Appendix 2: The DET Quality Teaching model & water education

1. The QT Dimension of Intellectual Quality

1.1 Deep knowledge

Based on the questions 'What do we want students to learn?' and 'Why does that learning matter?' identify significant concepts for water education and relate them to the concepts and content in syllabus stage statements, outcomes, and learn about/learn to statements. For each stage, identify the specialised resources most useful in helping students build that knowledge (experts, simulated problems, excursions, real life problem solving, …)

1.2 Deep understanding

Provide models or tools to facilitate and assess deep understanding within individual lessons or activities, such as group problem solving, developing or answering probing questions, constructing reasoned arguments in support of a point of view.

1.3 Problematic knowledge

Provide resources which encourage students to construct their own knowledge or views (e.g. via experiments or problem solving), identify and challenge assumptions underlying various positions, explore different perspectives, consider various options for a solution. Examples of problematic knowledge are:

- Discussing the way that the traditional classification of water into rainwater, potable water, stormwater and wastewater tends to undermine total water cycle management (and water sensitive urban and rural design solutions);
- Considering different cultural practices and views and their implications for water conservation.

1.4 Higher-order thinking

Plan at least one significant question requiring higher-order thinking for each activity. Use Bloom's Taxonomy to frame higher-order questions and tasks, pose questions with multiple answers and request justification, provide opportunities for students to construct meaning from information (differentiating, classifying, contrasting, summarising, inferring, …), make judgements based on criteria, assemble elements into functional wholes or reorganise elements into new patterns (rearrange, plan, design …). For example:

- Consider the options for improved water conservation and catchment management in a school water action plan or in the treatment of water in new or retrofitted suburbs.

1.5 Metalanguage

In either the teacher or student notes, unpack the specialist language of the materials to build upon likely known language.

1.6 Substantive communication

Provide opportunities and reward for small group discussion and cooperative activities, pose questions that require in-depth responses and extended interaction.

(Source: DET 2003:12- 23)

2. The QT Dimension of Quality Learning Environment

2.1 Explicit quality criteria

Provide clear criteria for the quality of work expected by answering the question 'What do we expect students to produce and how well should they do it?'. Provide annotated work samples that illustrate high quality.

2.2 Engagement

Ensure resources and tasks are meaningful and interesting to students at each stage (e.g. connect with background knowledge, home and youth culture), encourage negotiation of some elements of the activities.

2.3 High expectations

Provide examples of challenging problems at each stage of learning.

2.4 Social support

Provide flexible learning tasks that allow all students to experience success. Provide activities that encourage team work, consensus building, active listening, collaboration (e.g. think-pair-share, jigsaw activities, …).

2.5 Student self regulation

Provide resources that allow choice and motivation to participate, encourage student self-evaluation.

2.6 Student direction

Provide opportunities for students to negotiate learning (e.g. alternative activities) and multiple pathways for student assessment (logbooks, presentations, performances, models, online products …).

(Source: DET 2003:26-37

3. The QT Dimension of Significance

3.1 Background knowledge

Provide guidance for teachers to pre-test student knowledge, values and skills to determine appropriate start points and ensure recognition of prior student knowledge, etc in class activities.

3.2 Cultural knowledge

Avoid stereotypes, ensure learning resources reflect diversity and the practices of various social groups, include people/events/situations from diverse cultural backgrounds as models in the materials.

3.3 Knowledge integration

Explicitly develop the interdisciplinary or cross-KLA elements of the water education materials and demonstrate this by identifying the relevant syllabus content and outcomes from several KLAs. Refer back to knowledge developed in earlier stages. Encourage cross-KLA team approach to water education activities in secondary schools.

3.4 Knowledge inclusivity

Refer to cultural knowledge, above (this element refers to teacher practice & class dynamics around the concept of cultural inclusion).

3.5 Connectedness

Make the authentic nature of the water education tasks explicit to teachers and students (e.g. consider the questions 'Why are we studying this, when would we need it? …), link to current media issues, incorporate out of school experts/expertise.

3.6 Narrative

Use multiple stories from biographies, documentaries, case studies, field reports, guest speakers, history and provide opportunities for students to construct their own (journal, portfolios, scenarios, performances).

(Source: DET 2003:40-51)

Appendix 3: Board of Studies Foundation Statements K–6

Stage 3 Water Education possibilities of HSIE and SciTech Foundation Statements

Human Society and Its Environment	**Science and Technology**
•Change and Continuity •Cultures •Environments •Social Systems and Structures	•Investigating Scientifically •Designing & Making •The Natural Environment •The Made Environment
Students analyse Australian and global environments, identifying **environmental issues and problems** and they explore ways in which individuals and groups can contribute to **solutions** for these.	Students identify, describe and evaluate **interdependent relationships** between living things and the environment within ecosystems.
They investigate human interactions with environments and recognise **ecologically sustainable development**.	They identify and describe various sources, forms, uses, transfers and changes in forms of energy… They recognise that **the Earth is the source of most materials, and resources must be managed for sustainability**.
Students recognise various beliefs and **practices** and explain how these influence interactions with environments.	Students recognise that **built environments are systems created to** meet the needs and requirements of people and communities.
They examine **decision-making processes at state** and federal levels and explain the structures, roles and responsibilities of government. They examine … the **rights and responsibilities of producers and users** of goods and services.	Students **explain how production processes have changed** over time and model systems used to manufacture products and provide services.
Students explore the **principles of Australian democracy** and explain its development over time.	Students independently **develop questions for scientific investigation**, conduct scientific investigations based on fair testing and collect, record and analyse the resulting data. They **identify trends in data, evaluate findings and prepare possible explanations**. Students use, select and evaluate equipment, computer-based technology and other resources to meet the requirements and constraints of investigations.
Students apply knowledge of participatory democracy to **formulate plans and create possible solutions illustrating fairness and social justice for school, local, national and global problems.**	
Students explain how shared culture … contributes to Australian and community identity.	Students independently plan, implement and manage the design process and evaluate the results using design criteria. They consider the implications of design and production in relation to environmental, aesthetic, cultural, ethical, safety and functional factors.
They sketch, label and use maps, applying appropriate conventions and terminology. They locate information from a variety of primary and secondary sources, presenting their findings in a range of ways.	Students select, safely use and evaluate equipment, computer-based technology and other resources to meet the requirements and constraints of design tasks.
	They identify techniques used to engage audiences and convey meaning when creating information products.

Stage 2 Water Education possibilities of HSIE and SciTech Foundation Statements

Human Society and Its Environment	**Science and Technology**
•Environments •Social Systems and Structures •Change and Continuity •Cultures	•The Natural Environment •The Made Environment •Investigating Scientifically •Designing and Making
Students identify, locate and describe natural, heritage and built features in the local area and in other parts of Australia and explain their significance and management.	Students identify and describe structures and functions in living things and how they interact with each other and their environment. Students identify features of the solar system and describe interactions that affect conditions on Earth.
Students examine roles, responsibilities, rights and the decision-making processes in schools and local government. They **participate in the planning, implementation and evaluation of school and community programs** recognising how participation in these contributes to the quality of school and community life. They examine how technologies affect the provision of goods and services, lifestyles, the environment and monetary exchange.	They identify various forms and sources of energy and identify ways in which energy causes change. They describe **how the properties of materials affect their use.** Students **identify the ways built environments, products and services are constructed or produced**. Students explore the properties and uses of both natural and made materials and components
Students explore change in communities from different perspectives and evaluate the effects of change on individuals and groups, including Aboriginal peoples, and the environment. Students explain how different cultures and traditions contribute to Australian and community identity. They examine a variety of local and other communities, investigating similarities and differences including ways of living, languages and belief systems. They locate the four compass points and other significant features on a map and develop skills to locate and evaluate information from a variety of sources. Students use a variety of texts and media to communicate information and data.	Students independently implement aspects of a scientific investigation, such as observing, questioning, predicting, testing, recording accurate results, analysing data and drawing conclusions. They demonstrate an understanding of a fair test and identify variables. Students select and safely use equipment, computer-based technology and other resources throughout the processes of investigation. Students **develop and evaluate design ideas** recognising the needs of users or audiences. They implement the design process and evaluate solutions using functional and aesthetic criteria Students select and safely use equipment, computer-based technology and other resources throughout the processes of design and production.