHE134 History ACHHS148</p>	<p>create and connect complex ideas using imagery, analogies and symbolism</p> <p>Examples</p> <ul style="list-style-type: none"> developing hypotheses based on known and invented models and theories <p>English ACELY1756 Mathematics ACMNA239 History ACHHS192</p>
Consider alternatives					
<p>suggest alternative and creative ways to approach a given situation or task</p> <p>Examples</p> <ul style="list-style-type: none"> considering alternative uses for a familiar product 	<p>identify and compare creative ideas to think broadly about a given situation or problem</p> <p>Examples</p> <ul style="list-style-type: none"> considering ways of conserving water in their environment 	<p>explore situations using creative thinking strategies to propose a range of alternatives</p> <p>Examples</p> <ul style="list-style-type: none"> asking 'What if..?' 	<p>identify situations where current approaches do not work, challenge existing ideas and generate alternative solutions</p> <p>Examples</p> <ul style="list-style-type: none"> examining the environmental impact of transporting goods 	<p>generate alternatives and innovative solutions, and adapt ideas, including when information is limited or conflicting</p> <p>Examples</p> <ul style="list-style-type: none"> negotiating a solution to a community dispute 	<p>speculate on creative options to modify ideas when circumstances change</p> <p>Examples</p> <ul style="list-style-type: none"> submitting designed and developed ideas or products for further investigation

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
English ACELY1651 Mathematics ACMMG006 History ACHHS020	English ACELLY1665 Mathematics ACMSP050 Science AC SIS042 History ACHHS052	English ACELY1694 Mathematics ACMSP095 Science AC SIS065 History ACHHK080	English ACELT1800 Science AC SIS104 History ACHHS123	English ACELY1736 Mathematics ACMMG199 Science AC SHE135 History ACHHS155	History ACHHS193
Seek solutions and put ideas into action					
<p>predict what might happen in a given situation and when putting ideas into action</p> <p>Examples</p> <ul style="list-style-type: none"> suggesting different endings to a story <p>English ACELY1650</p>	<p>investigate options and predict possible outcomes when putting ideas into action</p> <p>Examples</p> <ul style="list-style-type: none"> exploring identified problems and ways of overcoming them <p>English ACELY1789 Mathematics ACMSP024 Science AC SIS041 History ACHHK045</p>	<p>experiment with a range of options when seeking solutions and putting ideas into action</p> <p>Examples</p> <ul style="list-style-type: none"> using a graphic organiser to suggest alternative solutions <p>English ACELA1496 Mathematics ACMNA082 Science AC SIS069</p>	<p>assess and test options to identify the most effective solution and to put ideas into action</p> <p>Examples</p> <ul style="list-style-type: none"> using role plays to test and refine approaches when initial ideas do not work <p>English ACELT1800 Mathematics ACMNA122 Science AC SIS104</p>	<p>predict possibilities, and identify and test consequences when seeking solutions and putting ideas into action</p> <p>Examples</p> <ul style="list-style-type: none"> using information from a range of sources to predict results from an inquiry or investigation <p>English ACELA1548 Mathematics ACMSP204 Science AC SIS140 History ACHHS155</p>	<p>assess risks and explain contingencies, taking account of a range of perspectives, when seeking solutions and putting complex ideas into action</p> <p>Examples</p> <ul style="list-style-type: none"> expressing difficult concepts digitally, kinaesthetically or spatially <p>English ACELY1756 Mathematics ACMSP225 Science AC SIS205 History ACHHS190</p>

Reflecting on thinking and processes

Level 1 Typically by the end of Foundation Year, students:	Level 2 Typically by the end of Year 2, students:	Level 3 Typically by the end of Year 4, students:	Level 4 Typically by the end of Year 6, students:	Level 5 Typically by the end of Year 8, students:	Level 6 Typically by the end of Year 10, students:
Think about thinking (metacognition)					
<p>describe what they are thinking and give reasons why</p> <p>Examples</p> <ul style="list-style-type: none"> drawing on a past experience to explain their thinking <p>English ACELT1783</p>	<p>describe the thinking strategies used in given situations and tasks</p> <p>Examples</p> <ul style="list-style-type: none"> describing how they approach tasks when they are not sure what to do <p>English ACELT1590 Mathematics ACMNA017 Science ACSIS214</p>	<p>reflect on, explain and check the processes used to come to conclusions</p> <p>Examples</p> <ul style="list-style-type: none"> explaining ways they check their thinking and deal with setbacks <p>English ACELY1687 Mathematics ACMSP094 Science ACSIS216 History ACHHS085</p>	<p>reflect on assumptions made, consider reasonable criticism and adjust their thinking if necessary</p> <p>Examples</p> <ul style="list-style-type: none"> identifying where methods of investigation and inquiry could be improved <p>English ACELY1715 Mathematics ACMNA099 Science ACSIS108 History ACHHS119</p>	<p>assess assumptions in their thinking and invite alternative opinions</p> <p>Examples</p> <ul style="list-style-type: none"> reflecting on the accuracy of their own and others' thinking <p>English ACELY1731 Science ACSIS145 History ACCHS155</p>	<p>give reasons to support their thinking, and address opposing viewpoints and possible weaknesses in their own positions</p> <p>Examples</p> <ul style="list-style-type: none"> reflecting on justifications for approaching problems in certain ways <p>English ACELT1640 Mathematics ACMSP247 Science ACSHE194 History ACHHS188</p>
Reflect on processes					
<p>identify the main elements of the steps in a thinking process</p> <p>Examples</p> <ul style="list-style-type: none"> identifying steps involved in daily routines 	<p>outline the details and sequence in a whole task and separate it into workable parts</p> <p>Examples</p> <ul style="list-style-type: none"> using logic to sort information in graphic organisers or musical segments 	<p>identify pertinent information in an investigation and separate into smaller parts or ideas</p> <p>Examples</p> <ul style="list-style-type: none"> examining the significant aspects of an historical event 	<p>identify and justify the thinking behind choices they have made</p> <p>Examples</p> <ul style="list-style-type: none"> explaining why particular musical notations or mathematical sequences were 	<p>evaluate and justify the reasons behind choosing a particular problem-solving strategy</p> <p>Examples</p> <ul style="list-style-type: none"> choosing images that best represent an idea or product 	<p>balance rational and irrational components of a complex or ambiguous problem to evaluate evidence</p> <p>Examples</p> <ul style="list-style-type: none"> exploring reasons for selecting or rejecting patterns or groupings to represent an idea

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
English ACELY1648	English ACELT1592 Mathematics ACMMG044 Science ACSSU030	English ACELT1592 Mathematics ACMNA079 Science ACSSU073 History ACHHK080	selected English ACELY1709 Mathematics ACMNA128 Science AC SIS110 History ACHHK115	English ACELY1810 Mathematics ACMSP168 Science AC SIS131 History ACHHS154	English ACELA1572 Mathematics ACMSP253 Science AC SIS206 History ACHHS184
Transfer knowledge into new contexts					
connect information from one setting to another Examples <ul style="list-style-type: none"> giving reasons for rules at home and school English ACELY1648	use information from a previous experience to inform a new idea Examples <ul style="list-style-type: none"> applying reasons for actions previously given to similar new situations English ACELY1666 Mathematics ACMNA028 Science ACSSU031 History ACHHK046	transfer and apply information in one setting to enrich another Examples <ul style="list-style-type: none"> using visual or numerical representations to clarify information English ACELY1691 Mathematics ACMMG090 Science ACSHE050	apply knowledge gained from one context to another unrelated context and identify new meaning Examples <ul style="list-style-type: none"> using statistics to interpret information from census data about migration English ACELT1616 Mathematics ACMNA133 Science ACSHE220	justify reasons for decisions when transferring information to similar and different contexts Examples <ul style="list-style-type: none"> explaining choices, such as the use of a soundtrack to accompany a performance English ACELY1735 Mathematics ACMMG202 Science AC SIS234 History ACCHS153	identify, plan and justify transference of knowledge to new contexts Examples <ul style="list-style-type: none"> demonstrating ways ideas gained in an historical or literary context could be applied in a different scenario English ACELA1565 Mathematics ACMNA238 Science ACSHE158

Analysing, synthesising and evaluating reasoning and procedures

Level 1 Typically by the end of Foundation Year, students:	Level 2 Typically by the end of Year 2, students:	Level 3 Typically by the end of Year 4, students:	Level 4 Typically by the end of Year 6, students:	Level 5 Typically by the end of Year 8, students:	Level 6 Typically by the end of Year 10, students:
Apply logic and reasoning					
<p>identify the thinking used to solve problems in given situations</p> <p>Examples</p> <ul style="list-style-type: none"> asking how dilemmas in narratives were solved <p>English ACELA1786 Mathematics ACMNA289 History ACHHS021</p>	<p>identify reasoning used in choices or actions in specific situations</p> <p>Examples</p> <ul style="list-style-type: none"> asking what course of action was most logical and why <p>English ACELA1462 Science ACSHE035 History ACHHS051</p>	<p>identify and apply appropriate reasoning and thinking strategies for particular outcomes</p> <p>Examples</p> <ul style="list-style-type: none"> using logical or predictive reasoning when problem solving <p>English ACELY1690 Mathematics ACMNA076 Science ACSIS057</p>	<p>assess whether there is adequate reasoning and evidence to justify a claim, conclusion or outcome</p> <p>Examples</p> <ul style="list-style-type: none"> comparing and contrasting interpretations of information or image <p>English ACELT1614 Science ACSIS221</p>	<p>identify gaps in reasoning and missing elements in information</p> <p>Examples</p> <ul style="list-style-type: none"> finding wrong rationales or assumptions made and/or illogical conclusions drawn when seeking outcomes <p>English ACELY1730 Science ACSIS234 History ACHHS152</p>	<p>analyse reasoning used in finding and applying solutions, and in choice of resources</p> <p>Examples</p> <ul style="list-style-type: none"> testing propositions to identify reliability of data and faulty reasoning when designing new products <p>English ACELY1754 Mathematics ACMMG244 Science ACSIS165 History ACHHS187</p>
Draw conclusions and design a course of action					
<p>share their thinking about possible courses of action</p> <p>Examples</p> <ul style="list-style-type: none"> discussing various ways people could have acted 	<p>identify alternative courses of action or possible conclusions when presented with new information</p> <p>Examples</p> <ul style="list-style-type: none"> describing how an outcome might change if a character acted differently 	<p>draw on prior knowledge and use evidence when choosing a course of action or drawing a conclusion</p> <p>Examples</p> <ul style="list-style-type: none"> assessing the worth of elements of a planned approach or solution 	<p>scrutinise ideas or concepts, test conclusions and modify actions when designing a course of action</p> <p>Examples</p> <ul style="list-style-type: none"> charting progress of an argument or investigation and proposing 	<p>differentiate the components of a designed course of action and tolerate ambiguities when drawing conclusions</p> <p>Examples</p> <ul style="list-style-type: none"> assessing the success of a formula for a product or management of an 	<p>use logical and abstract thinking to analyse and synthesise complex information to inform a course of action</p> <p>Examples</p> <ul style="list-style-type: none"> using primary or secondary evidence to support or refute a conclusion

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Typically by the end of Foundation Year, students:	Typically by the end of Year 2, students:	Typically by the end of Year 4, students:	Typically by the end of Year 6, students:	Typically by the end of Year 8, students:	Typically by the end of Year 10, students:
English ACELY1646 Mathematics ACMNA005	English ACELA1469 Mathematics ACMNA015 Science AC SIS025 History ACHHK046	English ACELT1604 Mathematics ACMNA073 Science ACSHE062	alternatives English ACELY1801 Mathematics ACMNA103 Science AC SIS218 History ACHHS119	event English ACELY1732 Mathematics ACMSP171 History ACHHS155	English ACELY1750 Mathematics ACMMG223 Science AC SIS172 History ACHHS189
Evaluate procedures and outcomes					
check whether they are satisfied with the outcome of tasks or actions Examples <ul style="list-style-type: none"> asking whether their work sounds and looks right and makes sense 	evaluate whether they have accomplished what they set out to achieve Examples <ul style="list-style-type: none"> asking whether they listened to a peer's answer well or used a suitable procedure English ACELY1669 Science AC SIS212	explain and justify ideas and outcomes Examples <ul style="list-style-type: none"> evaluating whether specified materials or calculations were appropriate for set goals or evidence presented English ACELY1695 Mathematics ACMSP097 Science AC SIS058 History ACHHS216	evaluate the effectiveness of ideas, products, performances, methods and courses of action against given criteria Examples <ul style="list-style-type: none"> assessing their own and peer responses to an issue, performance or artefact English ACELA1518 Mathematics ACMMG115 History ACHHS216	explain intentions and justify ideas, methods and courses of action, and account for expected and unexpected outcomes against criteria they have identified Examples <ul style="list-style-type: none"> evaluating whether a chosen investigation method withstands scrutiny English ACELA1543 Science AC SIS124 History ACHHS151	evaluate the effectiveness of ideas, products and performances and implement courses of action to achieve desired outcomes against criteria they have identified Examples <ul style="list-style-type: none"> strengthening a conclusion, identifying alternative solutions to an investigation English ACELY1752 Mathematics ACMSP283 Science AC SIS171 History ACHHS188