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Acronyms

ACSA	Australian Curriculum Studies Association
ASCD	Association for Supervision and Curriculum Development
CMC	computer mediated communication
CLO	Core Learning Outcome
CORS	Centre on Organization and Restructuring of Schools
DDG	Deputy Director-General of Education Queensland
EA	Education Advisor
ELA	English Language Arts
ELT	effective learning and teaching
EQ	Education Queensland
FLIP	Further Literacy Inservice Project
HPCT	Hierarchical Perceptual Control Theory
ICTs	information and communication technologies
IDEAS	Innovative Designs for Enhancing School Achievement
IT	information technology
KAM	Key Abilities Model
KLA	Key Learning Area
OBE	outcome-based education
PCT	Perceptual Control Theory
QBSSSS	Queensland Board of Senior Secondary School Studies
QSA	Queensland Studies Authority
QSCC	Queensland School Curriculum Council
QSE-2010	Queensland State Education - 2010
QSRLS	Queensland School Reform Longitudinal Study
RTP	Responsible Thinking Process
SRLS	School Reform Longitudinal Study (same as QSRLS)
UNESCO	United Nations Educational, Scientific and Cultural Organisation

Appendix

Some of the guidelines and resources developed during 2002-2003 (including a genre guide developed in 1999), to assist schools to ‘flesh out’ the Key Abilities Model.

CURRICULUM OVERVIEW ~ THE KEY ABILITIES MODEL

The Key Abilities Model provides research-based guidelines for curriculum programming, assessment and reporting, learning and teaching, and school organisation, to create rich learning environments which closely reflect the known principles of effective learning and teaching, and promote meaningful and engaged learning connected to the world. The Model assists with addressing officially mandated learning outcomes or syllabus content, while supporting and tracking the development of six exit or transformational outcomes, six Key Abilities needed to prosper in complex and changing social, cultural and economic worlds. The six Key Abilities are:

- Understanding
- Multiliteracies
- Problem Solving
- Creativity
- Community Participation
- Self Management.

The Model identifies about seventy generic curriculum elements – genres and procedures which are associated with traditional disciplines and subjects, and which are general enough that they might be employed in a wide variety of teacher-directed, negotiated and student-directed activities. Along with essential understandings identified within official syllabuses, these genres and procedures constitute the generic core elements in the school curriculum program, and the easily assessable indicators of development of the Key Abilities.

The Key Abilities Model provides a coherent structure for assessing and reporting students' learning and performance through the years of compulsory schooling. In addition to the tracking of student performance on generic curriculum elements, the Key Abilities Model enables us to map or profile each student's demonstration of the Key Abilities along a continuum, with performance level statements for each of six levels. To provide more detailed information about the learning activities students have been engaged in, the Model also enables identification and reporting of performance levels for generic curriculum elements and/or particular curriculum focus areas. Learning and assessment of many of these generic curriculum elements may be supported in most year levels by the use of rubrics. These rubrics not only identify the criteria of performance for particular generic curriculum elements, but also describe the quality of the elements of performance for each criterion, along a performance continuum.

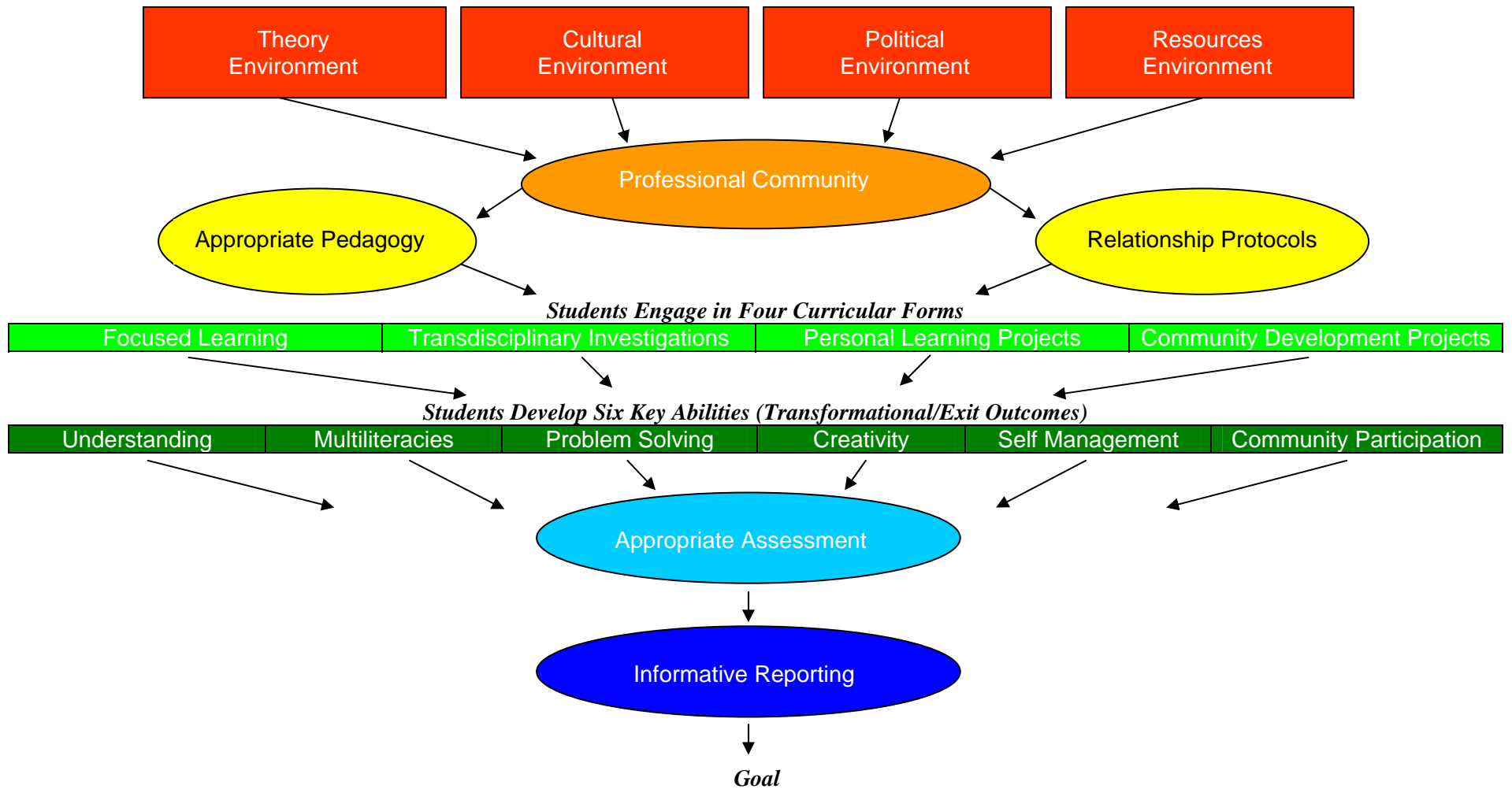
Provision of Four Curricular Forms, and their associated pedagogies, enables teachers and the school to reconcile the principles of the reform agenda focused on transformational outcomes, to the constraints of formal systemic curriculum and assessment policies. The Four Curricular Forms, or kinds of learning activities, are Focused Learning, Transdisciplinary Investigations, Personal Learning Projects, and Community Development Projects.

The distinctions between the Four Curricular Forms are more strategic, or pedagogical, than fundamental, and each overlaps and complements the others. However, each of the Four Curricular Forms has a particular significance.

1. *Focused Learning*: Subject- or content-focused learning and teaching relating to particular mandated outcomes, essential understandings and generic curriculum elements that cannot practically be learned and mastered solely in complex, transdisciplinary or real-life contexts.
2. *Transdisciplinary Investigations*: Complex, active-learning investigations addressing real-life issues, questions or purposes, and each incorporating a variety of essential understandings and generic curriculum elements from several Key Learning Areas.
3. *Personal Learning Projects*: Largely student-initiated and student-directed, purpose- and problem-based learning activities, in which the topic and the generic curriculum elements to be incorporated in the activity are negotiated with teachers by individuals and/or groups.
4. *Community Development Projects*: Real-life, on-going, multi-participant projects with consequential, public outcomes, which provide authentic contexts for complex role performance and a wide variety of identified generic curriculum elements. A few examples are: learnscaping projects (design, construction and maintenance of one or more of a wide variety of environmental enhancements or developments within or near the school grounds, such as a permaculture garden, bush regeneration, outdoor 'classroom', amphitheatre, bush food garden, organic market garden, maze...), a small commercial enterprise, commercial community newspaper, a recycling program, building construction, establishing an aquaculture farm, a school shop, adopt-a-grandparent projects.

There are a variety of ways in which teachers might allocate time to each of these curricular forms. The important thing is that transformational outcomes are supported and assessed, and that each of the Four Curricular Forms receives explicit recognition as a vital part of every student's curriculum program.

KEY ABILITIES MODEL OVERVIEW OF SCHOOL LIFE



Individuals who: (1) are constantly authenticating or reconstructing their beliefs through experience and reflection; (2) are capable of using, critically analysing and transcending given texts, contexts, systems and structures; (3) are able to prosper in changeable social, cultural and economic environments; (4) have recognised and developed passions, talents and capacities which they willingly contribute to productive and cooperative purposes; (5) have a strong sense of identity, autonomy and self-efficacy; and (6) have a genuine respect for themselves and others.

Figure 11: Key Abilities Model Overview of School Life

GENERIC CURRICULUM ELEMENTS

Four Curricular Forms have place within the Key Abilities Model school curriculum, namely, Focused Learning, Transdisciplinary Investigations, Personal Learning Projects and Community Development Projects.

All mandated curriculum outcomes are mapped within Focused Learning and/or Transdisciplinary Investigations. However, *curriculum is organised in such a way as to maximise the mastery of generic curriculum elements* identified within curriculum outcomes and 'clumpings' of curriculum outcomes, and within Personal Learning Projects and Community Development activities, as well as the development of transformational or exit outcomes (Key Abilities).

The generic elements of curriculum are also the generic elements of life. They are practices or genres that foster critical thinking, the art of learning, and people's ability to pursue their interests and purposes. They involve students in having purposeful experiences in the material and social world, and in that context using language and intuitive processes to:

- (1) build cognitive structures (words, concepts, theories, attitudes),**
- (2) explain or communicate them,**
- (3) apply them in actions,**
- (4) test or critique the meaning or value of such constructions, whether produced by themselves or others, and**
- (5) adjust or challenge them, if found inadequate or unworkable.**

Such curriculum elements are 'generic' in that they are independent of particular subject matter. Within Transdisciplinary Investigations, the subject matter to be associated with the generic curriculum elements is influenced by the conceptual understandings identified in systemic policy as being essential. Generic curriculum elements addressed within any particular Personal Learning Project are negotiated by student and teacher, as is the problem or purpose (subject matter) to be explored. Within Community Development activities, teachers select generic curriculum elements appropriate to the particular project and the variety of tasks and roles students might take within it.

Generic curriculum elements are mostly assessed with the aid of rubrics, which identify the performance criteria or desirable features, as well as describing the actual performance standards relating to each criterion. Many generic curriculum elements are used to track the development along a continuum of six exit outcomes or Key Abilities: Understanding, Multiliteracies, Problem Solving, Creativity, Self Management, and Community Participation (or 'essential learnings').

The chart below shows in white those Year Levels (in the Queensland primary school context) at which particular generic curriculum elements are suitable. The letters 'N', 'P', 'S' and 'T' show where particular generic curriculum elements are relevant to Transdisciplinary Investigations in 'Our Natural World', 'Our Personal World', 'Our Social World' and 'Our Technological World', respectively (on the Framework of Transdisciplinary Investigations – Qld example). This list of generic curriculum elements is neither exhaustive, nor entirely prescriptive. However, the letters appearing in red do indicate the Transdisciplinary Investigations in which certain generic curriculum elements *should* be addressed.

The Related Key Abilities section of the chart shows in black those Key Abilities for which a generic curriculum element, *or aspects of it*, serves as an indicator. Related Key Abilities shaded in grey are some of those for which the generic curriculum element *may* serve as an indicator, *depending on the context* in which the generic curriculum element is demonstrated. For example, a letter to the editor serves as an indicator of Multiliteracies (the rubric as a whole) and Understanding (one criterion on the rubric). If the letter addresses a current issue and is actually sent to a newspaper, it would also serve as an indicator of Community Participation.

GENERIC CURRICULUM ELEMENTS

CORE LEARNING	APPROPRIATE YEAR LEVELS										RELATED KEY ABILITIES					
	1	2	3	4	5	6	7	8	9	10	U	M	P	C	S	CP
Biography				S	NS	S	NS									
Budget			P	PS	NT	PT	N									
Dance continuum				S	N											
Design, make, appraise	T	PS	T	ST	T	T	T									
Discussion - written					S	T	PS									
Display advertisement				ST		P										
Dramatic performance	S			S	N	S	PS									
Email			NP	P		NP	PT									
Event / Project planning & management				ST	T											
Event program				S												
Explanation – written				N	P	PS	NP									
Explanatory diagram / Design plan	T	T	NT		NT	NS	NP									
Fictional literature – poetry / song lyrics				S	NP		S									
Fictional literature – short story	S	PS	PS	PS	NP	PS	NP									
Film making – documentary							P									
Graph			NP	P	NP	NP	NP									
Historical research	S	S	T	NS	NP	S	S									
Instructions – written			NP	PT	NT	T	N									
Internet literacy			P	NP	PT	PS	PS									
Interview		NP	P	N	PS	PS	PS									
Letter of invitation				NS	PS	PS	PS									
Letter of persuasion (exposition)				NP	T	ST	PS									
Letter of thanks				N		ST	S									
Letter to the editor						S	PS									
Mapping			N	N	NP	NS	NP									
Meeting procedure				S	S		S									
Needs audit / analysis	N	NP	N	T	PT	T	S									
Newspaper report						S	PS									
Numeracy practices																
Oral expression of thanks				S	PS	ST	S									
Oral presentation (possibly incl. Multimedia)	NP	NP	N	NS	P		T									
Oral visitor introduction	ST			S	PS	ST	S									
Personal / Project recount		NS	NS	T			P									
Personal resume																
Press release																
Promotional display	N	P		S		P										
Promotional flier / leaflet				ST	P		PS									
Promotional poster	P	P	PS	NS	S	PS	PT									
Proposal submission				S	T	S	PS									
Referencing						S	S									
Review / Evaluation			PS	NS	NS	NP	NS									
Scale model				S	NT	T	NS									
Scientific experiment	NT	NP	NT	T	N	NT	NT									
Scientific experiment report			NT	T	N	NT	NT									
Social investigation report			PS	PS	NP	PS	NS									
Spreadsheet (eg. MS Excel)			S	P	N	N	NS									
Summary / Precis		N	N	N	PS	NS	PS									
Survey / Questionnaire	S	PS	PS	PS	NP	PS	NS									
Table (see also Spreadsheet)		T	PS	ST	NP	PS	NT									
Technical description			ST	T	T	T	P									
Timeline	S	P	T	N	NS	N	N									
Visual art / Illustration continuum	NP	NP		S	NP	S	S									
Webpage making (eg. using MS FrontPage)			PS		P	NP	PS									
Word processing (eg. MS Word)			PS	PS	P	PS	PS									

N = Our Natural World P = Our Personal World S = Our Social World T = Our Technological World
 Red = Essential Black = Relevant, but discretionary

UNDERSTANDING AS A PEDAGOGICAL GOAL¹

Authentic learning involves actively building new understandings, *not on top of existing beliefs and ideas, but by changing existing beliefs and ideas*. Conceptual change follows active performance in a variety of challenging situations that demand understanding, *and critical reflection on the incompatibility of existing conceptions* with clarified or revised purposes, with other existing conceptions, or with new ideas and the evidence of experience.

Why would students (or anybody) consider alternatives to a view they hold, *when they are unconvinced of the inadequacy of their conceptions*? Students will only create new understandings if:

1. they understand *why* new logical or experiential evidence represents a contradiction of some aspect of their existing conceptions; and
2. *it is important to them* to resolve the contradiction or reduce inconsistencies in their beliefs.

Transdisciplinary Investigations are structured in such a way as to lend themselves to students' making, critiquing and re-making of meaning:

1. They deal with authentic issues that require students to gather, critically examine, and possibly challenge others' ideas (meanings) about the situation.
2. They deal with problems or purposes that will potentially be of enough interest to many students that *it will be important to them* to revise their own inadequate or inconsistent beliefs and ideas.
3. They incorporate generic procedures that are central to various disciplines and are transferable to other contexts.
4. They focus learning for understanding on just a few identified critical issues or concepts.
5. They engage students from beginning to end in a variety of generic curriculum elements or performances that demand understanding of identified concepts.
6. They involve various forms of authentic (contextualised) assessment of student performance, including demonstrations of understanding in the context of performances. Many rubrics that might be used for assessment of, and feedback on generic curriculum elements, include a criterion that relates to level of understanding demonstrated. Transdisciplinary Investigations should also involve regular opportunities for student reflection on their own learning.

Since most students expect learning to primarily involve memorisation or gaining a sense of the subject matter, they might not know how to best take advantage of their engagement in performances designed to help them reconstruct their own understandings. We need to emphasise through our teaching that students are not 'a fixed set of beliefs', but can be in charge of their own minds and lives. We need to show them *how* they can construct more viable beliefs and understandings when their existing ones prove inadequate. Additional ideas for teaching for understanding include the following:

1. ask questions to elicit students' conceptions *and misconceptions*;
2. encourage students to elaborate on *the thinking behind their misconceptions*, rather than being pre-occupied with eliciting or giving 'right' definitions or answers;
3. encourage students to challenge their ideas and explanations, and those of others, and show them *how* to support or critique them *on the basis of logical and/or experiential evidence*;
4. *use activities and/or experiments to create conceptual conflict* (e.g. experiments whose results are likely to differ from students' predictions);
5. use explanations from textbooks, and a variety of teacher constructed explanations, not to define or explain the 'right' answer, but to highlight, rather than gloss over, *the contrast between logical and/or experiential evidence and students' misconceptions*; and
6. deliberately revisit concepts from a variety of 'angles', and *give students repeated challenges to apply new concepts* to explain real world phenomena, or resolve problem situations.

¹ Ideas presented here are drawn from many sources, amongst them:

Perkins, D. & Blythe, T. 1994, 'Putting understanding up front', *Educational Leadership*, vol. 51, pp. 4-7.

Roth, K. & Anderson, C. 1988, 'Promoting conceptual change learning from science textbooks', in P. Ramsden (ed.), *Improving Learning: New Perspectives*, Kogan Page, London, pp. 109-141.

Strike, K. & Posner, G. 1985, 'A conceptual change view of learning and understanding', in L. West & A. Pines (eds.), *Cognitive Structure and Conceptual Change*, Academic Press, pp. 211-223.

A FRAMEWORK OF TRANSDISCIPLINARY INVESTIGATIONS (Qld example)

Our *transdisciplinary* approach to curriculum integration dissolves the 'body of knowledge' boundaries between the disciplines, and makes use of generic curriculum elements commonly associated with various disciplines to shape curriculum to support student engagement in productive citizenship and construction and reconstruction of meaning through investigation of real-world issues, questions and problems.

	OUR PERSONAL WORLD	OUR TECHNOLOGICAL WORLD	OUR SOCIAL WORLD	OUR NATURAL WORLD
	These investigations explore the ways in which our personal identities, actions, relationships, growth and development influence our individual and collective wellbeing. Students explore varied dimensions of Our Personal World , including the physical, emotional, mental, conative and spiritual.	Investigations of Our Technological World explore the energies, forces and properties of the material world and the built environment in which we live. Students explore issues concerning the sustainable use of energy and the Earth's material resources, and how important is the search for more effective technologies for harnessing them.	These investigations explore the construction and diversity of Our Social World in local and global contexts, and explore the cultural significance of place. Students build an understanding of changes and continuities in society over time, particularly with regard to citizenship, government, and people's access to resources and power.	These investigations explore how the living and non-living components of nature interact to form our diverse and complex universe. Students come to understand how living things function and interact with other components of the world. They learn to identify how we can better manage the resource that is Our Natural World .
Year 1	<i>How Can We Make Places Healthy & Safe?</i> PH1.1, 1.3, 1.5, 2.3, 2.5 SRP1.3, 1.5 All Level 1 English CLOs	<i>Using the World Around Us to Make Things</i> EC1.1, 1.2 MAT1.1, 1.2 NPM1.1, 1.3 SYS1.1, 1.2 TP1.1, 1.2, 1.3 All L1 English CLOs	<i>What Can Families Be Like?</i> TCC1.1, 1.2, 1.4 SRP1.4 PD1.2, 1.4 INF1.1, 1.2 CI1.1, 1.2, 1.3, 1.4, 2.2 All L1 English CLOs	<i>Diversity and Interdependence</i> SS1.1 LL1.1, 1.2 SRP1.1 EB1.1, 1.2 PS1.1, 1.2, 1.3, 1.4, 1.5 All L1 English CLOs
Year 2	<i>What Kind of Me Would I Like to Be?</i> PH1.2, 1.4, 2.2 PD1.1, 1.3, 2.1, 2.3 C11.5 INF2.1, 2.2 All L1/L2 English CLOs	<i>Making Toys & Games from the World Around Us</i> EC1.3, 2.1 NPM1.2, 2.1 SS1.3, 2.1 TP1.4, 2.1 SYS2.1, 2.2 MAT2.1, 2.2 All L1/L2 English CLOs	<i>Why Do Different Groups Do Things Differently?</i> TCC1.3, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5 CI2.4, 2.5 SRP1.2, 2.4 All L1/L2 English CLOs	<i>Can We Use Paper Without Damaging the Earth?</i> EB1.3, 2.3 LL1.3, 2.1 SS1.2 PS2.2, 2.3, 2.5 SRP2.1, 2.2 All L1/L2 English CLOs
Year 3	<i>How Do Animals & People Stay Healthy?</i> PH2.1, 2.4, 3.1 PD2.2, 2.4 LL2.2(animals) All L2 English CLOs	<i>Keeping Warm, Keeping Cool</i> EC2.2, 2.3 SS2.2, 2.3 NPM2.2, 2.3 TP2.2, 2.3, 2.4 All L2 English CLOs	<i>What Makes a Good Place to Live?</i> PS2.1 CI2.1, 2.3 SRP2.3, 2.5 All L2 English CLOs	<i>How Does My Garden Grow?</i> EB2.1, 2.2 PS2.4 LL2.2(plants), 2.3, 3.2 All L2 English CLOs
Year 4	<i>Taking Action on Hunger and Malnutrition</i> PH3.2, 3.4 PD3.1, 3.2 All L3 English CLOs	<i>Changing Materials to Make... Dinner!</i> EC3.1, 3.2 TP3.1, 3.2 NPM3.1 MAT3.1, 3.2 SYS3.1, 3.2 All L3 English CLOs	<i>Planning an Event to Celebrate Difference</i> TCC3.3, 3.5 CI3.1, CI3.2, 3.3 INF3.1, 3.2 SRP3.3, 3.5 All L3 English CLOs	<i>Can We Minimise Environmental Disasters?</i> SS3.3 EB3.2, 3.3 PS3.1, 3.2 SRP3.1 All L3 English CLOs
Year 5	<i>Dealing with Hazards and Emergencies</i> PH3.3, 3.5 PD3.4 All L3 English CLOs	<i>How Can We Build a More Useful Landscape?</i> EC3.3 NPM3.2, 3.3 TP3.3, 3.4 All L3 English CLOs	<i>How Do People Cooperate in Societies?</i> TCC3.1, 3.2, 3.4 CI3.4, 3.5 SRP3.2, 3.4, 4.4 All L3 English CLOs	<i>How Can We Enjoy and Care for Nature?</i> SS3.1, 3.2 EB3.1 LL3.1, 3.3 PS3.3, 3.4, 3.5 All L3 English CLOs
Year 6	<i>How Can We Promote a Healthy Lifestyle?</i> PH4.2, 4.4 PD3.3, 4.3, 4.4 All L4 English CLOs	<i>How Do You Go About Building a Structure?</i> TP4.1, 4.2 NPM4.1, 4.2, 4.3 MAT4.1, 4.2 All L4 English CLOs	<i>How Can We Get Along in the Global Village?</i> TCC4.2, 4.4 INF4.1, 4.2 CI4.1, 4.3, 4.4, 4.5 SS4.1 All L4 English CLOs	<i>What's it Like in Your Part of the World?</i> SS4.2, 4.3 EB4.1, 4.2, 4.3 PS4.4 All L4 English CLOs
Year 7	<i>Dealing with Risk in Social Environments</i> PH4.1, 4.3, 4.5 PD4.1, 4.2 All L4 English CLOs	<i>How Can We Promote Sustainable Energy?</i> TP4.3, 4.4 EC4.1, 4.2, 4.3 SYS4.1, 4.2 All L4 English CLOs	<i>Can We Learn from the Past & Create the Future?</i> TCC4.1, 4.3, 4.5 CI4.2 SRP4.1, 4.2, 4.3, 4.5 All L4 English CLOs	<i>How Can We Stop Damaging Living Systems?</i> LL4.1, 4.2, 4.3 PS4.1, 4.2, 4.3, 4.5 All L4 English CLOs
	Some Core Learning Outcomes from Maths and The Arts could also be incorporated.	Some CLOs from Maths and The Arts could also be incorporated.	Some CLOs from Maths and The Arts could also be incorporated.	Some CLOs from Maths and The Arts could also be incorporated.

HOW CAN WE PROMOTE SUSTAINABLE ENERGY?

A Transdisciplinary Investigation of Our Technological World for Year 7

Our *transdisciplinary* approach to curriculum integration dissolves the 'body of knowledge' boundaries between the disciplines, and makes use of generic curriculum elements commonly associated with various disciplines to shape curriculum to support student engagement in productive citizenship and construction and reconstruction of meaning through real-world issues, questions and problems.

1. Essential Learnings & Outcomes addressed in the investigation

(Queensland example)

Science:

EC4.1 Students design and perform investigations into relationships between forces, motion and energy.

EC4.2 Students collect and present information about the transfer and transformation of energy (including potential and kinetic energy).

EC4.3 Students present alternative ways of obtaining and using energy (including energy from the sun and from fossil fuels) for particular purposes.

Technology:

TP4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.

TP4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

SYS4.1 Students identify and explain the logic of systems and sub-systems.

SYS4.2 Students incorporate feedback to refine and modify systems and/or sub-systems.

English:

Cu4.1 Students identify implied messages and draw conclusions when listening; take account of their relationship with listeners, when developing a main idea or point of view in a range of prepared and spontaneous texts.

Cu4.2 Students interpret texts considering likely purposes, audiences and implied messages; identify how construction of characters contributes to plot development in narratives; and summarise relevant information and draw conclusions from reports and expositions.

Cu4.3 Students select and organise subject matter according to purpose, text type, relationship with audience, and medium, when developing plot and characterisation in narratives and to develop a main idea or point of view with supporting details in, reports and expositions.

Op4.1 Students use and respond to patterns in generic and clause structures, extended noun groups and a range of non-verbal, spoken and auditory resources, modals, evaluative verbs and adjectives and interpret figurative language.

Op4.2 Students use patterns in generic, sentence and clause structures; interpret figurative language, symbols, modality, evaluative verbs and adjectives shot types and camera angles; and use word origins and sound, visual and meaning patterns in words.

Op4.3 Students organise and link ideas using generic structure, paragraphs, topic sentences and theme; indicate certainty using modals; elaborate ideas through dependent and independent clauses, extended noun groups, and visual resources; and use common punctuation marks and a multi-strategy approach to spelling.

Cr4.1 Students identify how the selection of subject matter, attributes, processes, gestures and voice qualities is influenced by likely characteristics of the listener and how these construct representations.

Cr4.2 Students identify how aspects of subject matter and textual resources construct representations of people, places, events and/or things to appeal to different groups; and explore how their own membership of groups influences their reading/viewing.

Cr4.3 Students choose aspects of subject matter, attributes, processes and visual resources to construct representations of people, places, events and things in ways that appeal to certain groups.

2. Relevant real-world contexts, needs, questions and/or purposes driving the investigation

Fossil fuels provide over 80% of the world's energy. These fuels, most importantly coal, oil and gas, will not last forever: they are non-renewable resources. They are also damaging to the environment in a variety of ways. There is, therefore, an increasing need to develop and promote new forms of energy.

3. Generic Curriculum Elements essential (in bold italics) to the investigation, or optional

Design, make, appraise (scale model, following production procedures, and gathering and responding to feedback when designing and applying production systems)

Email

Explanation - written

Explanatory diagram / Design plan

Graph

Information literacy (sourcing, evaluating and using the practical advice of others)

Letter of invitation

Letter of persuasion (exposition)

Oral presentation (including ICT)

Promotional flier / leaflet

Promotional poster

Scale model

Scientific experiment

Scientific experiment report

<p>Social investigation report Summary / Precís Survey / Questionnaire Table Webpage making Wordprocessing</p>
4. Understandings essential to the investigation
<p>Basic concepts and principles relating to forces and motion. Basic concepts and principles relating to energy, including its forms, sources, uses, conversion and conservation. Systems and sub-systems assist in translating design ideas into products which meet particular needs.</p>
5. Methods of assessing Generic Curriculum Elements, incl. perf. criteria and standards
<p>Generic curriculum elements in bold italics are addressed in this investigation. Inclusion of others is optional. Essential understandings, and those essential generic curriculum elements that lend themselves to assessment with rubrics or by other means, should be assessed. Assessment of optional generic curriculum elements is itself optional. For example:</p> <p>The Scientific Experiment Report Rubric is used to assess “Designing and performing scientific investigations” and “Writing a scientific investigation report”.</p> <p>The Oral / Multimedia Presentation Rubric is used to assess “Giving an oral / multimedia presentation”. This rubric also reflects student performance relating to “Sourcing and using the practical advice of others”, “Following production procedures”, and “Gathering and responding to feedback when designing and applying production systems”, as well as student understanding of how “Systems and sub-systems assist in translating design ideas into products which meet particular needs”.</p> <p>Understanding of “Basic concepts and principles relating to forces and motion” and “Basic concepts and principles relating to energy, including its sources, forms, uses, transfer and transformation” are assessed via the ‘Conclusion’ criterion of the Scientific Experiment Report Rubric, and via the ‘Understanding’ and ‘Organisation’ criteria of the Oral / Multimedia Presentation Rubric. Performance quality ratings for criteria relating to understanding also reflect teacher observations of student performance and discussions during learning activities, and student comments and ratings on self- and peer-assessment sheets.</p> <p>Other Generic Curriculum Elements are assessed similarly, or in other appropriate ways.</p>
6. Activities to support student learning
<p>STEP 1 – NEGOTIATE ISSUE (Issues in Transdisciplinary Investigations, unlike those in Personal Learning Projects, are largely teacher- and/or school-determined in order to address mandated core learning outcomes.)</p> <p>STEP 2 – CLARIFY EXPECTATIONS (Assessment requirements in Transdisciplinary Investigations, unlike those for Personal Learning Projects, can be explained as the investigation unfolds, and might only be flagged in very general terms at the commencement of the investigation.)</p> <p>STEP 3 ~ ORIENTATION Consider artistic/photographic interpretations of the energy crisis (including group work) and individually create an artistic interpretation. Decorate room and/or make collage with magazine pictures showing benefits of energy. Consider poetic and song lyric perspectives (eg. Julian Lennon, <i>Salt Water Runs in My Eyes</i>). Read some fiction or non-fiction about climate change, Greenhouse Effect, or energy crisis. Think, pair, share. What is energy? Where does it come from? What good effects does it have? What bad effects? Consider various statistics re energy crisis. Word search? Students make them, then swap and do. Crossword? Make in groups. Define the problem / identify what’s ‘known’ and what needs to be ‘known’. 5W+H – What do you know already? Questioning. Question matrix.</p> <p>STEP 4 ~ INFORMATION GATHERING Options: CD (eg. QUT, <i>Sustainability</i>), surveys, questionnaires, interviews, writing/faxing to request information, emailing, telephoning, Internet search, experiment, trial, observation, excursion (petrol company? solar powered facility or house?), invite visiting speaker (Greenpeace, the Greens, solar company or solar powered facility, petrol company), online/print encyclopaedia, videos, fiction and non-fiction texts. Survey parents re energy concerns/actions/forms now and after presentation. School energy audit? Develop a rating scale for domestic or organisation energy practices. Science experiment. Recent newspaper articles on energy crisis or alternative energy.</p> <p>STEP 5 ~ INFORMATION PROCESSING (DESIGN)</p>

Retrieval chart.

Summary.

Processing of information gathered eg. creating tables and graphs from survey.

Assumption testing. How have others seen the problem? Who benefits from the continued use of non-renewable energy? Include a kinaesthetic science experiment such as bicycle stopping distances > science reports > chart, graph, statistical analysis.

Reading and questioning texts (including songs? poems?). Think, pair, share. Who benefits? Who suffers? Who has suggested alternatives?

Brainstorm in group questions to ask visitor.

After visitor do PMI (positive, minus, interesting) or SWOT (strengths, weaknesses, opportunities, threats) analysis.

Web quest.

(Could cover Chance & Data outcomes 4C1 and 4C2.)

STEP 6 ~ APPLICATION (MAKE)

Make, apply, propose, promote.

(The following items are obviously designed then made, planned then written and sent, etc.)

Persuasive letter (to local, state or federal politician? business?)

Presentation (oral and/or multimedia) – for parents? Year 6?

Newsletter item.

Radio advertisement for solar or solar/petrol car.

Email.

Petition.

Produce posters.

STEP 7 ~ EVALUATION (APPRAISE)

Reflection, testing, consultation re suitability of proposals/solutions.

PMI or swot analysis based on:

- Did we influence anybody? Or will we? (Blue hat)
- How did you feel about the investigation unit? (Red hat)
- How did you benefit from the unit? (Yellow hat)
- How might you do things differently in future? (Green hat)

Self-assessment.

Peer-assessment.

STEP 8 ~ PRESENTATION

Include in presentation:

- graphs?
- a personally composed poem?
- a personally drawn cartoon?
- a rap song?
- a musical (recorded) collage?
- a personally created board game?
- a drawn diagram (scanned) of an alternative energy source and/or a model/diorama to scale?

(Could cover Media outcomes ME4.1, 4.2 and 4.3, and Visual Arts outcomes VA4.1, 4.2 and 4.3.)

STEP 9 ~ ASSESSMENT

See sections 4 and 5 above. Most assessment will not be chronologically the last step.

7. Resources to support student learning and teacher planning

Australian and New Zealand Solar Energy Society website, www.anzsos.org

Australian Greenhouse Office, Renewable Energy Home Page (excellent), www.greenhouse.gov.au/renewable

Blue Planet Intergalactic Rescue (interesting UK schools' project), <http://millennium-debate.org/blueplanet/bpenter.htm>

Greenpeace (Australia Pacific) Climate Change website (excellent), www.greenpeace.org.au/climate (including media releases at www.greenpeace.org.au/media/climate_archive.php)

Griffith University, *Sustainability* (a CD).

California Energy Commission, 'Energy Quest', www.energyquest.ca.gov

Infoplease.com, free online encyclopedia, www.infoplease.com (searches on force, laws of motion, energy, including types, environmental considerations, and the search for new sources)

Esso Mobil Australia's website statement of values regarding the environment, www.mobil.com.au (from Our Values drop down menu, choose Environment)

Office of Sustainable Energy (Queensland) website, www.env.qld.gov.au/sustainable_energy

Queensland Government Environmental Protection Agency, 'Power for a Sustainable Future' website, <http://www.sustainableenergy.qld.edu.au>

Renewable Revolution (a Greenpeace fact sheet downloadable in pdf format),

www.greenpeace.org.au/resources/factsheets/pdfs/renewable_revolution.pdf

Renewables in Global Energy Supply – An IEA Fact Sheet (a 12 page leaflet downloadable in pdf format),

www.iea.org/leaflet.pdf

Stop Climate Change (a Greenpeace fact sheet downloadable in pdf format),

www.greenpeace.org.au/resources/factsheets/pdfs/stop_climate_change.pdf

Sustainable Energy and Anti-Uranium Service website, www.sea-us.org.au

Sustainable Energy Industry Association (Australia) website (useful links page), www.seia.com.au

APPROPRIATE ASSESSMENT STRATEGIES

The school's program of learning is based on four distinct kinds or forms of learning activity, each of which overlaps and complements the others.

FOCUSED LEARNING: Subject- or content-focused learning and teaching targeting core learnings (understandings and generic skills and practices) identified within the syllabus that cannot practically be learned and mastered solely in complex, transdisciplinary or real-life contexts.

Appropriate Assessment: A variety of authentic (in context, rather than add-on) assessment methods is appropriate to support teacher judgements about student learning. These may include observation, performance, samples, written tasks, portfolios, discussion, self-assessment, peer-assessment, and appropriate forms of test. In demonstrating learning, students will often perform/complete generic tasks, procedures and genres from the Key Learning Area. Many of these generic curriculum elements may be assessed using rubrics (describing a developmental continuum), and serve not only as indicators of curriculum area learning, but also of one or more of the key abilities.

TRANSDISCIPLINARY INVESTIGATIONS: Complex, active-learning investigations are based on significant issues, tasks, questions or problems, each informed by syllabus learning outcomes and generic curriculum elements from several Key Learning Areas.

Appropriate Assessment: A variety of authentic (in context, rather than add-on) assessment methods is appropriate to support teacher judgements about student learning. These may include observation, performance, samples, written tasks, portfolios, discussion, self-assessment, peer-assessment, and appropriate forms of test. In pursuing investigations, students will often perform/complete generic tasks, procedures and genres from a variety of Key Learning Areas. Many of these generic curriculum elements may be assessed using rubrics (describing a developmental continuum), and serve not only as indicators of curriculum area learning, but also of one or more of the key abilities.

COMMUNITY DEVELOPMENT: Real-life, on-going, multi-participant projects with consequential, public outcomes, which provide authentic contexts for complex role performance and a wide variety of identified generic curriculum elements.

Appropriate Assessment: Where activities involve performance/completion of generic tasks, procedures and genres, these are assessed using rubrics (describing a developmental continuum), which serve as indicators of performance of one or more of the key abilities. In addition, appropriate authentic assessment methods to support teacher judgements about generic curriculum element and/or key ability performance levels may include observation of performance, samples, journals, portfolios, expert/mentor reports, discussion, self-assessment and peer-assessment.

PERSONAL LEARNING PROJECTS: Largely student-initiated and student-directed, problem-based or purpose-based learning activities, in which the topic and the generic curriculum elements to be incorporated in the project are negotiated for individuals and/or groups.

Appropriate Assessment: Performance/completion of generic tasks, procedures and genres (core learnings) are assessed using rubrics (describing a developmental continuum), which serve as indicators of performance of one or more of the key abilities. In addition, appropriate authentic assessment methods to support teacher judgements about generic curriculum element and/or key ability performance levels may include observation of performance, samples, portfolios, discussion, self-assessment and peer-assessment.

KEY ABILITY PERFORMANCES ~ Teacher: _____ Class: _____

Student Name: Blo, Jo (example)

KEY ABILITY	ELEMENTARY	DEVELOPING	CONSOLIDATING	PROFICIENT
Understanding				
Multiliteracies				
Problem Solving				
Creativity				
Self Management				
Community Participation				

Student Name:

KEY ABILITY	ELEMENTARY	DEVELOPING	CONSOLIDATING	PROFICIENT
Understanding				
Multiliteracies				
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Student Name:

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Creativity				
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