Focus on the Future: Opportunities for Sustainability in Western Australia

Curriculum Council Submission

CONTENTS

Preface

This submission has been prepared to provide background on how implementation of the *Curriculum Framework* has the potential to accommodate education strategies that might emerge which support sustainability as outlined in the *Focus on the Future* consultation paper**.**

Educational Changes in Western Australia

Since 1995 education in Western Australia and the development of school curriculum has been influenced by two reviews:

1. *Review of School Curriculum Development Procedures and Processes in Western Australia* (Temby Report, 1995)
2. *Post-compulsory Education Review Report: Our Youth, Our Future* (2001).

The release of the *Review of School Curriculum Development Procedures and Processes in Western Australia* (Temby Report, 1995) was instrumental in the development of the *Curriculum Framework.* The *Curriculum Framework* is currently being implemented in all schools in this state, that is, government, Independent and Catholic. The *Curriculum Framework* is to be fully implemented by 2004.

The *Curriculum Framework* provides clear statements in the form of learning outcomes about what students are expected to achieve as a result of their schooling from kindergarten to year 12. These outcomes are referred to as Overarching outcomes and Learning Area outcomes. The eight learning areas have been identified as:

- The Arts;
- English;
- Health and Physical Education,
- Languages Other Than English (LOTE);
- Mathematics;
- Science;
- Society and Environment; and
- Technology and Enterprise.

A set of core shared values has been identified and endorsed as one of the principles that underpin the *Curriculum Framework.* The set of values has been structured into five clusters of thirty-two values. Each of the eight learning area statements explicitly or implicitly endorses these values in a manner suited to the area. Systems, sectors and schools may add to this minimum set or interpret and promote values in relation to their particular school ethos or mission statement (*Curriculum Framework,* p. 8).

The Curriculum Council has recently completed the *Post-compulsory Education Review Report: Our Youth, Our Future* (2001). The results of this review will impact on curriculum development in years 11 and 12 for all students in this state.

Links to ecological sustainability

Consultation for both of the above reviews involved debate about issues to do with the environment, ecological sustainability and the place of these concepts in the curriculum for children in all years of schooling. The result of this consultation and debate is reflected in the learning outcomes and the values included in the *Curriculum Framework.*

The *Focus on the Future* consultation paper provides support for teachers and students in that it outlines:

- The Western Australian Government's position on sustainability including the definition and principles that will inform the State Sustainability Strategy;
- Some of the key concepts of sustainability; and
- The process that will be used to develop the strategy.

Introduction - Curriculum implementation in Western Australia

Curriculum Framework

In 1999 all schools in Western Australia began implementation of the *Curriculum Framework.* The *Curriculum Framework* describes what all students should know, understand, value and be able to do as a result of their learning in schools. The curriculum provided by teachers should challenge students to achieve learning outcomes, described in the *Curriculum Framework*, at the highest possible level. The main purpose of the *Curriculum Framework* is not only to describe essential learning outcomes but also to help schools and teachers to design educational programs that ensure students progress in their achievement of these outcomes.

While schools have always had some focus on the environment in their curriculum the shift in the *Curriculum Framework* is for students to develop skills, knowledge and values that are needed for them to be active, responsible citizens in their society and environment and globally. Learning about environmental responsibility has been identified throughout the *Curriculum Framework* as important learning for all students. Students are expected to know about their environment, to know how to care for it in the context of using limited and renewable resources in enterprising ways and to take appropriate action where needed. This should be at increasing levels of sophistication and achievement, from kindergarten to year 12.

Rather than being prescriptive about what must be taught, the *Curriculum Framework* is being used in schools to develop and implement teaching and learning programs according to the needs and characteristics of their students and local communities. Under this curriculum development model, schools and teachers determine the content and strategies that they consider best meet the learning needs of their students. As such, environmental programs will vary from school to school, reflecting the flexibility of the curriculum to meet the different needs of students and communities.

Post-Compulsory years 11 and 12

The post-compulsory review has recommended that students study a breadth of learning areas and outcomes. It promotes the development of generic skills and abilities in addition to specific contextualised knowledge.

The proposed list of courses of study accompanying the Post-Compulsory Education Review (PCER) includes specific courses with a direct focus on issues relevant to sustainability practices in Western Australia. The following courses of study, that are planned for development in the near future, are directly related to the education of young people in issues concerned with sustainability:

- Agriculture
- Biological Sciences
- Building and Construction
- Earth and Environmental Science
- Economics
- Geography
- Recreational and Environmental Studies
- Systems Technology

In addition other courses of study will promote and explore valuing the natural and built environment, the understandings of different groups and respecting the rights of others in the context of ecological sustainability. The development of critical thinking skills within English courses and investigation skills within Science, Society & Environment and Technology and Enterprise courses will also develop skills that support students understanding of the issues relating to ecological sustainability. Courses such as Marine and Maritime Technology will expect students to demonstrate their knowledge and values of the marine environment and the principles related to ecological sustainability.

Relationship between the State Sustainability Strategy and the Curriculum Framework

Principles of the Curriculum Framework

The *Curriculum Framework* is underpinned by a set of seven principles (*Curriculum Framework*, p. 16-17) that are supportive of the development of learning programs about sustainability. These include:

1. **An encompassing view of curriculum.** This principle acknowledges that curriculum is dynamic and includes all learning experiences provided for the students.
2. **Explicit acknowledgment of core values**. These values are articulated in the Overarching and the Learning Area outcomes. In particular, cluster 5 of the values is about environmental responsibility;
3. **Inclusivity**. This principle ensures the recognition of and the valuing of understandings and knowledge of different groups. In the context of ecological sustainability this means valuing the perspectives of groups such as small and large business, community members, conservation and environmentalists;
4. **Flexibility of curriculum**. The curriculum is to be adaptable to the particular needs of different schools and communities, responsive to technological change and meet students' needs arising from that change process, and encourage effective use of new technologies as tools for learning;
5. **Integration, breadth and balance**. Effective education enables students to make connections between ideas, people and things, and to relate local, national and global events and phenomena;
6. **A developmental approach**. Students develop at different rates and in different ways. The *Curriculum Framework* provides clear directions for student learning while accommodating the different needs of different students; and
7. **Collaboration and partnerships**. Recognition that education is the shared responsibility of students, teachers, parents, tertiary educators and the community. Thus the development of collaborative learning programs with community groups to enable student achievement of the intended outcomes is being recognised.

Learning outcomes in the Curriculum Framework

In the *Curriculum Framework* several outcomes can best be achieved through the development of concepts and skills about sustainability. These outcomes place an emphasis on students learning local, national, and global perspectives of the issues. In addition the outcomes support implementation of policies and practices that are sustainable and recognise the need for solutions to be in line with long-term social and economic change and the need for international cooperation as identified in the *Focus on the Future* paper.

While it is possible to take an ecological sustainability perspective and develop it through any learning program there are outcomes that explicitly state that understandings about ecological sustainability are part of the achievement of that outcome. In the *Curriculum Framework* this will be through student achievement of Overarching outcomes, a range of Learning Area Outcomes and through the core shared values that are embedded in these outcomes.

1. Overarching outcomes

The *Curriculum Framework* includes a set of 13 Overarching Outcomes that develop as a result of the total curriculum that students experience through their schooling. Student achievement of these outcomes can be contributed to through learning experiences in a range of learning areas. For example, the sustainability principle related to conservation of biological diversity and ecological integrity may be developed through the following overarching outcomes:

Overarching outcome 6: EXPLORING IDEAS, OPPORTUNITES AND SOLUTIONS

> 'Students visualise consequences, think laterally, recognise opportunity and potential and are prepared to test options.' (*Curriculum Framework*, p. 23)

Achievements of this outcome involves students investigating alternatives, visualising consequences and implications, and show a willingness to change direction when necessary. This may be done in the context of identifying alternative, viable solutions to a local environmental problem.

Overarching outcome 7: *USING SCIENTIFIC UNDERSTANDINGS*

> 'Students understand and appreciate the physical, biological, and technological world and have the knowledge, skills and values to make decisions in relation to it'. (*Curriculum Framework,* p. 23)

Achievement of this outcome involves students showing concern for the environment, understanding the consequence of choices in using the natural resources and environment and having the knowledge and skills to look after both. They understand that the connection of Aboriginal people to the environment is profoundly significant to their identity and well-being. In particular, student achievement of outcomes in the Health and Physical Education, Science, Society & Environment and Technology and Enterprises learning areas also improves student learning of this overarching outcome.

2. Learning Area specific outcomes

Specific learning area outcomes (Science, Society & Environment, and Technology and Enterprise) place an emphasis on students learning local, national, and global perspectives. In addition, these outcomes support implementation of policies and practices that are sustainable and recognise the need for solutions to be in line with long-term social and economic change and the need for international cooperation as identified in the *Focus on the Future* paper. In particular, student learning principles, practices and values of ecological sustainability are developed in the following Learning Area outcomes:

Science Learning Area Outcomes

The Definition and Rationale section of the Science Learning Area Statement (*Curriculum Framework*, p. 218-219) introduction to outcomes explicates the importance of an ecologically sustainable future and the role played by science education in schools. It is explained that knowledge of science enables people to value the systems and processes that support life on earth. It helps us assess which technological developments and science research can improve the quality of life and develops students' critical thinking skills so they can debate sensitive, ethical and environmental issues. This has the potential to help students protect and encourage an ecologically sustainable environment and future, and provide them with opportunities for responsible decision making in their local, national and global environments.

OUTCOME 7. ENERGY AND CHANGE

Students understand the scientific concept of energy and explain that energy is vital to our existence and to our quality of life. As students progress in their understanding of energy and change they learn about energy sources – both renewable and non-renewable, forms of energy and the effects it has on materials. They learn about energy conservation and degradation and the impact of energy production and distribution on the environment.

In the early childhood years, students investigate sources and effects of energy to learn about the changes it can cause in objects. For example, they investigate the effect of the sun's energy on ice blocks. During middle childhood, students investigate different forms of energy to learn how it is transferred and transformed in simple devices such as a torch or an electromagnet. For example, they construct and use a solar oven to cook food. In the early adolescent years, students develop and apply models to explain energy transfer to investigate the changes it produces in materials. For example, they measure the efficiency of an energy converter such as a solar (photovoltaic) cell. Students studying Physics in the late adolescent years learn about the structure of materials and mechanisms of energy transformation to investigate the properties of materials. For example, they investigate the variation of output voltage of a photoelectric cell with frequency and intensity of light.

OUTCOME 6. EARTH AND BEYOND

Students develop their understanding of the role that the physical environment on Earth and our position in the universe impacts on the way we live and life on earth. They find that the sustainability of life depends on the quality of air and availability of other resources and the wise use of resources and that there are processes of slow change in our environments.

In the early childhood phase children actively construct their knowledge and understanding of the world through concrete experiences. For example, they understand that the sun provides light and, when it is not present they need to turn on lights to see. In the middle childhood phase, children progress in their understanding as they classify and link concepts. For example, they examine the effects of light and soil fertility on the growth of plants. In early adolescence students want to understand the world and how it affects them. They progress in their understanding of scientific models and concepts. For example they may explain the concept of the water cycle and understand that the supply of fresh water in the global system is finite. In late adolescence students develop sophisticated explanations for science concepts. For example, they assess how scientists generate scientific evidence about environmental issues like the enhanced Greenhouse Effect, photochemical smog or the effect of landcare programs.

OUTCOME 8. LIFE AND LIVING

Students progress in their understanding of key environmental ideas such as the interdependence of all living things, the differences and relationships between living and non-living and that changing one aspect of the environment will affect organisms. They develop understandings of structures and processes at a microscopic level and the equilibrium present in systems. This helps them understand the impact of changing environments on the organism, populations and ecosystems. Students also critically examine the place of humans in ecosystems and how to act with compassion and care to sustain these systems.

In the early childhood phase, children are keen explorers of the environment, learn through direct experiences and ask questions such as 'Do insects drink water?' During middle childhood children explore the wider environment from small to large and, through field trips for example, make links to their knowledge and experiences. They might, for example, examine the biodegradability of waste materials and effects of wastes on habitats. In early adolescence students develop concerns about wider issues and use scientific concepts to explain phenomena. For example, they recognize that a sustainable environment supports a variety of living things and these are interdependent. In late adolescence, students are adept at developing sophisticated explanations and linking theoretical ideas with scientific applications, such as, the importance of biodiversity in maintaining adaptability, continuity and change in living things and identification of special relationships between living organisms.

OUTCOME 4. ACTING RESPONSIBLY

Students make decisions that include ethical consideration of the impact of the processes and likely products of science on people and the environment. They evaluate solutions from a scientific point of view and consider what action they might take.

OUTCOME 1. INVESTIGATING

Students investigate to answer questions about the natural and technological world using reflection and analysis to prepare a plan, to collect, process and interpret data, to communicate conclusions and to evaluate their plan, procedures and findings. Their exploration of the environment often involves them in use of equipment or organisms and, therefore central to their investigation are issues of safety and ethical practice, which they must address. Investigations can demonstrate the principles of ecological sustainability in all concept areas of science.

Society and Environment Learning Area Outcomes

The Definition and Rationale section of the Society & Environment Learning Area Statement (*Curriculum Framework*, p. 250 –251) identifies the importance of developing understandings of how people interact with each other and their environment and manage resources. These understandings are developed through processes of social inquiry, environmental appraisal, ethical analysis and the skills to constructively critique various perspectives from the past and present context. Students are encouraged to apply their understandings and skills in their own lives, in developing environmental consciousness and, social competence and civic responsibility.

OUTCOME 1. INVESTIGATION, COMMUNICATION AND PARTICIPATION

Children plan investigations by asking questions about their society and environment. Through the process of investigation students develop understandings about place and space, resources, culture, time, continuity, change, natural and social systems. The understandings, skills and values developed

are used when participating in school life and as citizens in society. They understand that investigating is an ethical process.

At ever increasing levels of sophistication children conduct their investigations by identifying sources of information and collecting, collating and organising information from a range of sources. They translate and interpret this information by distinguishing between fact and opinion and by judging its credibility and relevance. They formulate conclusions and decide best how to communicate them. This communication may be in the form of social action. They predict consequences, identify issues, and personal implications. They ask: 'So why is this important to me?'

OUTCOME 2. PLACE AND SPACE

Students develop understandings about natural and built environments. The relationships or interdependence between people and places are investigated. Students recognise the importance of caring for landscapes and their features. They apply principles embedded in the concept of ecological sustainability to describe ways in which natural landscapes can be managed appropriately.

When young children in the early childhood phase of schooling investigate their local environment they learn that they need to care for different places and why they need to follow rules about caring for plants and animals. In the middle childhood years, they investigate the natural landscapes and environment; identifying issues of how different environments are cared for in the context of varied economic, recreation, preservation and community uses. In early adolescence they investigate how different values affect the ways in which groups and individuals act to sustain the environment and justify their views on issues related to caring for places. In late adolescence they use their understanding of ecological sustainability to evaluate various management practices with respect to natural and built landscapes and to make judgements about their effectiveness while formulating strategies in matters concerning care of the environment demonstrating a commitment to environmental stewardship.

OUTCOME 3. RESOURCES

When developing understandings about resources children understand that as people strive to satisfy unlimited needs and wants, there is increasing pressure on the available resources.

The Resources outcome further contributes to students' understandings about the need for sustainability and how their responsibilities as consumers of limited and renewable resources impacts on environmental, economic and social goals. Students understand how enterprise and management may lead to optimal use of resources; for example, how innovations such as improved farm technology impacts on both agricultural outputs and the environment.

OUTCOME 6. NATURAL AND SOCIAL SYSTEMS

As young children investigate natural systems they learn the environment has natural and built features. They learn that all living things are connected and that to impact on one element is to impact on all. In middle childhood they learn how the elements of natural systems are connected to form flows and cycles, for example, the water cycle, food chains. In early adolescence they build on their earlier understandings gathering information on local, national and global environmental issues to stimulate planning decisions and to debate alternative solutions. Students in early adolescence apply models and theories through the study of geography, economics and political and legal studies to enhance understandings of how systems operate in a variety of contexts. They apply principles of ecological sustainability to assess various policies and management practise for the care of natural systems. As their understandings about natural systems are developed so are their understandings about both economic and political systems are developed. They begin to see how these systems are interconnected and decisions made in any system may impact on one or both of the other systems.

OUTCOME 7. ACTIVE CITIZENSHIP

The Active Citizenship outcome is about students demonstrating 'behaviours and practices in the school environment, in accordance with principles and values associated with the democratic process, social justice and ecological sustainability' (***Curriculum Framework***, p. 261). Thus this outcome emphasises the behaviours associated with improving decision making related to community issues. Students act in equitable ways to ensure the present and future quality of life. They develop strategies to ensure the sustainable use of natural resources and the maintenance of healthy natural cycles; the

importance of biodiversity and the integrity of living species; and the preservation, conservation and enhancement of our natural and cultural heritage.

Technology and Enterprise Learning Area outcome

The Definition and Rationale section of the Technology and Enterprise learning Area Statement (*Curriculum Framework*, p. 290-291) identifies that when seeking solutions students adapt and develop technologies that make efficient use of resources, and are effective in managing social and environmental impacts. They understand the social, economic, political, cultural and environmental issues surrounding the use, development and disposal of technology.

OUTCOME 7. TECHNOLOGY IN SOCIETY

When developing technologies, students make decisions that ensure that what they are developing is ecologically sustainable and that is does meet the needs of all stakeholders. While they consider the economic advantage of what they develop, they are aware that technological developments have consequences for individuals and groups at local, national and international levels.

In early childhood, young children begin to understand that resources and materials are limited and that they should be shared and used appropriately. They understand, for example, the importance of re-using materials and disposing of products in appropriate ways to minimise harm to the environment. Older children, in middle childhood, are more aware of the effects that developing and using technologies can have outside their immediate environment. For example, they consider the advantages and disadvantages of types of energy used, by-products, operation and disposal of products. In creating technologies they consider and select materials that will suit their purpose and that have minimal impact on environments.

In early adolescence students consider types and costs of resources and the environmental impacts of these on communities. When developing technologies they form reasoned arguments related to ethical and practical issues. For example, they critically examine the social and environmental impacts and consequences of the use of a wide range of materials and identify unexpected and harmful impacts associated with their use.

In late adolescence there is an emphasis on ethical behaviour. Students consider ethical implications of proposals for developing and/or using technologies. They recognize that technologies are not value neutral and are aware of the potential and extent of destructive impacts of technologies, taking these into account when considering suggestions for developing, for example, recycling systems and subsystems. They understand the need to consider the interplay between technological developments, society and the environment at the local, national and international levels.

Details of these outcomes are found in Attachment 1 and are also available on the Curriculum Council website at www.curriculum.wa.edu.au.

3. Curriculum Framework principle - Explicit acknowledgment of core values

The core-shared values are articulated and embedded in the learning outcomes, especially the outcomes outlined above, of the *Curriculum Framework.* These core values are divided into 5 clusters. The fifth cluster identifies the commitment to environmental responsibility. It states:

> 'The commitment to developing an appreciative awareness of the interdependence of all elements of the environment, including humans and human systems, and encouraging a respect and concern for Australia's natural and cultural heritage and for forms of resource use that are regenerative and sustainable.'

This cluster is divided into 4 values, namely:

5.1 Cultural heritage;
5.2 Conservation of the environment;
5.3 Sustainable development; and
5.4 Diversity of species.

Details of these values are found in Attachment 2 and are also available on the Curriculum Council website at www.curriculum.wa.edu.au.

Collaboration and partnerships with community agencies

The flexibility of the *Curriculum Framework* has enabled a range of community agencies to become involved in curriculum development and for others to change their programs to link to the outcomes in the *Curriculum Framework.* Several of these groups, including a range of government departments, have identified the values and emphasis on sustainability in the *Curriculum Framework* and have included this in their curriculum programs.

The flexibility of the curriculum and the need to link to local areas has enabled a range of programs to be developed within the context of students achieving *Curriculum Framework* outcomes. When collaborating with community agencies the secretariat of the Curriculum Council emphasise the shift to student achievement that focuses on caring for the environment in the context of maximising our resources. The emphasis on active learning and social action in the *Curriculum Framework* has strong links to programs that are currently in schools such as:

- *Ribbons of Blue* (River and Waters Commission); and
- *Water wise schools program* (Water Corporation).

Other agencies have developed programs through the provision of curriculum packages that include links to the *Curriculum Framework.* Examples of these include:

- *Growing Better* (Cooperative Bulk Handling); and
- education programs such as that of the Chamber of Minerals and Energy.

CONCLUSION

It is hoped that through this submission an understanding of the framework that guides curriculum development in Western Australia has been provided. Strategies implemented through the *Focus on the Future consultation paper* will be most effective if they align with this framework. In addition, educational strategies developed need to recognise the key and differing roles of the following groups in Western Australian education: the Curriculum Council; Department of Education (DOE); Catholic Education Office (CEO); and Association of Independent Schools of WA (AISWA).

The implementation of the *Curriculum Framework* supports student achievement of learning outcomes in line with the focus on sustainability outlined in the *Focus on the Future consultation paper*. Curriculum development requires writers and teachers to be kept current in areas, such as, the nature of educational programs that are in place, along with issues and solutions that are being identified at local, national and international levels. Key curriculum players need to keep informed of the latest research, practices and programs that are suitable for use in learning programs.

Key questions (*Focus on the Future*, Consultation paper Box 1)

1. *Is sustainability a worthwhile pursuit?*
   The consultation processes used in the development of the *Curriculum Framework* identified teaching and learning about sustainability as important for all students in Western Australia. This is reflected in the development of the *Curriculum Framework* and the recommendations for courses of study through the post-compulsory review.
2. *What best practices exist?*
   Each education system and sector is responsible for the curriculum development in its schools and the identification of best practice would require the collection of information from individual schools through their relevant body. The best practices are recognised through different awards; for example, Department of Education schools compete in the 'Quest for Excellence Awards' where the Citizenship Award category tends to be exemplified in schools through sustainable practices by students being good citizens and stewards of the environment. Best practice exists where schools are developing outcomes with a strong sustainability focus.
3. *In your experience what opportunities exist to pursue sustainability*?
   The curriculum must be adaptable to the particular needs of different schools and communities. It must also be responsive to social and technological change and meet students' needs arising from that change process' (*Curriculum Framework*, p. 17) All schools are free to develop a range of practices that suit the needs of their local school, shire or region. It is through focusing on the achievement of the outcomes in the *Curriculum Framework* that opportunities exist to pursue learning programs that develop students' understandings, skills and values of ecological sustainability.
4. *What benefits could flow if sustainability was taken more seriously?*
   Better education about ecological sustainability for students from kindergarten to year 12 will inform students and facilitate greater adoption of sustainable principles across all levels of society. Where government policy supports students' learning it enables students to identify the links between classroom learning and actively participating in society.

Different perspectives (*Focus on the Future,* Consultation paper Box 2, key questions)

Education authorities
The strategy developed needs to be consistent with the *Curriculum Framework* and inclusive of education systems/sectors of this state to inform programs that schools may develop.

Schools
Many schools have established relevant learning programs incorporating sustainability principles and practices. The sustainability strategy needs to include these programs in acknowledgment of best practice.

thus valuing student involvement at a local level and showing how this impacts on the wider community. Collaboration between schools and community groups need to be included in strategy development.

Attachment 1. *Curriculum Framework* OUTCOMES

This attachment (pp. 12–20) includes extracts from the *Curriculum Framework*. In particular the extracts give the full text for the Overarching and specific Learning Area outcomes referred to in the main body of the submission.

Overarching Learning Outcome 6
EXPLORING IDEAS, OPPORTUNITIES AND SOLUTIONS

6. Students visualise consequences, think laterally, recognise opportunity and potential and are prepared to test options.

In approaching issues and problems, students think laterally, offer possibilities, explore and evaluate new ideas, and generate a range of positions and solutions. They are often stimulated by curiosity and see opportunity and potential in developing and extending ideas, including those based on intuition, insight or speculation. They investigate alternatives, visualise consequences and implications and are willing to change direction when necessary: for example, students may apply their language knowledge in unfamiliar contexts; collaborate to solve a mathematical problem in an unorthodox way; identify alternative solutions to a local environmental problem; visualise their future beyond school and explore work opportunities; experiment with the ingredients in a recipe; or develop and market their own products, such as novelties for festivals or celebrations.

Overarching Learning Outcome 7
USING SCIENTIFIC UNDERSTANDINGS

7. Students understand and appreciate the physical, biological and technological world and have the knowledge, skills and values to make decisions in relation to it.

Students have the confidence, knowledge and skills to satisfy questions about the workings of the physical, biological and technological world and recognise that cultural preconceptions influence their understanding. They are able and willing to participate in community debate and decision making and can make informed decisions about sustainable development and its impact on people and the environment. They show concern for the environment, understand the consequences of choices in using natural resources and the environment, and have the knowledge and skills to look after both. Students understand that the connection of Aboriginal people to the environment is profoundly significant to their identity and well-being. They devise solutions to problems arising from their own needs and have methods for testing the validity of their observations and assumptions in relation to the natural and built worlds: for example, students may pose questions about the habitat of an animal; experiment with mixing colours to find out what happens with various combinations; investigate the causes of water salinity; recognise the consequence of reducing wetlands in the urban environment; investigate housing designs which minimise energy use; or use landscapes for inspiration in the arts.

Society and Environment Learning Outcomes

INVESTIGATION, COMMUNICATION AND PARTICIPATION (Society and Environment)

1. Students investigate the ways people interact with each other and with their environments in order to make informed decisions and implement relevant social action.

Students investigate aspects of time, place, culture, resources and systems to understand and act on important issues in their social and environmental world. In these investigations, they use skills of critical inquiry and ethical decision making in order to become better-informed, active citizens.

questions or formulating hypotheses. They clarify the purpose of their inquiry to determine what is relevant and important, and they predict some possible answers. They design suitable methods for organising and gathering information from a variety of sources, including familiar objects and experiences, fieldwork and research involving primary and secondary source data.

Students conduct their investigations by identifying sources of information, and use a range of techniques, such as summarising and note-making skills, to collect, organise and evaluate information. They question their sources of information by comparing the sources, identifying bias and ensuring that they consider perspectives in a balanced way. Students record their information in a variety of forms, such as in the spoken or written word, or through the use of symbols, graphs, maps, diagrams, tables, statistics and models. They also question whether the information collected is sufficient and appropriate to the investigation.

Using the information they have collected, students translate and interpret it into a form that has meaning to them and which describes as accurately as possible the focus of their investigation: for example, social and natural features, events, actions or processes. They might use forms such as drawing a picture, making a summary, constructing a table or creating a database. They are then able to analyse the information by distinguishing between fact and opinion, and by judging the credibility and relevance of the information. Because of the variable nature of information and evidence collected, students recognise that interpretations will be subjective and need to be applied with some caution.

Students synthesise information by identifying relationships such as cause and effect, patterns, trends and similarities and differences. They endeavour to empathise with the motives and beliefs of people.

Students then formulate their conclusions and judgments and decide how best to communicate them. They share and communicate their findings according to purpose and audience: for example, a study of an environmental issue might result in an official report, a press release, a journal article or a talk.

Students then predict consequences and identify issues and questions arising from their conclusions and suggest areas in need of more evidence or investigation. They actively apply their learning to other relevant situations and contexts. They identify personal implications of their actions, and the immediate and future implications for society and environment.

As a consequence of being involved in the process of investigation and communication, students develop the capacity to participate effectively in small groups, whole-school activities and in the community.

In dealing with a variety of information derived from cultural and natural phenomena, students recognise that any views formed will be tentative. They will seek to constantly test the integrity of information, recognise the perspectives of all stakeholders and modify conclusions and action where appropriate.

PLACE AND SPACE (Society and Environment)

2. Students understand that the interaction people have with places in which they live is shaped by the location, patterns and processes associated with natural and built features.

Students develop an understanding of the components of the natural landscape and the various processes that contribute to the development of natural landscapes around the world. These components include flora, fauna, physical features (e.g. mountains, coasts, rivers) and soil. The types of processes shaping natural landscapes include those that form and modify the earth, especially climate, as well as the ongoing influence of human activity.

Students also understand that today's natural landscapes are a result of the interplay of these processes over long periods of time and that the pattern of natural landscapes varies on local, regional and global scales.

Students recognise that built landscapes are the result of activities by groups of people over time. Examples of built landscapes include settlements, agriculture and mining. Some of the features of built landscapes include buildings, industrial activity, transport links, dams and open space.

Students will also recognise that built landscapes, like natural landscapes, will vary in their characteristics on local, regional and global scales.

Through an examination of natural and built landscapes students recognise that there is a relationship or interdependence between people and places. They understand that natural landscapes can be modified by human activities such as clearing forests, reclaiming rivers and levelling hills.

Similarly, the activities of people will be influenced by aspects of the natural landscape. Examples include the effect of slope on transport networks and settlement, the influence of soil on agriculture and the impact of climate on the lives of people and the economy. Through study of local and global examples, students demonstrate that this interdependence will vary for different peoples and natural landscapes, and will be subject to change over time.

Students constantly recognise the importance of caring for landscapes and their features. They apply principles embedded in the concept of ecological sustainability to describe ways in which natural landscapes can be managed appropriately.

RESOURCES (Society and Environment)

3. Students understand that people attempt to meet their needs and wants by making optimum use of limited resources in enterprising ways.

Students recognise that all people need food, water, shelter, health and education. In addition, needs and wants may include communication, transport, clothing and home comforts.

They understand that, as people strive to satisfy unlimited needs and wants, there is increasing pressure on the available resources. This usually necessitates prioritising and making choices: for example, students manage simple budgets, prioritise their work and leisure time, and coordinate team and group activities. Students refer to a range of examples from local, regional, national and global contexts to demonstrate how these needs and wants are met in different ways.

Students recognise that resources can be classified broadly as land (natural resources such as forests, crops, fertile soil), labour (human resources), capital (human-made resources such as machinery, cars, transport routes) and enterprise (risk taking and organisational skills).

They understand the importance of markets in meeting needs through the exchange of goods and services. Market forces help to determine the value that is placed upon resources and the unequal distribution of wealth that may result. Students identify the unequal distribution of resources among people and how this has led to patterns of relative wealth and poverty over the earth. They evaluate these patterns and the policies that may be responsible for them, and make judgments about the unequal distribution of these resources. They also consider options for a fairer distribution of the world's resources and their responsibilities as consumers of limited resources.

Students understand how enterprise and management may lead to optimal use of resources: for example, the impact of technology on people's work and efficiency, how fertilisers and improved farm technology increase agricultural outputs, and how recycling techniques affect minerals production. Students understand that enterprise refers to the various organisational and management practices as well as to the technology adopted by people.

Students further recognise that enterprise and management models vary according to a range of factors, including culture, history and economic system, and this leads to variations in how resources are valued and used.

Students understand the role of workers. They recognise that different occupations bring various skills and competencies to the workplace and this contributes to productivity in many ways.

Students understand how occupational and structural changes in the workplace have impacted on the skills and competencies required of workers and on the nature of work itself, which encompasses full-time, part-time, paid and unpaid labour, and unemployment. They relate this to worldwide trends and how this

students are able to describe the features of various occupational groups and identify pathways or careers that may match their areas of interest.

Attachment 1. *Curriculum Framework* OUTCOMES (continued)

NATURAL AND SOCIAL SYSTEMS (Society and Environment)

6. Students understand that systems provide order to the dynamic natural and social relationships occurring in the world.

Students identify and describe the elements of natural systems such as soil, vegetation, landforms, water and fauna. They recognise how these elements can be combined to produce distinctive systems such as communities, ecosystems and natural cycles (e.g. air, nitrogen, water). They come to understand the processes that enable these systems to operate and the factors that lead to equilibrium or balance within these systems, e.g. sustainable food chains. They recognise natural and human factors such as floods, fire, earthquakes, over-grazing, soil depletion and deforestation which contribute to an imbalance in the system. Students are then able to describe how equilibrium is reestablished in systems. They further describe how people can act to sustain these systems. The study of these systems will vary from local contexts (e.g. small wetlands) through to global contexts (e.g. tropical rainforests).

Students recognise that a number of social systems that exist vary both in their function (e.g. political, legal, economic) and scale (e.g. family unit, national, community, global): for example, power and decision making structures may be defined in political and legal systems. Students understand that the creation of rules and laws is necessary to ensure civic rights and associated responsibilities. They further understand that where rights are infringed and responsibilities are not met, consequences are evident. They recognise that these systems vary in accordance with social contexts (e.g. autocratic, communist and democratic systems). Students describe the structures that underpin these systems and how they adapt to ensure adherence to civic rights and responsibilities.

Students also identify ways in which people influence the structures.

Students understand that economic systems (past and present) help to determine what goods and services will be produced, how much, how and for whom, in attempting to satisfy peoples' needs and wants with limited resources. Examples of parts of economic systems in Australia that could be studied range from the local store to the national economy. Using a range of such examples, students understand the role played by the forces of supply and demand and by governments in the operation of economic systems. Examples might include taxes and exchange rates and the resultant effects on the supply and demand of goods and services.

A study of operations of a local market or food store might enable students to understand how a system operates and how it is connected to other systems and economies: for example, the provision of fresh produce from a local food store might be affected by supply in other agricultural regions and demand from consumers, including those from other regions and countries. Students are therefore able to identify that economic systems adapt to the changing needs and wants of people.

Examples of such adaptations may include changes in the price and quality of goods, the reduction in the importance of cash as a means of exchange and the movement towards part-time employment in the Australian economy.

Attachment 1. *Curriculum Framework* OUTCOMES (continued)

ACTIVE CITIZENSHIP (Society and Environment)

7. Students demonstrate active citizenship through their behaviours and practices in the school environment, in accordance with the principles and values associated with the democratic process, social justice and ecological sustainability.

The behaviours and practices students display as active citizens reflect their commitment to the values and principles associated with the democratic process, social justice and ecological sustainability. This process of active citizenship is the basis for students to formulate, guide and critically review responsible social and environmental action.

Students critically analyse their heritages and traditions, institutions and organisations. Through this analysis, they demonstrate behaviours consistent with the values associated with the democratic process, such as acknowledging individual freedom and the rights and responsibilities of participating in a democracy; respect for the law and for legitimate and just authority; respect for different choices, viewpoints and ways of living; and ethical behaviour and equitable participation in decision making.

Students critically analyse heritages and traditions of social justice and human rights, and policies and practices related to discrimination and disadvantage. Through this analysis they demonstrate behaviours consistent with the values associated with social justice, such as a respect and concern for the welfare, contribution, rights and dignity of all people; empathy with people of different belief systems and cultural groups; fairness and equity in dealing with people; and redressing disadvantage and changing discriminatory and violent practices.

Students critically analyse their environmental heritage. Through this analysis they demonstrate values consistent with the values associated with ecological sustainability. Students act in equitable ways to ensure the present and future quality of life. They develop strategies to ensure the sustainable use of natural resources and the maintenance of healthy natural cycles; the importance of biodiversity and the integrity of all living species; and the preservation, conservation and enhancement of our natural and cultural heritage.

Students investigate interactions in their everyday world and make decisions from which they identify ways of acting in a socially and environmentally responsible manner. They develop skills of democratic social action, such as organising and working in school and community groups, writing letters, lobbying and representing interests. They develop action strategies and skills in social contexts such as displaying appropriate behaviour, manners and courtesies, accepting leadership roles and participating effectively in group activities. They display initiative and enterprise in these actions and thereby develop further their personal and interpersonal skills: for example, by putting forward original ideas, participating in student and school decision-making processes and demonstrating leadership qualities. Students develop skills of democratic and social action, such as organising and working in school and community groups, participating in community service and volunteer activities, writing letters, lobbying and representing interests.

Attachment 1. *Curriculum Framework* OUTCOMES (continued)

Science Learning Outcomes

INVESTIGATING (Science)

1. Students investigate to answer questions about the natural and technological world using reflection and analysis to prepare a plan; to collect, process and interpret data; to communicate conclusions; and to evaluate their plan, procedures and findings.

Students plan investigations using a variety of processes that may involve exploring ideas and materials; reflecting on their knowledge and experience; reviewing background information; thinking laterally; discussing ideas; clarifying purposes; identifying variables; making predictions and educated guesses that lead to research questions or hypotheses; and inventing feasible, valid and accurate strategies for investigation.

Students collect data by obtaining suitable materials and equipment; designing and building equipment and tools where necessary; choosing suitable measurement methods; and sequencing procedures effectively. Students may use scientific instruments, audio-visual equipment and computers for collecting, organising, interpreting and representing data. They take care to ensure that measurements and observations are accurate, sufficient and relevant, and that the process of data collection does not harm other people, animals or the environment. Students ensure that investigations are conducted safely and ethically, while working individually and in cooperative teams in group investigations.

Students process data by recording and classifying information in organised and logical ways, using quantification and calculation where necessary; searching for patterns in results; and constructing graphical and symbolic representations. They draw conclusions by linking new and old understandings; adjusting personal and established theories and models; constructing explanations and solutions; and proposing further investigations.

Students review and evaluate their investigations and the implications of their data as an integral part of the science inquiry process. They challenge their own beliefs and ways of doing things by reflecting on their investigations; questioning personal or received ideas and solutions; revising and adding to their questions in the light of new evidence; and identifying issues and converting them into questions that the practice of science can seek to answer.

ACTING RESPONSIBLY (Science)

4. Students make decisions that include ethical consideration of the impact of the processes and likely products of science on people and the environment.

Students think and act carefully and with concern about the ways science is used in their home, school and the broader community. They consider the positive and negative personal, social, economic, technological, cultural, political and environmental implications of scientific knowledge and how it is used. They recognise that risks and uncertainties arise from processes and products of science that impact on people, their human rights, their cultures and the environment. Students discuss the scientific aspects of and form reasoned judgements about issues ranging from, for instance, the recycling of drink containers to the aggressive advertising of infant formulas in developing countries. They consider what, if any, action they might take.

Students critically analyse the impact on their local environment of human activities such as the use of fire, urban development, farming, mining and tourism. They acknowledge human responsibility for the effects of science and make responsible decisions about their own use of science and its products: for

make a list of possible solutions to the problem of killing the weeds. They evaluate the solutions from a scientific point of view and decide to remove the weeds by hand and compost them rather than use a herbicide.

EARTH AND BEYOND (Science)

6. Students understand how the physical environment on Earth and its position in the universe impact on the way we live.

Students know that the sustainability of life depends on the quality of the air and the availability of water and materials from the ground, and they use these resources wisely. They recognise and interpret weather patterns and describe how the weather affects them and their environment. They might demonstrate this by devising methods to measure and record wind, cloud cover, rain and temperature over a week and relate weather conditions to the clothes they wear and the activities they undertake. They explain how and why weather patterns are monitored and used to make forecasts and predict events such as droughts and cyclones.

Students recognise that humans have made use of the earth's materials according to properties of these materials: for example, they might describe how wet sand makes better sandcastles than does dry sand; explain why adding humus to a sandy soil makes plants grow better; suggest why chert is preferred to sandstone for the manufacture of stone tools; or discuss how the nature and variety of archaeological artefacts can be used to deduce how past civilisations lived and worked in their environment.

Students understand that the earth's resources are finite and argue the importance of conserving and replacing them: for example, they identify and take steps to remedy water wastage in their home or school by detecting leaky taps, monitoring the placement of sprinklers, describing water consumption in their community (taking into account seasonal variation and the nature of the water supply) or creating an effective plan to monitor community water use.

Students understand that the earth is composed of materials that are altered by forces within it and on its surface. They describe the processes of weathering, erosion and tides and how such physical processes affect the landscape. They give examples of erosion in their local area, such as in river beds, sand dunes or salt lakes, and evaluate the success of steps taken to remedy its effects.

Students identify some common minerals, describe the origin of rocks and give examples of common rock types and how they are used. They use a map showing the location of earthquakes and volcanoes to identify the position of tectonic plate margins and describe the processes happening. Students understand how the geological occurrence and properties of an ore are related to how it is mined. They recognise the impact of mining on the physical environment and suggest ways in which the area can be rehabilitated: for example, students explain why topsoil is removed and stored during bauxite mining and replaced to begin rehabilitation.

Students recognise the relationship between the earth, our solar system and the universe. They know that the moon, sun and other stars appear to move relative to the earth and that these movements correspond to the pattern of day and night, the seasons and the behaviour of living things: for example, students name the stars, moon and sun and realise that the sun is linked with daylight and the moon and stars with night time. Alternatively, they measure the length of the shadow of a stick at intervals during the day and relate the results to the relative position of the sun. Students might construct a "lunar log" of the moon's position and appearance over a month and use the relative positions of the sun, moon and earth to interpret their results.

Students describe how changing ideas and theories about the nature and origin of the universe are interwoven with the changing cultures of different civilisations and societies. They contrast the ideas and beliefs held by people of different cultures, and in earlier times, about the importance of the sun and examine how these beliefs affected people's daily lives. Students use their knowledge of theories about conditions on other worlds and the origin of life on the earth to speculate about the possibilities of life in other parts of the universe.

Attachment 1. *Curriculum Framework* OUTCOMES (continued)

ENERGY AND CHANGE (Science)

7. Students understand the scientific concept of energy and explain that energy is vital to our existence and to our quality of life.

Students define the scientific concept of energy, give examples of energy sources and describe patterns of energy use around the home and in the community. They recognise change as something that involves the transfer of energy, such as being warmed by heat from the sun or hearing the sound of wind in the leaves. From their investigations they learn that some human activities require more energy than others.

Students understand and apply their knowledge about a range of concepts associated with energy, such as current and static electricity; the principles of machines; the nature of light, sound and magnetism; the nature of collisions; and the processes of heating and cooling. They relate different forms of energy (such as kinetic, potential, thermal, electrical, chemical and nuclear) to physical, chemical and biological change and interaction: for example, they suggest ways to cool down on a hot day or describe how energy in the form of X-rays is used in medicine and industry and explain the care and safety aspects involved.

Students know that energy has renewable and non-renewable sources, and that there are social issues involved in its production and use. They estimate the economic and ecological cost of using different energy sources and plan energy-saving practices in the home, school or community: for example, they might prepare a timeline showing how various energy sources have been used for activities such as transport in a particular society and examine the shortcomings and benefits of those sources to that society.

Students understand that energy can be transferred from one form into another, and that change involves the transfer of energy. They realise that the same source of energy can be used for different purposes: for example, electricity from a battery can be used to make a toy move, a radio produce sound or a torch give out light. They describe how objects such as electric toasters, mouse-traps and apples act as both receivers and sources of energy. Students use a scientific model to explain the transfer of heat in solids, liquids and gases or the process of magnetising a piece of iron.

They consider the concepts of force, work and power in terms of energy transfer. They apply the principles of energy transfer, conservation and efficiency to sequences of interaction, such as the generation of heat from fuel or the output of light from an incandescent bulb: for example, they use the principle of conservation of energy to calculate the efficiency of a kettle or describe the energy changes in a roller-coaster or a pendulum clock and explain the apparent loss of energy in these systems.

LIFE AND LIVING (Science)

8. Students understand their own biology and that of other living things, and recognise the interdependence of life.

Students understand the interdependence of all living things in an environment and can explain how changing one aspect of the environment will affect other organisms. They understand the concept of an ecosystem. Using an ecosystem they have studied, such as a terrarium in the classroom, an aquarium in the home, a park or a paddock, students describe the variety of relationships that exist between the organisms. They also consider the influence of physical conditions such as light, moisture and temperature on the ecosystem. They use diagrams and other means to model the flow of energy and the cycling of matter within an ecosystem. They predict the consequences of change in an unfamiliar ecosystem on the population and distribution of the organisms within it.

Students understand the relationship between structure and function in living things and use that as a basis for understanding life-maintaining processes. They identify the characteristics of living and non-living things. They recognise themselves as living things and give examples of their needs and the characteristics that identify them as living. They classify plants and animals into major groups by describing similarities and differences.

Students describe how living things function as whole organisms and explain the relationship between structure and function in systems, organs, tissues and cells: for example, they describe how different animals move in different ways and relate movement to the shape and function of body parts. They recognise different types of plant cells in microscope slides and suggest what their function might be. Students understand physiological processes such as digestion, respiration, circulation, homeostasis, excretion and movement. They know about the effects of disease and how to maintain a healthy lifestyle.

Students can describe how organisms grow and reproduce, and understand how they change over generations. They understand the concept of life cycle and describe some examples for plants and animals. They link reproduction with the inheritance of characteristics, by, for example, recognising that living things grow to resemble their parents. They differentiate between learned and inherited characteristics and use scientific models and theories to give reasons for these things.

Students recognise that a sustainable environment supports a variety of living things and understand the importance of biodiversity in maintaining adaptability, continuity and change in living things. They realise the significance of particular characteristics in relation to survival, adaptation and extinction. They give examples of special relationships between living things, such as the structure of lichen, mistletoe and the mistletoe bird, and how galls form on trees. Students critically examine the place of humans in ecosystems and discuss how to act with compassion and care to sustain these systems. They recognise the ways that humans have changed their local environments and identify some changes as beneficial and others as detrimental for themselves and other organisms.

Students consider theories of evolution and the evidence for them: for example, they examine fossils found on a field trip or a visit to a museum, and find out ways in which they are similar to and different from today's organisms and suggest reasons for the differences. Students consider the ethical implications of humans controlling reproduction, altering genes and changing the lifestyles of other organisms, and can take an informed position in debate about these issues.

Technology and Enterprise Learning Outcome

TECHNOLOGY IN SOCIETY

7. Students understand how cultural beliefs, values and ethical positions are interconnected in the development and use of technology and enterprise.

When exploring the potential of technology and enterprise, students identify and take into account the cultural beliefs, value systems, abilities and ethical positions that affect the development and use of technologies. They examine and develop their own beliefs, values and attitudes, while also using their understanding of those held by individuals, families, groups and society. They account for these and their interconnectedness when making decisions that ensure solutions are ecologically sustainable and meet the needs of all stakeholders.

Students are aware that technological developments inevitably have consequences. They evaluate the appropriateness of technologies on ethical and moral grounds, as well as considering economic advantage and the suitability of products, processes, systems, services and environments for individuals and groups at local, national and international levels. They understand that suitability may be affected by the beliefs and abilities of individuals, or the cultures and values of groups within society.

Students may, for example, discuss reasons why particular groups in the community may wear certain types of clothing and assess the implications for designers; examine issues concerning 'plastic money' in society; analyse how fast-food advertising may influence family values and household expenditure; or simulate a recycling program to predict effects on the environment and waste disposal processes.

ATTACHMENT 2 - *Curriculum Framework* VALUES

This attachment outlines the core shared values that are embedded in the outcomes. The agreed values have been created through a process of consensus and wide consultation. Systems, sectors and schools may add to this minimum set or interpret and promote values in relation to their particular school ethos or mission statement. (*Curriculum Framework*, p. 8)

As explicit acknowledgement of core shared values is one of the principles of the *Curriculum Framework*, the integration of these values will enhance the learning opportunities within school communities. Students are assisted in developing these values through discussion and modelling as part of the learning and teaching processes within the school environment. These core values are divided into 5 clusters.

The five clusters of values are:

1. A PURSUIT OF KNOWLEDGE AND A COMMITMENT TO ACHIEVEMENT OF POTENTIAL
2. SELF ACCEPTANCE AND RESPECT OF SELF
3. RESPECT AND CONCERN FOR OTHERS AND THEIR RIGHTS
4. SOCIAL AND CIVIC RESPONSIBILITY
5. ENVIRONMENTAL RESPONSIBILITY

The fifth cluster identifies the commitment to environmental responsibility. It is further broken into four core values as identified below.

5.	ENVIRONMENTAL RESPONSIBILITY
	The commitment to developing an appreciative awareness of the interdependence of all elements of the environment, including humans and human systems, and encouraging a respect and concern for Australia's natural and cultural heritage and for forms of resource use that are regenerative and sustainable.
5.1	**Cultural heritage:** The cultural heritage of Australia, including Aboriginal sacred and archaeological cultural heritage, should be respected and maintained.
5.2	**Conservation of the environment:** The management of the environment should take into account the need to preserve its diversity and balance for the future.
5.3	**Sustainable development:** There is a need to continue to develop natural resources to sustain human life. This should be done in a way consistent with long-term ecological sustainability and rehabilitation practices.
5.4	**Diversity of species:** Each person should recognise a need to preserve native habitats and arrest the extinction of presently-surviving native species.

Attachment 3 - SUBMISSION CONTRIBUTORS

This submission was prepared in consultation with the following people:

Mark Brown	A/Director of Curriculum
Kerry Boyd (writer)	Curriculum Officer (Society and Environment)
Andrew Thompson	Curriculum Officer (Policy)
Graham Baker	A/Manager (Science/Health and Physical Education)
Maria Tsovleas	Curriculum Officer (Technology and Enterprise)
Rod Beresford	Manager (Mathematics and Post-compulsory Review)